A comparative analysis: Retailers' locations and socio-economic deprivation

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Summary

Critics allege that there is a targeted concentration of alleged anti-social retailers (AASRs; i.e. betting shops, fringe banks and rent-to-own (RTO) outlets) in deprived neighbourhoods in the UK. Before the notion of targeting can be ascertained, AASRs location patterns need to be compared to those of conventional retailers. Consequently, this research aims at critically comparing the locations of AASRs to food and grocery retailers (FGRs). Results show that FGRs and AASRs have high presence in zones of high deprivation, but it appears that AASRs have highest likelihoods in deprived neighbourhoods, while FGRs are located in moderately deprived neighbourhoods.

Keywords: gambling, fringe bank, rent-to-own, food and grocery retailers, socio-economic deprivation

1. Introduction

The opportunities present in the immediate environment play an important role in the health and well-being of inhabitants to a large extent. Consequently, in recent times there have been contentions from various sectors in the UK that gambling, fringe banking and rent-to-own (RTO) provisioning - which this paper refers to as alleged anti-social retailers (AASRs) because of the controversial services they offer - are concentrated in deprived areas (Wardle et al., 2014; Astbury and Thurstain-Goodwin, 2015). In additional, critics also allege that these concentrations are targeted (Graves, 2003; Stegman and Faris, 2003; Kubrin et al., 2011; Portas, 2011). The notion of concentration of retailers in deprived neighbourhoods has been an on-going debate in the food and grocery sector. A number of scholars allude that food retailers are concentrated in deprived neighbourhoods (Black et al., 2012; Cummins and Macintyre, 2002; Smith et al., 2009), while some are of the view that poor areas have limited options (Burgoine et al., 2017).

In recent times, the AASRs have received widespread negative publicity and government crackdown because of their many unethical practices (Davies, 2018; Davis, 2017; Gambling Commission, 2018; BBC, 2018). Therefore, if a targeted concentration exists, it will pose serious risks to the health and well-being of inhabitants of deprived communities (Hills et al., 1998; Graves, 2003; Wheeler et al., 2006; Kubrin et al., 2011). Hence, only a comparative study can unearth the seemingly complex relationship between AASRs' location preferences and socio-economic deprivation (SED). Unfortunately, most studies in the UK have failed to carry out a comparative analysis (Wardle et al., 2014; Astbury and Thurstain-Goodwin, 2015). Only Whysall (2014) attempted a simple comparative analysis and found that betting shops are not more likely to be in deprived areas compared to other retailers. Therefore, this paper aims to carry out a critical comparative analysis of AASRs retailers location preference with a more ubiquitous group of retailers (FGRs).

2. Methods

The study area for this paper are all lower super output areas (LSOAs) in England due to their small geographical extent. This will help capture neighbourhood trends.

2.1 Data

The IMD 2015 data provides area deprivation index as well as the key statistics (domains) used in its production. For this paper, only the IMD index as well as income, employment and education skills and training domains will be utilised.

Table 1: Summarises data sources employed here

|	Data	Source
1	Gambling Outlets, 2015	Gambling Commission, UK
2	Fringe Banking Outlets, October 2016 (Payday Loan, Pawn Brokers, Rent to Own)	Payday Loans, RTO Retailers websites
3	Major Food and Grocery Retailers Outlet, April, 2016 (19 retailers)	GeoLytix Limited
4	English Indices of Multiple Deprivation Data (IMD) 2015 and its domain	Department of Communities and Local Government (DCLG)
5	England Boundary data, 2011 (Lower Super Output Area)	UK Borders (Data available at http://infuse2011.ukdataservice.ac.uk/)

2.2 Spatial and Statistical Analysis

To carry out the comparative analysis of AASRs' and FGRs' locations, kernel density estimation (KDE), was performed using the spatial analyst tool in ArcGIS 10.4 which used the quadratic kernel function developed by Silverman (1986 p. 76, equation 4.5). Spearman's Rank Correlation Coefficient (r) was used to examine the relationship between the 2 groups of retailers (AASRs and FGRs) and SED, while a one way analysis of variance (ANOVA) was used to examine the relationship between the means of outlets of the groups of retailers and SED (all outlets were weighted with their corresponding population per thousand persons for a more representative distributions and represented as outlets per thousand persons). Lastly, a binomial logistic regression was used to compare the likelihood of the presence/absence retailers across income deprivation deciles.

3. Results

3.1 Comparison of AASRs and FGRs Outlets and IMD 2015 (Income, Employment and Education Domains)

Figure 1 and 2 show the distribution of counts of AASRs and FGRs by income, employment and education deprivation domain deciles in England. Figure 1 indicates that there is large presence of AASRs in the lower deciles compared to the higher deciles. Based on decile definition, decile 1 represents the most deprived 10% LSOAs and 10 represents the least deprived 10% LSOAs. Therefore, as area deprivation reduces, presence of AASRs also reduces across all 3 domains. Figure 2 also shows a high presence of FGRs across deciles 2 to 5 with little variations across the deciles compared to AASRs for the 3 indicators.
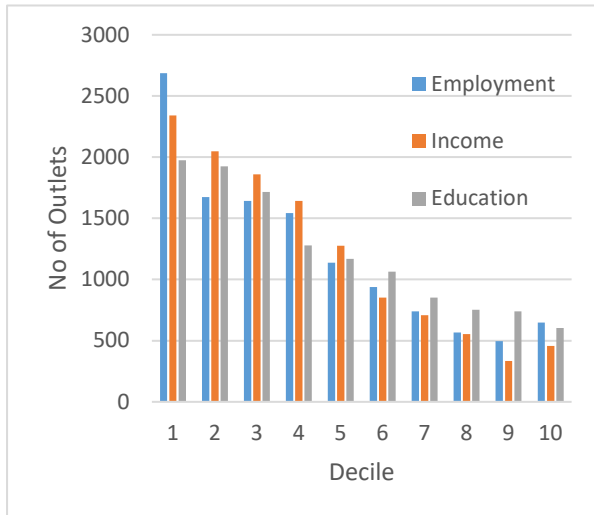
Figure 1: Distribution of AASRs Outlets by IMD Domain Deciles Source: Department of Communities and Local Government
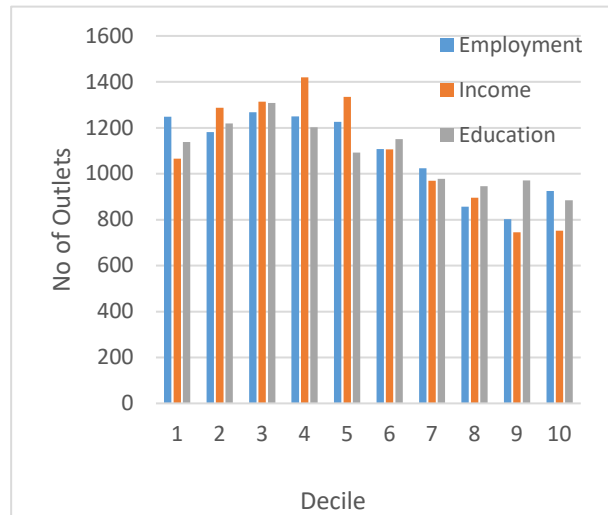

Figure 2: Distribution of FGRs' Outlets by IMD Domain Deciles. Source: Department of Communities and Local Government

## 3.2 Comparison of density maps of AASRs and FGRs with IMD Index

To further explore the relationship, a kernel density method (using the spatial analyst tool in ArcGIS 10.4 developed by Silverman (1986 p. 76, equation 4.5)) was deployed on the FGRs and AASRs outlets. This technique represent the outlets as a density surface rather than points to reveal areas of high concentrations (LSOA population was used as the weight). Figure 3 shows the patterns of SED in England. Visual comparison of the maps (Figure 3, 4 and 5) broadly reveal that areas with high concentration of AASRs' and FGRs' outlets also correspond with most deprived LSOAs in England. Some of the areas include South East including London and its environs, The West Midlands, Yorkshire and Humber, North West, broadly representing the more traditional urban areas.
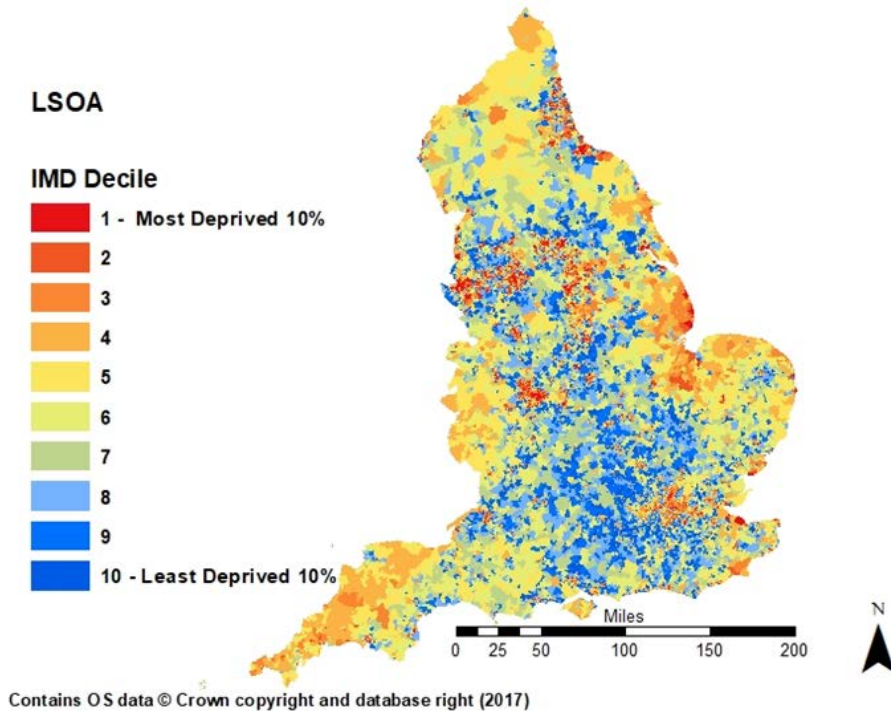
Figure 3: Patterns of Socio-Economic Deprivation in England's LSOAs using IMD Index Deciles. Source: Dept. of Communities and Local Govt.
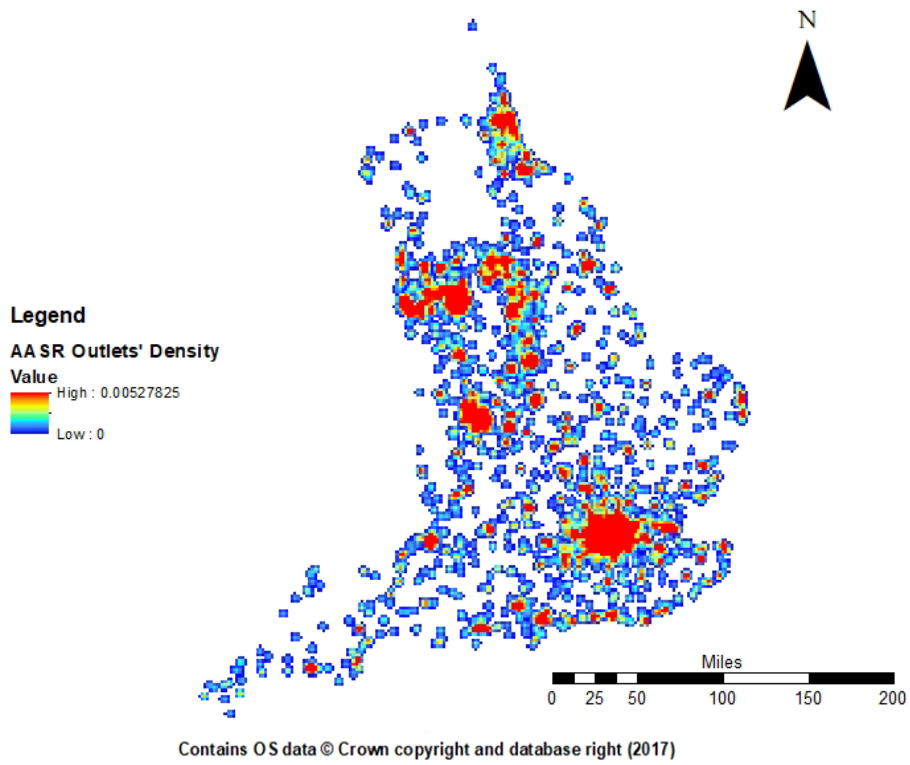
Figure 4: Patterns of AASRs Outlets in England Source: Data obtained from Gambling Commission and various retailers' websites
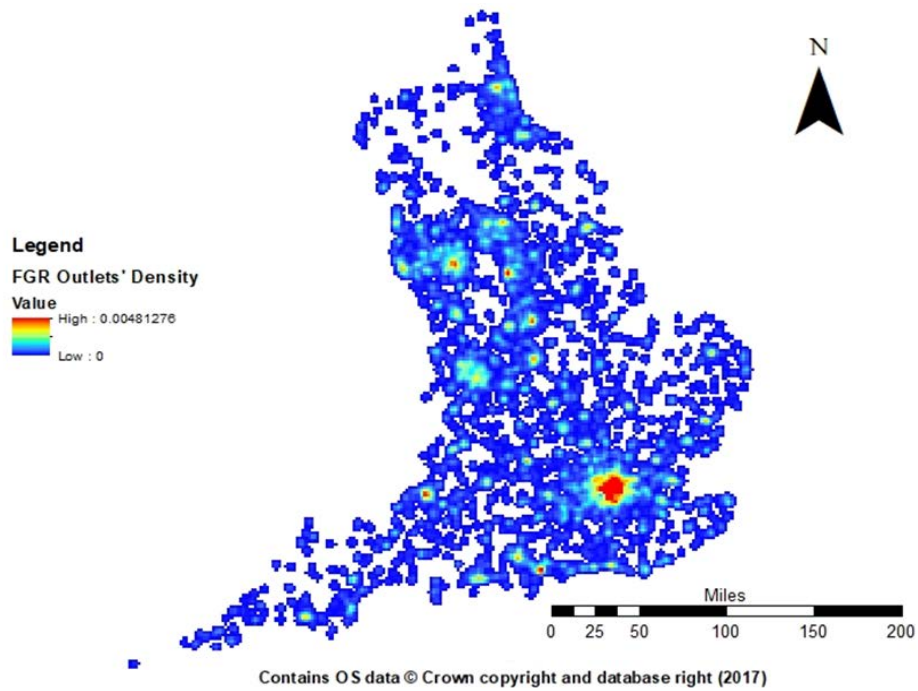
Figure 5: Patterns of FGRs' Outlets in England Source: Data obtained from Gambling Commission and various retailers' websites

3.3 Comparison of the Relationship between AASRs and FGRs with SED

A Spearman's correlation coefficient test was used to explore the relationship between these groups of retailers and SED using the 3 deprivation domain indicators. To carry out the correlation analysis, the retail outlets '000 households were ranked according to the polarity of the domains. Comparison show a highly significant positive correlation ($p < .001$) between the two groups of retailers and SED. In addition, the correlation coefficient for AASRs are all stronger compared to FGRs for income, employment and education deprivation (table 2).

Table 2: Comparison of Spearman's co-efficient for the group of retailers (AASRs and FGRs) and income, employment and education skills and training domain ranks

		Income Rank	Employment Rank	Education Rank
AASRs	**Correlation Coefficient**	.080**	.118**	.063**
	N	5533	5533	5533
FGRs	**Correlation Coefficient**	.054**	.088**	.052**
	N	7634	7634	7634

** Correlation co-efficient significant at $p < .001$

Table 3 shows the mean in each decile for the three deprivation indicators. Generally, as area deprivation reduces, there is a reduction in the mean for both groups of retailers apart from decile 10. The explanation for decile 10, which is the most affluent decile, is because it has a small representation (LSOAs) in England. In addition, from table 3, AASRs have a higher mean compared to FGRs across all deciles with AASRs' means in decile 1 for income, employment and education domains approximately 70.2%, 75.7% and 64.4% greater than those of FGRs. To ascertain if the mean differences are significant across deciles, a Welch one-way analysis of variance (ANOVA) test was used because of the violation of assumption of homogeneity of variances (Levene's test significant $p < .001$) . From table 4, there are highly significant differences in the means of both retail groups across income, employment and education deprivation deciles ($p < .001$)

Table 5 shows the result of the post hoc test (Games Howell) for the within groups comparisons of the mean of AASRs' and FGRs' outlets per '000 persons in decile 1 against other deciles (for only income deprivation domain deciles) From table 5, there are no significant differences in the mean for FGRs' in income decile 1 compared to deciles 2 – 5 (most and moderately deprived areas have similar patterns) while there is a significant difference in the mean of 6 – 9 which represents the least deprived LSOAs. On the other hand, for the AASRs' outlets, there is no significant difference in the means of only decile 1 – 3 which (i.e. most deprived 30% LSOAs have similar patterns) while there is a significant difference for decile 1 compared to 4 – 9.

Furthermore, a binary logistic regression was conducted to examine the likelihood of presence/absence of these retailers in income deprived areas. The retail outlet data were recoded to binary form 0 and 1 representing absence or presence of these retailers across all LSOAs in England respectively. From table 6, the likelihood of presence of FGRs in decile 1 is 1.3 times higher compared to the reference decile (decile 10). Interesting, the mid deprived deciles have the highest likelihood of FGRs compared to the reference decile For AASRs, the patterns seems to highly favour deprived areas with their highest odds of presence in decile 1 compared to decile 10 (almost 6 times) and as income deprivation reduces, the odds of likelihood of their presence reduces.

Table 3: Mean and Standard deviations for FGRs and AASRs outlets per thousand persons

	FGRs			AASRs		
Income Decile	**LSOAs**	**Mean**	**Std. Dev.**	**LSOAs**	**Mean**	**Std. Dev.**
1	693	0.95	0.63	883	1.61	2.13
2	846	0.92	0.58	860	1.40	1.79
3	890	0.89	0.54	804	1.37	1.53
4	935	0.91	0.54	740	1.29	1.53
5	925	0.86	0.52	644	1.18	1.15
6	813	0.83	0.48	474	1.08	1.39
7	722	0.82	0.42	413	1.04	1.04
8	662	0.83	0.51	306	1.08	1.76
9	599	0.77	0.39	217	0.96	0.85
10	549	0.86	1.06	192	1.43	3.00
Employment Decile	**LSOAs**	**Mean**	**Std. Dev.**	**LSOAs**	**Mean**	**Std. Dev.**
1	773	1.01	0.66	935	1.77	2.34
2	810	0.90	0.53	776	1.30	1.47
3	851	0.90	0.55	736	1.32	1.50
4	877	0.87	0.49	734	1.23	1.37
5	847	0.86	0.51	571	1.14	1.15
6	799	0.84	0.50	493	1.15	1.49
7	772	0.81	0.42	404	1.09	1.18
8	657	0.78	0.38	337	0.96	1.02
9	606	0.81	0.58	266	1.15	1.86
10	642	0.87	0.99	281	1.35	2.54
Education Decile	**LSOAs**	**Mean**	**Std. Dev.**	**LSOAs**	**Mean**	**Std. Dev.**
1	746	0.94	0.60	774	1.55	2.02
2	812	0.92	0.59	774	1.48	2.01
3	886	0.89	0.54	705	1.45	1.87
4	852	0.86	0.47	642	1.18	1.30
5	775	0.85	0.54	555	1.25	1.60
6	826	0.84	0.55	524	1.21	1.30
7	707	0.82	0.44	451	1.09	1.14
8	697	0.83	0.52	394	1.17	1.83
9	705	0.84	0.49	374	1.14	1.09
10	628	0.87	0.95	340	1.09	1.70
Total	**7634**			**5533**		

Table 4: Welch ANOVA test for AASRs and FGRs outlets per thousand persons for Income, Employment and Education Deprivation Domain Deciles

	FGRs Outlets '000 persons				AASRs outlets ' 000 persons			
Variables	**Statistic[a]**	**df1**	**df2**	**Sig.**	**Statistic[a]**	**df1**	**df2**	**Sig.**
Income	8.491	9	2983.29	.000	9.926	9	1625.874	.000
Employment	10.175	9	3039.274	.000	9.929	9	1820.151	.000
Education	3.872	9	3057.336	.000	5.902	9	2058.398	.000

a. Asymptotically F distributed.

Table 5: Games Howell Multiple Comparison Table for income deprivation deciles 1 with other deciles and FGR and AASR outlets per thousand persons

(I) Income Decile	(J) Income Decile	FGRs' Mean Difference (I-J)	Std. Error	AASRs Mean Difference (I-J)	Std. Error
	2	.0209781	.031068	.2054496	.0941227
	3	.05370514	.02998893	.24275375	.08967036
	4	.04062096	.02978833	**.31824635***	.09113662
	5	.08144241	.02943148	**.43033511****	.08469653
1	6	**.11199556***	.02921599	**.53313581****	.09581405
	7	**.12519408***	.02869678	**.56837757****	.088095
	8	**.11888496***	.03111738	**.52609876***	.12334805
	9	**.17656897****	.02879205	**.65396332****	.09179676
	10	.09022065	.05122964	.17714443	.22815708

**The mean difference significant at .001 level.
* The mean difference significant at 0.05 level.

Table 6: Likelihood of presence/absence and confidence interval of FGRs and AASRs across all income deprivation decile 1 – 9 compared to the reference decile (decile 10)

Decile 10 (Reference)	FGRs Exp(B)	95% C.I.		AASRs Exp(B)	95% C.I.	
1	**1.320****	1.166	1.494	**5.910****	5.013	6.967
2	**1.725****	1.530	1.945	**5.738****	4.866	6.766
3	**1.849****	1.642	2.083	**5.235****	4.435	6.178
4	**1.974****	1.754	2.223	**4.685****	3.965	5.535
5	**1.959****	1.740	2.205	**3.952****	3.338	4.679
6	**1.663****	1.474	1.876	**2.736****	2.297	3.258
7	**1.403****	1.241	1.586	**2.343****	1.961	2.799
8	**1.281****	1.132	1.451	**1.658****	1.375	1.998
9	1.122	.988	1.273	1.15	.942	1.405
Constant	.204**			.062**		

Exp(B) – odds ratio
 **$p < .001$ *$p < .05$
Decile 1 – most deprived 10% LSOAs
Decile 10 – least deprived 10% LSOAs (reference category)

4. Discussion/Conclusion

The results of the preliminary analysis using kernel density maps show that concentrations of the two groups of retailers is observed in densely populated and highly urbanised centres in the UK. The omnibus ANOVA test results further reveal significant differences in both FGRs and AASRs in the poorer areas compared to more affluent areas. Therefore, there is a concentration of FGRs in deprived areas which corroborates finding from other research (Black et al., 2012; Cummins and Macintyre, 2002; Smith et al., 2009) as well as AASRs (Wardle et al., 2014; Whysall, 2014) in England. Consequently, there is a concentration of both group of retailers in deprived areas in the UK. Accordingly, it is a possibility that the location of these AASRs echo the more abundant retail opportunities in these highly deprived commercialised communities and effect of planning regulation (Whysall, 2014).

Results from the comparison of FRGs and AASRs show that there is a stronger significant positive relationship between AASRs and deprived neighbourhoods than FGRs. Likewise, AASRs are more densely located in fewer areas with a higher average outlet across all areas. In addition, the ANOVA results show that although there is a concentration of retailers in deprived areas, the concentration seems to be more pronounced in AASRs. In addition, the regression analysis clearly shows that AASRs favour the most deprived areas (Graves, 2003; Wheeler, 2006 et al., 2006) while FGRs clearly favour moderately deprived deciles contrary to similar studies (Cummins and Macintyre, 2002; Burgoine et al., 2017). The aforementioned gives credence to the notion that AASRs might be deliberately targeting deprived areas (Graves, 2003; Portas, 2011). This uneven pattern which seems to favour deprived and poor neighbourhoods might be a fallout of their location strategy (Whysall, 2014). Further research need to further look into local areas to identify the salient characteristics driving AASRs' locations.

A limitation of this research is the spatial unit of measurement for the retail outlets. This research has assumed that the catchment area for all the concerned retailers are similar. In real world, this the catchment area of a 3000sq m food shop is different from that of a 30,000sq m. Likewise, the catchment area of a betting shop is different compared to a pawn shop. Therefore, further research should attempt to include a method that would incorporate appropriate catchment areas suitable for a comparative analysis.

5. Biography

Oluwole Adeniyi is a PhD researcher at Nottingham Trent University. He holds a B.Sc. degree in Geography and a Master degree in GIS with interest in retailing, inequality and health.

Professor. Paul Whysall is a Professor of Retailing. His major role in Nottingham Business School is as programme leader of the PhD programme, a role which causes him also to represent the School on a number of College and University committees concerning research degrees and research policy. His teaching interests have tended to focus around my research interests in ethics in retailing and marketing, social responsibility, and aspects of retailing.

Dr Abraham Brown is a lecturer at Nottingham Business School. He leads core business modules at undergraduate and postgraduate levels. He is the Internal Assessor of Market Research Society's Advanced Certificate in Market & Social Research. Additionally, he supervises undergraduate and postgraduate dissertations. He conducts public health research, with particular focus on tobacco marketing and policy effects on smokers.

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