Why Shorter Advertisement Breaks Reduce Radio Advertisement Avoidance

When It Comes to Radio Advertising, Less Is More

AARON MICHELON
University of South Australia, UniSA Business, Ehrenberg-Bass Institute for Marketing Science
aaron.michelon@marketingscience.info

STEVEN BELLMAN
University of South Australia
steven.bellman@marketingscience.info

MARGARET FAULKNER
University of South Australia
margaret.faulkner@marketingscience.info

JUSTIN COHEN
University of South Australia
justin.cohen@marketingscience.info

JOHAN BRUWER
University of South Australia
johan.bruwer@marketingscience.info

Low-clutter radio stations have shorter advertisement breaks to attract listeners, increase advertisement effectiveness, and potentially reduce mechanical advertisement avoidance (*i.e.* switching stations). This research introduces a two-factor theory explaining why mechanical advertisement avoidance has an inverse U-shaped relationship with advertisement position in the break, and advertisement break length in advertisement units. The theory was supported by portable people meter (PPM) ratings data. Peak mechanical avoidance occurred at the fourth advertisement position, similar to the average advertisement break length perceived by radio listeners from the same city as the PPM data. This explains why the two-advertisement breaks that are typical for low-clutter radio stations minimize mechanical avoidance.

INTRODUCTION

With the rise of advertisement-free streaming media platforms such as Netflix, advertising-supported services such as Disney+ have been experimenting with limited-interruption advertising to win back their audience (*e.g.*, Brechman, Bellman, Robinson, *et al.*, 2016; Vranica and Flint, 2022). Limited-interruption, one-advertisement breaks are also a feature of streaming advertisement insertions in some podcasts, with podcast advertisement spending forecast to exceed $2 billion in 2023 (Benes, 2022). Radio has a longer history of using low-clutter advertising formats. In Australia, for example, the Nova radio network has led FM ratings since 2002 (Radio Today, 2022), most likely because it uses a low-clutter format of just four advertisement minutes per hour, in short two-advertisement breaks (Riebe and Dawes, 2006). Low-clutter radio offers advertisers two key benefits. First, advertisements reach more people, because low-clutter radio appeals to listeners by delivering more content and less advertising (Puig, 1989; Bhattacharyya, 2018). Second, radio advertisements in a low-clutter setting are more effective because they are more likely to be recalled (Brechman *et al.*, 2016; Hammer, Riebe, and Kennedy, 2009; Riebe and Dawes, 2006).

Radio was the first electronic mass medium and continues to reach large audiences of most ages weekly, despite the introduction of new digital

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Management Slant

- Low-clutter radio stations have larger audiences and less mechanical advertisement avoidance.
- Low clutter (*i.e.*, shorter advertisement breaks) reduces the time available for advertisement avoidance.
- It is best to place advertisements in breaks with no more than three advertisements.
- Buy spots at the largest-reaching station, but consider low clutter when reach is equal.

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audio platforms (Nielsen, 2021; RAJAR, 2021). Radio audience measurement pioneered the use of people meters with the set-top box in the 1930s (Nielsen, 1942, 1945); however, measurement of radio audience size has become more difficult, as listening can now occur through many devices. The inclusion of podcast audiences aims to provide a more holistic estimate of the size of the digital audio advertising audience (Song, 2023). Accurate second-by-second radio audience measurement has revealed patterns in mechanical advertisement avoidance. Understanding current levels of radio advertisement avoidance is necessary to anticipate future changes in the radio advertising environment.

Radio stations sell the size of their audience to advertisers using *program ratings*, which advertisers use as a proxy for the advertisement-break audience. The invention of the portable people meter (PPM) replaces this proxy with advertisement-spot ratings (Generali, Kurtzman, and Bose, 2011), which are often smaller than program ratings because of advertising avoidance (Michelon, Bellman, Faulkner, *et al.*, 2020; Generali *et al.*, 2011). Listeners can avoid radio advertising in three ways (Bellman, Schweda, and Varan, 2010):

- **Cognitive avoidance**, where listener attention is diverted from the advertisement to another task, so the radio advertisement becomes background noise. Background radio advertising can still be effective, as demonstrated by the "ironing board" studies where participants thought the purpose of the study was evaluating a new starch product and could recall the radio advertisements playing in the background (Riebe and Dawes, 2006).
- **Physical avoidance** occurs when the listener leaves the room, although this may not prevent hearing the advertisements.
- **Mechanical avoidance**, or the use of a function or device to reduce exposure to advertising content, such as switching the station, muting the sound, or turning off the radio.

Because low-clutter stations have higher ratings and higher advertisement recall, they can charge more for advertisement spots to cover the revenue lost by running fewer spots. Low-clutter advertising may also be worth more, because it is associated with lower rates of advertisement avoidance. This research makes an important contribution, because it proposes and tests a new two-factor theory that explains why mechanical advertisement avoidance likely has an inverse U-shaped relationship with advertisement position in the break and the length of advertisement breaks in advertisement units. First, the new theory clarifies the understanding of radio advertisement avoidance, which has been hampered by previous studies' conflicting results due to method differences (*e.g.*, survey data versus people meter data; Abernethy, 1991; Callius, 2008; Generali *et al.*, 2011; McDowell and Dick, 2003; Paech, Riebe, and Sharp, 2003; Speck and Elliott, 1997). Second, finding general patterns in mechanical advertisement avoidance is complicated by differences between countries in the number of advertising minutes per hour (Dix and Phau, 2010). Third, technology advances have made advertisement avoidance more sophisticated, so past findings may no longer apply (Kelly, Kerr, and Drennan, 2010; Kelly, Kerr, Drennan, and Fazal-e-Hasan, 2019). With a smart speaker, for example, listeners can switch stations by voice command and block advertisements (Storelli, 2018). Last, prior studies have varied in their duration of observation, from minutes (Abernethy, 1991; Edison Research, 2016) to days (Generali and Kurtzman, 2015; Newstead, Reynolds, and Riebe, 2009), months (North and van Meurs, 2004), and even a whole year (Generali *et al.*, 2011).

To test the proposed two-factor theory of the relationships between mechanical avoidance of radio advertisements and advertisement position within a break, and advertisement-break size, this research reports two studies. Study 1 tested the theory using PPM data, an objective measure of mechanical avoidance. Study 2 confirmed the theory's explanation of when the peak of mechanical advertisement avoidance occurs by surveying radio listeners' perceptions of average advertisement-break length, in the same city where the PPM data originated. The results of this research will help advertisers choose the best radio stations for their advertising. Furthermore, the insights can help radio stations design their advertisement breaks to attract more listeners and advertisers.

LITERATURE REVIEW

Although few radio studies examine the effects of advertisement-break length on advertisement avoidance, some guidance comes from previous studies on television advertisement avoidance (McDowell and Dick, 2003; North and van Meurs, 2004; Speck and Elliott, 1997). During the average television advertisement break, the outflow of advertisement avoiders at the beginning of the break is matched by an equal inflow at the end of the break (many of them are the same people returning), so that the program's average-minute audience is unchanged when it recommences (van Meurs, 1998). This means that the maximum rate of television-advertisement mechanical avoidance occurs during the middle of the break (*e.g.*, Danaher, 1995). The authors of the current research explore whether the same inverse U-shaped relationship between advertisement avoidance and advertisement position in the break will be seen in radio average-minute audience data (van Meurs, 1998).

To explain this inverse U-shaped effect of advertisement position on advertisement avoidance, the authors developed a modified two-factor theory similar to the two-factor theory that has been used to explain the effects of repetition on advertisement

In lab studies, where advertisement exposure is controlled, the peak of the inverse U-shaped effect of advertisement repetition (the trough of its effect on avoidance) occurs at around three exposures.

avoidance (Berlyne, 1970). According to this theory, repetition has an inverse U-shaped effect on advertisement liking—and, therefore, a U-shaped effect on advertisement avoidance—because, up to a certain number of repetitions, exposure is dominated by the first factor in the model, "familiarity," and has a positive "wear-in" effect. Unfamiliar or novel stimuli demand attention and understanding, so Krugman (1972) justified "frequency of three or more" planning, because the first exposure aroused cognitive curiosity ("What is it?"); the second, an evaluation ("What of it?"); and, finally, the third would generate a behavioral response: buying or avoidance. The potential diminishing returns and negative effects of repeated exposure are explained by the second factor in the two-factor model, "tedium." The desire for novelty is frustrated by seeing the same content repeated. When the advertisement is no longer interesting, the second factor starts to dominate, and further advertisement repetition has a negative "wear-out" effect, making mechanical avoidance (*e.g.*, changing channels) more likely (Siddarth and Chattopadhyay, 1998). In lab studies, where advertisement exposure is controlled, the peak of the inverse U-shaped effect of advertisement repetition (the trough of its effect on avoidance) occurs at around three exposures (Calder and Sternthal, 1980; Campbell and Keller, 2003). In the field, where exposure is uncertain, repetition's peak effect can occur much later, after 10 or 15 exposures (Pechmann and Stewart, 1988).

This two-factor theory has been widely applied in marketing and advertising research. A meta-analysis of 19 studies confirmed that advertisement repetition has an inverse U-shaped effect on brand attitude, consistent with Berlyne's (1970) two-factor theory (Schmidt and Eisend, 2015). Recently, this two-factor theory has been used to explain a cross-media wear-in effect, whereby exposure to a radio advertisement enhances responses to a video advertisement for the same brand (Russo, Valesi, Gallo, *et al.*, 2020). In another study, the two-factor theory was used to explain why repeated exposure to content from Instagram influencers has an inverse U-shaped effect on likes and comments, which peak after 40 to 50 posts per month (*i.e.*, just over one a day; Tafesse and Dayan, 2023).

Differences between Standard and Modified Two-Factor Model

Similarly, a two-factor model can be used to explain the inverse U-shaped effect of advertisement position on mechanical advertisement avoidance. However, this new model has several notable differences compared with the standard two-factor model. First, the dependent variable is not liking or favorable attitude but disliking, which is expressed as advertisement avoidance. Instead of liking increasing to a peak and then diminishing, the new model seeks to explain how disliking (avoidance) increases and then decreases. Second, the phenomenon causing this increase and decrease is not repetition or frequency of a single advertisement but the number of advertisements in an advertisement break. Third, the increase and decrease can affect advertisement avoidance across individuals (*i.e.*, audience size) rather than only changes over time within the same individual. For this reason, increases and decreases in advertisement avoidance can be associated with different people. Increasing advertisement avoidance has been associated with male viewers and longer breaks between programs, whereas decreasing avoidance (*i.e.*, an increase in audience) has been associated with a different age group tuning in to watch the next program as well as with advertisement breaks starting on other stations (van Meurs, 1998).

The first factor in this new two-factor model has to explain why advertisement disliking (avoidance) at first increases over the first few advertisements in the break and then shows diminishing returns. This is similar to how positive thoughts about a repeated stimulus increase to a maximum and then diminish, as a person becomes habituated to that stimulus (Cacippo and Petty, 1979). Disliking is a negative response, however, negative responses habituate by simply diminishing (Barry, 2009; Potter, Lynch, and Kraus, 2015) rather than increasing with diminishing returns. Second, it is unusual for advertisements to repeat within an advertisement break, so each advertisement is potentially a novel and interesting stimulus. For these reasons, the first factor in this new two-factor model was called "reactance" rather than habituation.

Like tedium, reactance is a negative response, but unlike tedium, reactance could show diminishing returns over time as the proportion of potential reactors in the audience decreases. Reactance (Brehm and Brehm, 1981) is a typical coping response to persuasion attempts such as advertising (Friestad and Wright, 1994), because advertisements are perceived as irritating (Speck and Elliott, 1997) and detract from the content (Ha, 1996). The first advertisement may not be avoided much, because not everyone recognizes it as an advertisement (sometimes it is a station promotion; Danaher, 1995). The second advertisement, however, should be associated with the biggest increase in advertisement avoidance, as most people who want to avoid advertisements will do so as soon as they can (Danaher, 1995; McGranaghan, Liaukonyte, and Wilbur, 2022). About 30 percent of television advertisements are avoided by viewers leaving the room (Wolf and Donato, 2019), and another 30 percent avoid them by switching off the television or switching to another channel (van Meurs, 1998). Although it is not likely that these fast reactors will be in the audience for the third advertisement, some reactors will remain, so advertisement avoidance will increase (*i.e.*, the audience will further decline) but not by as much as during the second advertisement. Advertisement avoidance will continue to decline until all the reactors leave the audience (Fossen, Mallapragada, and De, 2021), leaving only those who like the advertisements (Kirmani and Campbell, 2004) or at least put up with them. Some of these remaining audience members will avoid advertisements invisibly (to people meters) by attending to something else (McGranaghan *et al.*, 2022) or by disengaging—consciously withdrawing cognitive resources (Potter, 2009).

The second factor in this new two-factor model explains why advertisement avoidance, after increasing to a maximum in the middle of an advertisement break, decreases again over the rest of the break. This happens because the size of the audience increases toward the end of the break as more people tune in to the station. These people may be experiencing content on this station for the first time, so this factor cannot be called tedium. Instead, this second factor was labeled "interest" in the program content (Webster, Phalen, and Lichty, 2000). A change of program, for example, can attract a different audience (van Meurs, 1998), and most of these people will arrive during the last advertisements in the break.

Another reason for why advertisement avoidance decreases just before the program starts is the return of some of the people who left earlier in the break, when their interest in viewing the program was lower than their reactance to the advertisements. If viewers or listeners have developed an expectation for how long the average advertisement break is, they can time their leaving and returning to perfection (Danaher, 1995). Nevertheless, leaving risks missing some of the program, so highly involving programs have lower rates of advertisement avoidance (Shi, Kim, and Zhao, 2022; Wilbur, Xu, and Kempe, 2013), because interest in the program remains high across the advertisement break. For most programs, however, somewhere around the middle of the advertisement break, the diminishing returns effect of reactance on advertisement avoidance will be replaced by the increasingly negative effect of interest in the program, so that avoidance will decline to near zero during the last advertisement in the break. For these reasons, the inverse U-shaped pattern of the effect of advertisement position on television advertisement avoidance is likely to be replicated in radio advertisement avoidance data. Thus, the following hypothesis was proposed:

H1: There will be an inverse U-shaped relationship between mechanical avoidance of radio advertisements and advertisement position in a break.

This inverse U-shaped effect of advertisement position on mechanical avoidance should be reflected in the relationship between mechanical avoidance and advertisement-break size, measured by the number of advertisement units in the break. If viewers or listeners expect advertisement breaks to contain a certain number of advertisements, then the first few advertisement positions in the break will attract their normal response, with reactance dominating over interest; the level of avoidance will remain low, however, because it takes a while to notice that the advertisement break has started. The peak effect of advertisement-break size on mechanical avoidance should occur when advertisement-break size matches the peak for the advertisement-position effect. If avoidance peaked at the third advertisement position, for example, then it should also peak for advertisement breaks that are three advertisement units long. This reasoning led the authors to propose a second hypothesis:

H2: There will be an inverse U-shaped relationship between mechanical avoidance of radio advertisements and advertisement-break size, measured in advertisement units.

Hypothesis 2 predicts that mechanical avoidance is likely to be highest when radio stations play their advertisements in advertisement breaks that are long enough to give listeners time to recognize and react to the advertisements. Because shorter breaks reduce the time available for avoidance, a North American study found that mechanical avoidance was only one percent during 2-minute breaks but 15 percent during 6-minute breaks (Generali *et al.*, 2011). Hypothesis 2 also predicts that breaks that are longer than average will have a similarly low rate of avoidance, most likely because only listeners with a high interest in the content, and a high tolerance for advertisements, will remain after the average number of advertisement positions. Longer advertisement breaks, on the one hand, increase perceptions of "high clutter" (Smit and Neijens, 2000) during the advertisement breaks, which increases irritation (McDowell and Dick, 2003; Speck and Elliott, 1997) and reduces advertisement recall (Potter, Callison, Chambers, and Edison, 2008; Riebe and Dawes, 2006). On the other hand, longer advertisement breaks minimize perceived clutter during the program content, because stations can offer listeners "commercial-free half hours" (Potter *et al.*, 2008). The other extreme is to divide the total number of commercials

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across multiple advertisement breaks, with mostly one or two advertisements per break. Multiple short advertisement breaks per hour potentially increase the perception of clutter in the program, which might drive the audience to another station (Potter *et al.*, 2008). Two- or three-advertisement breaks might be a happy medium, allowing stations to offer shorter advertisement breaks without driving away listeners and potentially attracting more listeners.

One aim of this research was to test these two hypotheses about the effects of different advertisement positions and advertisement-break lengths on mechanical avoidance of radio advertisements, using PPM data. Another aim was to explore the explanation for why the inverse U-shaped pattern in mechanical avoidance predicted by the modified two-factor theory would have a peak at a certain advertisement position in the break or a certain number of advertisements in the break. The proposed explanation is that this peak will coincide with the average advertisement-break size, as perceived by the audience (Danaher, 1995; Jardine, Romaniuk, Dawes, and Beal, 2016; North and van Meurs, 2004). For this reason, this study used an online survey to ask listeners in the same city where the PPM data originated how long they expected the average advertisement break to be on the stations that they preferred. A third hypothesis proposed that the effects seen in the PPM data can be explained by listeners' expectations about advertisement-break length:

H3: Radio listeners' expectations about the length of the average radio advertisement break coincide with the peak of the relationship between mechanical avoidance and advertisement-break position.

GENERAL METHOD

A multimethod approach was used to explore whether a "Goldilocks" just-right number of advertisements in the break exists. This study used PPM data to compare advertisement and program ratings, measured four times over one year (one month from each season). Canadian data were used because only a Canadian radio ratings supplier was willing to share their data with the research team. However, many similarities exist between the United States and Canada in radio formats (*e.g.*, Radioinfo, 2016; Radio Connects, 2016) and culture (*e.g.*, House, Quigley, and de Luque, 2010), which suggests that these findings will apply in the United States and other similar countries. Given the difficulties associated with aggregating data from different locations within countries, the current research focused on a single Canadian city, Vancouver, in British Columbia. The most popular Canadian test city, their equivalent to Peoria in the United States, is London, Ontario. For this study, however, Vancouver was chosen for its larger population size and ethnic diversity, which makes it more representative of the total Canadian population than Canada's largest cities, Toronto and Montreal (Statistics Canada, 2017). In addition to these aggregate average-minute audience data, individual-level data were collected using a one-off survey of listeners from the same city, Vancouver. Notably, the survey data measured listeners' expectations for how long a typical advertisement break was on their favorite radio stations and compared those expectations with self-reported mechanical advertisement avoidance. The authors have outlined the key variables and descriptive statistics for each study (See Table 1).

OVERVIEW OF THE STUDIES

The next subsection presents Study 1 to answer Hypotheses 1 and 2, in which the authors used PPM data to analyze the dependent variable, mechanical avoidance, by comparing the sizes of the advertisement and program audiences. This is followed by Study 2, which tests Hypothesis 3 by measuring listeners' expectations about the length of the average radio advertisement break, and their self-reported mechanical advertisement avoidance.

STUDY 1

Method and Results

Sample. The average monthly PPM panel size for ages 12 and older in the Greater Vancouver area was approximately 800 individuals. Using census statistics, the authors compared the panel's demographics with the general population's demographics, and there were no significant differences in age or gender.

PPM Data Collection. A PPM device listens for digital watermarks in radio signals and tracks switching between stations, or when the signal disappears, logged as turning off the device. Leaving the room or muting the sound is indistinguishable from turning off, and the authors categorized both behaviors as turning off and, along with changing the station, counted them as forms of "mechanical avoidance." The official Canadian radio audience measurement data collected using PPM technology by Numeris were made available

Table 1 Key Variables and Descriptive Statistics

Study 1	Variable	Portable people meter (PPM) Data	M	SD	Min	Max
Key variables	Advertisement-break audience	Ratio of average-minute audience (AMA) during each advertisement to the AMA during the program segment before the break	97%	.04%	87%	104%
	Advertisement position	Advertisement position number in the advertisement break	3	4	1	30
	Advertisement-break size	Total number of advertisement units in the advertisement break	4	8	1	30
Dependent variable	Mechanical avoidance	100%—Advertisement-break audience	3%	.04%	0%	13%
Study 2	**Variable**	**Survey Data**				
Key variables	Expected advertisement-break size	How many advertisements on average make up a radio advertising break? (responses include 1 to 6+, I never listen to the end, and Don't know)	3.2	1.3	1	6+
	Perceived advertisement-break position	How many advertisements on average would you listen to before changing radio stations? (responses on a 7-point scale include <1 to 6+, I never listen to the end, and Don't know)	2.4	1.5	0.5	6
Dependent variable	Self-reported mechanical avoidance	Items from Speck and Elliott (1997) on a 7-point scale ranging from 1 (never) to 7 (always) **Switched stations** **Skipped past stations** Focused attention away from advertising I listen to the advertising	3.8	1.8	1	7

Note: An advertisement break was defined as all nonprogram material, including station promotions and public service announcements. Min = minimum; Max = maximum. Bold type indicates types of avoidance asked in the survey to indicate mechanical avoidance.

for the study and have been analyzed previously to benchmark mechanical avoidance of radio advertising (Michelon *et al.*, 2020). These data are the industry currency with which radio advertising spots are traded. In most cases, radio listening occurred live from the station broadcast, including listeners receiving the AM/FM live broadcast on a digital device (*e.g.*, iHeartRadio on the Internet). A PPM device would not distinguish between devices, which was not considered detrimental to the analysis.

Radio programming average-minute audience data and the data on advertising spots were extracted using Kantar InfoSys+Radio software (NLogic, 2019) from a dataset dated September 2015 to August 2016. The extraction process required setting filters for the timeframe (broadcast month and dayparts), listening threshold, age groups, location (in home versus out of home), and station identification. Instead of investigating the total radio audience, this research focused on the 17 largest commercial radio stations in the Vancouver region of Canada. The time of data collection was limited to four months over one year, each representing one season (October 2015 [autumn], January 2016 [winter], April 2016 [spring], and July 2016 [summer]). Further details of the sampling frame and descriptive results can be found in Michelon *et al.* (2020). This study undertakes new and extended analyses to investigate how advertisement-break structure influences mechanical avoidance.

PPM radio data captured at the individual level were aggregated to station level. The listening threshold for each station was set at a minimum of one minute, as applied by Generali *et al.* (2011) and North and van Meurs (2004). The station level was suitable to answer questions about the effects of advertisement-break structure on mechanical avoidance (Pingree, Hawkins, Bush Hitchon, *et al.*, 2001). Station-level data provide robust average audience numbers during programming and advertising minutes (Twyman and Wilcox, 1998), and advertisers buy advertisement spots at the station level.

PPM Data Characteristics. The 17 commercial stations analyzed in Study 1 consisted of 11 music stations; five news, talk, and sports stations; and one traffic station. Advertising breaks were defined as all nonprogramming material, including station promotions,

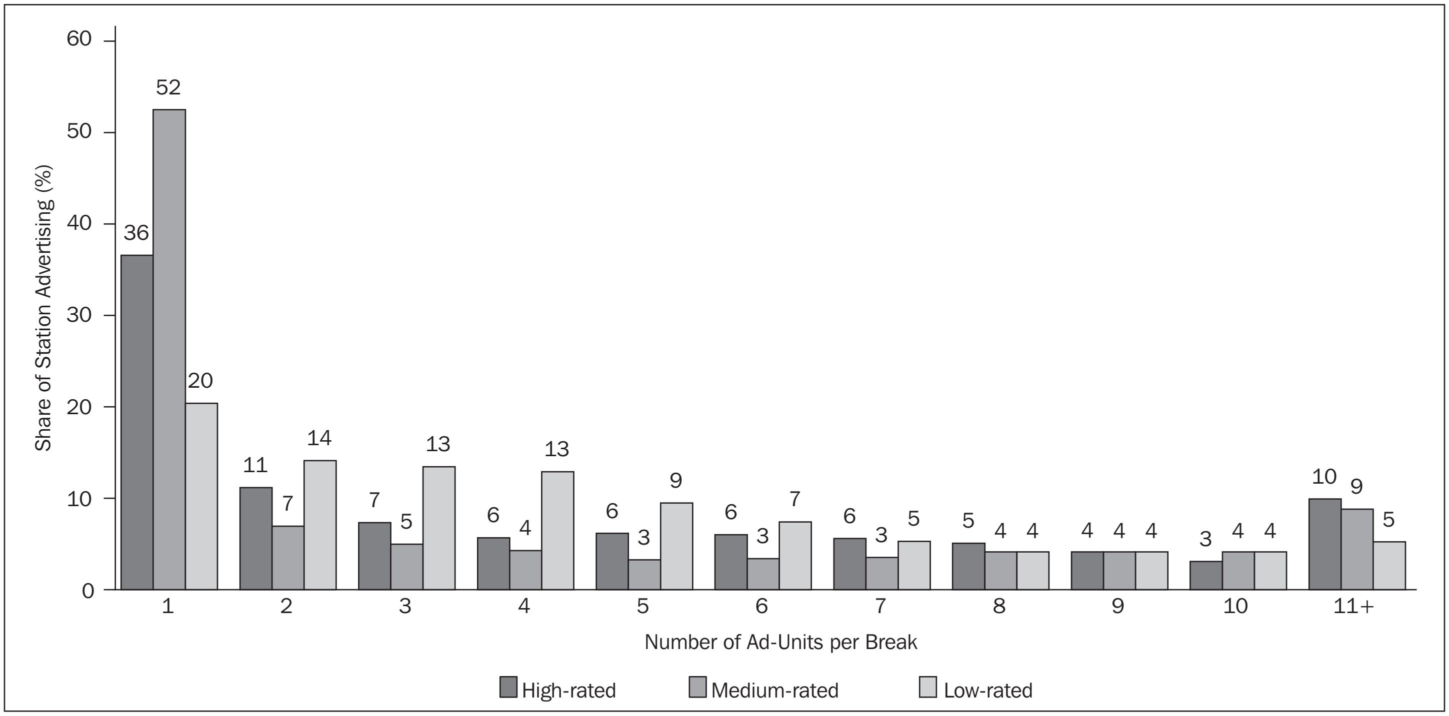

Figure 1 Distribution of Average Station Advertisement-Break Size
Note: High-rated stations (*i.e.*, stations one standard deviation above the median share of audience; median = 5.1, *SD* = 2.8, *n* = 2) had a 12% "share" of all advertising.

public service announcements, and commercials. A noteworthy characteristic of the PPM data was that 42 percent of the advertisement breaks in the dataset ($N = 54{,}602$) consisted of just one unit (highest for music stations) lasting less than a minute. The remaining 58 percent ranged between two and 11 or more units. Station promotions constituted 87 percent of one-unit breaks, and 94 percent of all advertisement breaks had at least one station promotion (Danaher, 1995, reported similar results for television). On average, there were 11 minutes of advertisement-break time per hour. Three-quarters of advertisement breaks were three minutes long (six 30-second advertisements) or shorter, and advertisement breaks occurred every 15 minutes on average.

High-rating stations had a higher proportion of shorter breaks (55 percent had three advertisement units or fewer), compared with lower rating stations (48 percent had three advertisement units or fewer) (See Figure 1). These high-rating stations were predominantly "low-clutter" stations, although all stations had advertisement breaks of 11 or more advertisement units.

Analysis. Mechanical avoidance was not normally distributed (See Figure 1), according to a Shapiro-Wilk test ($p < .05$), because skewness was above 2.0. Because this could invalidate any statistical tests, the dependent variable was normalized by a log-transformation. Because each of the 17 stations was measured four times over the year, there were four repeated observations (total $N = 68$), so repeated measures analysis of variance (ANOVA) was used to test the modified two-factor model's predicted inverse U-shaped effect of advertisement position in the break on mechanical avoidance (Hypothesis 1), using a 4 × 11 design (4 [Month: October, January, April, and July] × 11 [Advertisement Position: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11+]). Because the number of advertisement positions determined the size of the advertisement break, the same ANOVA design was used to test the similar predicted effect of advertisement-break size on mechanical avoidance (Hypothesis 2), with the 11-level factor measuring the number of advertisement units in the break (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11+).

Hypothesis 1: Advertisement Position. Hypothesis 1 proposed an inverse U-shaped relationship between mechanical avoidance of radio advertisements and advertisement position in a break such that avoidance increases for advertisement-break positions up to the middle of the advertisement break and then decreases for advertisement-break positions later in the break. Hypothesis 1 was tested using the Simonsohn (2018, 2019) two-lines test. Mechanical avoidance was derived from the ratio of the average-minute audience during each advertisement to the average-minute audience during the program segment before the break (Danaher, 1995). If the advertisement's audience, for example, was only 96 percent of the size of the program audience, the mechanical avoidance rate for that advertisement was 4 percent (100 percent – 96 percent).

Visually, mechanical avoidance and advertisement position showed their expected inverted U-shaped relationship (See Figure A1). A repeated-measures ANOVA revealed a significant main effect of advertisement position on mechanical avoidance (log-transformed), $F(10, 670) = 3.69$, $p = .006$, $\eta_p^2 = .05$ (Huynh-Feldt corrected). There were no significant effects of month, $F(1, 210) = 2.07$, $p = .11$, $\eta_p^2 = .03$ (Huynh-Feldt corrected); or the interaction between month and position. A planned polynomial contrast revealed a significant quadratic effect of advertisement position on mechanical avoidance, $F(1, 67) = 6.99$, $p = .01$, $\eta_p^2 = .09$. The same inverse U-shaped trend was found in the raw, unlogged mechanical avoidance data.

The two-lines test also detected an inverted U-shaped relationship. Line one was significant and positive for low values of advertisement position ($b = 0.01$, $z = 3.74$, $p < .001$), whereas the second line was also significant but negative for high values of advertisement position ($b = -0.003$, $z = -2.57$, $p = .01$; See Appendix, Figure A1). The breakpoint indicates that mechanical advertisement avoidance peaked at around the fourth advertisement position, but the two-lines breakpoint is chosen to maximize the significance of the least significant line (using the "Robin Hood" algorithm) rather than to identify the actual peak of the distribution. Visually, mechanical avoidance was lowest for Position One (one percent), rising to a maximum (five percent) at Position Three (See Table 2). After Position Three, mechanical avoidance declined, but not all the way down, staying flat (three percent) from Position Seven onward. These results supported Hypothesis 1.

Table 2 Effect of Advertisement Position and Advertisement-Break Size on Mechanical Avoidance

Advertisement Position[a]	***M* % (*SD*)**	**95% CI**
1	1 (3)$_{v, w, x, y, z}$	[1, 2]
2	4 (5)$_{v}$	[2, 5]
3	5 (6)$_{w}$	[3, 6]
4	4 (6)$_{x}$	[3, 6]
5	4 (5)$_{y}$	[3, 5]
6	4 (5)$_{z}$	[2, 5]
7	3 (6)	[2, 4]
8	3 (5)	[2, 5]
9	3 (6)	[1, 4]
10	3 (7)	[1, 4]
11+	3 (7)	[2, 5]
Average	3 (4)	
Size, in Advertisement Units[a]	***M* % (*SD*)**	**95% CI**
1	0 (3)$_{q, r, s, t, v, w, x, y}$	[–1, 1]
2	2 (5)$_{u}$	[1, 3]
3	3 (10)	[1, 6]
4	6 (10)$_{q}$	[4, 8]
5	6 (9)$_{r}$	[4, 9]
6	6 (10)$_{s}$	[4, 8]
7	7 (10)$_{t, u, z}$	[4, 9]
8	5 (9)$_{v}$	[3, 7]
9	4 (8)$_{w}$	[2, 6]
10	5 (7)$_{x}$	[3, 6]
11+	3 (6)$_{y, z}$	[1, 4]
Average	4 (8)	

Note: Means in the same column with the same subscript letters are significantly different from each other at $p < .05$.
Numbers indicate mechanical avoidance, the percentage of the advertisement break audience missing compared with the lead-in program audience. For example, 4% means that the advertisement audience was 96% of the size of the program audience just before the break.
CI = confidence interval. [a] $n = 68$ (17 stations measured four times).

Hypothesis 2: Advertisement-Break Size. Hypothesis 2 predicted that the inverse U-shaped relationship between advertisement position and mechanical avoidance would be reflected in an inverse U-shaped relationship between mechanical avoidance and advertisement-break size (the number of advertisements in an advertisement break). Hypothesis 2 was also tested using a two-lines test (Simonsohn, 2018, 2019). Visually, there was an inverse U-shaped relationship between advertisement-break size and mechanical avoidance (See Appendix, Figure A2). A repeated-measures ANOVA revealed a significant main effect of advertisement-break size on (log-transformed) mechanical avoidance, $F(10, 670) = 6.24$, $p < .001$, $\eta_p^2 = .09$ (Huynh-Feldt corrected). A polynomial contrast test revealed a significant quadratic trend in the effect of advertisement-break size on mechanical avoidance, $F(1, 67) = 29.12$ $p < .001$, $\eta_p^2 = .30$. There was also a significant main effect of month, $F(3, 201) = 4.26$, $p = .006$, $\eta_p^2 = .06$ (Huynh-Feldt corrected), but no significant interaction between month and size. The main effect of month was due to the summer month (July) having a significantly higher rate of mechanical avoidance (averaging across advertisement breaks) than both the winter month (January, $p = .011$) and the spring month (April, $p = .02$).

Again, the two-lines test also detected an inverted U-shaped relationship. Line one was significant and positive for low values of advertisement-break size ($b = 0.01$, $z = 5.64$, $p < .001$), whereas the second line was also significant but negative for high values of advertisement-break size ($b = -0.01$, $z = -2.71$, $p = .007$; See Appendix, Figure A2). The two-lines breakpoint indicated that mechanical avoidance peaked at an advertisement-break size of around six advertisement units, but visually, the peak occurred at a larger advertisement-break size. Mechanical avoidance was lowest for one-advertisement breaks (zero percent) and increased to a maximum (7 percent) for seven-advertisement breaks (See Table 2). Mechanical avoidance declined for advertisement breaks with more than seven advertisements but not to the level for one-advertisement breaks (*e.g.*, 3 percent for breaks with 11 or more advertisements). These results supported Hypothesis 2.

Discussion

In Study 1, the authors used PPM data to test Hypotheses 1 and 2. Hypothesis 1 proposed that advertisement position has an inverse U-shaped relationship with mechanical avoidance of radio advertisements. Hypothesis 2 predicted that this inverse U-shaped relationship would also be found for advertisement-break size (measured by number of advertisement units). Both hypotheses were supported, which was interesting for Hypothesis 2, as it predicted a pattern opposite to that reported in previous research investigating television advertisement avoidance (Danaher, 1995). The explanation for these inverse U-shaped relationships is that radio listeners have developed expectations for the number of advertisements in an advertisement break, and beyond this expected number, they are less likely to avoid advertisements and more likely to keep listening for their desired content to recommence.

The next section reports Study 2, which tested whether the PPM data results for Hypotheses 1 and 2 could be explained by listeners' expectations about the length of the average radio advertisement break. Hypothesis 3 predicted that the expected average advertisement-break length would coincide with the peak of the relationship between mechanical avoidance and advertisement-break position. Differences in advertisement-break length expectations may potentially explain the difference between the television results and the radio results.

STUDY 2

Method and Results

Sample. A total of 597 respondents were recruited from Vancouver, British Columbia, Canada, using an informed consent procedure approved by the University of South Australia Ethics Review Board. Respondents were members of an opt-in panel (Toluna, 2019), and each completed an online survey using Qualtrics software. After screening out 11 respondents because they selected their location as "other" or refused to disclose their age, the final sample size was 586. Data collection began the day after the Canadian Thanksgiving holiday, from October 9 to October 16, 2018. Quotas ensured that the sample reflected the Vancouver census, with female respondents representing just over half of the sample (55%, $n = 321$) and no significant difference between the census and sample proportions for any age group: 12–17 years (with parental consent), 19%, $n = 111$; 18–24 years, 9%, $n = 53$; 25–49 years, 39%, $n = 229$; and 50 years and over, 33%, $n = 193$.

(Study 2) Data collection began the day after the Canadian Thanksgiving holiday, from October 9 to October 16, 2018.

Hypothesis 3: Expectations of Advertisement-Break Size. H3 predicted that radio listeners' expectations about the length of the average radio advertisement break would coincide with the peak relationship between mechanical avoidance and advertisement-break position. Most survey respondents (36 percent) expected the average radio advertisement break to consist of three advertisements on the stations they preferred. This expected advertisement-break size was larger than the modal advertisement-break size in the PPM data, as 42 percent of advertisement breaks consisted of just one unit. Because many one-unit breaks were station promotions, however, most listeners may not have considered these as advertisement breaks. The expectation of three advertisement units or fewer, reflected 60 percent of advertisement breaks in the PPM data.

Hypothesis 3 was supported, although the 95 percent confidence interval for expected break length (3.1 to 3.3) did not include the peak of the inverse U-shaped distribution of advertisement avoidance, which was 4, as determined by the two-lines method. Because station promotions are often the first unit in the advertisement break and may not be considered as advertisements (*i.e.*, listeners apparently did not consider a one-unit break consisting of a station promotion to be an advertisement break), the listener's average expectation of three advertisements probably does coincide with the number of advertisements in the average break, excluding station promotions, and so is supportive of Hypothesis 3.

Self-Reported Advertising Avoidance. The relationship between expected advertisement break size and motivation to avoid advertisements was explored by measuring self-reported advertising avoidance, using published scales (Speck and Elliott, 1997). A 7-point scale ranging from 1 ("never") to 7 = ("always") indicated whether, during advertising, respondents switched stations, skipped past stations that played advertisement breaks, or cognitively avoided advertisements. The first two items measured mechanical advertisement avoidance and were used in analysis; descriptive statistics were shown for all scale items (See Table 1). The third item's wording was modified from the original "tune out" used by Speck and Elliott (1997, p. 68) to "focused attention away from advertising" to avoid confusion when used in a radio listening survey. A fourth item was added to force a positive response from all respondents: "I listen to the advertising." This fourth item measured the "no avoidance" rate. The option to answer "I don't know" was also included. To allow comparison between the survey data and the PPM data, mechanical avoidance in the survey only included responses for switching stations (*e.g.*, muting or turning the radio off were not measured).

Self-reported mechanical avoidance scores from the survey were not normally distributed, as assessed by a Kolmogorov-Smirnov test ($p < .05$). This test is commonly used to check if data with a sample size $n \geq 50$ follows a bell-shaped pattern. For this reason, nonparametric Kruskal-Wallis H tests were conducted, along with calculation of the ε^2 estimate of effect size for these tests, $\varepsilon^2 = (H - k + 1) / (n - k)$, where H is the Kruskal-Wallis H test statistic, k is the number of groups, and n is the total number of observations (Tomczak and Tomczak, 2014). This test is a way to check if several groups of an independent variable on an dependent variable have different patterns in their data, even if the data is not normally distributed.

Most respondents (69 percent) claimed that they mechanically avoided advertisements by switching stations after listening to two or more advertisement units. However, the highest rate of self-reported advertisement avoidance was associated with less than one advertisement in the break. A Kruskal-Wallis H test showed a statistically significant main effect of advertisement position on self-reported mechanical avoidance, $\chi^2(6\ N = 425) = 51.14$, $p < .001$; $\varepsilon^2 = .11$. Pairwise comparisons showed many statistically significant differences between advertisement positions (*e.g.*, between less than one advertisement and more than advertisement listened to; $p < .05$; See Table 3). A negative relationship between higher advertisement positions and self-reported mechanical avoidance can be seen. Respondents with higher claimed advertisement avoidance were not available to avoid advertisements with higher advertisement positions, as they had left the audience after the first or second advertisement in the break. This behavior, in the aggregate, would produce the inverse U-shaped pattern predicted by Hypothesis 1.

Overall, there was a significant positive correlation, $r(397) = .22$, $p < .001$, between the perceived number of advertisements in the average break and self-reported mechanical avoidance. A second Kruskal-Wallis H test showed a statistically significant main effect of advertisement-break size on self-reported mechanical avoidance, $\chi^2(5\ \ N = 397) = 26.59$, $p < .001$; $\varepsilon^2 = .06$. Pairwise comparisons showed many statistically significant differences between advertisement-break sizes (*e.g.*, between one- and four-advertisement breaks, $p < .05$). Again, this effect of advertisement-break size on claimed avoidance behavior would produce the results for Hypothesis 2 in the PPM data. Listeners who expected more advertisements in the average break (*i.e.*, higher advertisement clutter) reported more advertisement avoidance, but only up to the four advertisement units coinciding with the peak of the inverse U-shaped relationship in the PPM data.

Discussion

Study 2's survey data and its test of Hypothesis 3 provide explanations for Study 1's PPM data results for Hypotheses 1 and 2. Self-reported advertisement avoidance provided evidence of the reactance factor in the modified two-factor model explaining the inverse U-shaped effect of advertisement position on advertisement avoidance proposed by Hypothesis 1. Reactance was so high for some individuals that they would leave the advertisement break during the first advertisement. The people who stayed through the advertisement break would be those with the highest level of the second factor, interest in the program. These individual differences in reactance and interest would produce the inverse U-shaped relationship with advertisement position seen in the aggregated PPM data.

Self-reported expectations of advertisement-break size also helped to explain the inverse U-shaped relationship with advertisement-break length measured in advertisement units, predicted by Hypothesis 2. The longer participants expected advertisement breaks to be, the more likely they were to avoid advertisements, but only up to an expected break length of four advertisement units. Hypothesis 3 was supported, as radio listeners expected radio advertisement breaks to about three units long. This was less than the actual midpoint of the inverse U-shaped distribution of avoidance in the PPM data, but the discrepancy can be explained by the survey respondents not counting station promotions as advertisements. If they had counted station promotions as advertisements, they would have said that the typical advertisement break was one advertisement unit long instead of three units long, because nearly half of the advertisement breaks in the PPM data were one unit long, although most of those single-unit breaks were station promotions. If the first unit in a break is typically a

Table 3 Effect of Advertisement Position and Advertisement-Break Size on Self-Reported Mechanical Avoidance

Advertisement Position[a]	***n***	***M* (*SD*)**	**95% CI**
Less than 1	58	5.1 (1.8)$_{m, n, o, p, q, r}$	[4.7, 5.6]
1	75	4.6 (1.5)$_{m, s, t, u, v}$	[4.3, 5.0]
2	120	4.3 (1.4)$_{n, w, x}$	[4.0, 4.5]
3	82	3.8 (1.5)$_{o, s, y}$	[3.5, 4.2]
4	41	3.8 (1.5)$_{p, t}$	[3.3, 4.3]
5	22	3.4 (1.2)$_{q, u, w}$	[2.8, 3.9]
6 or more	27	3.0 (1.7)$_{r, v, x, y}$	[2.3, 3.6]
Average		4.0 (1.5)	
Size, in Advertisement Units[b]	***n***	***M* (*SD*)**	**95% CI**
1	30	3.2 (1.5)$_{r, s, t, u}$	[2.6, 3.7]
2	85	3.4 (1.4)$_{v, w, x, y}$	[3.1, 3.7]
3	141	3.9 (1.6)$_{r, v, z}$	[3.6, 4.2]
4	80	4.4 (1.6)$_{s, w, z}$	[4.0, 4.7]
5	34	4.3 (1.8)$_{t, x}$	[3.7, 5.0]
6+	27	4.2 (1.8)$_{u, y}$	[3.5, 4.9]
Average		3.9 (1.6)	

Note: Self-reported mechanical avoidance was rated on a scale ranging from 1 ("Never") to 7 ("Always"). Means in the same column with the same subscript letters are significantly different from each other at $p < .05$. CI = confidence interval.
[a] N = 425 (n = 102 answered "Don't know," and n = 46 reported never listening to the end of the advertising break; these are not reported in the table).
[b] N = 397 (n = 118 answered "Don't know," and n = 60 reported never listening to the end of the advertising break; these are not reported in the table).

station promotion, the first real advertisement would be the second unit. That would mean the third real advertisement would coincide with the peak of the inverse U-shaped distribution, at around the fourth unit in the break. Radio listeners' expectations of advertisement-break length, therefore, provide an explanation for the inverse U-shaped relationship between advertisement-break length and mechanical advertisement avoidance (Danaher, 1995).

GENERAL DISCUSSION

This research investigated the relationships between mechanical avoidance of radio advertisements and advertisement position in the break (Hypothesis 1) and advertisement-break size, in advertisement units (Hypothesis 2). In Study 1, the PPM data confirmed Hypothesis 1, that mechanical avoidance of radio advertisements has an inverse U-shaped relationship with advertisement position in the break. This supports a modified version of the two-factor theory (Berlyne, 1970) for explaining this inverse U-shaped relationship, with reactance being the first (positive) factor followed by interest in the station's programming content as the second (negative) factor. The peak of this inverse U-shaped relationship occurred around the fourth position in a break. In Study 2, the PPM results were reinforced by survey data measuring listeners' expectations of advertisement-break size. As predicted by Hypothesis 3, listeners expected the average advertisement break to be three advertisement units long, which was consistent with the peak at four units in the PPM data, because listeners did not count the first unit in the break as an advertisement, as it was often a station promotion. The highest levels of self-reported advertisement avoidance were associated with the first two advertisements in a break, consistent with the reactance factor in the modified two-factor model. A second discovery, answering Hypothesis 2, was a similar inverse U-shaped relationship between mechanical avoidance and advertisement-break size. Mechanical avoidance peaked for breaks with about six advertisements. Again, this coincided with listeners' claimed behavior in response to advertisement breaks, if station promotions were not counted as advertisements. Self-reported avoidance peaked for breaks perceived to be four units long, which potentially were the same length as the six-unit breaks in the PPM data but with station promotions at the beginning and the end of the break.

Together, both studies suggest that advertisement position four marks a threshold for radio advertising tolerance. Most listeners listen to two or three advertisements in a break, as it takes time to "realize" they are listening to advertisements and react through mechanical avoidance. Avoidance begins during the first advertisement and rises to a maximum during the fourth advertisement. Advertisement avoidance is lower for subsequent advertisements because of the second factor, interest in the program content, which means the remaining listeners have a lower rate of advertisement avoidance (McGranaghan *et al.*, 2022). This may be due to the second factor, their interest in the program content. Also, the advertisement-break audience increases, because many listeners arrive at, or return to, the station to avoid advertisements on other stations (Danaher, 1995; Dawes, Riebe, and Sharp, 2003; Jardine *et al.*, 2016). Hence, the advertisement-break rating is highest, and advertisement avoidance is lowest, for advertisements in the first and last positions in a break, producing an inverse U-shaped relationship between advertisement position and mechanical avoidance.

The similar inverse U-shaped relationship found mechanical avoidance and the size of the advertisement break contrasted with a previously reported U-shaped relationship for television-advertisement mechanical avoidance (Danaher, 1995). The difference can be explained by different expectations about average advertisement-break length for radio versus television. Television advertisement breaks average nearly twice as many advertisement units in length (seven versus four) as the radio advertisements in the current study (Danaher, 1995; McGranaghan *et al.*, 2022). Breaks that are that long give people time to leave and return or to find something better to watch before the program recommences. When a television advertisement break is shorter than the expected seven advertisement units, it can end when reactance is still dominating over interest in the program, so shorter breaks will have higher mechanical avoidance. Television advertisement breaks that are longer than average allow reactance to dominate again when viewers leave because the program has not started yet (Jardine *et al.*, 2016; van Meurs, 1998). For this reason, television advertisement breaks that are longer than average can also have high levels of advertisement avoidance, and, together with the high avoidance associated with shorter advertisement breaks, this produces a U-shaped relationship between advertisement-break length and mechanical avoidance, which can be explained by the same two-factor model used to explain the inverse U-shaped relationship for radio advertisement breaks. The re-emergence of reactance during long breaks probably explains why mechanical avoidance did not decline to zero in the longest radio advertisement breaks in the current study.

Implications for Advertisers and Networks

Several implications for advertisers and radio networks flow from the two-factor model of mechanical avoidance. The model's first factor is reactance, which increases with advertisement position. Shorter advertisement breaks minimize the chances that reactance will result in mechanical avoidance. In Study 1, one-advertisement breaks had the lowest avoidance rate, most likely because they minimized reactance time. Also, many one-advertisement breaks were station promotions, which listeners may not regard as advertising. In previous research, station promotions at the beginning and end of breaks reduced television-advertisement mechanical avoidance (Danaher, 1995). Many radio networks in Canada appear to be aware of the usefulness of one-advertisement breaks, because most advertisement breaks in this study were one-advertisement breaks. For other countries and radio networks, however, these results provide a justification for using one-advertisement breaks. One-advertisement breaks are also a feature of new forms of audio advertising, such as in streaming media (*e.g.*, Spotify) and podcasts (Benes, 2022). However, a station that ran all its advertising in frequent one-advertisement breaks would likely be perceived by listeners as having highly cluttered content, which might drive its audience away (Potter *et al.*, 2008).

To maximize reach, advertisers choose radio stations on the basis of their audience size (Lees and Wright, 2013). A secondary consideration, however, is whether that reach is reduced by mechanical advertisement avoidance. This research suggests that when advertisers are deciding between two stations with equally large ratings, they should choose the station with the shortest advertisement breaks. In the Vancouver region examined in this research, the higher rating stations were also the ones with the highest number of short advertisement breaks.

This research suggests that when advertisers are deciding between two stations with equally large ratings, they should choose the station with the shortest advertisement breaks.

The success of low-clutter advertising formats at attracting larger radio audiences, so that radio stations can charge more for a more limited advertisement inventory, suggests that shorter advertisement breaks can be a winning strategy. Results of this research explain why the two-advertisement breaks used by the Nova network were effective in two ways: reducing mechanical advertisement avoidance and increasing advertisement recall (Riebe and Dawes, 2006). In the current research, mechanical advertisement avoidance peaked at four advertisements in the break, suggesting that low-clutter stations could increase their two-advertisement break size and, therefore, their advertisement revenue while maintaining high effectiveness and low avoidance. Before networks tried a low-clutter advertising strategy, the default was to sell as many advertisements per hour as regulations allowed in high-clutter breaks with six or more advertisements aired (Radio Today, 2022). On these stations, advertisers should pay more to advertise in the first or last positions in the advertisement break if those positions can be bought.

The survey data in Study 2 showed that, among Vancouver radio listeners, the average advertisement break was perceived to be three advertisements long. Their expectations of break length were formed by the local high-rating stations with many short advertisement breaks. In other cities and regions, advertisement-break length expectations might be higher or lower. Keeping advertisement-break size below three advertisement units would be perceived in the Vancouver region as advertisement-break clutter that is lower than average, which has increased station enjoyment and, thus, overall station ratings (Potter *et al.*, 2008). The high reach and high effectiveness of low-clutter advertising (*e.g.*, Bellmanm, Treleaven-Hassard, Robinson, *et al.*, 2012; Hammer *et al.*, 2009; Pieters and Bijmolt, 1997; Riebe and Dawes, 2006) should make low-clutter advertisements more valuable to advertisers, allowing low-clutter stations to make the same money from fewer advertisements. In short, radio advertisements in shorter advertisement breaks reach more people, are more effective, and have lower rates of mechanical avoidance.

There are also implications for practice related to the other factor in the two-factor model: interest in the content. Stations can increase interest in the content by having niche content with few similar options to switch to, so advertisement avoidance is lower (Michelon *et al.*, 2020). These stations tend to have lower ratings, however, which makes them less attractive for advertisers. High-rating stations can increase interest in content on the other side of a break by using various tactics, such as having the announcer preview upcoming music tracks, or by running a long break before unmissable content, such as news on the hour (Webster *et al.*, 2000).

Limitations and Recommendations for Future Research

This study used multiple methods to arrive at its conclusions, but it had some limitations that suggest directions for future research. First, it is based on one market, Vancouver, with PPM data from 2015 to 2016. Future research should test whether these results hold in radio station markets across time, in different cities and countries with different demographics and advertising regulations. Because there was a one-year delay before the commercially valuable ratings data could be released for academic research, Study 2's survey data were more recent, from 2018, but that gap between the two datasets is another limitation. Things may have changed in the two-year interval. Replication and extension of this research with newer data; from other locations; and, if possible, with simultaneous collection of PPM and survey data are important to confirm whether these results apply in other contexts (Park, Venger, Park, and Reid, 2015).

Second, this research was based on aggregate average-minute audience data rather than the individual-level PPM data on which these average-minute audience data are based. Future studies should use individual-level data to verify the explanations offered in this paper for the inverse U-shaped patterns in the average-minute audience data. However, compared with individual-level television advertisement avoidance behavior measured by cameras (McGranaghan *et al.*, 2022), it is more difficult to link radio listeners' motivations to their advertisement exposure. If a young person wearing a PPM sits in the back seat of a car, unable to control the car's radio, for example, the PPM will give a misleading record of how they respond to high- or low-clutter advertising.

Third, technology advances have made advertisement avoidance more sophisticated, so past findings may no longer apply, and these findings may not apply to new audio media and new methods of advertisement avoidance (Kelly *et al.*, 2019).

Another limitation of this research was that it did not test the effects of advertisement avoidance on advertisement effectiveness by measuring sales, or a proxy like advertisement recall. The relationship between low-clutter format and audience size also requires longitudinal research. The authors show the correlation of variables but not the causation. Although no examples were found in the literature, once stations achieve a large audience, they could move to a low-clutter advertising format and charge more per advertisement. Examples were found of stations changing to a low-clutter format, or starting with one, that attracts a large audience, and managers believe that it is due to having fewer advertisements (Puig, 1989; Bhattacharyya, 2018). JAR

DISCLAIMER

The processing of data and subsequent analysis and conclusions found within have been conducted outside of Numeris. Numeris has not endorsed or validated these results or conclusions.

ABOUT THE AUTHORS

Aaron Michelon is a senior marketing scientist at the Ehrenberg-Bass Institute for Marketing Science, University of South Australia. His main research focus is on advertising effectiveness, media efficiency, and product distribution. His research has been published in the *Journal of Advertising Research* and *International Journal of Market Research*.

Steven Bellman is the MediaScience research professor at the Ehrenberg-Bass Institute, University of South Australia. Much of his research on media and advertising has been for the Beyond:30 project, sponsored by television networks and advertisers worldwide. His research has appeared in the *Journal of Marketing*, *Journal of the Academy of Marketing Science*, and *Journal of Advertising Research (JAR)*, among others, and he is on the editorial boards of the *Journal of Advertising*, *JAR*, and *Journal of Interactive Marketing*.

Margaret Faulkner is a senior marketing scientist at the Ehrenberg-Bass Institute for Marketing Science, University of South Australia. Her research interests include understanding brand management and marketing effectiveness, primarily for nonprofit organizations. Her work has been published in *Marketing Letters*, *Journal of Forecasting & Social Change*, *Journal of Product & Brand Management*, among others.

Justin Cohen is a senior marketing scientist at the Ehrenberg-Bass Institute, University of South Australia. His expertise is in brand growth, route-to-market decision making, emerging markets (in particular, China), retailing, online advertising, and beverage marketing.

Johan Bruwer is research professor of marketing at the Ehrenberg-Bass Institute for Marketing Science, University of South Australia. He specializes in the marketing and consumer behavior psychology research fields and has published more than 150 research journal articles and book chapters.

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APPENDIX

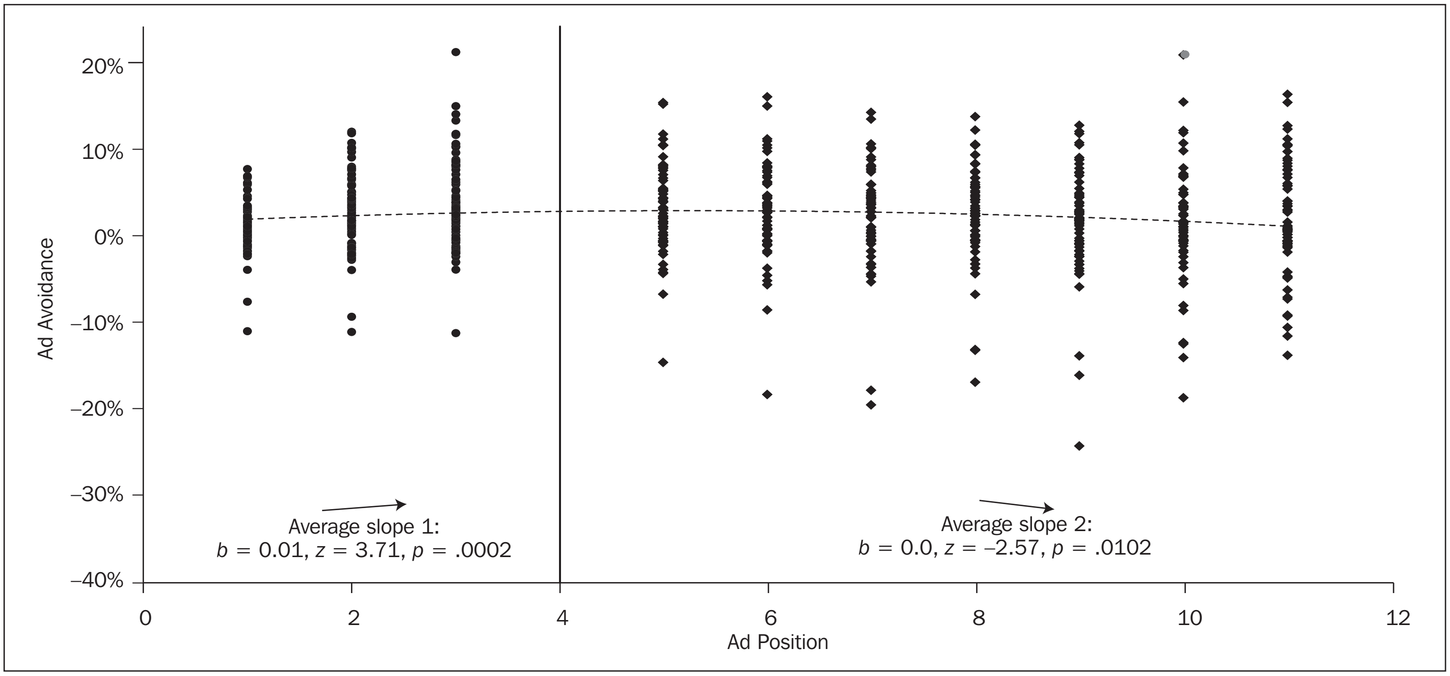

Figure A1 Two-Lines Test of the Relationship between Advertisement Position and Mechanical Avoidance

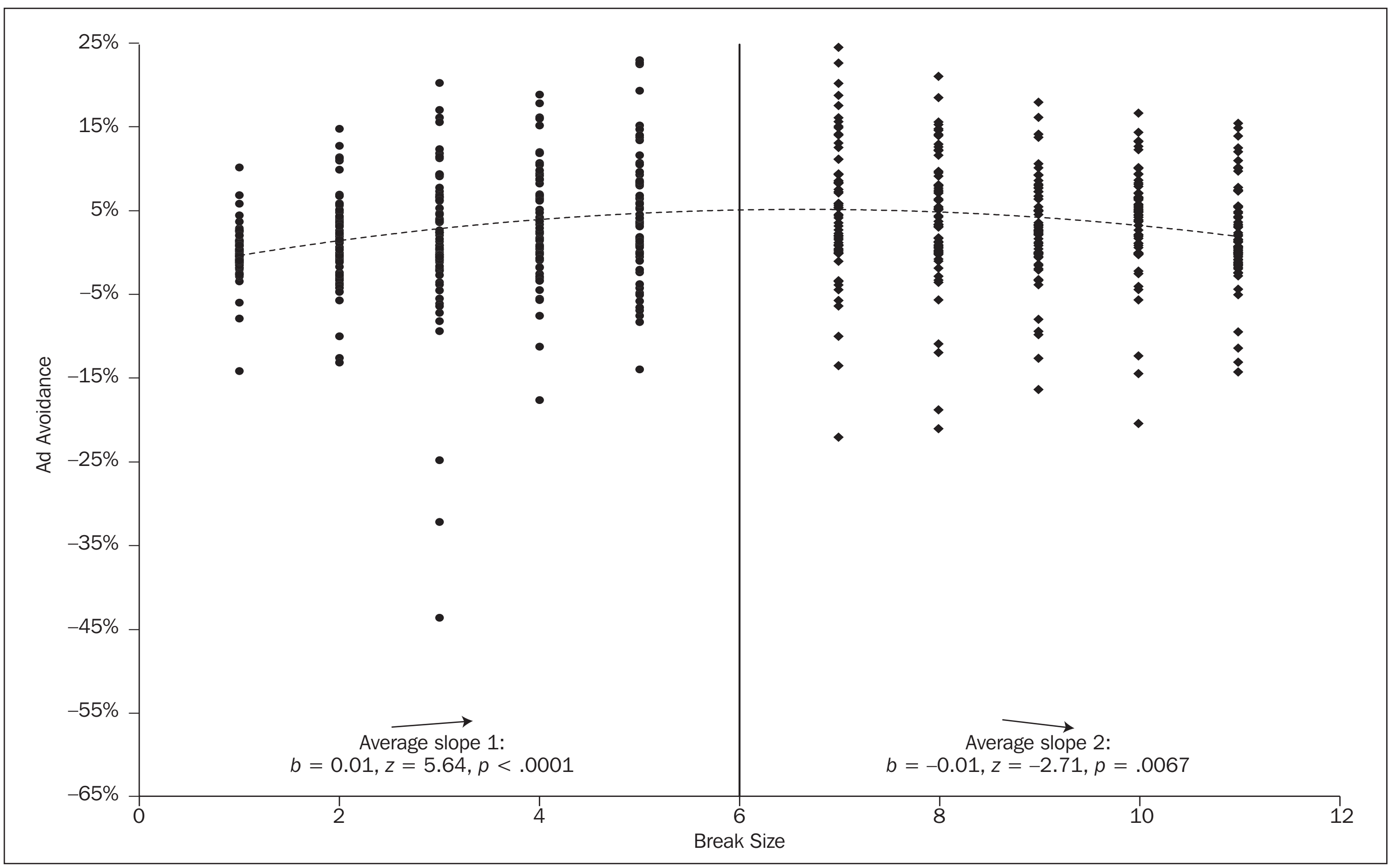

Figure A2 Two-Lines Test of the Relationship between Advertisement-Break Size and Mechanical Avoidance