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Young people's exposure to point-of-sale tobacco products and promotions



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ABSTRACT

Objectives: Point of sale (POS) displays are one of the most important forms of tobacco marketing still permitted in many countries. Reliable methods for measuring exposure to such displays are needed in order to assess their potential impact, particularly on smoking attitudes and uptake among young people. In this study we use a novel method for evaluating POS exposure based on young people's use of retail outlets and recall of tobacco displays and observational data on the characteristics of displays.

Study design: Observational audit of retail outlets ($n = 96$) and school-based pupil survey ($n = 1482$) in four Scottish communities reflecting different levels of social deprivation and urbanisation, conducted in 2013 before legislation to remove POS displays was implemented in supermarkets.

Methods: Measures were taken of: visibility and placement of tobacco displays; internal and external advertising; display unit size, branding and design; visibility of pack warnings; proximity of tobacco products to products of potential interest to children and young people; pupils' self-reported frequency of visiting retail outlets; and pupils' recall of tobacco displays. Variation in POS exposure across social and demographic groups was assessed.

List of abbreviations: POS, Point of sale; CTNs, Confectioners, tobacconists and newsagents.

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Results: Displays were highly visible within outlets and, in over half the stores, from the public footway outside. Tobacco products were displayed in close proximity to products of interest to children (e.g. confectionery, in 70% of stores). Eighty percent of pupils recalled seeing tobacco displays, with those from deprived areas more likely to recall displays in small shops. When confectioners, tobacconists and newsagents (CTNs) and grocery/convenience stores (two of the outlet types most often visited by young people) were examined separately, average tobacco display unit sizes were significantly larger in those outlets in more deprived areas.

Conclusions: POS displays remain a key vector in most countries for advertising tobacco products, and it is important to develop robust measures of exposure. The data reported in this paper provide a baseline measure for evaluating the efficacy of legislation prohibiting such displays.

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Introduction

Point-of-sale (POS) displays of tobacco products in retail outlets, often on specially designed shelving, are important to tobacco manufacturers because they are one of the few remaining marketing methods still permitted in many countries.^{1–3} Described as ‘power walls’,⁴ they are designed to be attractive and eye-catching, and are located in prominent positions with high traffic flow. They are often placed alongside everyday products thus helping to normalise the idea of tobacco use.⁵ Previous studies have found that exposure to POS tobacco displays can stimulate impulse purchase of cigarettes by existing smokers^{6,7} and increase the risk of uptake of adolescent smoking.^{8–12} Studies which have attempted to identify the mechanisms through which exposure to POS tobacco displays might affect uptake by young people have suggested that exposure to displays influences young people’s perceptions of the attractiveness of cigarette packs and smoking and also their smoking norms (i.e. perceptions of prevalence among one’s peers), both of which are recognised factors which increase the likelihood of starting smoking.^{9,13} Exposure to POS displays can also inhibit smoking cessation attempts by triggering cravings in smokers who are trying to quit.¹⁴ Furthermore, it is possible that differences in exposure to POS displays between high and low income neighbourhoods may partially account for well-documented social inequalities in smoking initiation and prevalence.

Article 13 of the WHO Framework Convention on Tobacco Control, which came into force in 2005, advocates the complete ban on any display of tobacco products at points of sale.¹⁵ Less than half of the 180 signatories currently have in place legislation to restrict advertising at POS, and only around a dozen have comprehensive bans on any display of tobacco products. It is estimated that around 80% of the world’s population is exposed to tobacco displays at point of sale.¹⁶

Research to date into exposure to POS displays has either measured consumers’ recall and perceptions of displays⁹ or used observational methods to describe the key display characteristics.^{17–19} However, observational studies have often examined only a limited range of retail outlets in which

tobacco is sold or have taken only limited measures of display characteristics.²⁰ Therefore, the development of more reliable methods for the measurement of exposure to displays is important both to assess their potential impact on young people’s attitudes to smoking and smoking initiation and to evaluate the impact of legislation to ban POS tobacco marketing.

The data presented here were collected as part of Determining the Impact of Smoking Point of Sale Legislation Among Youth (DISPLAY) study. This is a longitudinal study designed to evaluate Section 1 of the Tobacco and Primary Medical Services (Scotland) Act 2010 which prohibits point of sale tobacco displays by tobacco retailers in Scotland.²¹ The legislation came into force in large supermarkets over 280 m² on 29th April 2013 and in smaller retailers on 6th April 2015. The legislation requires that all tobacco products and smoking-related products covered by the ban must be put out of public sight. Retailers can choose their own means of covering or removing products, and when covers are removed temporarily for customer service or re-stocking, the area of open display should not exceed 1000 cm². The term ‘display’ in this paper refers to tobacco products displayed on shelf units at point-of-sale. Advertising of tobacco products, including at point of sale, was prohibited in the UK in 2002 by the Tobacco Advertising and Promotion Act 2002.²²

In this paper we describe a method for accurately measuring tobacco displays at POS and outline two measures of exposure based on young people’s ‘opportunity to see’ displays (self-reported frequency of visits to retail outlets where tobacco is sold) and their recall of seeing the displays. Used in combination these three measures allow a comprehensive assessment of exposure to POS tobacco marketing. We then go on to examine the relationship between the different measures of exposure and socio-economic variables.

Methods

The DISPLAY study has a multimodal before-and-after design using mixed methods to collect data in four purposively

selected communities. Baseline data collection was in 2013, with follow-up data collected annually for four years. For the purposes of the study, the communities were defined as the catchment areas around four secondary schools selected to reflect two levels of urbanisation (urban vs small town) and two levels of social deprivation (high vs medium/low). Deprivation was assessed using the population-weighted average Scottish Index of Multiple Deprivation (SIMD) scores derived from the datazones ($n = 125$; mean population 872) with population-weighted centroids falling within each school catchment area, and the proportion of children receiving free school meals. All data reported here were collected in 2013, prior to the implementation of the POS legislation in supermarkets and when tobacco products were on display in all types of retail outlets.

Observational audit

The observational element involved a discreet audit of all fixed retail outlets selling tobacco in the same four communities. These fixed retail outlets comprised supermarkets, grocery/convenience stores, CTNs (confectioners/tobacco-nists/newsagents), petrol station forecourt stores and fast food/take-away outlets. Across Scotland and the UK as a whole, these outlet categories represent the vast majority of outlets which sell tobacco in the UK. Only mobile vans and illicit tobacco were excluded from the study because observational research would not be feasible in these outlets. Retail databases for each community were compiled through a two-stage process. Firstly, all retailers in the categories of interest were identified from the Scottish Tobacco Retailers Register, a self-completion online register set up in April 2011 by the Scottish government. On occasions, retailers registered more than once and hence the data were first cleaned to remove duplicates. Secondly, researchers walked the streets to verify all coded retailers and to identify any unregistered retailers.²¹

A semi-structured audit tool was developed and piloted to record seven key features of tobacco displays. These were: internal and external visibility of displays and products (i.e. whether displays could be seen from inside retail outlets and also from the street outside, through the window or door); internal and external tobacco advertising (whether advertising appeared inside or outside the retail outlet); the style of display unit; any brand promotions on the display unit; the visibility of on-pack health warnings when packs were stocked in the display unit; display unit size; and proximity of tobacco products to products with potential appeal to children. These seven measures were identified as key elements of exposure based on previous studies (e.g. Refs. 18,20,23) and based on piloting work to develop and test the observation protocol (see [Supplement for more information](#)).

The audits were conducted by a team of observers working in pairs with up to two field visits being made in each study community between February and April 2013. Data collection was facilitated by a token purchase made in each retail outlet to gain access to the tobacco counter, and the use of memory aids and devices, such as mobile phones to record key numeric data. Audit protocols were completed away from the retail sites immediately following each observation, with

observers comparing notes to verify key characteristics. Where inconsistencies or gaps emerged these were addressed by an immediate follow-up visit to the study outlet. For most items, observers noted the presence or absence of particular features. The overall visibility of the display inside the outlet was rated on a scale of 1–5 and the visibility of the display from outside the shop rated as ‘not very visible’, ‘fairly visible’ or ‘very visible’. Retail outlets were linked to the Scottish Index of Multiple Deprivation (SIMD)²⁴ by their postcode and grouped by SIMD quintile for the purpose of analysis by area deprivation. Data analysis was conducted in IBM SPSS version 21. Ethical approval was provided by the University of Stirling School of Management Research Ethics Committee.

School-based survey

School-based surveys of pupils in secondary 2 ($n = 775$, mean age: 13.6 years) and secondary 4 ($n = 707$, mean age: 15.6 years) were conducted in the four communities in February 2013. Class teachers distributed the questionnaires within personal and social education (PSE) classes and pupils completed the questionnaire under exam conditions. Ethical approval was obtained from the University of St Andrews, School of Medical Ethics Committee. The Ethics Committee approved the use of parental opt-out consent, as is the norm for national school surveys in Scotland, and pupils provided active consent on the day of completing the survey. The survey explored a range of topics relating to young people's smoking attitudes and behaviour. Two measures of exposure are reported in this paper: frequency of visiting different types of retail outlet; and recall of seeing tobacco packs displayed for sale in the last 30 days in: a) large supermarkets; and b) smaller shops. Frequency of shop visits was measured using a seven point scale (everyday; most days; about two or three times a week; about once a week; less than once a week; never and don't know). In the analysis, frequency of shop visits was collapsed into ‘ ≥ 2 per week’ and ‘ ≤ 1 per week’. ‘Don't know’ responses were recoded as missing values. For seeing cigarette and tobacco products in supermarkets and small shops in the past 30 days, the response categories were: ‘yes’ vs ‘no or don't know’. Socio-economic status was measured using the Scottish Index of Multiple Deprivation²⁴ derived from the respondent's postcode.

Results

Number and characteristics of retail outlets

In total, 96 outlets were mapped and observed across the study areas. These included five types of retail outlets: grocery/convenience stores ($n = 58$); CTNs ($n = 16$); large supermarkets (over 280 m² of retail space) ($n = 9$); petrol station forecourt shops ($n = 10$); and fast food/take-away outlets ($n = 3$). The number of outlets per population (aged 10–19) ranged from 55.4 per 10,000 (catchment located in a suburb of a large urban area and with medium-low levels of social deprivation) to 83.0 per 10,000 (catchment located in a suburb of a large urban area and with high levels of deprivation).

Visibility of displays

External descriptors such as mentions of ‘tobacco’ or ‘tobacconist’ on store fascias were present in only a minority of outlets (12%) (Table 1). Supermarkets, petrol station forecourt stores and fast food/take-away outlets had no external descriptors, while they were observed for 16% of grocery/convenience stores and 19% of CTNs. Few outlets (4%) had tobacco products displayed in the front window. However, the internal main tobacco display was visible from the main entrance of most (69%) outlets. Displays were almost exclusively positioned behind the main service counter (97%), at customer eye level (98%) and within arm’s reach of the server (97%). Tobacco displays were rated to be most prominent in supermarkets (mean 4.3) and petrol station forecourt stores (mean 3.5), and less prominent in grocery/convenience stores (mean 3.0) and CTNs (mean 2.6). The lower prominence ratings reflect the fact that these stores were often small and appeared cluttered.

Design features of displays

The design features of displays were rated on seven dimensions (Table 2). Nearly all of the displays (94%) were purpose-designed units. There were four types, three of which were associated with two different tobacco manufacturers and the fourth were proprietary units associated with different supermarket retail groups. On 96% of displays the cigarette packs were displayed upright and facing forwards, with branding clearly visible.

Half (50%) of the displays featured brand advertising, most commonly shelf-edge strips promoting a brand of rolling tobacco papers (43% of stores); other forms of advertising included posters within the unit (6% of stores), posters on the top panel of the unit and illuminated units (1% each) (Table 2). Shelf-edge advertising was found in 10 CTNs (63%) and 30 grocery/convenience stores (52%), but only one petrol station (10%). Thirteen percent of units ($n=12$) included

structural features designed to give prominence to a particular brand. These structural features tended to be found in large supermarkets (two stores) and petrol stations (four stores) rather than in other types of stores. The majority of displays also featured generic messages indicating that tobacco products were for sale (e.g. the words ‘cigarettes’ or ‘rolling tobacco’ on the unit top panel). Price information, another form of advertising, was provided on shelf strips on 90% of the units, and on price-marked packs on 64% of the units.

Over a third of units were designed in such a way that health warnings on the bottom section of the front face of the pack were obscured, either wholly (6%) or partially (29%) (Table 2). Nineteen (33%) grocery/convenience stores displayed cigarette packs in such a way that warnings were wholly or partially obscured, as did seven (78%) supermarkets, and seven (70%) petrol station forecourt stores, with most or all of the units in the remaining categories (CTNs, and fast food/take-away outlets) allowing the warnings to be seen. Further analysis indicated that certain types of units were more likely to obscure the health warnings than others: e.g. 81% of the proprietary units associated with particular supermarket retail groups (unit type ‘d’) obscured the warnings wholly or partially, while the three unit types associated with different tobacco manufacturers (types ‘a’ – ‘c’) obscured the health warnings in 22%, 25% and 11% of cases.

Size

The displays ranged in size from 0.0 m² to 6.9 m², with an average, across all outlets, of 2.0 m² (Table 3). Display unit size differed across outlet category ($P < 0.001$), with supermarkets (mean 4.6 m²) having larger displays than each of the other outlet types ($P < 0.05$), and grocery/convenience stores having larger displays (mean 1.9 m²) than fast food/take-away outlets (mean 0.3 m²) ($P < 0.05$). Displays in fast food/take-away outlets were the smallest, reflecting the limited shelving in such outlets.

Table 1 – Observational audit: measures of visibility of tobacco displays and products.

Visibility measure	Total outlets ($n = 96$)		
	<i>n</i>	%	
External:			
Number of shop front descriptors:	Two	3	3%
	One	9	9%
	None	84	88%
Internal display visible from:	Public footway outside the store	50	52%
	Main store entrance	66	69%
Products on display within or behind window:	Yes	4	4%
Internal:			
Display positioned:	Behind service counter	93	97%
	At eye level	94	98%
	Within arm’s-reach of assistant	93	97%
Visibility of display (5 = high, 1 = low):	Highly visible (5)	7	7%
	4	19	20%
	3	44	46%
	2	22	23%
Not at all visible (1)	4	4%	
	Mean (Std Dev)	3.0 (0.945)	

Table 2 – Observational audit: design features of tobacco displays.

Design feature		No. of outlets with feature	% of all outlets (n = 96)
Style of display	Purpose-built unit: ^a	90	94%
	Type a	28	29%
	Type b	18	19%
	Type c	19	20%
	Type d	22	23%
	Purpose-built shelving	1	1%
Whether packs are displayed upright and facing forwards	Generic shelving	1	1%
	Yes	92	96%
Whether display features brand advertising	Yes:	48	50%
	On shelf edge	41	43%
	Poster on top panel	1	1%
	Poster in storage unit	6	6%
Whether display is designed to give prominence to specific brand(s)	LED display	1	1%
	Yes:	12	13%
	Inset panel	10	10%
Whether display obscures health warnings on packs	Product hanger	2	2%
	Shelf extension	1	1%
	Wholly obscured	6	6%
Total number of generic and branded tobacco messages on display ^b	Partially obscured	28	29%
	Not obscured	59	61%
	Four	1	1%
Price marking	Three	5	5%
	Two	27	28%
	One	35	36%
Price marking	None	28	29%
	On shelf strips	86	90%
	On price-marked products	61	64%

^a Four types of purpose designed display unit were noted: Type a promoted products produced by one tobacco manufacturer, Type b and Type c promoted products from another manufacturer, and Type d were proprietary units each unique to a particular retail chain.

^b These were generic or unbranded signs promoting the availability of tobacco, cigarettes, rolling tobacco etc, and were usually positioned on the units top panel for maximum all round visibility and to frame the display of tobacco products underneath.

Proximity to products with potential appeal to children and young people

Proximity to products with potential appeal to children and young people was assessed by recording whether a range of different products were stocked in front of, below, above or to the sides of the tobacco display (Table 4). In the majority of outlets, tobacco products were displayed in proximity to confectionery (70%) and gums and mints (79%). In a minority of outlets, they were also in proximity to cakes and pastries (6%), toys (9%), crisps and other salty snacks (9%), collectable cards and stickers (7%), soft drinks (7%), ice cream and frozen drinks (5%). Only 6% of outlets did not display tobacco in proximity to any products with potential appeal to children and young people. Tobacco products were displayed in proximity to confectionery in 81% of CTNs and 72% of grocery/convenience stores, compared with 56% of supermarkets, 60% of petrol stations, and 33% of fast food/take-away outlets.

Young people's frequency of visiting different retail outlets

A survey response rate of 87% (n = 1482) was achieved. Of the pupils completing the survey, just under a quarter (24%) reported that they had tried smoking, 'even just a puff' (boys 21%, girls 27%) and 6% indicated they were current smokers (boys 6%, girls 6%) (current smoking was defined by one question: 'I currently smoke cigarettes or hand rolled cigarettes').

Table 5 lists that overall, pupils were most likely to frequent CTNs 'twice a week or more often' (62%). A slightly lower proportion of pupils reported visiting grocery/convenience stores and supermarkets 'twice a week or more often' (47% and 45%). Retail outlets such as petrol stations and fast food/take-away outlets tended to be frequented 'once a week or less often' (both 85%). Overall, boys visited all retail outlets more often than girls. In particular they were significantly more likely to frequent CTNs (P < 0.001) and fast food/take-away outlets (P < 0.001) 'twice a week or more often'. There were no significant differences by age.

Young people's recall of tobacco displays

Table 6 lists that there were high levels of recall of cigarettes and tobacco displayed for sale, with 80% of young people noticing them in both supermarkets and small shops ('small shops' were not classified by retail categories in this question).

Table 3 – Observational audit: size of tobacco displays.

Size (m ²)	All outlets (n = 96)	Grocery/convenience stores (n = 58)	CTNs (n = 16)	Large super-markets (n = 9)	Petrol station forecourt stores (n = 10)	Fast food/take-away outlets (n = 3)
Minimum	0.0	0.0 ^a	0.4	2.0	0.1	0.0 ^b
Maximum	6.9	3.1	2.2	6.9	3.2	0.7
Mean	2.1	1.9**	1.5	4.6*	2.0	0.3
Std dev	1.2	0.7	0.5	1.8	0.9	0.4

*P < 0.05 larger than each of the other outlet types.

**P < 0.05 larger than fast food/take-aways.

^a The smallest grocery/convenience store display was 0.03 m sq.

^b In one fish and chip shop, products were stacked behind the counter out of customers' view, so the unit size was recorded as 0.00 m².

Table 4 – Observational audit: proximity of tobacco products to products with potential appeal to children (number and percentage of outlets which display each product category immediately above, below, in front of or to the side of the display unit).

Product category	No. of outlets with items in proximity to tobacco	No of outlets as percentage of all outlets (n = 96)
Gums & mints	76	79%
Confectionery	67	70%
Crisps & other salty snacks	9	9%
Toys	9	9%
Soft drinks	7	7%
Collectable cards & stickers	7	7%
Cakes & pastries	6	6%
Ice cream & frozen drinks	5	5%
Hot pies & savouries	2	2%
Total number of product categories in proximity to tobacco display:		
7 products	1	1%
6 products	0	–
5 products	2	2%
4 products	10	10%
3 products	21	22%
2 products	30	31%
1 product	26	27%
0 products	6	6%
Mean std dev	2.2 (1.3)	

Recall of cigarettes or tobacco displayed for sale in both large supermarkets and in small shops did not vary by gender. However, there was a patterning by social disadvantage. Recall of cigarette displays in small shops was higher in young people living in areas of greater socio-economic deprivation ($P < 0.007$). There was also a significant difference by age, with pupils aged 15 and older more likely to recall seeing displays in small shops than those aged under 15 years ($P < 0.004$).

Analysis by retail outlet category and by store level of deprivation

The school survey indicated that young people in the study areas visited CTNs, grocery/convenience stores and

Table 6 – Young people's recall of cigarettes or tobacco in large supermarkets and small shops, by demographic and socio-economic factors.

Large supermarkets	Recall of cigarettes or tobacco displayed for sale				P-value ^a
	Yes		No		
	n	%	n	%	
Total sample	1180	79.6	286	19.5	0.09
Gender					
Boys	563	78.7	152	21.3	
Girls	614	82.3	132	17.7	
Age group					
<15 years	551	78.5	151	21.5	0.07
≥15 years	567	82.3	122	17.7	
SIMD quintile					
one low	191	78.6	52	21.4	
2	131	82.4	28	17.6	0.83
3	158	82.7	33	17.3	
4	223	83.2	45	16.8	
5 high	231	79.1	61	20.9	
Small shops	1181	79.7	265	17.9	
Total sample					
Gender					
Boys	565	80.3	139	19.7	0.17
Girls	612	83.0	125	17.0	
Age group					
<15 years	547	78.9	146	21.1	0.004 ^a
≥15 years	576	85.0	102	15.0	
SIMD quintile					
1 most deprived	205	86.1	33	13.9	
2	136	86.6	21	13.4	0.007 ^b
3	160	84.2	30	15.8	
4	210	79.2	55	20.8	
5 least deprived	229	79.5	60	20.8	

^a Chi square value 8.4 with one df.

^b Chi-squared test for trend value 7.3 with one df.

supermarkets more frequently than other types of retail outlets. Additional analyses were conducted for key measures to assess whether displays in stores which young people visited more often were different in any way. These analyses indicated that in the stores which young people visited more often, tobacco displays were less likely to be visible from outside the store ($P < 0.001$), while pack health warnings were

Table 5 – Frequency of visiting different types of retail outlet, by gender.

	Retail outlet category									
	CTNs (newsagent/corner shop)		Grocery/convenience store		Large supermarket		Petrol station forecourt stores		Fast food/take-away outlets	
	≥2 per week	≤1 per week	≥2 per week	≤1 per week	≥2 per week	≤1 per week	≥2 per week	≤1 per week	≥2 per week	≤1 per week
Male n	462	226	338	346	323	361	108	546	128	559
Male %	67%*	33%	49%	51%	47%	53%	17%	84%	19%**	81%
Female n	413	315	325	392	310	414	87	594	79	638
Female %	57%	43%	45%	55%	43%	57%	13%	87%	11%	89%
Total n	875	541	663	738	633	775	195	1140	207	1197
Total %	62%	38%	47%	53%	45%	55%	15%	85%	15%	85%

* Significant difference males and females chi square = 16.3, df = 1, $P < 0.001$.

** Significant difference males and females chi square = 16.2, df = 1, $P = 0.001$.

more likely to be visible ($P < 0.001$). There were no other significant differences according to retail outlet category.

Display characteristics were analysed by the store SIMD quintile, to assess whether displays varied by area-level deprivation (Table 7). For most measures, there were no significant differences. However, as area deprivation increased, the likelihood that cigarette pack warnings were obscured by the design of the display unit decreased ($P < 0.001$). When the analysis by area level socio-economic deprivation included only CTNs and groceries (two of the three categories of outlet more frequently visited by young people), tobacco display units were of significantly larger average size in areas of more deprivation than in areas of less deprivation ($P = 0.03$).

Discussion

This study used a novel and comprehensive approach to examine exposure to tobacco displays. Marketing exposure is a multifaceted concept which comprises the customer's 'opportunity to see' the marketing, customer recall of the marketing, and features of the marketing itself. We examined opportunities to see displays using frequency of visiting different types of retail outlets by young people, young people's self-reported recall of seeing displays in different types of retail outlets, and the characteristics of the displays themselves, using a combination of mapping and observational research. A particular strength of the study was that all these measures were taken in the same four communities. In future analysis we will link together changes in exposure derived from both the observational audit and the school survey. Given that POS advertising and displays of tobacco products are still permitted in many countries, it is important to develop robust methods for measuring exposure to them. In the UK, where POS displays have been prohibited in all retail

outlets since April 2015, the approach reported in this study is providing a baseline measure for evaluating the efficacy of the legislation.²⁴ It is important to note that although POS displays have been prohibited in the UK, this does not mean that consumers will in future have no exposure at all to tobacco-related messages in retail outlets; the vast majority of tobacco retailers are likely to retain a unit in a prominent position which is identifiable as selling tobacco products, even though packs will no longer be visible. Recent research from Australia, where POS advertising is prohibited, suggests that even in the absence of this advertising, the mere sight of tobacco retailers and cues that tobacco is for sale, such as price lists, can trigger cravings among smokers who are trying to quit.²⁵ This suggests that the effects of indicators of tobacco products being on sale will still need to be monitored, even where advertising and displays are prohibited.

In this study, conducted before the implementation of the legislation, tobacco displays were highly visible not only within the store but also, in over half the stores, from the public footway outside, meaning that even customers who did not frequent a particular shop were exposed to tobacco products while walking past. Within the study stores, nearly all of the tobacco displays were behind till-points at customer eye level, meaning that the vast majority of customers would see them even if they were not buying tobacco. Eye level display of products is important for tobacco companies because it ensures visibility and generates, according to one industry document, 'a strong impulse to buy'.⁵ The presence of tobacco products in everyday settings alongside common household goods may suggest that tobacco is an ordinary product and therefore socially acceptable.^{12,26,27} In this study, tobacco products were also displayed in proximity to a range of products of particular interest to children, most notably confectionery (in 70% of all stores, increasing to 72% of grocery/convenience stores and 81% of CTNs). This proximity

Table 7 – Display characteristics by store postcode level of deprivation (SIMD).

Measure	SIMD					
	1 Most deprived	2	3	4	5 Least deprived	
External visibility of display mean (sd) (Not at all visible = 0 Not very visible = 1 Fairly visible = 2 Very visible = 3)	1.0 (0.9) n = 26	0.7 (0.9) n = 23	1.0 (1.4) n = 13	0.9 (1.1) n = 21	1.2 (1.3) n = 13	Kruskal Wallis n.s.
Internal visibility of display mean (sd) Rated 5-high to 1-low	2.9 (0.8) n = 26	2.9 (0.8) n = 23	3.3 (0.8) n = 12	3.3 (1.2) n = 21	2.9 (1.0) n = 13	Kruskal Wallis n.s.
Packs displayed upright and facing forward % stores in which pack warnings obscured	96.2% 8.0%	100% 22.7%	100% 75%	95.2% 57.1%	92.3% 46.2%	Chi square n.s. Chi square for trend = 13.2 df = 1 P = 0.001
Size of display mean (sd)	2.1 (0.6) n = 26	2.0 (1.3) n = 23	2.2 (1.4) n = 12	2.0 (1.3) n = 21	2.1 (1.6) n = 13	Kruskal Wallis n.s.
Number of product categories in proximity to tobacco display mean (sd)	1.6 (1.0) n = 26	2.0 (1.2) n = 23	2.2 (1.1) n = 12	2.1 (1.0) n = 21	1.9 (0.5) n = 13	Kruskal Wallis n.s.

n.s = Not significant.

ensures that cigarette products have the potential to be noticed by children from a young age. Pollay⁵ has suggested that recruitment of young smokers is enhanced by POS materials which expose children to cigarette promotion with every store visit. Furthermore, exposure to point-of-sale advertising increases young people's perception that tobacco is easy to buy.²⁷

The majority of young people in the school survey (80%) recalled seeing tobacco products displayed for sale both in supermarkets and in smaller shops. Although the number of children taking up smoking has been falling since the 1990s, an estimated 207,000 children aged 11–15 still start smoking each year in the UK,²⁸ and there is a consistent socio-economic patterning, with more disadvantaged 11–15 year olds more likely to take up the habit.²⁹ Given this, and the evidence that exposure to POS displays increases susceptibility to smoking initiation,^{8,9} it is of concern that young people from the least affluent backgrounds were more likely to recall seeing tobacco displays in our study.

A Californian study³⁰ found more tobacco advertising materials and greater shelf space devoted to popular brands in stores which adolescents visited frequently, compared with stores which were less often visited by adolescents. The current study found few differences in marketing between the stores more frequently visited by young people – CTNs, grocery/convenience stores and supermarkets – compared with the types of outlets less frequently visited by young people. However tobacco displays were **less** likely to be visible from outside the store, and pack health warnings **more** likely to be visible, in those outlet types more frequently visited by young people. One possible explanation for the first finding is that the stores less frequently visited by young people included petrol station shops, which tend to score highly on external visibility of tobacco products because they have large windows to enable the shop assistants to keep an eye on the pumps.

It has been suggested that small stores are a more important source of exposure to tobacco for young people than supermarkets, because the latter tend to have numerous till-points meaning that tobacco products can be avoided.⁸ When CTNs and grocery/convenience stores (two of the three types of outlets most often visited by young people) were examined separately, those located in more deprived areas (based on outlet postcode SIMD quintile) were found to have significantly larger average display unit size than CTNs and grocery/convenience stores in areas of less deprivation. Again, given the increased risk of youth smoking uptake in more disadvantaged groups, this is of concern.²⁹ There were few other differences between outlet types when display characteristics were analysed by store SIMD quintile. However, where cigarettes were on sale in stores in more deprived areas, pack warnings were less likely to be obscured. This may be because obscuring of pack warnings was more common in supermarkets (because of the design of certain supermarket display units), which in these communities tended to be located in more affluent postcode areas.

There are some limitations of the study methodology. Observer recall, supported by memory aids, was used, which introduces the possibility of observer recall error. Other methods involving photography and video were piloted, but proved unreliable and not necessarily capable of capturing all

the information required for the audit. However, conducting observations in pairs meant that observers were able to compare findings immediately after each site visit, and to make a repeat visit if necessary to verify any gaps or anomalies in recording. The data collected are not nationally representative although they were obtained in four communities that varied according to levels of social deprivation, and degree of urbanisation.

Internationally, POS displays remain a key vector for the tobacco industry to promote its products. Developing robust methods to measure exposure to POS displays, and using these measures to examine variations in exposure amongst different sociodemographic groups, is an important priority for tobacco researchers.²⁰ Such measures not only help to reveal insights into industry behaviour but also enable researchers to examine the influence of POS marketing on smoking initiation and cessation. The methods and measures described in the current study are replicable in other countries wanting to describe and assess exposure to POS displays, or interested in evaluating the impact of controls on POS advertising and display. The measures of display characteristics can be used to demonstrate changes over time or between different areas in display practices: e.g. to assess whether certain brands are promoted more heavily in some areas than others, whether display practices differ between different types of retail outlets, or to measure the effectiveness of controls in reducing the impact of displays. The methods are also potentially transferable to other product categories of concern, such as e-cigarettes, alcohol or high fat, salt and sugar foods.

Author statements

Ethical approval

Ethical approval for the retail audit was obtained from the University of Stirling School of Management Research Ethics Committee. Ethical approval for the schools' survey was obtained from the University of St Andrews, School of Medical Ethics Committee.

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Competing interests

The authors declare no competing interests.

Authors' contributions

MS conceived of the paper, drafted the manuscript and conducted some of the observational audit fieldwork; DE designed the observational audit tools and led the fieldwork; AMM and CB conducted the observational audit data analysis; MM and FH conducted the school survey data analysis; JP and CT mapped the communities to identify the retailer sample; LMCD conducted observational audit data fieldwork; SH, AA,

AMcG, WvdS and JF designed the overall study (along with DE and MS), advised on the analysis and commented on the draft.

REFERENCES

- Harper T. Why the tobacco industry fears point of sale display bans. *Tob Control* 2006;15(3):270–1.
- Lavack AM, Toth G. Tobacco point-of-purchase promotion: examining tobacco industry documents. *Tob Control* 2006;15(5):377–84.
- Cohen JE, Planinac LC, Griffin K, Robinson DJ, O'Connor SC, Lavack A, Thompson FE, Di Nardo J. Tobacco promotions at point-of-sale: the last hurrah. *Can J Public Health* 2008;99(3):166–71.
- Dewhirst T. POP goes the power wall? Taking aim at tobacco promotional strategies utilised at retail. *Tob Control* 2004;13:209–10. <http://dx.doi.org/10.1136/tc.2004.009043>.
- Pollay RW. More than meets the eye: on the importance of retail cigarette merchandising. *Tob Control* 2007;16(4):270–4. <http://dx.doi.org/10.1136/tc.2006.018978>.
- Kim AE, Nonnemaker JM, Loomis BR, Shafer PR, Shaikh A, Hill E, Holloway JW, Farrelly MC. Influence of point-of-sale tobacco displays and graphic health warning signs on adults: evidence from a virtual store experimental study. *Am J Public Health* 2014;104(5):888–95. <http://dx.doi.org/10.2105/AJPH.2013.301723>.
- Li L, Borland R, Fong GT, Thrasher JF, Hammond D, Cummings KM. *Impact of point-of-sale tobacco display bans: findings from the International Tobacco Control Four Country Survey*. Health Education Research; 2013.
- Spanopoulos D, Britton J, McNeill A, Ratschen E, Szatkowski L. Tobacco display and brand communication at the point of sale: implications for adolescent smoking behaviour. *Tob Control* 2014;23(1):64–9.
- MacKintosh AM, Moodie C, Hastings G. The association between point-of-sale displays and youth smoking susceptibility. *Nicotine Tob Res* 2012;14(5):616–20.
- Paynter J, Edwards R, Schluter PJ, McDuff I. Point of sale tobacco displays and smoking among 14–15 year olds in New Zealand: a cross-sectional study. *Tob Control* 2009;18:268–74.
- Paynter J, Edwards R. The impact of tobacco promotion at the point of sale: a systematic review. *Nicotine Tob Res* 2009;11:322–8. <http://dx.doi.org/10.1093/ntr/ntn002>.
- Hastings G, MacKintosh AM, Holme I, Davies K, Angus K, Moodie C. *Point of sale display of tobacco products*. London: Cancer Research UK; 2008.
- McNeill A, Lewis S, Quinn C, Mulcahy M, Clancy L, Hastings G, et al. Evaluation of the removal of point-of-sale tobacco displays in Ireland. *Tob Control* 2011;20(2):137–43. <http://dx.doi.org/10.1136/tc.2010.038141>.
- Kirchner TR, Cantrell J, Anesetti-Rothermel A, Ganz O, Vallone DM, Abrams DB. Geospatial exposure to point-of-sale tobacco: real-time craving and smoking-cessation outcomes. *Am J Prev Med* 2013;45(4):379–85.
- World Health Organization. *WHO framework convention on tobacco control*. Geneva: Switzerland; 2005.
- World Health Organization. *WHO report on the global tobacco epidemic. Enforcing bans on tobacco advertising, promotion and sponsorship*. Geneva: WHO; 2013. Art No: 251.
- Spanopoulos D, Ratschen E, McNeill A, Britton J. Retail price and point of sale display of tobacco in the UK: a descriptive study of small retailers. *PLoS One* 2012;7(1):e29871. <http://dx.doi.org/10.1371/journal.pone.0029871>.
- Rooke C, Cheeseman H, Dockrell M, Millward D, Sandford A. Tobacco point-of-sale displays in England: a snapshot survey of current practices. *Tob Control* 2010;19(4):279–84. <http://dx.doi.org/10.1136/tc.2009.034447>.
- Cohen JE, Planinac L, Lavack A, Robinson D, O'Connor S, DiNardo J. Changes in retail tobacco promotions in a cohort of stores before, during, and after a tobacco product display ban. *Am J Public Health* 2011;101(10):1879–81. <http://dx.doi.org/10.2105/AJPH.2011.300172>.
- Lee JG, Henriksen L, Myers AE, Dauphinee AL, Ribisl KM. A systematic review of store audit methods for assessing tobacco marketing and products at the point of sale. *Tob Control* 2014;23(2):98–106. <http://dx.doi.org/10.1136/tobaccocontrol-2012-050807>.
- Haw S, Amos A, Eadie D, Frank JW, MacDonald L, MacKintosh AM, MacGregor A, Miller M, Pearce J, Sharp C, Stead M, Tisch C, van der Sluijs W. Determining the impact of smoking point of sale legislation among youth (display) study: a protocol for an evaluation of public health policy. *BMC Public Health* 2014;14(1):251–61.
- Chapter 36 Tobacco advertising and promotion act 2002. London: The Stationery Office. Available, http://www.legislation.gov.uk/ukpga/2002/36/pdfs/ukpga_20020036_en.pdf; 2002.
- Barnoya J, Colditz G, Moreland-Russell S, Cyr J, Snider D, Schootman M. Prevalence of cigarette advertising and other promotional strategies at the point of sale in St Louis, Missouri: analysis by store type and distance from a school. *Prev Chronic Dis* 2014;11:130150. <http://dx.doi.org/10.5888/pcd11.130150>.
- Scottish Government. *Scottish index of multiple deprivation 2012*. Edinburgh: A National Statistics Publication for Scotland, <http://simd.scotland.gov.uk/publication-2012/>; 2012.
- Burton S, Hoek J, Nesbit P, Khan A. “Smoking is bad, it's not cool...yet I'm still doing it”: cues for tobacco consumption in a ‘dark’ market. *J Bus Res* 2015;68:2067–74.
- Monshouwer K, Verdurmen J, Ketelaars T, van Laar MW. *Points of sale of tobacco products: synthesis of scientific and practice-based knowledge on the impact of reducing the number of points of sale and restrictions on tobacco product displays*. Utrecht: Trimbos Instituut, Netherlands Institute of Mental Health and Addiction; 2014.
- Wakefield M, Germain D, Durkin S, Henriksen L. An experimental study of effects on schoolchildren of exposure to point-of-sale cigarette advertising and pack displays. *Health Educ Res* 2006;21(3):338–47.
- Department of Health. *Equalities analysis: standardised packaging of tobacco products*. London: Dept of Health; 2015.
- Green MJ, Leyland AH, Sweeting H, Benzeval M. Socioeconomic position and early adolescent smoking development: evidence from the British Youth Panel Survey (1994–2008). *Tob Control* 2014; <http://dx.doi.org/10.1136/tobaccocontrol-2014-051630>.
- Henriksen L, Feighery EC, Schleicher NC, Haladjian HH, Fortmann SP. Reaching youth at the point of sale: cigarette marketing is more prevalent in stores where adolescents shop frequently. *Tob Control* 2004;13:315–8. <http://dx.doi.org/10.1136/tc.2003.006577>.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.puhe.2016.03.032>.