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The association between the 'whistle-to-whistle' ban and the presence of gambling advertising on UK television

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ABSTRACT

Background: A previous study explored how restrictions on gambling advertising, known as the 'whistle-to-whistle' (W2W) ban, were associated with changes in television advertising around live football broadcasts in the United Kingdom. This study explores changes around other live sports broadcasts, and other programming, in the years before and after the W2W ban.

Methods: TV scheduling (Concise Media) and gambling advertising data (Nielsen Media) between 1 September and 1 December in the pre (2018) and post-W2W ban (2019) periods were used. Linear regression models assessed changes in the frequency of advertising during sports (football, horse racing, other), and other television programming (documentaries, drama, entertainment, film, leisure, music, news, other).

Results: Results corroborate previous findings; the W2W ban was associated with a decrease in gambling advertising around live football (2.9 advertisements per-program; $p < .001$) and other live sports (0.8 advertisements per-program; $p < .001$), except horse racing where advertising increased (2.5 advertisements per-program; $p < .001$). There were small changes in advertising around other types of programming during the same years.

Conclusions: Voluntary partial gambling advertising restrictions were associated with a reduction in television advertising across all live sports, except horse racing where advertising increased. There were small changes across the rest of the UK TV network. Understanding the magnitude of reductions on gambling behavior is complex since advertisements were not eliminated post-W2W ban period. Increased advertising around live horse racing programs might also mitigate the effects. These results have implications for global gambling policy, highlighting important considerations for the overall efficacy of partial, and voluntary, advertising restrictions.

Introduction

On 1 August 2019, the gambling industry body in the United Kingdom (UK), known as the Industry Group for Responsible Gambling, agreed to a voluntary restriction on gambling advertising on television (TV). Known as the 'whistle-to-whistle' (W2W) ban, it limited the timing of gambling advertising on TV during live sports broadcasts (Industry Group for Responsible Gambling 2023). The W2W ban applies to any advertising present on TV in the 5 min before a live sports game (i.e. the first 'whistle'), to 5 min after a live sports game (i.e. the final 'whistle'). This includes TV advertising present during any half-time, or intermittent break periods. During this within-program voluntary restriction period, only lottery and bingo advertisements are permitted. Advertisements for other products, such as sports betting or casino products, are only permitted in the pre and post-game sections of programming, which lie outside of the 5-min window either side of the game. A previous study explored the association between the introduction of this voluntary W2W ban and the presence of gambling advertising during live football broadcasts (McGrane et al. 2024). Results indicated that gambling advertising reduced, and that this was mostly driven by reductions during half-time. Despite this, advertising remained prevalent in the post-W2W ban years: approximately 3 advertisements per-live program.

Aside from football, the voluntary restriction applies to all other live sport programming, excluding horse and dog racing. Other television (non-sports) genres are not subject to the W2W ban, but have been associated with a voluntary daytime restriction on TV advertising, excluding advertising for lottery and bingo products, between the hours of 5:30 am and 9:00 pm (Industry Group for Responsible Gambling 2023). At the time of the W2W ban, non-live sports programming was brought under this voluntary daytime restriction on TV advertising alongside the rest of the UK TV network. Consequently, from the 1 August 2019, only live sports programming could carry advertising for sports betting and casino products during the day, as long as it was present outside of the within-program W2W ban period.

Evidence from other industries suggests that partial and voluntary advertising restrictions may be less effective than comprehensive restrictions (Saffer and Chaloupka 2000; Blecher 2008; Kovic et al. 2018), which are recommended by the World Health Organization (WHO) for both alcohol and tobacco (World Health Organization 2003, 2018). This is because they may cause a displacement of advertising from the restricted area toward the unrestricted area (Saffer and Chaloupka 2000; World Health Organization 2018). In this case, advertising might be displaced from live sports programming to the unrestricted period, to programming that lies outside of daytime restrictions (9:00 pm to 5:30 am), or to programming that is not subject to any restrictions (horse and dog racing). Advertising may also be substituted across different advertising media, such as pitch-side or online advertising. In order to understand the full effect of the W2W ban on TV advertising, we must explore how advertising changed across the rest of the UK TV network.

This study extends on a previous study (McGrane et al. 2024) by exploring the change in the frequency of gambling advertising across the UK TV network following the introduction of voluntary gambling advertising restrictions in the UK. It first explores the changes around live sports which are included in the W2W ban, and live sports which are exempt from the W2W ban, before exploring advertising across the rest of the UK TV network.

Materials and methods

Data

The W2W ban was implemented at the start of the 2019 football season (Industry Group for Responsible Gambling 2023). This study used three comparable months of data (1 September to 1 December) in the pre (2018) and post-W2W ban (2019) years. Choosing three months at the start of the football season was in line with when the voluntary W2W ban was introduced. Selecting these months also avoided most major global sporting events, such as the International Cricket Council (ICC) and International Federation of Association Football (FIFA) World Cups, or the Grand National (horse racing), which might have confounded results (see Appendix B for the spread of advertising across specific live sports). It was not possible to avoid all global sporting events, but choosing these dates avoided the events that were most likely to be associated with a higher prevalence of gambling advertising. For example, the Rugby World Cup took place over this period in 2019, but Rugby is a sport with a lower prevalence of gambling advertising compared to other sports (see Appendix B). The Ryder Cup (golf) took place in 2018 but over two days only. We could not look at data post-December in 2019 due to the potential influence of the COVID-19 pandemic. Therefore, we limited the data to September to December in both periods.

Data comprised TV scheduling (Concise Media), and gambling advertising data (Nielsen Media). A description of the content of these datasets is available in a previous paper (McGrane et al. 2024). After combining the datasets, data were collapsed to the program level. For each program, we calculated the total number of gambling advertisements across its entire duration. The data were pre-coded into genres, and horse racing was separated from all other sports programming before analysis:

1. Arts
2. Children
3. Films (movies)
4. Current affairs
5. Documentaries
6. Drama
7. Education
8. Entertainment
9. Leisure
10. Music
11. News
12. Religion
13. Football
14. Other sports
15. Teleshopping
16. Weather
17. Other (unassigned)

Variables

The primary dependent variable was the total frequency of advertisements during each program. A binary variable indicating the introduction of the W2W ban was the key explanatory variable in each model. This was equal to 0 if the year was 2018 (pre-W2W ban) and 1 if the year was 2019 (post-W2W ban). Control variables included the day of the game, the channel (ITV, Sky, TNT Sport (formerly BT Sport), Channel 4, Channel 5, Other) and the time of the game; Early Morning (00:00 to 4:59), Late Morning (4:59 to 11:59), Afternoon (12:00 to 16:49), Early Evening (17:00 to 20:59) and Late Evening (21:00 to 23:59). We also controlled for the length of the program in hours. These variables were selected based on available data, and their likely influence on the frequency of gambling advertising.

Statistical analysis

This study used linear regression models to investigate changes in advertising using the four control variables mentioned above. We did not use matching methods like a previous study (McGrane et al. 2024) because these methods did not improve the balance of covariates for all models. This is likely due to the additional genres being much larger and potentially requiring supplementary matching variables, which were not available for this study. However, the results of the linear regressions were similar to those from the matching regressions, likely due to the selection of two comparable time periods in 2018 and 2019 which minimizes confounding in the model.

The most heavily advertised genres were included as regression models: sports (football, horse racing, other) and other genres (documentaries, drama, entertainment, film, leisure, music, news). Horse racing was separated from all

other sports and assessed independently since it is not subject to the W2W ban. We were not able to separate dog racing since this was not categorized as a separate subgenre. The 'other sports' genre contained 45 categories of sport (see Appendix A for a detailed list). A large proportion of advertising data was assigned to the 'Other - unassigned' category; this is a characteristic of the broadcasting data used. Given the length of time required to manually categorize this group, a separate regression model was run which treats the unassigned group as its own genre.

Robustness checks

Gambling advertising data is count data which has a large number of zeros. Therefore, using a linear model may not be appropriate because these models assume normality of the data. Furthermore, other outcome variables which take account of the length of programming may be more suitable. Additional models using advertising per-hour of programming as the outcome variable, and using Poisson (count data) models, were undertaken as robustness checks. Despite small variations in the magnitude of coefficients, the results were similar. Linear models are intuitively more appealing since they provide coefficients showing the change in advertising per-program rather than ratios which may be harder to interpret and less relevant for policy. Using advertising per-hour of programming as an outcome variable is interesting, but in order to understand the impact across the whole program these need to be multiplied by the average hours of programming for that genre. Therefore, only linear models using total advertisements per-program were reported in the main paper for ease of interpretation. See Appendix C Tables C1 to C3 for the robustness checks and a comparison of coefficients across all three models.

Results

Descriptive

Table 1 details the total frequency of advertising, and hours of programming, for each of the genres. Football, horse racing, and other sport have been separated into live and non-live programming. The greatest percentage of total gambling advertising was present on documentary (13.9%) and entertainment (15.2%) programs. For sports, 2.3% of total advertising was present around football programs and 9% around other sports. Live horse racing and live football programs carried the highest number of adverts per-hour of programming (3.01 and 1.55 respectively), and per-program (14.02 and 3.46 respectively), compared to the rest of the UK TV network. Live football programs had between 2 and 5 times as many adverts per-program in 2019 and 2018 compared to all other genres, except horse racing. See Appendix B for a summary of advertising by specific live sport.

Table 1. Summary statistics.

Genre (all)		Total					2018 (pre-W2W ban)					2019 (post-W2W ban)				
		Freq	%	Total hours	Adv/hour	Adv/prog	Freq	%	Total hours	Adv/hour	Adv/prog	Freq	%	Total hours	Adv/hour	Adv/prog
Arts		238	0.0%	1659	0.14	0.10	128	0.0%	845	0.15	0.10	110	0.0%	814	0.14	0.09
Children		1	0.0%	19,762	0.00	0.00	1	0.0%	11,499	0.00	0.00	0	0.0%	8262	0.00	0.00
Current affairs		1396	0.3%	4560	0.31	0.19	635	0.2%	2305	0.28	0.16	761	0.3%	2255	0.34	0.23
Documentaries		72,891	13.9%	69,247	1.05	0.83	37,971	13.6%	32,909	1.15	0.89	34,920	14.2%	36,338	0.96	0.78
Drama		47,683	9.1%	52,211	0.91	0.74	25,537	9.2%	27,579	0.93	0.71	22,146	9.0%	24,632	0.90	0.76
Education		0	0.0%	41	0.00	0.00	0	0.0%	7	0.00	0.00	0	0.0%	34	0.00	0.00
Entertainment		79,773	15.2%	104,711	0.76	0.42	44,855	16.1%	57,728	0.78	0.42	34,918	14.2%	46,982	0.74	0.41
Film (movies)		30,543	5.8%	68,993	0.44	0.76	13,580	4.9%	36,879	0.37	0.64	16,963	6.9%	32,114	0.53	0.91
Leisure		17,460	3.3%	23,552	0.74	0.57	9307	3.3%	12,214	0.76	0.59	8153	3.3%	11,337	0.72	0.55
Football	Live	4558	0.9%	2939	1.55	3.46	2864	1.0%	1174	2.44	5.81	1694	0.7%	1766	0.96	2.05
	Non-live	7094	1.4%	7204	0.98	0.50	3417	1.2%	3480	0.98	0.48	3677	1.5%	3723	0.99	0.53
Horse racing	Live	3939	0.8%	1307	3.01	14.02	1818	0.7%	653	2.78	12.99	2121	0.9%	654	3.24	15.04
	Non-live	427	0.1%	1222	0.35	0.33	331	0.1%	899	0.37	0.42	96	0.0%	323	0.30	0.19
Other sports			0.0%													
	Live	10,447	2.0%	17,222	0.61	1.07	7414	2.7%	8704	0.85	1.48	3033	1.2%	8518	0.36	0.65
	Non-live	36,722	7.0%	43,266	0.85	0.62	20,746	7.4%	20,081	1.03	0.77	15,976	6.5%	23,185	0.69	0.49
Music		11,757	2.2%	16,305	0.72	0.89	10,904	3.9%	14,194	0.77	0.97	853	0.3%	2111	0.40	0.43
News		5287	1.0%	10,595	0.50	0.22	2018	0.7%	4919	0.41	0.16	3269	1.3%	5676	0.58	0.28
Religion		85	0.0%	772	0.11	0.08	22	0.0%	334	0.07	0.05	63	0.0%	437	0.14	0.11
Teleshopping		18	0.0%	2804	0.01	0.00	17	0.0%	2359	0.01	0.00	1	0.0%	445	0.00	0.00
Weather		156	0.0%	142	1.10	0.40	49	0.0%	50	0.99	0.28	107	0.0%	92	1.16	0.50
Other (unassigned)		193,858	37.0%	337,017	0.58	0.37	97,158	34.9%	162,325	0.60	0.40	96,700	39.4%	174,693	0.55	0.34
Total		524,333	100%	785,529	0.7	1.2	278,772	100%	401,137	0.7	1.3	245,561	100%	384,392	0.7	1.2

Table 2. Regression model results for sports programs.

	Live football	Live racing	Other live sports	Non-live football	Non-live racing	Other non-live sports
Change 2018–2019	−2.93*** [−3.34, −2.51]	2.56*** [1.09,4.03]	−0.83*** [−0.94, −0.73]	0.01 [−0.02,0.04]	−0.17** [−0.29, −0.04]	−0.24*** [−0.26, −0.22]
Program Length (hours)	4.30*** [4.02,4.58]	2.76*** [2.34,3.19]	0.83*** [0.80,0.87]	1.54*** [1.50,1.58]	0.17*** [0.10,0.23]	0.88*** [0.87,0.90]
Channel						
ITV	C –	C –	C –	C –	C –	C –
Sky	−0.18 [−2.14,1.78]	−7.66*** [−10.40, −4.92]	−1.56*** [−1.89, −1.23]	−0.28** [−0.53, −0.04]	−7.08*** [−7.54, −6.62]	−0.03 [−0.18,0.11]
TNT	−1.79* [−3.83,0.24]	–	−1.65*** [−2.03,−1.27]	−1.13*** [−1.38,−0.87]	–	−0.18** [−0.33,−0.04]
Channel 4	–	–	−2.66*** [−3.30,−2.02]	–	–	−0.40** [−0.75,−0.05]
Channel 5	–	–	−2.80*** [−3.65,−1.95]	–	–	−1.17*** [−1.40,−0.94]
Other	−0.24 [−2.22,1.73]	–	−2.53*** [−2.86,−2.20]	−1.18*** [−1.50,−0.87]	–	−0.56*** [−0.71,−0.41]
Day of week						
Sunday	C –	C –	C –	C –	C –	C –
Monday	0.08 [−0.50,0.67]	−0.81 [−3.66,2.03]	0.16* [−0.03,0.35]	0.01 [−0.05,0.07]	0.03 [−0.22,0.28]	−0.04* [−0.08,0.00]
Tuesday	−0.45 [−1.04,0.14]	1.26 [−1.78,4.30]	0.22** [0.03,0.41]	0.05* [−0.00,0.11]	0.04 [−0.21,0.29]	0.05*** [0.01,0.09]
Wednesday	−0.14 [−0.77,0.48]	2.60* [−0.17,5.38]	0.27*** [0.09,0.46]	0.05* [−0.01,0.11]	0.12 [−0.13,0.38]	0.06*** [0.02,0.10]
Thursday	−0.12 [−0.76,0.53]	4.16*** [1.28,7.03]	0.44*** [0.25,0.62]	0.06* [−0.00,0.11]	−0.02 [−0.28,0.23]	0.10*** [0.06,0.14]
Friday	−0.25 [−0.83,0.33]	2.91** [0.19,5.64]	0.33*** [0.15,0.51]	0.02 [−0.03,0.08]	0.31** [0.06,0.56]	0.06*** [0.02,0.10]
Saturday	−0.21 [−0.69,0.27]	0.41 [−2.09,2.91]	0.32*** [0.15,0.48]	0.10*** [0.03,0.16]	0.03 [−0.24,0.30]	0.07*** [0.03,0.11]
Time of day						
Early Morning	C –	C –	C –	C –	C –	C –
Late Morning	−2.65*** [−3.31,−1.99]	2.14 [−2.53,6.81]	−0.31*** [−0.46, −0.17]	−0.84*** [−0.88, −0.80]	0.39*** [0.16,0.63]	−0.97*** [−1.00, −0.94]
Afternoon	−2.72*** [−3.37, −2.06]	6.98*** [2.34,11.63]	−0.57*** [−0.73, −0.41]	−0.88*** [−0.93, −0.84]	0.90*** [0.56,1.25]	−0.89*** [−0.92, −0.86]
Early Evening	−1.17*** [−1.82, −0.52]	5.29* [−0.95,11.52]	−0.27*** [−0.43, −0.10]	−0.77*** [−0.83, −0.72]	3.54*** [2.90,4.18]	−0.89*** [−0.93, −0.86]
Late Evening	0.04 [−0.74,0.83]	−0.89 [−9.14,7.36]	−0.42*** [−0.60, −0.24]	0.37*** [0.31,0.43]	0.82* [−0.04,1.67]	0.19*** [0.16,0.23]
Constant	−2.05* [−4.21,0.12]	−0.47 [−5.58,4.64]	2.15*** [1.78,2.52]	0.49*** [0.24,0.73]	6.68*** [6.12,7.23]	0.75*** [0.61,0.90]
N	1319	281	9725	14,065	1305	59,709

Notes: Models report unstandardized linear coefficients using total advertising per-program as the outcome variable; 95% confidence intervals in brackets; early morning (00:00 to 4:59), late morning (4:59 to 11:59), afternoon (12:00 to 16:49), early evening (17:00 to 20:59), late evening (21:00 to 23:59); C represents the comparison category for the relevant variable; *$p < .1$, **$p < .05$, ***$p < .01$.

Linear regression models

Football

Table 2 shows the model results for sports programs split by live and non-live programming. There was a total reduction in advertising around live football (2.9 advertisements per program; $p < .001$) between 2018 and 2019 when the W2W ban was introduced. An additional hour of programming was associated with an additional 4 advertisements ($p < .001$). There were no significant difference in advertising across channels or days of the week. There were significantly fewer gambling advertisements during programs televised in the late morning, afternoon, and early evening compared to early morning.

For non-live football programming there was a marginal and statistically insignificant reduction in advertising between 2018 and 2019. An additional hour of programming was associated with an additional 1.54 advertisements ($p < .001$). There were significantly fewer advertisements televised on Sky, TNT Sports, and Other channels compared to ITV. There were significantly greater advertisements shown on Saturdays compared to Sundays, though coefficients were small. There were significantly fewer advertisements shown during in the late morning, afternoon and early evening compared to early morning. However, there were significantly more advertisements shown in the late evening compared to early morning.

Horse racing

Between 2018 and 2019 there was a total increase in advertising around live horse racing programs equal to 2.5 advertisements ($p < .001$). An additional hour of programming was associated with an additional 2.8 advertisements ($p < .001$). There were significantly fewer advertisements televised on Sky compared to ITV. There were significantly more advertisements shown on Thursdays and Fridays compared Sundays, and during the afternoon compared to early morning.

Changes for non-live racing were small and negative (0.2 advertisements per-program; $p < .05$). An additional hour of programming was associated with 0.17 more advertisements ($p < .001$). There were fewer advertisements on Sky compared to ITV. There were more advertisements present during programming on Fridays compared to Sundays, though coefficients were small. There were more advertisements present at all other times of the day compared to early morning, but results for late evening were only marginally significant ($p < .01$).

Other sports

For all other live sports programming, there was a statistically significant reduction of 0.8 advertisements per program ($p < .001$) between 2018 and 2019. An additional hour of programming was associated with 0.8 more advertisements ($p < .001$). There were fewer advertisements on all channels compared to ITV. There were more advertisements present on all days compared to Sundays, though results for

Monday were only marginally significant ($p < .01$) and coefficients were small in magnitude.

Likewise, the reduction around other non-live sports programming was small, but statistically significant (0.24 advertisements per program; $p < .001$). There were 0.9 additional advertisements associated with each additional hour of programming ($p < .001$). There were significantly fewer advertisements on all channels compared to ITV, except Sky which did not reach statistical significance. There were fewer advertisements on all days, except Mondays, compared to Sundays.

Other genres

Table 3 shows the model results for all other television genres. Between 2018 and 2019, there were marginal reductions in advertising around documentary, drama, entertainment, leisure, music and other programming (0.01 to 0.33 advertisements per program; $.001 > p < .05$). Around news and film programming there were small increases in advertising (0.09 to 0.15 advertisements per program; $p < .001$).

Table 3. Regression model results for non-sports programs.

	Documentaries	Drama	Entertainment	Leisure	Music	News	Film	Other (unassigned)
Change 2018–2019	−0.15*** [−0.17,−0.14]	−0.07*** [−0.09,−0.05]	−0.03*** [−0.03,−0.02]	−0.03** [−0.05,−0.00]	−0.33*** [−0.41,−0.24]	0.09*** [0.07,0.10]	0.15*** [0.12,0.18]	−0.01*** [−0.02,−0.01]
Program Length (hours)	1.31*** [1.28,1.34]	1.20*** [1.18,1.23]	1.24*** [1.23,1.25]	0.88*** [0.85,0.92]	0.79*** [0.77,0.81]	0.36*** [0.33,0.38]	0.53*** [0.51,0.55]	0.75*** [0.74,0.75]
Channel								
ITV	C –	C –	C –	C –	C –	C –	C –	C –
Sky	−0.08* [−0.16,0.00]	0.04** [0.00,0.07]	−0.50*** [−0.52,−0.48]	−0.22*** [−0.33,−0.10]	1.70 [−1.62,5.02]	0.15*** [0.11,0.19]	−1.10*** [−1.18,−1.02]	−0.94*** [−1.00,−0.89]
Channel 4	−0.72*** [−0.81,−0.63]	−0.19*** [−0.26,−0.12]	−0.67*** [−0.69,−0.64]	−0.80*** [−0.91,−0.70]	0.77 [−2.56,4.11]	−0.00 [−0.07,0.07]	0.03 [−0.06,0.13]	−0.66*** [−0.72,−0.60]
Channel 5	0.18*** [0.09,0.26]	0.54*** [0.50,0.58]	−0.52*** [−0.55,−0.49]	−0.18*** [−0.32,−0.05]	1.63 [−2.20,5.46]	0.13*** [0.09,0.18]	0.23*** [0.14,0.31]	0.25*** [0.19,0.32]
Other	−0.07* [−0.15,0.01]	0.05*** [0.01,0.08]	−0.48*** [−0.50,−0.46]	−0.46*** [−0.56,−0.36]	1.57 [−1.75,4.88]	0.24*** [0.20,0.28]	−0.23*** [−0.30,−0.15]	−0.12*** [−0.18,−0.07]
Day of week								
Sunday	C –	C –	C –	C –	C –	C –	C –	C –
Monday	−0.04*** [−0.07,−0.02]	−0.04** [−0.07,−0.01]	0.01 [−0.01,0.02]	−0.02 [−0.06,0.02]	−0.06 [−0.17,0.05]	−0.03** [−0.05,−0.00]	0.00 [−0.05,0.05]	−0.02*** [−0.03,−0.01]
Tuesday	−0.02 [−0.05,0.01]	0.01 [−0.02,0.04]	0.05*** [0.04,0.07]	−0.07*** [−0.11,−0.03]	−0.08 [−0.19,0.03]	−0.01 [−0.03,0.02]	0.02 [−0.02,0.07]	−0.02*** [−0.03,−0.01]
Wednesday	0.02 [−0.01,0.05]	0.03 [−0.01,0.06]	0.04*** [0.03,0.06]	−0.03 [−0.07,0.01]	−0.04 [−0.15,0.07]	−0.01 [−0.03,0.02]	0.01 [−0.04,0.06]	−0.01** [−0.02,−0.00]
Thursday	0.05*** [0.02,0.08]	0.08*** [0.05,0.11]	0.08*** [0.06,0.09]	0.02 [−0.02,0.06]	−0.04 [−0.15,0.07]	0.01 [−0.01,0.04]	0.04 [−0.01,0.09]	0.01** [0.00,0.02]
Friday	0.06*** [0.04,0.09]	0.08*** [0.05,0.11]	0.09*** [0.07,0.10]	0.00 [−0.04,0.04]	−0.01 [−0.12,0.10]	0.02* [−0.00,0.05]	0.08*** [0.03,0.13]	0.00 [−0.01,0.01]
Saturday	0.05*** [0.02,0.07]	0.09*** [0.06,0.12]	0.06*** [0.05,0.08]	0.00 [−0.04,0.04]	0.05 [−0.05,0.16]	−0.00 [−0.02,0.02]	0.02 [−0.03,0.06]	0.01 [−0.00,0.02]
Time of day								
Early Morning	C –	C –	C –	C –	C –	C –	C –	C –
Late Morning	−0.36*** [−0.38,−0.34]	−0.20*** [−0.22,−0.17]	−0.14*** [−0.15,−0.12]	−0.08*** [−0.11,−0.04]	0.08* [−0.01,0.17]	−0.08*** [−0.10,−0.06]	−0.24*** [−0.28,−0.20]	−0.12*** [−0.13,−0.11]
Afternoon	−0.09*** [−0.12,−0.07]	0.03** [0.00,0.05]	−0.05*** [−0.06,−0.03]	0.11*** [0.07,0.14]	0.27*** [0.17,0.36]	−0.08*** [−0.10,−0.06]	−0.17*** [−0.21,−0.13]	−0.04*** [−0.05,−0.03]
Early Evening	−0.51*** [−0.53,−0.48]	−0.51*** [−0.53,−0.48]	−0.24*** [−0.25,−0.23]	−0.22*** [−0.25,−0.18]	0.28*** [0.18,0.38]	−0.09*** [−0.11,−0.07]	−0.43*** [−0.48,−0.39]	−0.11*** [−0.12,−0.10]
Late Evening	0.69*** [0.66,0.71]	0.02 [−0.01,0.05]	0.35*** [0.34,0.37]	0.76*** [0.71,0.81]	0.54*** [0.44,0.64]	0.04*** [0.02,0.07]	0.32*** [0.28,0.37]	0.19*** [0.18,0.20]
Constant	0.03 [−0.05,0.12]	−0.18*** [−0.23,−0.13]	0.24*** [0.21,0.26]	0.39*** [0.29,0.50]	−1.79 [−5.11,1.52]	−0.12*** [−0.17,−0.08]	0.35*** [0.26,0.43]	0.08*** [0.03,0.14]
N	87,630	64,740	192,217	30,683	13,205	24,088	39,971	523,774

Notes: Models report unstandardized linear coefficients using total advertising per-program as the outcome variable; 95% confidence intervals in brackets; morning (00:00 to 4:59), midday (4:59 to 11:59), afternoon (12:00 to 16:49), evening (17:00 to 20:59), late evening (21:00 to 23:59); C represents the comparison category for the relevant variable; *$p < .1$, **$p < .05$, ***$p < .01$.

Each additional hour of programming was associated with between 0.36 and 1.31 additional advertisements depending on the relevant genre ($p < .001$). Across the other control variables, the relative differences in advertising across the day of the week, time of day, and channels varied in direction, magnitude, and statistical significance.

Discussion

This study explored changes in television gambling advertising associated with the introduction of voluntary advertising restrictions on television, known as the 'whistle-to-whistle ban'. Results corroborate a previous study, showing that advertising reduced around live football broadcasts. The present study expands on these earlier findings by showing that there was a comparatively smaller reduction across all other live sports programming, except horse racing which was exempt from the restrictions. Advertising around horse racing increased in 2019 even after controlling for the duration of programming. There were minimal changes observed across all other TV programming around this time. It is important to note that TV advertising during the W2W period was not entirely eliminated. This is because lottery and bingo advertisements are still permitted during this time, since they are exempt from both the voluntary W2W ban and voluntary daytime advertising restrictions.

The coefficient and sample size on the live football models were marginally higher in this study compared to a previous study because we used different models (linear), and we did not restrict programs to those which covered the full length of a football game; the previous study relied on splitting games into sections (pre-match, W2W, half-time, post-match). The time-of-day variable was coded differently to reflect the wider range of program times in the rest of the data compared to just football programs. This was to ensure all models were comparable in this study. Nonetheless results were similar.

The decrease in advertising around most live sports programs is expected; the voluntary W2W ban was an agreement to limit the available time for TV advertising around live sports broadcasts. However, in 2019, advertising around other live sports programming was much smaller than live football (Table 1). This might be due to the large number of sports in this category, with only a few sports having a higher frequency of advertising such as Cricket, Golf, and Boxing (See Appendix B Table B1).

The minimal changes around non-sports programming is likely due to the voluntary daytime restriction on advertising faced by these programs (excluding lottery and bingo products) between the hours of 5:30 am and 9:00 pm. The small changes around non-live sports are expected given that the data from 2018 suggests sparse advertising around these programs (less than one advertisement per-program). Therefore, bringing these programs under the voluntary restrictions on advertising during daytime TV, in line with other television genres, did not have a substantial impact. Although there was the opportunity to increase advertising during unrestricted times (9:00 pm to 5:30 am), or to switch advertisements during restricted periods to exempt products (lottery and bingo), this does not appear to have happened.

Between 2018 and 2019, we observe an increase in horse racing advertising, which may indicate spreading of advertising from restricted to unrestricted programming. This holds after controlling for the length of programming, the day of the week, the channel, and the time of day the program was televised. However, we cannot confirm causality. Nonetheless, live horse racing has the greatest share of advertising around live all sports programming (36%; see Appendix C), and the highest advertisements per-program (15 advertisements; see Table 1) in 2019. Live horse racing is the only genre in this study exempt from all voluntary advertising restrictions, including the W2W ban and day-time restrictions. The much higher presence of advertising around unrestricted programming raises concerns about the efficacy of voluntary partial advertising restrictions like the W2W ban.

This study could not control for overall trends in gambling advertising. Over the last decade online gambling advertising has been growing significantly; it has been reported that there was a 56% rise in expenditure on gambling advertising by operators between 2014 and 2017, mostly driven by online and social media advertising expenditure (The National Audit Office 2020). A more recent study showed increases in advertising expenditure following the COVID-19 lockdowns in the UK (Critchlow et al. 2023). Whilst there are no more recent figures on advertising expenditure in the UK in the public domain, the increase in advertising around live horse racing programs would suggest that TV advertising is still an important type of advertising media. However, future research on trends in gambling advertising would be a valuable addition to the evidence base.

Strengths

This study used two rich datasets on TV schedules and gambling advertising to explore the wider impact of advertising restrictions on the presence of advertising on television. The data allowed us to observe the distribution of gambling advertising across different TV genres. This study expanded on a previous study, enhancing our understanding of the wider impact of advertising restrictions. It also compared a number of models to test the robustness of results.

Limitations

A key limitation of this study is that it only looked at one type of advertising. Other types of advertising, such as online and embedded (e.g. pitch-side), are not included in the W2W ban. Therefore, there is the opportunity to increase advertising efforts elsewhere to make up for losses in TV advertising. Whilst we cannot comment on this in the current study, this is an area requiring further research. A general limitation of the dataset is the large proportion of unassigned data. We explored advertising amongst this group separately, treating it as its own genre, to avoid

dropping the data. This study used linear regression models. However, selecting two comparable periods of TV programming before and after the voluntary W2W ban, which avoided global sporting events that might be highly associated with gambling advertising, helped to minimize confounding. Additionally, supplementary analysis confirmed the robustness of results. Finally, the data covered 2018 and 2019 only due to budget constraints and concern over the impact of COVID-19 on gambling advertising post-2019. However, additional data from the years before and after the voluntary W2W ban would be valuable. This would allow us to observe much longer-term trends in advertising.

Policy implications

Despite the observed reductions in advertising during live sports, these programs (particularly live football) still carry some of the highest numbers of advertisements per program, and per-hour of programming, compared to the rest of the UK TV network. This is likely due to the voluntary restrictions on daytime TV advertising between 5:30 am and 9:00 pm that is applied to all other programming. Gambling advertising around other programming is still present during the day, since all voluntary restrictions do not apply to lottery and bingo products. However, the only opportunity to advertise other products, such as sports betting and casino products, during the day is around live sports programming. It appears that this is the case for live football, and to a greater extent, live horse racing where there are an average of 15 advertisements per program in 2019. Given the evidence of the impact of advertising on gambling behavior (Bouguettaya et al. 2020; Killick and Griffiths 2022; McGrane et al. 2023), particularly around sports, the higher presence of advertising around live sports may still represent a risk factor for gambling harm. Additionally, the low frequency of advertising around other programming might suggest that the restrictions on daytime TV are more effective at reducing advertising than the partial W2W ban, and may subsequently make a greater contribution toward the mitigation of gambling harms. These results have wider implications given that other countries, such as Ireland have implemented similar restrictions (The Advertising Standards Authority for Ireland 2021). Other countries are calling for a complete ban on gambling advertising (The Parliament of Australia 2023).

Understanding the magnitude of impact of these reductions in advertising on gambling behavior is complicated. Although there is ample evidence that gambling advertising has an impact on gambling behavior (Bouguettaya et al. 2020; Killick and Griffiths 2022; McGrane et al. 2023), there is no evidence of how this impact differs based on the timing of TV advertisements. Advertisements are still present during unrestricted periods, such as the pre and post-match programming sections of live sport. Therefore, we cannot estimate the magnitude of reduction in betting behavior. This depends on how influential advertisements are when present outside of the W2W period. If they are sufficient to prompt an increase in betting, then the impact of the

reduction in advertising during the W2W period may be mitigated. Also, the increase in advertising around live horse racing might reduce the overall impact on betting behavior. There is some evidence of a dose-response effect of advertising (Bouguettaya et al. 2020), whereby increased exposure increases gambling behavior. Given that advertising is not eliminated around live sports, the effect on betting behavior would likely be greater than zero. However, we do not have the data to confirm this in the current study. This is an area that requires further research.

Displacement of advertising also includes substitution to other types, and content, of advertising. Whilst we do not have information on the content of advertisements in this study, it would be interesting to explore whether this changed between 2018 and 2019. For example, exploring whether the targeted content of advertisements shifted. We must also identify how other types of advertising changed at the time of the restrictions (e.g. embedded, online, direct, sponsorship) to gauge a full picture of the impact of the partial voluntary restrictions. Obtaining additional data on TV gambling advertising and comparing this to other types of advertising media before and after the voluntary W2W ban would provide a greater understanding of the longer term trends in gambling advertising, and how expenditure on advertising has changed over the years. Gambling advertising remains mostly self-regulated in the UK, and understanding how this impacts restrictions on advertising, and subsequently the presence of advertising on TV, more comprehensively is important.

Conclusions

Voluntary partial gambling advertising restrictions were associated with a reduction in advertising across all live sports, except horse racing where there was an increase in advertising. This might indicate spreading of advertising from restricted to unrestricted programming, which could mitigate the positive effects of reduced advertising elsewhere. There were few robust changes in advertising across the rest of the TV network. Advertisements were not eliminated in the post-W2W ban period, and remained comparatively prevalent around live football and live horse racing. These results highlight important considerations when evaluating the overall efficacy of voluntary partial advertising restrictions, which has implications for global gambling policy. Future research should investigate changes to other types of advertising, such as online, following the introduction of the voluntary restrictions. Research should also use additional data from before and after the voluntary W2W ban to observe the longer-term changes in advertising.

Ethical approval

Ethical approval was not required because this research used secondary advertising and TV scheduling data.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

Advertising data used in this study is not available for sharing due to licensing restrictions. However, STATA do-files and log-files are available on request from the corresponding author (EM).

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Appendices

Appendix A: List of sports in 'other sports' genre (live and non-live)

1. American football
2. Angling/fishing
3. Athletics
4. Ballet
5. Basketball
6. Boxing
7. Clay pigeon shooting
8. Composite
9. Contact sports
10. Cricket
11. Curling
12. Cycling
13. Dance
14. Darts
15. Extreme sports
16. Figure skating
17. Formula one
18. Gaelic football
19. Golf
20. Gymnastics
21. Hockey
22. Hurling
23. Ice hockey
24. Judo
25. Magazine
26. Motor racing
27. Miscellaneous
28. Netball
29. News
30. Poker
31. Powerboat racing
32. Rugby (league and union)
33. Show Jumping
34. Snooker/pool/billiards
35. Special events
36. Squash
37. Swimming/diving
38. Table tennis
39. Tennis
40. Triathlon
41. Volleyball
42. Water sports
43. Weightlifting
44. Winter sports
45. Wrestling

Appendix B: Advertisements by live sports subgenre

Table B1. Advertisements by all live sports subgenres.

Subgenre (live sports)	Total					2018					2019				
	Freq	%	Total hours	Adv/ hour	Adv/ prog	Freq	%	Total hours	Adv/ hour	Adv/ prog	Freq	%	Total hours	Adv/ hour	Adv/ prog
American football	14	0.09%	408	0.03	0.11	11	0.12%	156	0.07	0.22	3	0.05%	253	0.01	0.04
Athletics	5	0.03%	79	0.06	0.08	4	0.04%	60	0.07	0.08	1	0.02%	19	0.05	0.07
Basketball	190	1.27%	234	0.81	1.81	185	2.04%	91	2.03	4.74	5	0.08%	142	0.04	0.08
Boxing	185	1.23%	114	1.62	3.25	88	0.97%	43	2.03	7.33	97	1.64%	71	1.37	2.16
Clay pigeon shooting	0	0.00%	4	0.00	0.00	0	0.00%	0	0.00	0.00	0	0.00%	4	0.00	0.00
Contact sports	92	0.61%	85	1.08	1.84	17	0.19%	14	1.19	2.13	75	1.27%	71	1.06	1.79
Cricket	1089	7.27%	1104	0.99	3.86	804	8.87%	517	1.56	5.78	285	4.82%	587	0.49	1.99
Curling	0	0.00%	68	0.00	0.00	0	0.00%	59	0.00	0.00	0	0.00%	9	0.00	0.00
Cycling	85	0.57%	1228	0.07	0.08	50	0.55%	749	0.07	0.07	35	0.59%	479	0.07	0.09
Darts	641	4.28%	396	1.62	5.25	310	3.42%	126	2.47	8.86	331	5.59%	270	1.23	3.80
Extreme sports	6	0.04%	22	0.27	0.21	3	0.03%	3	0.96	0.43	3	0.05%	19	0.16	0.14
Figure skating	0	0.00%	203	0.00	0.00	0	0.00%	203	0.00	0.00	0	0.00%	0	0.00	0.00
Formula one	223	1.49%	334	0.67	0.82	178	1.96%	199	0.90	1.16	45	0.76%	135	0.33	0.38
Football	4558	30.42%	2939	1.55	3.46	2864	31.59%	1174	2.44	5.81	1694	28.62%	1766	0.96	2.05
Gaelic football	1	0.01%	3	0.29	1.00	1	0.01%	3	0.29	1.00	0	0.00%	0	0.00	0.00
Golf	2639	17.61%	2078	1.27	3.62	1829	20.17%	1022	1.79	4.94	810	13.68%	1056	0.77	2.26
Horse racing	3939	26.29%	1307	3.01	14.02	1818	20.05%	653	2.78	12.99	2121	35.83%	654	3.24	15.04
Judo	0	0.00%	41	0.00	0.00	0	0.00%	28	0.00	0.00	0	0.00%	12	0.00	0.00
Motor racing	105	0.70%	1437	0.07	0.07	69	0.76%	616	0.11	0.09	36.0	0.61%	821	0.04	0.05
Netball	96	0.64%	83	1.16	2.18	96	1.06%	65	1.49	2.74	0.0	0.00%	18	0.00	0.00
Powerboat racing	126	0.84%	310	0.41	2.09	23	0.25%	10	2.29	2.09	103.0	1.74%	300	0.34	0.67
Rugby	174	1.16%	310	0.56	0.92	174	1.92%	293	0.59	1.18	0.0	0.00%	17	0.00	0.00
Show jumping	242	1.61%	578	0.42	0.00	0	0.00%	43	0.00	0.00	242.0	4.09%	535	0.45	0.98
Snooker/pool/billiards	182	1.21%	725	0.25	0.66	178	1.96%	678	0.26	0.46	4.0	0.07%	47	0.09	0.06
Sport-misc	40	0.27%	109	0.37	0.20	37	0.41%	100	0.37	0.27	3.0	0.05%	9	0.34	0.16
Sport-special events	41	0.27%	98	0.42	0.41	25	0.28%	40	0.62	0.51	16.0	0.27%	58	0.27	0.64
Table tennis	0	0.00%	86	0.00	0.00	0	0.00%	50	0.00	0.00	0.0	0.00%	36	0.00	0.00
Tennis	227	1.51%	488	0.47	1.15	227	2.50%	331	0.69	2.16	0	0.00%	157	0.00	0.00
Triathlon	1	0.01%	47	0.02	0.01	0	0.00%	19	0.00	0.00	1.0	0.02%	29	0.04	0.02
Watersports	0	0.00%	33	0.00	0.00	0	0.00%	3	0.00	0.00	0.0	0.00%	30	0.00	0.00
Weight lifting	67	0.45%	56	1.19	1.91	66	0.73%	54	1.23	2.06	1.0	0.02%	3	0.37	0.33
Winter sports	1	0.01%	415	0.00	0.00	1	0.01%	122	0.01	0.01	0.0	0.00%	294	0.00	0.00
Wrestling	16	0.11%	246	0.06	0.12	8	0.09%	116	0.07	0.12	8.0	0.14%	130	0.06	0.12
	14,985	100%	15,669	0.6	1.5	9066	100%	7639	0.8	2.0	5919	100%	8029	0.4	1.0

Appendix C: Coefficients from additional models

Table C1. Coefficients from additional sports models (linear models using advertisements per-hour of programming as the outcome variable; Poisson models using total advertisements per-program as the outcome variable).

	Live football	Live racing	Other live sports	Non-live football	Non-live racing	Other non-live sports
Change 2018–2019 in advertisements per hour of programming	−1.13*** [−1.30,−0.96]	0.36* [−0.04,0.76]	−0.25*** [−0.29,−0.21]	−0.01 [−0.05,0.03]	−0.27*** [−0.39,−0.16]	−0.23*** [−0.25,−0.21]
Change 2018–2019 using Poisson models (coefficients are incidence-rate ratios)	0.52*** [0.49,0.56]	1.23*** [1.16,1.31]	0.49*** [0.47,0.51]	0.94*** [0.89,0.98]	0.50*** [0.39,0.64]	0.65*** [0.63,0.66]

Note: Advertisements per-hour of programming models report unstandardised linear coefficients; Poisson models report incidence rate ratios; 95% confidence intervals in brackets; *$p<0.1$, **$p<0.05$, ***$p<0.01$.

Table C2. Coefficients from additional non-sports models (linear models using advertisements per-hour of programming as the outcome variable; Poisson models using total advertisements per-program as the outcome variable).

	Documentaries	Drama	Entertainment	Leisure	Music	News	Film	Other (unassigned)
Change 2018–2019 in advertisements per hour of programming	−0.12*** [−0.14,−0.11]	−0.02** [−0.04,−0.00]	0.01 [−0.00,0.02]	−0.04*** [−0.07,−0.02]	−0.09*** [−0.15,−0.04]	0.15*** [0.11,0.20]	0.08*** [0.07,0.10]	−0.10*** [−0.11,−0.10]
Change 2018–2019 using Poisson models (coefficients are incidence-rate ratios)	0.88*** [0.86,0.89]	0.94*** [0.92,0.96]	0.95*** [0.94,0.97]	0.98 [0.95,1.01]	0.45*** [0.42,0.48]	1.57*** [1.48,1.66]	1.24*** [1.21,1.27]	0.83*** [0.83,0.84]

Note: Advertisements per-hour of programming models report unstandardised linear coefficients; Poisson models report incidence rate ratios; 95% confidence intervals in brackets; *$p<0.1$, **$p<0.05$, ***$p<0.01$.

Table C3. A comparison of coefficients between the three models.

Column number Genre	1 Linear coefficient	2 Poisson coefficient	3 2018 Adv/ Prog	4 2019 Adv/ prog	5 Poisson check	6 Adv/ hour	7 Average hours	8 Adv/hour check
Live football	−2.93***	0.52***	5.81	2.05	3.02	−1.13***	2.23	−2.52
Football	0.01	0.94***	0.48	0.53	0.45	−0.01	0.51	−0.01
Live racing	2.56***	1.23***	12.99	15.04	15.98	0.36*	4.65	1.67
Racing	−0.17***	0.50***	0.42	0.19	0.21	−0.27***	0.94	−0.25
Other live sports	−0.83***	0.49***	1.48	0.65	0.73	−0.25***	1.77	−0.44
Other sports	−0.24***	0.65***	0.77	0.49	0.50	−0.23***	0.72	−0.17
Documentaries	−0.15***	0.88***	0.89	0.78	0.78	−0.12***	0.79	−0.09
Drama	−0.07***	0.94***	0.71	0.76	0.67	−0.02**	0.81	−0.02
Entertainment	−0.03***	0.95***	0.42	0.41	0.40	0.01	0.54	0.01
Leisure	−0.03**	0.98	0.59	0.55	0.58	−0.04***	0.77	−0.03
Music	−0.33***	0.45***	0.97	0.43	0.44	−0.09***	1.23	−0.11
News	0.09***	1.57***	0.16	0.28	0.25	0.15***	0.44	0.07
Film	0.15***	1.24***	0.64	0.91	0.79	0.08***	1.72	0.14
Other genre	−0.06***	0.83***	0.4	0.34	0.33	−0.10***	0.64	−0.06

Notes: All models produce similar results and support the conclusions in the main paper. Table C3 compares the coefficients in all three models. In this table, if columns 4 and 5 are similar, then the Poisson models report similar results to the main linear models. If columns 1 and 8 are similar, then the advert per-hour of programming models report similar results to the main linear models. Results are broadly similar across models despite some variation in magnitude. Variation in magnitude is expected across samples and models. In the adverts per-hour of programming model for horse racing, significance and magnitude are lower. Despite this, results for the count data model and alternative linear model, which both control for the length of the program, corroborate one another. Linear models have been reported in the main paper for ease of interpretation.
*$p<0.1$, **$p<0.05$, ***$p<0.01$.