



Widespread Retail Availability and In-Store Marketing of E-Cigarettes in London: Potential to Undermine Recent Tobacco Control Gains? An observational study

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Title: Widespread Retail Availability and In-Store Marketing of E-Cigarettes in London: Potential to Undermine Recent Tobacco Control Gains? An observational study.

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ABSTRACT

Objectives

E-cigarettes have recently gained attention in the medical community as devices which can potentially help smokers cut down on smoking or quit. The purpose of the study was to determine the availability, promotion, and relationship with area deprivation of e-cigarettes in London, U.K. stores selling tobacco and alcohol.

Design

Observational study.

Setting

Small and large stores selling alcohol and tobacco in London, U.K.

Primary and secondary outcome measures

Number of stores selling e-cigarettes, number of stores with an interior or exterior advertisement, number of stores with a point-of-sale movable display, store size, deprivation index score for store's corresponding lower super output area (LSOA)

Results

108 audits were completed in 128 stores. 62 of these stores (57%) sold e-cigarettes. E-cigarette availability was not related to store type based on size, but there was a trend towards increased availability in more deprived areas ($p = 0.069$). 31 out of the 62 stores (50%) had a point-of-sale movable display, with all but one found in small stores. Small stores had more interior and exterior advertisements than did large stores, but not a significant difference.

Conclusions

The availability and promotion of e-cigarettes was high, confirming recent trends in increasing e-cigarette consumer awareness and use. Encouraging the use of e-cigarettes could potentially

reverse tobacco control progress by cueing smoking in current or former smokers and desensitizing youth to the concept of smoking. With this in mind, the trend towards greater availability in more deprived areas could prevent smoking disparities from shrinking.

ARTICLE SUMMARY

Article focus

- What is the availability, promotion, and relationship with area deprivation of e-cigarettes in London, U.K. stores selling tobacco and alcohol?

Key messages

- There is a high availability of e-cigarettes in small and large stores in the UK, confirming recent growth in e-cigarette use and consumer awareness.
- E-cigarette promotion at the point-of-sale is prevalent in small stores.
- E-cigarettes could have potentially negative social and behavioural consequences by re-normalising smoking behaviours and serving as cues for cigarette smoking.

Strengths and limitations

- This is the first empirical study to observe the availability and promotion of e-cigarettes in the U.K. We used best practices in data collection by physically enumerating tobacco and alcohol retailers (since there is no tobacco licensing in the U.K.) and using a mobile data collection system to reduce errors.
- However, this study's sampling of only stores selling both alcohol and tobacco may have underestimated the true availability of e-cigarettes. The low statistical power overall makes it difficult to come to a definitive conclusion about the relationship between e-cigarette availability and area deprivation.

INTRODUCTION

While consumption of conventional cigarettes has decreased in the U.S. and U.K. [1, 2] in recent years, awareness and use of electronic cigarettes (referred to as e-cigarettes in this paper) have increased greatly in the last few years in the U.S. and U.K [3, 4]. E-cigarettes are cigarette-shaped devices that heat a solution of tobacco-derived nicotine and other chemicals to form a vapour that is inhaled by the user. Existing studies on e-cigarette users show that a majority of them try e-cigarettes as a way to quit smoking, reduce smoking, or satisfy smoking urges in places where smoking is prohibited [4-6]. These trends in e-cigarette use and the rise of e-cigarettes have drawn a mixed [7, 8] but mostly positive reaction [9-12] from the public health community, based on the belief that e-cigarettes can reduce harm and potentially act as cessation aids. A recent study showed that e-cigarettes had a smoking cessation effectiveness matching that of nicotine patches [13]; however, the only published longitudinal study to examine variation in quit success between e-cigarette users and non-users showed no differences, which supports e-cigarettes as a potential facilitator for dual use [5]. The U.S. Food and Drug Administration has expressed concerns over e-cigarettes' safety and effectiveness as cessation devices [14] and has stated a desire to assert jurisdiction over current non-regulated tobacco products by October 2013 [15]. Recently, the U.K. Medicines and Healthcare Products Regulatory Agency (MHRA) released its decision to regulate e-cigarettes as medicines in 2016 [16]. Yet little is known about the social and behavioural consequences of e-cigarette availability and marketing. These pervasive new cues that potentially promote tobacco use are important in a country like the U.K., which has successfully banned point-of-sale tobacco advertising in small and large stores, as well as tobacco displays in large stores, with large stores defined as those greater than 280 square meters [17]. In this paper, we present findings of the

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2
3 first store audit of e-cigarettes in the U.K. Our primary aim is to describe the availability of e-
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5 cigarettes and their promotion in stores. Our secondary aim is to describe the associations
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7 between e-cigarette availability and neighbourhood deprivation.
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10 **METHODS**

11 **Setting**

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13 The data presented here were collected as a part of an observational point-of-sale audit of
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15 the sales and marketing of tobacco products and alcoholic beverages in London, U.K. stores
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17 selling both products. Data collection took place over three weeks in June and July of 2013.
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20 **Sampling**

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22 Multistage area-based sampling was used. First, eighteen middle super output areas
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24 (MSOAs—composed of multiple lower super output areas (LSOA) that are a collection of output
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26 areas, geographic areas of similar populations and social homogeneity created from clusters of
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28 adjacent postcodes) [18, 19] were selected in which to collect data, with probability of selection
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30 proportionate to population size. Given that England lacks tobacco retailer licensing, we walked
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32 each street of each output area by foot to generate a list of tobacco and alcohol retailers. 128
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34 stores, 116 small and 12 large, were identified through this process.
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40 **Data Collection**

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42 Data collectors used a web-based store audit software on a 3G-cellular-enabled Apple
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44 iPad Mini™. Audits took place primarily between 09.00 and 19.00 hours. Upon entering a
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46 store, the data collector introduced him or herself (RH or AEM) and briefly explained the study
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48 to a clerk or manager in the store.
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52 **Measures**

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54 Availability and Promotion
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Our audit tool included dichotomous measures for whether stores sold e-cigarettes, promoted them with interior or exterior advertisements, or featured a movable display. Point-of-sale movable displays are branded structures that combine advertising with product presentation. They are commonly found at the cash register and are made of plastic or cardboard. See Figure 1 for an example of a point-of-sale movable display and Figure 2 for an example of an advertisement.

Neighbourhood Deprivation

We used store postcodes to identify the corresponding lower super output area (LSOA) deprivation index score based on the 2010 English Indices of Multiple Deprivation [20], with higher scores indicating higher levels of deprivation. We divided our data based on the quartiles for the entire set of deprivation scores.

Size

We classified stores into two categories: small ($< 280 \text{ m}^2$) and large ($\geq 280 \text{ m}^2$). We were interested in differences in e-cigarette availability and marketing possibly resulting from the tobacco display ban in large stores. E-cigarettes, which are not considered tobacco products in the U.K., could be an attractive product to large stores by allowing them to continue drawing revenue from smokers since their display and marketing is not restricted. Stores of an ambiguous size were measured using a laser-measuring device.

Data Analysis

Descriptive statistics were computed to characterize e-cigarette availability and promotion. Chi-square tests were used to examine associations between the following: neighbourhood deprivation and e-cigarette availability; store size and e-cigarette availability; store size and the presence of point-of-sale movable displays; and store size and the presence of

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3 advertisements. Data analyses were performed in SPSS (version 21.0, IBM Corp., Armonk, NY,
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5 USA).
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7 8 **RESULTS**

9 10 **Description of Sample**

11 We attempted audits in each of the 128 identified stores, of which 108 audits were
12 completed (96 small and 12 large). Twenty audits were incomplete due to store refusals (n = 18)
13 or stores being closed (n = 2), giving an 84% (108/128) completion rate. The audited stores
14 spanned areas of low and high deprivation (4.43 to 64.32) (mean 28.70 (SD 12.30)) but on
15 average were in areas of higher deprivation than for England as a whole (mean 21.67 (SD
16 12.35)). (Two stores were excluded from this analysis because their postcodes did not yield
17 corresponding LSOA deprivation index scores.) Ten of the twelve large stores were part of
18 chains (e.g., Tesco, Sainsbury's), while nearly all of the small stores appeared to be
19 independently-owned.
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34 **E-Cigarette Availability**

35 Overall, 62 of the 108 stores sold e-cigarettes (57%): 53 of the 96 small stores (55%) and
36 9 of the 12 large stores (75%). The distribution of e-cigarette sales in small and large stores was
37 not significantly different (X^2 2.490, df=1, p=0.115). There was a trend towards stores located in
38 higher quartiles of deprivation to be selling e-cigarettes (X^2 7.103, df=3, p=0.069).
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46 **E-Cigarette Promotion**

47 31 of the 62 stores selling e-cigarettes had a point-of-sale movable display (50%) with all
48 but one of these being in small stores. Small stores were more likely to have a point-of-sale
49 movable display (X^2 6.369, df=1, p=0.012) than were large stores. Two stores had an interior
50 advertisement (2% (2/62)), and eight stores had an exterior advertisement (15% (8/62)), with
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3 none of these being in large stores. However, there was no significant difference between small
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5 and large stores for the presence of advertisements (X^2 1.560, $df=1$, $p=0.212$).
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8 **DISCUSSION**

9 **Summary of Key Findings**

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11 Our results show a high availability of e-cigarettes in small and large stores, with an
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13 overall availability of 57% (95% CI: 48%, 67%) in our study sample. This is significantly higher
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15 than the 34% rate found in a 2012 national study conducted in the only other audit of e-cigarette
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17 availability, conducted in the U.S.A (Rose et al. 2013, manuscript in preparation). Given the
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19 recent increased investment in e-cigarettes by the tobacco industry [21, 22], a continued growth
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21 in the high observed e-cigarette availability is to be expected. Small stores had a noteworthy
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23 amount of e-cigarette marketing in the form of point-of-sale movable displays but not
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25 advertisements. Many of these point-of-sale movable displays engaged consumers directly by
26
27 inviting them to try the product (see Figure 1). We also noticed after beginning data collection
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29 that some small and large stores had e-cigarette brochures available at the point-of-sale, which
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31 can be included as a measure of the presence of marketing materials in future studies. In contrast
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33 to the U.S.A study which found that e-cigarettes were more prevalent in areas with higher
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35 household incomes, we found a trend towards higher availability in more deprived
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37 neighbourhoods. Given that existing studies on e-cigarette user profiles show that nearly all ever-
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39 users are existing or former cigarette smokers [4, 23], we speculate that this trend reflects the
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41 higher rate of smoking in more deprived areas [24]. Furthermore, the cost-effectiveness of e-
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43 cigarettes compared to conventional cigarettes, as emphasized in observed marketing materials,
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45 could make them more attractive to smokers in more deprived areas. Because we only sampled
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47 an urban area of higher than average deprivation, this may explain the opposite trend we found
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3 compared to the much larger U.S.A study, which sampled urban, suburban, and rural areas.
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5 Another possibility is that the size of the area used to analyse neighbourhood socioeconomic
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7 status differed between the two studies: the U.S.A study used census tracts, which are considered
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9 to be similar to middle super output areas. However, deprivation index data is only available at
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11 the lower super output area level; a middle super output area comprises multiple lower super
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13 output areas.
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16 17 **Strengths and Limitations of the Current Study**

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19 Our study has two key strengths. First, it is the first empirical study on e-cigarette
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21 availability and promotion in the U.K. Second, we used best practices in data collection
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23 including physically enumerating tobacco and alcohol retailers and using a mobile data
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25 collection system on a tablet device, a recent trend in point-of-sale audits [25, 26, 27]. Potential
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27 advantages of a mobile data collection system include making the data collector less conspicuous
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29 compared to using a clipboard, the ability to take photos, and reducing data entry errors.
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34 The limitations of the study can be attributed to the nature of our sampling. With low
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36 statistical power, especially in large stores, it is difficult to come to a firm conclusion about the
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38 association between e-cigarette availability and neighbourhood deprivation, as well as
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40 differences in the availability and marketing of e-cigarettes in small and large stores. We only
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42 sampled an urban area and audited retailers selling both tobacco and alcohol, so our results
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44 cannot be generalised to the U.K. and for all types of retailers, but they do provide a foundation
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46 for further research in this area.
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50 51 **IMPLICATIONS & CONCLUSIONS**

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53 A larger study is needed to estimate more precisely the availability of e-cigarettes and
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55 their marketing in the U.K and elsewhere. This could also elucidate the association between
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4 neighbourhood deprivation and e-cigarette availability. Furthermore, more detailed aspects of e-
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6 cigarette marketing, such as pricing, advertisement size, message appeals, imagery, and brands
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8 can be collected. Brands marketed by tobacco companies could provide insight into whether
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10 tobacco companies might be using e-cigarettes to re-normalise tobacco smoking. Nonetheless,
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12 our current study raises concerns about the relatively high and growing amount of e-cigarette
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14 sales and marketing. Contributing to this as well are increasing levels of e-cigarette coverage in
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16 U.K. newspapers, which tends to include more positive themes of e-cigarettes, such as getting
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18 around smoke-free legislation, causing less harm to the user, and being more affordable than
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20 conventional cigarettes [28]. Assessing the full range of benefits and harms of rising e-cigarette
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22 use requires wider considerations than hitherto, to ascertain the impact of it on non-users
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24 (tobacco smokers, tobacco smokers trying to quit, non-smokers, and youth), as well as e-
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26 cigarette users, to estimate the nature and scale of unintended consequences of the increasing
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28 presence of e-cigarettes and their marketing. Findings from tobacco research show that smoking
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30 paraphernalia [29] and point-of-sale marketing can cue cravings [30], making it difficult for
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32 smokers to quit or causing former smokers to relapse. It is therefore possible that e-cigarette use
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34 and its marketing could cue tobacco smoking in current or former smokers given that the
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36 appearance of e-cigarettes and associated behaviours are remarkably similar to those of
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38 cigarettes. The desire for e-cigarette users to use e-cigarettes to satisfy nicotine cravings in
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40 smoking-restricted areas [4-6] could also have negative behavioural effects on youth and non-
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42 smokers by normalising smoking-related behaviours. If e-cigarettes are truly more available in
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44 more deprived areas, as suggested by our data, smoking disparities between the wealthy and poor
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46 may only persist with the increasing popularity of e-cigarettes, reversing progress towards
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48 narrowing the gap. With investment from major tobacco companies flowing into e-cigarettes
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[21, 22], it is possible to expect products to appear that are targeted at children and young adults (e.g., extensive flavouring, eye-catching and colourful packaging). Whether child or young adult use of e-cigarettes leads to smoking initiation is unknown but is a possibility. Apart from the concerns we have raised, others have commented on the potential for dual use [7] and e-cigarette product safety, standardisation, and quality [7, 8].

Even if e-cigarettes are proven to provide a safe delivery mechanism for nicotine, become standardised in terms of design and quality, do not facilitate dual use, and are an effective cessation aid, the renewed and increasing presence of cigarette-like objects, images, and behaviours in public places still has the potential to prolong the demise of cigarette smoking. After years of work to de-normalise smoking behaviours, could e-cigarettes be the Trojan horse through which years of work by tobacco control advocates are undone [7]?

Figure Legend:

Figure 1: Point-of-sale movable display that invites store customers to sample the e-cigarette by providing disposable plastic covers to put over the tip.

Figure 2: An example of an exterior e-cigarette advertisement.

Contributors and Sources

AEM, KMR, and TMM designed the study. AEM and KMR provided the data collection software. AEM and RH collected data, and RH conducted data analysis. TMM had the idea for the paper. RH drafted the paper, with AEM, KMR, and TMM contributing to subsequent drafts. All authors approved the final manuscript. TMM is the guarantor.

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23
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25
26 authors and not necessarily those of the funders.
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31 **Competing Interests**

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33 KMR and AEM have developed the Counter Tobacco Store Audit Center data collection system
34
35 used in this study and a Store Mapper tobacco retailer mapping system (not used in this study).
36
37 Both will generate royalties when licensed. KMR and AEM receive compensation as the
38
39 Executive Director and Deputy Director, respectively, of Counter Tools, a nonprofit organization
40
41 with the mission to disseminate the Store Audit Center and the Store Mapper, and associated
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43 training and technical assistance to communities addressing point of sale tobacco control issues.
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48 **Data Sharing Statement**

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50 No additional data are available.
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Point-of-sale movable display that invites store customers to sample the e-cigarette by providing disposable plastic covers to put over the tip
84x102mm (72 x 72 DPI)

Review only



An example of an exterior e-cigarette advertisement
84x112mm (72 x 72 DPI)

review only

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An Observational Study of Retail Availability and In-Store Marketing of E-Cigarettes in London: Potential to Undermine Recent Tobacco Control Gains?

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4 London: Potential to Undermine Recent Tobacco Control Gains?
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36 industry, tobacco control policy
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ABSTRACT

Objectives

E-cigarette companies and vendors claim the potential of e-cigarettes to help smokers reduce or quit tobacco use. E-cigarettes also have the potential to re-normalise smoking. The purpose of this study was to describe the availability and in-store marketing of e-cigarettes in London, UK stores selling tobacco and alcohol.

Design

Observational study.

Setting

Small and large stores selling alcohol and tobacco in London, U.K.

Primary and secondary outcome measures

Number of stores selling e-cigarettes, number of stores with an interior or exterior e-cigarette advertisement, number of stores with an e-cigarette point-of-sale movable display, store size, deprivation index score for store's corresponding lower super output area (LSOA)

Results

Audits were completed in 108 of 128 selected stores. Sixty-two of the audited stores (57%) sold e-cigarettes. E-cigarette availability was unrelated to store size. There was a statistically non-significant trend towards increased availability in more deprived areas ($p = 0.069$). Thirty-one out of the 62 stores (50%) selling e-cigarettes had a point-of-sale movable display, with all but one found in small stores. Two small stores had interior advertisements and eight had exterior advertisements. No advertisements were observed in large stores.

Conclusions

This audit revealed widespread availability of e-cigarettes and in-store marketing in London. Even if e-cigarettes prove to be an effective cessation aid, their sale and use is resulting in an increasing public presence of cigarette-like images and smoking behaviour. After decades of work to de-normalise smoking these findings raise the question of whether e-cigarettes are re-normalising smoking.

ARTICLE SUMMARY

Article focus

- What is the availability and in-store marketing of e-cigarettes in London, U.K. stores selling tobacco and alcohol?

Key messages

- E-cigarettes are readily available in small and large stores in the UK, confirming recent growth in e-cigarette use and consumer awareness.
- E-cigarette promotion at the point-of-sale is prevalent in small stores.
- E-cigarettes could have potentially negative social and behavioural consequences by re-normalising smoking and serving as cues for cigarette smoking.

Strengths and limitations

- This is the first empirical study to observe the availability and in-store marketing of e-cigarettes in the U.K. We used standard methods to improve accuracy by physically enumerating tobacco and alcohol retailers in the field (since there is no tobacco licensing in England) and using a mobile data collection system. However, this study's sampling of only stores selling both alcohol and tobacco may have underestimated the true

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3 availability of e-cigarettes. The low statistical power also makes it difficult to assess the
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5 association between e-cigarette availability and area deprivation reliably.
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10 INTRODUCTION

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12 While consumption of conventional cigarettes has decreased in the U.S. and U.K. [1, 2]
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14 in recent years, awareness and use of electronic cigarettes (referred to as e-cigarettes in this
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16 paper) have increased greatly in the last few years in the U.S. and U.K [3, 4]. E-cigarettes are
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18 cigarette-shaped devices that heat a solution of tobacco-derived nicotine and other chemicals to
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20 form a vapour that is inhaled by the user. Existing studies on e-cigarette users show that a
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22 majority of them try e-cigarettes as a way to quit smoking, reduce smoking, or satisfy smoking
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24 urges in places where smoking is prohibited [4-6]. These trends in e-cigarette use and the rise of
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26 e-cigarettes have drawn a mixed [7, 8] but generally positive reaction [9-12] from the public
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28 health community, based on the belief that e-cigarettes might be less harmful than combusted
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30 tobacco products and may potentially aid cessation. A recent longitudinal study showed that
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32 smokers had similar abstinence rates using e-cigarettes and nicotine patches for quitting [13];
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34 however, another longitudinal study examining variation in quit success between e-cigarette
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36 users and non-users showed no differences, which supports e-cigarettes as a potential facilitator
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38 for dual use [5]. The U.S. Food and Drug Administration has expressed concerns over e-
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40 cigarettes' safety and effectiveness as cessation devices [14] and has stated a desire to assert
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42 jurisdiction over currently non-regulated tobacco products by October 2013 [15]. In the summer
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44 of 2013, the U.K. Medicines and Healthcare Products Regulatory Agency (MHRA) released its
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46 decision to regulate e-cigarettes as medicines in 2016 [16]. Yet little is known about the social
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48 and behavioural consequences of e-cigarette availability and marketing. These pervasive new
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3 cues that potentially promote tobacco use are important in a country like the U.K., which has
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5 successfully banned point-of-sale tobacco advertising in small and large stores, as well as
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7 tobacco displays in large stores, with large stores defined as those greater than 280 square meters
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9 [17]. In this paper, we present findings of the first store audit of e-cigarettes in the U.K. Our
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11 primary aim is to describe the availability of e-cigarettes and their promotion in stores. Our
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13 secondary aim is to describe the associations between e-cigarette availability and neighbourhood
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15 deprivation.
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20 21 22 **METHODS**

23 24 **Setting**

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26 The data presented here were collected as a part of an observational point-of-sale audit of
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28 the sales and marketing of tobacco products and alcoholic beverages in London, U.K. stores
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30 selling both products. Data collection took place over three weeks in June and July of 2013.
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34 35 **Sampling**

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37 Multistage area-based sampling was used. First, eighteen middle super output areas
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39 (MSOAs) were selected with the probability of selection proportionate to population size. These
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41 MSOAs were composed of multiple lower super output areas (LSOAs), which are a collection of
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43 geographic areas of similar populations and social homogeneity created from clusters of adjacent
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45 postcodes [18, 19]. Given England lacks tobacco retailer licensing, we walked each street of
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47 each output area by foot to generate a list of all retailers selling both tobacco and alcohol. 128
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49 stores, 116 small and 12 large, were identified through this process.
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Data Collection

Data collectors conducted store audits using web-based software on a 3G-cellular-enabled Apple iPad Mini™. Audits took place primarily between 09.00 and 19.00 hours. Upon entering a store, the data collector introduced him or herself (RH or AEM) and briefly explained the study to a clerk or manager in the store.

Measures

Availability and Promotion

Our audit tool included dichotomous measures for whether stores sold e-cigarettes, promoted them with interior or exterior advertisements, or featured a movable display. Point-of-sale movable displays are branded structures that combine advertising with product presentation. They are commonly found at the cash register and are made of plastic or cardboard. See Figure 1 for an example of a point-of-sale movable display and Figure 2 for an example of an advertisement.

Neighbourhood Deprivation

We used store postcodes to identify the corresponding lower super output area (LSOA) deprivation index score based on the 2010 English Indices of Multiple Deprivation [20], with higher scores indicating higher levels of deprivation. We divided our data based on the quartiles for the entire set of deprivation scores.

Size

We classified stores into two categories: small ($< 280 \text{ m}^2$) and large ($\geq 280 \text{ m}^2$). We were interested in differences in e-cigarette availability and marketing possibly resulting from the tobacco display ban in large stores. E-cigarettes, which are not considered tobacco products in the U.K., could be an attractive product to large stores by allowing them to continue drawing

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3 revenue from smokers since their display and marketing are not restricted. Stores of an
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5 ambiguous size were measured using a laser-measuring device.
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8 **Data Analysis**

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10 Descriptive statistics were computed to characterize e-cigarette availability and
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12 promotion. Chi-square tests were used to examine associations between the following:
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14 neighbourhood deprivation and e-cigarette availability; store size and e-cigarette availability;
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16 store size and the presence of point-of-sale movable displays; and store size and the presence of
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18 advertisements. Data analyses were performed in SPSS (version 21.0, IBM Corp., Armonk, NY,
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20 USA).
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27 **RESULTS**

28 **Description of Sample**

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30 We attempted audits in each of the 128 identified stores, of which 108 audits were
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32 completed (96 small and 12 large). Twenty audits were incomplete due to store refusals (n = 18)
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34 or stores being closed (n = 2), giving an 84% (108/128) completion rate. The audited stores
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36 spanned areas of low and high deprivation (4.43 to 64.32) (mean 28.70 (SD 12.30)) but on
37
38 average were in areas of higher deprivation than for England as a whole (mean 21.67 (SD
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40 12.35)). (Two stores were excluded from this analysis because their postcodes did not yield
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42 corresponding LSOA deprivation index scores.) Ten of the twelve large stores were part of
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44 chains (e.g., Tesco, Sainsbury's), while nearly all of the small stores appeared to be
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46 independently owned.
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E-Cigarette Availability

Overall, 62 of the 108 stores sold e-cigarettes (57%): 53 of the 96 small stores (55%) and 9 of the 12 large stores (75%). The distribution of e-cigarette sales in small and large stores was not significantly different (X^2 2.490, $df=1$, $p=0.115$). There was a statistically non-significant trend towards stores located in higher quartiles of deprivation to be selling e-cigarettes, with 46.9% of stores in the most deprived quartile selling e-cigarettes, compared with 37.5% of stores in the least deprived quartile (X^2 7.103, $df=3$, $p=0.069$).

E-Cigarette Promotion

31 of the 62 stores selling e-cigarettes had a point-of-sale movable display (50%) with all but one of these being in small stores. Small stores were more likely to have a point-of-sale movable display (X^2 6.369, $df=1$, $p=0.012$) than were large stores. Two stores had an interior advertisement (2% (2/62)), and eight stores had an exterior advertisement (15% (8/62)), with none of these being in large stores. However, there was no significant difference between small and large stores in the presence of advertisements (X^2 1.560, $df=1$, $p=0.212$).

DISCUSSION

Summary of Key Findings

Our results show a high availability of e-cigarettes in small and large stores, with an overall availability of 57% (95% CI: 48%, 67%) in our study sample. This is significantly higher than the 34% rate found in a 2012 national study conducted in the only other audit of e-cigarette availability, conducted in the continental U.S.A (Rose et al. 2013, manuscript in preparation). Given the recent increased investment in e-cigarettes by the tobacco industry [21, 22], continued growth in e-cigarette availability is to be expected. Small stores had a noteworthy amount of e-

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3 cigarette marketing materials in the form of point-of-sale movable displays but not
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5 advertisements. Many of these point-of-sale movable displays engaged consumers directly by
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7 inviting them to try the product (see Figure 1). We also noticed after beginning data collection
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9 that some small and large stores had e-cigarette brochures available at the point-of-sale, which
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11 can be included as a measure of the presence of marketing materials in future studies. In contrast
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13 to the U.S.A study, which found that e-cigarettes were more prevalent in areas with higher
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15 household incomes, we found a statistically non-significant trend towards higher availability in
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17 more deprived neighbourhoods. Given that existing studies on e-cigarette user profiles show that
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19 most are existing or former cigarette smokers [4, 23], we speculate that this trend reflects the
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21 higher rate of smoking in more deprived areas [24]. Furthermore, the cost-effectiveness of e-
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23 cigarettes compared to conventional cigarettes, as emphasized in observed marketing materials,
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25 could make them more attractive to smokers in more deprived areas.
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32 **Strengths and Limitations of the Current Study**

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34 Our study has two key strengths. First, it is the first empirical study on e-cigarette
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36 availability and promotion in the U.K. Second, given the field context of our study, we used
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38 standard methods to achieve accurate data collection, including physically enumerating tobacco
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40 and alcohol retailers and using a mobile data collection system on a tablet device, a recent trend
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42 in point-of-sale audits [25, 26, 27]. Potential advantages of a mobile data collection system
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44 include reducing data entry errors, having a single device for data collection that includes taking
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46 photographs, and making the data collector less conspicuous than s/he would be using a
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48 clipboard given the ubiquity of tablet devices.
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53 The limitations of the study can be attributed to the nature of our sampling. With low
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55 statistical power, especially in large stores, it is difficult to come to a firm conclusion about the
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3 association between e-cigarette availability and neighbourhood deprivation, as well as
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5 differences in the availability and marketing of e-cigarettes in small and large stores. We only
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7 sampled an urban area and audited retailers selling both tobacco and alcohol, so our results
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9 cannot be generalised to the U.K. and for all types of retailers. Although the MSOAs of our
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11 audited stores were not completely representative of England, they were diverse, varying in
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13 population density, ethnicity, and household number.
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20 **IMPLICATIONS & CONCLUSIONS**

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22 A larger study is needed to estimate more precisely the availability of e-cigarettes and
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24 their marketing in the U.K and elsewhere. This could also elucidate the association between
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26 neighbourhood deprivation and e-cigarette availability. Furthermore, more detailed aspects of e-
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28 cigarette marketing, such as pricing, advertisement size, message appeals, imagery, and brands
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30 can be collected. Mindful of the limitations in the current study, the results nonetheless raise
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32 concerns about the scale of e-cigarette sales and in-store marketing. Assessing the full range of
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34 benefits and harms of rising e-cigarette use requires consideration of a wider range of the
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36 increasing presence and marketing of e-cigarettes in order to ascertain the impact on non-users
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38 (including tobacco smokers, tobacco smokers trying to quit, non-smokers, and youth), as well as
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40 e-cigarette users. Prior studies show that smoking paraphernalia [29] and point-of-sale
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42 marketing can cue cravings [30], increasing the difficulty for smokers to quit or causing former
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44 smokers to relapse. It is therefore possible that e-cigarette use and its marketing could cue
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46 tobacco smoking in current or former smokers given that the appearance of e-cigarettes and
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48 associated behaviours are remarkably similar to those of cigarettes. The desire for e-cigarette
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50 users to use e-cigarettes to satisfy nicotine cravings in smoking-restricted areas [4-6] could also
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3 have negative behavioural effects on youth and non-smokers by normalising smoking-related
4 behaviours. Whether e-cigarettes are a gateway to smoking initiation is unknown and remains a
5 possibility. If e-cigarettes are truly more available in more deprived areas, as suggested by our
6 data, smoking disparities between the wealthy and poor may only persist with the increasing
7 popularity of e-cigarettes, reversing progress towards narrowing the gap. Apart from the
8 concerns we have raised, others have commented on the potential for dual use [7] and e-cigarette
9 product safety, standardisation, and quality [7, 8].

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11 In summary, even if e-cigarettes are proven to provide a safe delivery mechanism for nicotine
12 and are an effective cessation aid, their sale and use has resulted in a renewed and increasing
13 public presence of cigarette-like objects, images, and smoking behaviour. After decades of work
14 to de-normalise smoking, the question of whether e-cigarettes are re-normalising smoking merits
15 urgent empirical study.
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34 **Figure Legends:**

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36 *Figure 1:* Point-of-sale movable display that invites store customers to sample the e-cigarette by
37 providing disposable plastic covers to put over the tip.

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39 *Figure 2:* An example of an exterior e-cigarette advertisement.

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41 *Figure 3:* Map of the sampled areas in London.
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47 **Contributors and Sources**

48
49 AEM, KMR, and TMM designed the study. AEM and KMR provided the data collection
50 software. AEM and RH collected data, and RH conducted data analysis. TMM had the idea for
51 the paper. RH drafted the paper, with AEM, KMR, and TMM contributing to subsequent drafts.
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56 All authors approved the final manuscript. TMM is the guarantor.
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Competing Interests

RH and TMM have no competing interests. KMR and AEM have developed the Counter Tobacco Store Audit Center data collection system used in this study and a Store Mapper tobacco retailer mapping system (not used in this study). Both will generate royalties when licensed. KMR and AEM receive compensation as the Executive Director and Deputy Director, respectively, of Counter Tools, a non-profit organization with the mission to disseminate the Store Audit Center and the Store Mapper, and associated training and technical assistance to communities addressing point of sale tobacco control issues.

Data Sharing Statement

No additional data are available.

Contributorship statement

AEM, KMR, and TMM designed the study. AEM and KMR provided the data collection software. AEM and RH collected data, and RH conducted data analysis. TMM had the idea for the paper. RH drafted the paper, with AEM, KMR, and TMM contributing to subsequent drafts. All authors approved the final manuscript. TMM is the guarantor.

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3 An Observational Study of Retail Availability and In-Store Marketing of E-Cigarettes in
4 London: Potential to Undermine Recent Tobacco Control Gains?
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ABSTRACT

Objectives

E-cigarette companies and vendors claim the potential of e-cigarettes to help smokers reduce or quit tobacco use. E-cigarettes also have the potential to re-normalise smoking. The purpose of this study was to describe the availability and in-store marketing of e-cigarettes in London, UK stores selling tobacco and alcohol.

Design

Observational study.

Setting

Small and large stores selling alcohol and tobacco in London, U.K.

Primary and secondary outcome measures

Number of stores selling e-cigarettes, number of stores with an interior or exterior e-cigarette advertisement, number of stores with an e-cigarette point-of-sale movable display, store size, deprivation index score for store's corresponding lower super output area (LSOA)

Results

Audits were completed in 108 of 128 selected stores. Sixty-two of the audited stores (57%) sold e-cigarettes. E-cigarette availability was unrelated to store size. There was a statistically non-significant trend towards increased availability in more deprived areas (p = 0.069). Thirty-one out of the 62 stores (50%) selling e-cigarettes had a point-of-sale movable display, with all but one found in small stores. Two small stores had interior advertisements and eight had exterior advertisements. No advertisements were observed in large stores.

Conclusions

This audit revealed widespread availability of e-cigarettes and in-store marketing in London. Even if e-cigarettes prove to be an effective cessation aid, their sale and use is resulting in an increasing public presence of cigarette-like images and smoking behaviour. After decades of work to de-normalise smoking these findings raise the question of whether e-cigarettes are re-normalising smoking.

ARTICLE SUMMARY

Article focus

- What is the availability and in-store marketing of e-cigarettes in London, U.K. stores selling tobacco and alcohol?

Key messages

- E-cigarettes are readily available in small and large stores in the UK, confirming recent growth in e-cigarette use and consumer awareness.
- E-cigarette promotion at the point-of-sale is prevalent in small stores.
- E-cigarettes could have potentially negative social and behavioural consequences by re-normalising smoking and serving as cues for cigarette smoking.

Strengths and limitations

- This is the first empirical study to observe the availability and in-store marketing of e-cigarettes in the U.K. We used standard methods to improve accuracy by physically enumerating tobacco and alcohol retailers in the field (since there is no tobacco licensing in England) and using a mobile data collection system. However, this study's sampling of only stores selling both alcohol and tobacco may have underestimated the true

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3 availability of e-cigarettes. The low statistical power also makes it difficult to assess the
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5 association between e-cigarette availability and area deprivation reliably.
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10 INTRODUCTION

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12 While consumption of conventional cigarettes has decreased in the U.S. and U.K. [1, 2]
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14 in recent years, awareness and use of electronic cigarettes (referred to as e-cigarettes in this
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16 paper) have increased greatly in the last few years in the U.S. and U.K [3, 4]. E-cigarettes are
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18 cigarette-shaped devices that heat a solution of tobacco-derived nicotine and other chemicals to
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20 form a vapour that is inhaled by the user. Existing studies on e-cigarette users show that a
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22 majority of them try e-cigarettes as a way to quit smoking, reduce smoking, or satisfy smoking
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24 urges in places where smoking is prohibited [4-6]. These trends in e-cigarette use and the rise of
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26 e-cigarettes have drawn a mixed [7, 8] but generally positive reaction [9-12] from the public
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28 health community, based on the belief that e-cigarettes might be less harmful than combusted
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30 tobacco products and may potentially aid cessation. A recent longitudinal study showed that
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32 smokers had similar abstinence rates using e-cigarettes and nicotine patches for quitting [13];
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34 however, another longitudinal study examining variation in quit success between e-cigarette
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36 users and non-users showed no differences, which supports e-cigarettes as a potential facilitator
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38 for dual use [5]. The U.S. Food and Drug Administration has expressed concerns over e-
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40 cigarettes' safety and effectiveness as cessation devices [14] and has stated a desire to assert
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42 jurisdiction over currently non-regulated tobacco products by October 2013 [15]. In the summer
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44 of 2013, the U.K. Medicines and Healthcare Products Regulatory Agency (MHRA) released its
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46 decision to regulate e-cigarettes as medicines in 2016 [16]. Yet little is known about the social
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48 and behavioural consequences of e-cigarette availability and marketing. These pervasive new
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3 cues that potentially promote tobacco use are important in a country like the U.K., which has
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5 successfully banned point-of-sale tobacco advertising in small and large stores, as well as
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7 tobacco displays in large stores, with large stores defined as those greater than 280 square meters
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9 [17]. In this paper, we present findings of the first store audit of e-cigarettes in the U.K. Our
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11 primary aim is to describe the availability of e-cigarettes and their promotion in stores. Our
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13 secondary aim is to describe the associations between e-cigarette availability and neighbourhood
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15 deprivation.
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22 METHODS

24 Setting

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27 The data presented here were collected as a part of an observational point-of-sale audit of
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29 the sales and marketing of tobacco products and alcoholic beverages in London, U.K. stores
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31 selling both products. Data collection took place over three weeks in June and July of 2013.
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34 Sampling

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36 Multistage area-based sampling was used. First, eighteen middle super output areas
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38 (MSOAs) were selected with the probability of selection proportionate to population size. These
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40 MSOAs were composed of multiple lower super output areas (LSOAs), which are a collection of
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42 geographic areas of similar populations and social homogeneity created from clusters of adjacent
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44 postcodes [18, 19]. Given England lacks tobacco retailer licensing, we walked each street of
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46 each output area by foot to generate a list of all retailers selling both tobacco and alcohol. 128
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48 stores, 116 small and 12 large, were identified through this process.
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Data Collection

Data collectors conducted store audits using web-based software on a 3G-cellular-enabled Apple iPad Mini™. Audits took place primarily between 09.00 and 19.00 hours. Upon entering a store, the data collector introduced him or herself (RH or AEM) and briefly explained the study to a clerk or manager in the store.

Measures

Availability and Promotion

Our audit tool included dichotomous measures for whether stores sold e-cigarettes, promoted them with interior or exterior advertisements, or featured a movable display. Point-of-sale movable displays are branded structures that combine advertising with product presentation. They are commonly found at the cash register and are made of plastic or cardboard. See Figure 1 for an example of a point-of-sale movable display and Figure 2 for an example of an advertisement.

Neighbourhood Deprivation

We used store postcodes to identify the corresponding lower super output area (LSOA) deprivation index score based on the 2010 English Indices of Multiple Deprivation [20], with higher scores indicating higher levels of deprivation. We divided our data based on the quartiles for the entire set of deprivation scores.

Size

We classified stores into two categories: small ($< 280 \text{ m}^2$) and large ($\geq 280 \text{ m}^2$). We were interested in differences in e-cigarette availability and marketing possibly resulting from the tobacco display ban in large stores. E-cigarettes, which are not considered tobacco products in the U.K., could be an attractive product to large stores by allowing them to continue drawing

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3 revenue from smokers since their display and marketing are not restricted. Stores of an
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5 ambiguous size were measured using a laser-measuring device.
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8 **Data Analysis**

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10 Descriptive statistics were computed to characterize e-cigarette availability and
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12 promotion. Chi-square tests were used to examine associations between the following:
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14 neighbourhood deprivation and e-cigarette availability; store size and e-cigarette availability;
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16 store size and the presence of point-of-sale movable displays; and store size and the presence of
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18 advertisements. Data analyses were performed in SPSS (version 21.0, IBM Corp., Armonk, NY,
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20 USA).
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27 **RESULTS**

28 **Description of Sample**

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30 We attempted audits in each of the 128 identified stores, of which 108 audits were
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32 completed (96 small and 12 large). Twenty audits were incomplete due to store refusals (n = 18)
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34 or stores being closed (n = 2), giving an 84% (108/128) completion rate. The audited stores
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36 spanned areas of low and high deprivation (4.43 to 64.32) (mean 28.70 (SD 12.30)) but on
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38 average were in areas of higher deprivation than for England as a whole (mean 21.67 (SD
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40 12.35)). (Two stores were excluded from this analysis because their postcodes did not yield
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42 corresponding LSOA deprivation index scores.) Ten of the twelve large stores were part of
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44 chains (e.g., Tesco, Sainsbury's), while nearly all of the small stores appeared to be
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46 independently owned.
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E-Cigarette Availability

Overall, 62 of the 108 stores sold e-cigarettes (57%): 53 of the 96 small stores (55%) and 9 of the 12 large stores (75%). The distribution of e-cigarette sales in small and large stores was not significantly different (X^2 2.490, $df=1$, $p=0.115$). There was a statistically non-significant trend towards stores located in higher quartiles of deprivation to be selling e-cigarettes, with 46.9% of stores in the most deprived quartile selling e-cigarettes, compared with 37.5% of stores in the least deprived quartile (X^2 7.103, $df=3$, $p=0.069$).

E-Cigarette Promotion

31 of the 62 stores selling e-cigarettes had a point-of-sale movable display (50%) with all but one of these being in small stores. Small stores were more likely to have a point-of-sale movable display (X^2 6.369, $df=1$, $p=0.012$) than were large stores. Two stores had an interior advertisement (2% (2/62)), and eight stores had an exterior advertisement (15% (8/62)), with none of these being in large stores. However, there was no significant difference between small and large stores in the presence of advertisements (X^2 1.560, $df=1$, $p=0.212$).

DISCUSSION

Summary of Key Findings

Our results show a high availability of e-cigarettes in small and large stores, with an overall availability of 57% (95% CI: 48%, 67%) in our study sample. This is significantly higher than the 34% rate found in a 2012 national study conducted in the only other audit of e-cigarette availability, conducted in the continental U.S.A (Rose et al. 2013, manuscript in preparation).

Given the recent increased investment in e-cigarettes by the tobacco industry [21, 22], continued growth in e-cigarette availability is to be expected. Small stores had a noteworthy amount of e-

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3 cigarette marketing materials in the form of point-of-sale movable displays but not
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5 advertisements. Many of these point-of-sale movable displays engaged consumers directly by
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7 inviting them to try the product (see Figure 1). We also noticed after beginning data collection
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9 that some small and large stores had e-cigarette brochures available at the point-of-sale, which
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11 can be included as a measure of the presence of marketing materials in future studies. In contrast
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13 to the U.S.A study, which found that e-cigarettes were more prevalent in areas with higher
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15 household incomes, we found a statistically non-significant trend towards higher availability in
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17 more deprived neighbourhoods. Given that existing studies on e-cigarette user profiles show that
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19 most are existing or former cigarette smokers [4, 23], we speculate that this trend reflects the
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21 higher rate of smoking in more deprived areas [24]. Furthermore, the cost-effectiveness of e-
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23 cigarettes compared to conventional cigarettes, as emphasized in observed marketing materials,
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25 could make them more attractive to smokers in more deprived areas.
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32 **Strengths and Limitations of the Current Study**

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34 Our study has two key strengths. First, it is the first empirical study on e-cigarette
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36 availability and promotion in the U.K. Second, given the field context of our study, we used
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38 standard methods to achieve accurate data collection, including physically enumerating tobacco
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40 and alcohol retailers and using a mobile data collection system on a tablet device, a recent trend
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42 in point-of-sale audits [25, 26, 27]. Potential advantages of a mobile data collection system
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44 include reducing data entry errors, having a single device for data collection that includes taking
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46 photographs, and making the data collector less conspicuous than s/he would be using a
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48 clipboard given the ubiquity of tablet devices.
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53 The limitations of the study can be attributed to the nature of our sampling. With low
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55 statistical power, especially in large stores, it is difficult to come to a firm conclusion about the
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3 association between e-cigarette availability and neighbourhood deprivation, as well as
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5 differences in the availability and marketing of e-cigarettes in small and large stores. We only
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7 sampled an urban area and audited retailers selling both tobacco and alcohol, so our results
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9 cannot be generalised to the U.K. and for all types of retailers. Although the MSOAs of our
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11 audited stores were not completely representative of England, they were diverse, varying in
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13 population density, ethnicity, and household number.
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18 19 20 **IMPLICATIONS & CONCLUSIONS**

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22 A larger study is needed to estimate more precisely the availability of e-cigarettes and
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24 their marketing in the U.K and elsewhere. This could also elucidate the association between
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26 neighbourhood deprivation and e-cigarette availability. Furthermore, more detailed aspects of e-
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28 cigarette marketing, such as pricing, advertisement size, message appeals, imagery, and brands
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30 can be collected. Mindful of the limitations in the current study, the results nonetheless raise
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32 concerns about the scale of e-cigarette sales and in-store marketing. Assessing the full range of
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34 benefits and harms of rising e-cigarette use requires consideration of a wider range of the
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36 increasing presence and marketing of e-cigarettes in order to ascertain the impact on non-users
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38 (including tobacco smokers, tobacco smokers trying to quit, non-smokers, and youth), as well as
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40 e-cigarette users. Prior studies show that smoking paraphernalia [29] and point-of-sale
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42 marketing can cue cravings [30], increasing the difficulty for smokers to quit or causing former
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44 smokers to relapse. It is therefore possible that e-cigarette use and its marketing could cue
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46 tobacco smoking in current or former smokers given that the appearance of e-cigarettes and
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48 associated behaviours are remarkably similar to those of cigarettes. The desire for e-cigarette
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50 users to use e-cigarettes to satisfy nicotine cravings in smoking-restricted areas [4-6] could also
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3 have negative behavioural effects on youth and non-smokers by normalising smoking-related
4 behaviours. Whether e-cigarettes are a gateway to smoking initiation is unknown and remains a
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have negative behavioural effects on youth and non-smokers by normalising smoking-related behaviours. Whether e-cigarettes are a gateway to smoking initiation is unknown and remains a possibility. If e-cigarettes are truly more available in more deprived areas, as suggested by our data, smoking disparities between the wealthy and poor may only persist with the increasing popularity of e-cigarettes, reversing progress towards narrowing the gap. Apart from the concerns we have raised, others have commented on the potential for dual use [7] and e-cigarette product safety, standardisation, and quality [7, 8].

In summary, even if e-cigarettes are proven to provide a safe delivery mechanism for nicotine and are an effective cessation aid, their sale and use has resulted in a renewed and increasing public presence of cigarette-like objects, images, and smoking behaviour. After decades of work to de-normalise smoking, the question of whether e-cigarettes are re-normalising smoking merits urgent empirical study.

Figure Legends:

Figure 1: Point-of-sale movable display that invites store customers to sample the e-cigarette by providing disposable plastic covers to put over the tip.

Figure 2: An example of an exterior e-cigarette advertisement.

Figure 3: Map of the sampled areas in London.

Contributors and Sources

AEM, KMR, and TMM designed the study. AEM and KMR provided the data collection software. AEM and RH collected data, and RH conducted data analysis. TMM had the idea for the paper. RH drafted the paper, with AEM, KMR, and TMM contributing to subsequent drafts.

All authors approved the final manuscript. TMM is the guarantor.

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Competing Interests

RH and TMM have no competing interests. KMR and AEM have developed the Counter Tobacco Store Audit Center data collection system used in this study and a Store Mapper tobacco retailer mapping system (not used in this study). Both will generate royalties when licensed. KMR and AEM receive compensation as the Executive Director and Deputy Director, respectively, of Counter Tools, a non-profit organization with the mission to disseminate the Store Audit Center and the Store Mapper, and associated training and technical assistance to communities addressing point of sale tobacco control issues.

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Data Sharing Statement

No additional data are available.

For peer review only

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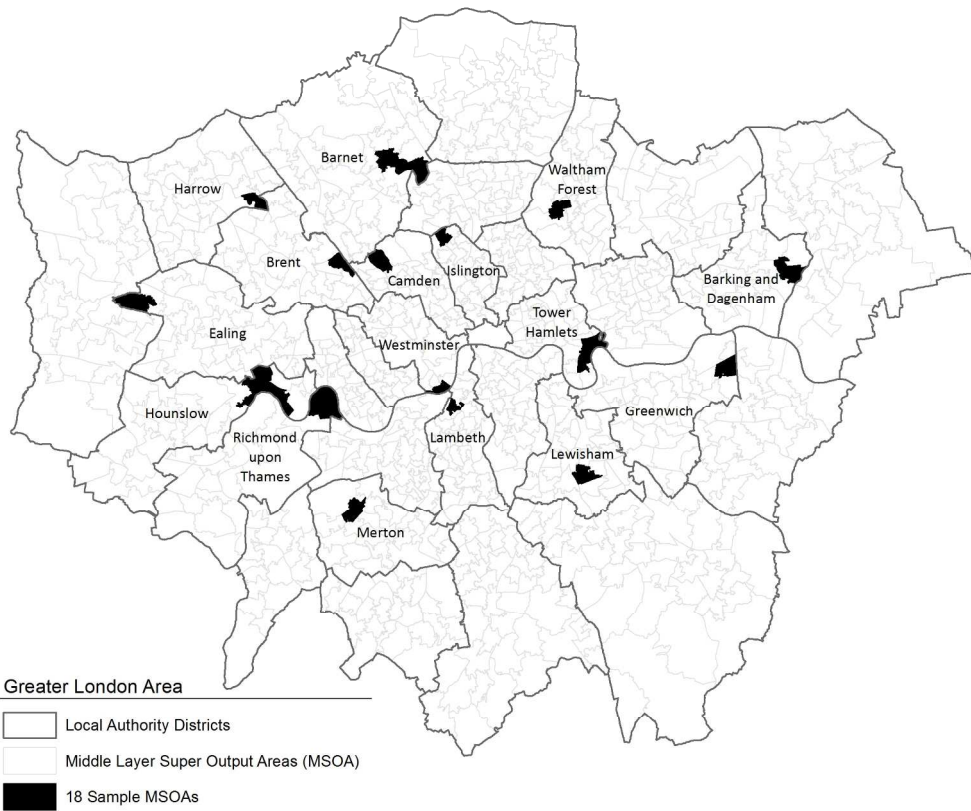
Point-of-sale movable display that invites store customers to sample the e-cigarette by providing disposable plastic covers to put over the tip.
90x108mm (300 x 300 DPI)



An example of an exterior e-cigarette advertisement.
90x120mm (300 x 300 DPI)

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Map of the sampled areas in London.
201x165mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

*Note: Because our study was conducted on stores, we have changed “participants” to “stores” and provided the page number with the relevant information.

	Item No	Page Number
Title and abstract	1	1-2
Introduction		
Background/rationale	2	4
Objectives	3	4-5
Methods		
Study design	4	5
Setting	5	5
Stores	6	5-6
Variables	7	6
Data sources/ measurement	8*	6
Bias	9	10
Study size	10	5
Quantitative variables	11	6
Statistical methods	12	6-7
Results		
Stores	13*	7
Descriptive data	14*	7
Outcome data	15*	7
Main results	16	7-8
Other analyses	17	N/A
Discussion		
Key results	18	8-9
Limitations	19	9-10
Interpretation	20	8-11
Generalisability	21	10
Other information		
Funding	22	12

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.