Radio Audience Analysis & Recommendations

May 9,2022

Background

- #1 audio company in U.S. with quarter billion listeners

- Reaches 9 out of 10 Americans every month

- Extends across multiple platforms:
  - 860+ live broadcast stations
  - Streaming music, radio, and on demand via digital service
  - On demand available across 250+ platforms and 2,000 devices
  - Influencers
  - Social media
  - Branded iconic live music events
  - Podcasts

- Leader in analytics and attribution technology for marketing partners
  - Data from massive consumer base
  - Minute-level listenership data in select Nielsen markets

Overview

Business Problem:
- Management understands that more ads increase revenue; however, they also put off listeners.

Goal:
- Uncover insights from data that can be leveraged to manage commercials in a way that minimize impact to listenership audience

Key Focus:
- Understand listenership trends for radio audience across time
- Evaluate audience reactions to commercial lengths

Questions:
- Are there notable listenership patterns throughout the day/week/month?
- At what times in the morning does listenership spike? The evening?
- Does listenership at night behave differently than during the day?
- Do listenership patterns vary by station? Pattern similarities among stations?
- Does sensitivity to commercials shift throughout the day?

Data Sets

- Minute-level data for 69 stations in CSV files; 23M rows of data

- Timeframe of data: from 1/1/21 – 8/1/21 (7 months)

- This analysis focuses on 4 stations: 1.4M rows of data; ~ 5.94% of total population

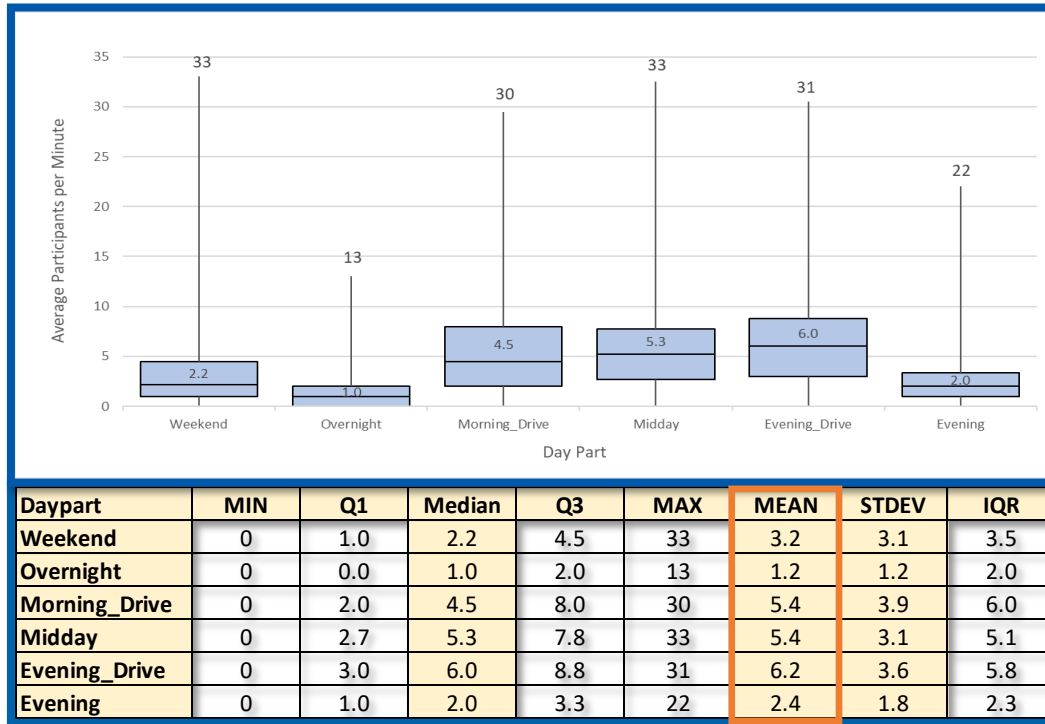| Station ID	Call Letter	Owner Name	Market Name	# Records
3322002	Station 2	N/A	Dallas	352,956
3322022	Station 1		Los Angeles	350,827
3322057	Station 3		Dallas	329,016
3323404	Station 4		New York	353,050

Analysis Highlights

- **Evening Drive** garnished the highest level of listeners, averaging **6.2 panelists/min**

- Morning Drive and Midday averaged same audience level at **5.4 panelists/min**

- Overnight and Evening have lowest audience at **1.2 and 2.4 participants/min**, respectively

- Listenership spikes in the morning at **7-8 am** and in the evening between **3-5 pm,** while **12-4 pm** is the sweet spot for weekends

- Fridays capture the highest audience, averaging **4.1 participants/min** while Sundays reflect a 29% drop to lowest level of **2.9 participants/min**

- No significant variations by month; however, listenership does peak in March, April and June (3.8), while January has lowest audience (3.4)
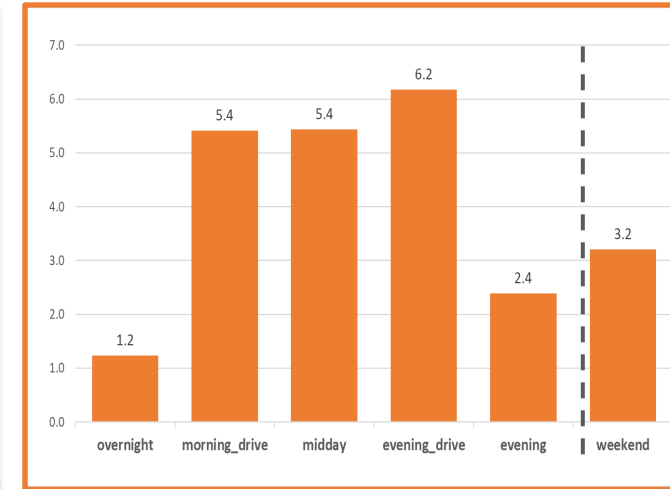
Analysis Highlights (cont.)

- The 4-stations reflect similar peaks and valleys trends; however, **low volumes from Station 2 and Station 3 out of Dallas**, decrease overall panelist averages for the population evaluated

- **30%** of all commercial break (include Podcasts) average **between 6-7 mins**

- Commercials drive a **2% increase in "panelists out"** for a total of **-10% vs. -8%** organically

- Commercial sensitivity greatest in evening **(-2.7%)** vs. morning drive (**-1.4%)**

- **90% of lead-in audience remain** during commercial breaks between 6-7 mins

- Audience levels do not drop significantly between the third, fourth, fifth and sixth min of a commercial break

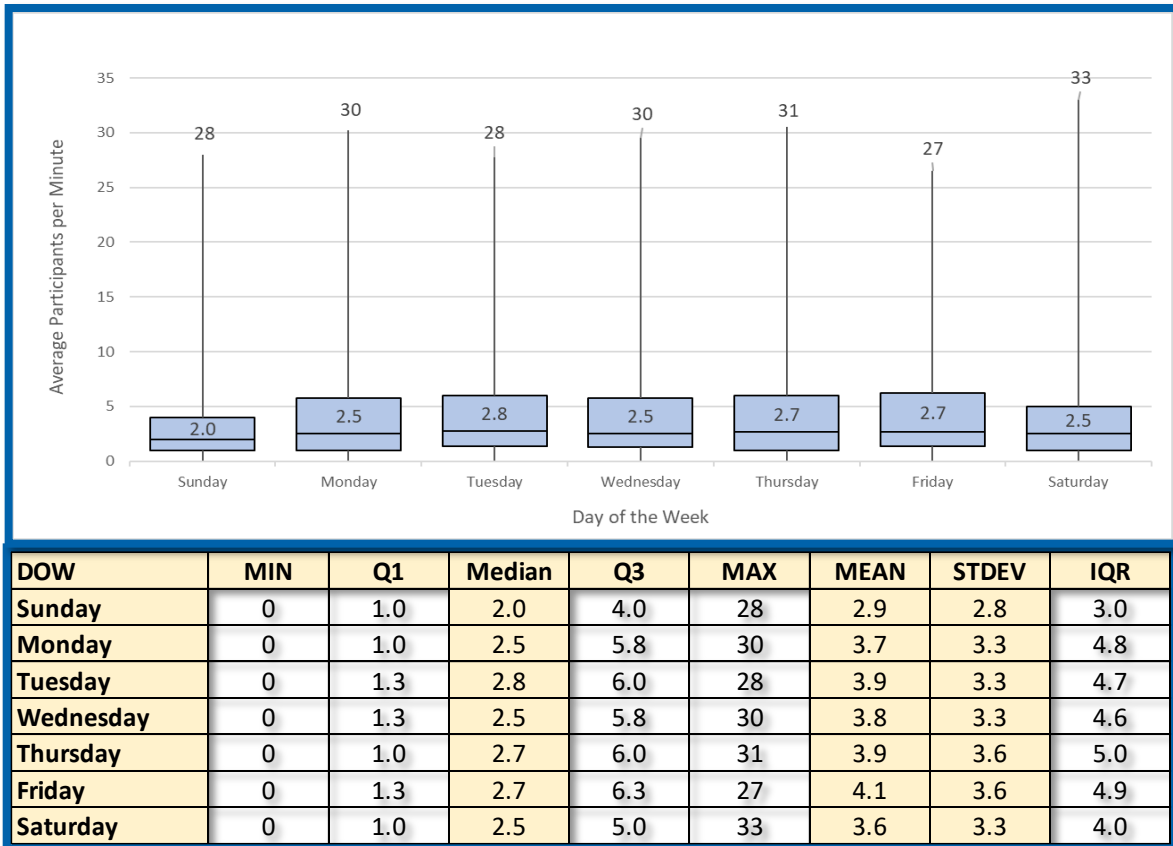## Figure 1A: Distribution of Participants/Min by Daypart

Average Participants per Minute

Daypart	MIN	Q1	Median	Q3	MAX	MEAN	STDEV	IQR
Weekend	0	1.0	2.2	4.5	33	3.2	3.1	3.5
Overnight	0	0.0	1.0	2.0	13	1.2	1.2	2.0
Morning_Drive	0	2.0	4.5	8.0	30	5.4	3.9	6.0
Midday	0	2.7	5.3	7.8	33	5.4	3.1	5.1
Evening_Drive	0	3.0	6.0	8.8	31	6.2	3.6	5.8
Evening	0	1.0	2.0	3.3	22	2.4	1.8	2.3

- Evening Drive garnished the highest level of listeners, averaging 6.2 panelists per minute

- Morning Drive and Midday both averaged 5.4 participants/min; however,

- Midday has higher median listeners (5.3 vs 4.5), but Morning Drive shows greater dispersion (SD 4 vs 3)

- Overnight and evening listenership lowest at 1.2 and 2.4 participants/min, respectively

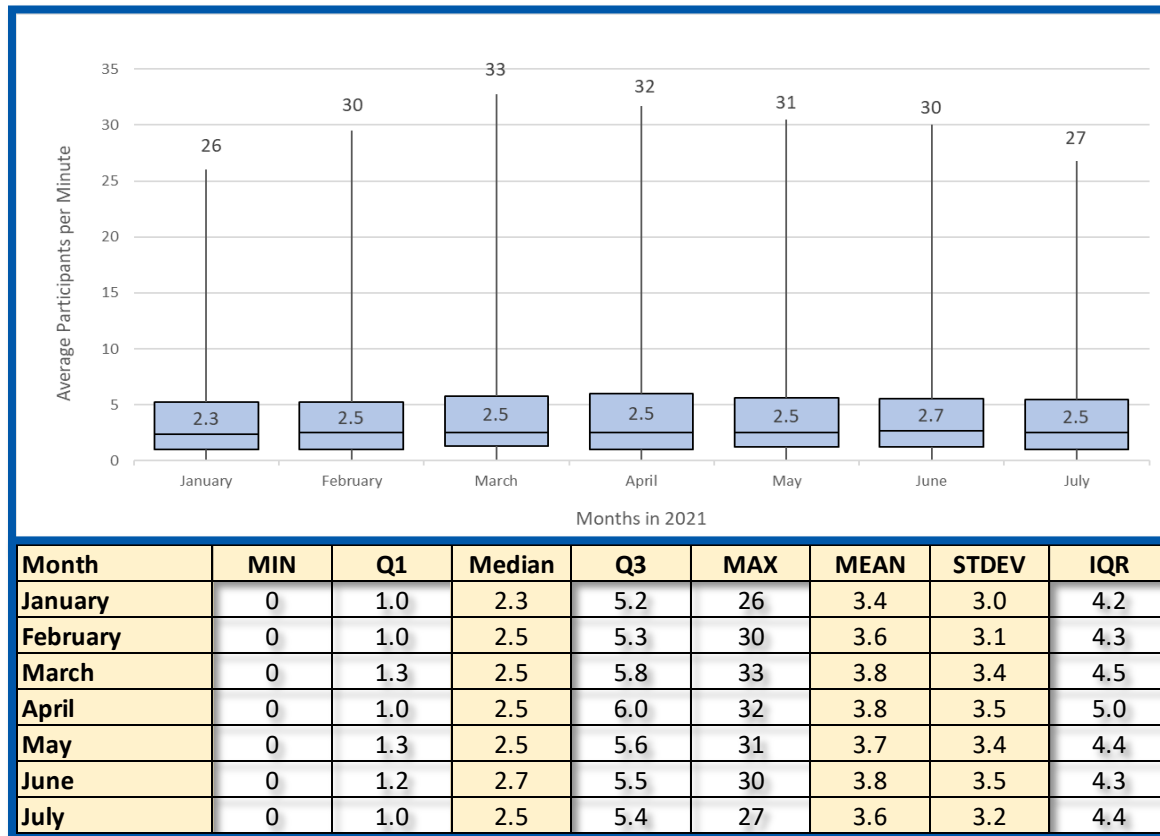*Median stats and Max values are labeled on box plots.

Figure 1B: Distribution of Participants/Min by Day of Week (DOW)

DOW	MIN	Q1	Median	Q3	MAX	MEAN	STDEV	IQR
Sunday	0	1.0	2.0	4.0	28	2.9	2.8	3.0
Monday	0	1.0	2.5	5.8	30	3.7	3.3	4.8
Tuesday	0	1.3	2.8	6.0	28	3.9	3.3	4.7
Wednesday	0	1.3	2.5	5.8	30	3.8	3.3	4.6
Thursday	0	1.0	2.7	6.0	31	3.9	3.6	5.0
Friday	0	1.3	2.7	6.3	27	4.1	3.6	4.9
Saturday	0	1.0	2.5	5.0	33	3.6	3.3	4.0

*Median stats and Max values are labeled on box plots.

- Fridays capture the highest audience with 4.1 average participants/min

- Tuesdays and Thursdays tie at 3.9 participants/min

- Sundays average the lowest audience rate with 2.9 listeners per min, followed by Saturdays at 3.6

- Sundays' low represent a 29% drop in listenership compared to Fridays high (4.1 vs 2.9)

- Since the coefficient of variation (CV = SD/mean) is < 1 audience variability is low when evaluated by days of the week
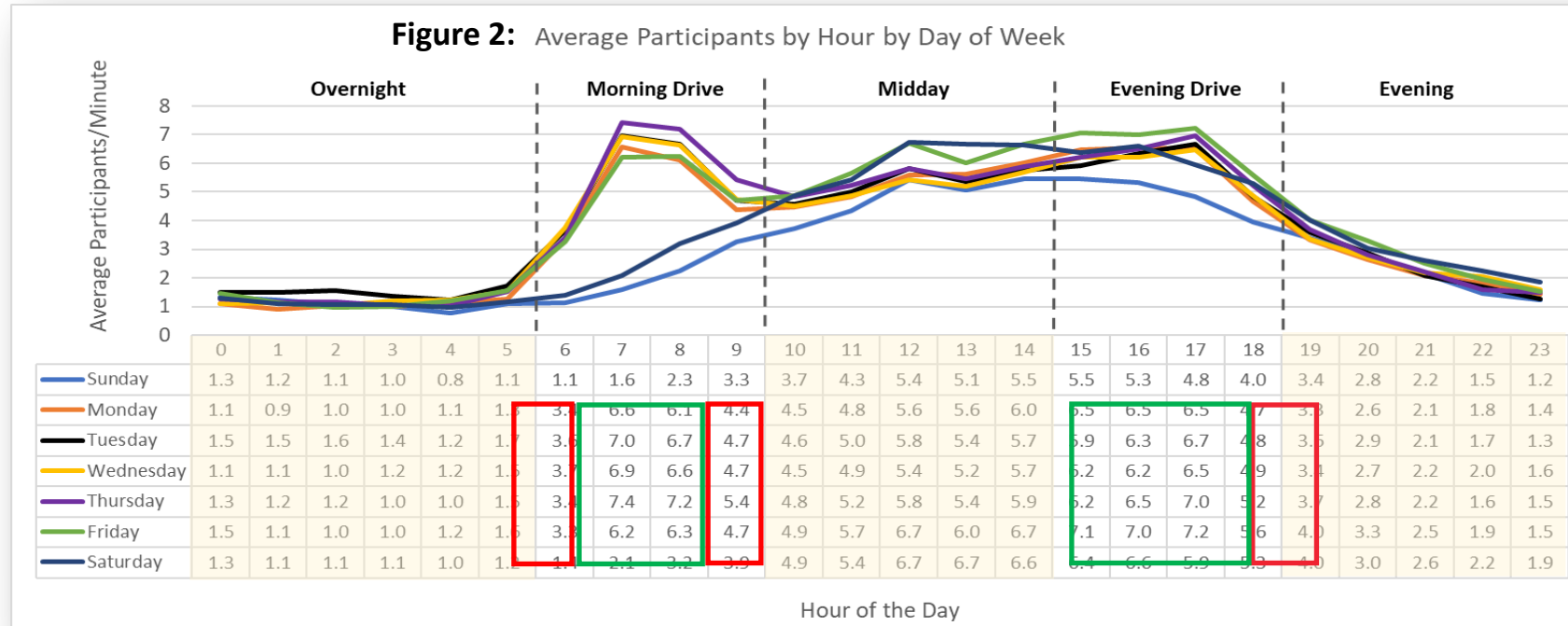
Figure 1C: Distribution of Participants by Months in 2021

Month	MIN	Q1	Median	Q3	MAX	MEAN	STDEV	IQR
January	0	1.0	2.3	5.2	26	3.4	3.0	4.2
February	0	1.0	2.5	5.3	30	3.6	3.1	4.3
March	0	1.3	2.5	5.8	33	3.8	3.4	4.5
April	0	1.0	2.5	6.0	32	3.8	3.5	5.0
May	0	1.3	2.5	5.6	31	3.7	3.4	4.4
June	0	1.2	2.7	5.5	30	3.8	3.5	4.3
July	0	1.0	2.5	5.4	27	3.6	3.2	4.4

*Median stats and Max values** are labeled on box plots.

- Audience variability is low on a monthly basis, CV < 1
- March, April and June are highest audience months, averaging 3.8 participants per min
- January shows the lowest audience month, averaging 3.4 panelists per min
- Overall, relatively stable from month to month based on first 7-months of year
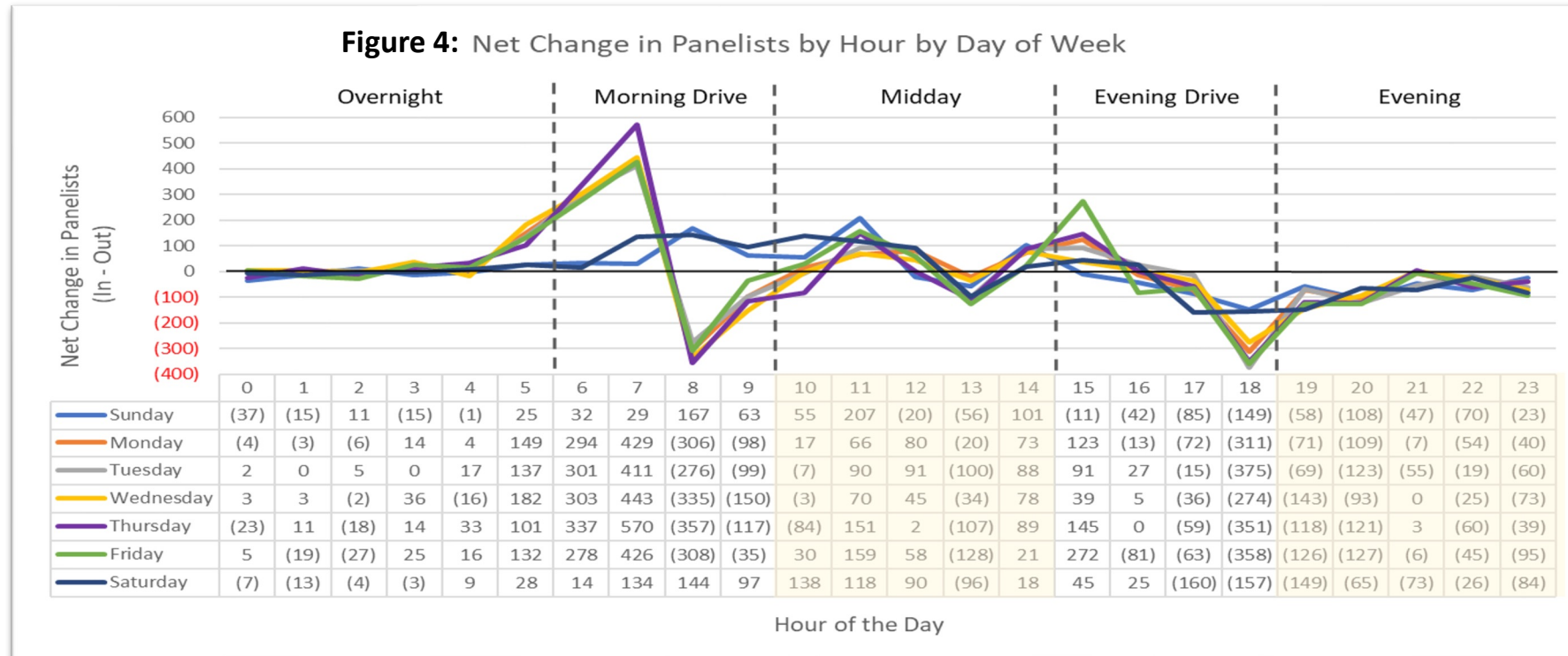- No distinct seasonal trends observed

Figure 2: Average Participants by Hour by Day of Week

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sunday	1.3	1.2	1.1	1.0	0.8	1.1	1.1	1.6	2.3	3.3	3.7	4.3	5.4	5.1	5.5	5.5	5.3	4.8	4.0	3.4	2.8	2.2	1.5	1.2
Monday	1.1	0.9	1.0	1.0	1.1	1.	3.	6.6	6.1	4.4	4.5	4.8	5.6	5.6	6.0	6.5	6.5	6.5	4.7	3.8	2.6	2.1	1.8	1.4
Tuesday	1.5	1.5	1.6	1.4	1.2	1.	3.	7.0	6.7	4.7	4.6	5.0	5.8	5.4	5.7	5.9	6.3	6.7	4.8	3.6	2.9	2.1	1.7	1.3
Wednesday	1.1	1.1	1.0	1.2	1.2	1.	3.	6.9	6.6	4.7	4.5	4.9	5.4	5.2	5.7	6.2	6.2	6.5	4.9	3.4	2.7	2.2	2.0	1.6
Thursday	1.3	1.2	1.2	1.0	1.0	1.	3.	7.4	7.2	5.4	4.8	5.2	5.8	5.4	5.9	6.2	6.5	7.0	5.2	3.7	2.8	2.2	1.6	1.5
Friday	1.5	1.1	1.0	1.0	1.2	1.	3.	6.2	6.3	4.7	4.9	5.7	6.7	6.0	6.7	7.1	7.0	7.2	5.6	4.0	3.3	2.5	1.9	1.5
Saturday	1.3	1.1	1.1	1.1	1.0	1.	1.	2.1	3.2	3.9	4.9	5.4	6.7	6.7	6.6	6.4	6.6	5.9	5.3	4.0	3.0	2.6	2.2	1.9

Hour of the Day

- Overall, Evening Drive audience outpaces Morning Drive 6.2 vs 5.4 participants/min

- Midday averaged comparably to Morning Drive with 5.4 participants/min

- Weekend listeners engagement peak between 12 – 5 pm before dropping off in the evening

- No significant differences in weekend or weekday listener trends during Evening and Overnight daypart segments

Figure 3: Average Participants by Hour by Station

	Overnight						Morning Drive				Midday					Evening Drive				Evening				
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Station 2	0.9	0.7	0.7	0.6	0.6	1.0	1.9	5.1	3.7	2.9	3.2	3.7	4.1	4.0	4.4	4.8	4.5	4.8	4.0	2.9	2.4	1.8	1.3	1.0
Station 1	1.7	1.6	1.5	1.6	1.5	1.9	2.5	5.8	6.7	6.2	6.6	7.2	8.5	7.8	8.7	8.2	7.8	8.0	6.2	4.7	4.0	3.1	2.7	2.3
Station 3	0.6	0.4	0.4	0.4	0.5	0.7	1.1	1.7	1.7	1.7	1.9	1.9	2.1	2.0	1.9	2.2	2.3	2.1	1.7	1.4	1.1	1.0	0.8	0.6
Station 4	2.0	2.0	1.9	1.7	1.7	2.0	5.8	8.7	9.6	6.9	6.5	7.4	9.0	8.6	9.1	9.8	10.7	10.6	7.8	5.5	4.0	3.1	2.5	2.1

Hour of theDay

Average Participants per Minute

Station evaluation highlights dispersion:

- 6.2 listeners/min during **Evening Drive** resulting from Station 2 and 3 (out of Dallas) low volume. They average 5 and 2 listeners/min, respectively

- While Station 4 out of New York and Station 1 out of LA are averaging highs of **11 and 8 listeners/min**

- Nonetheless, overall high listener trends during **3-5 pm** and **7 or 8 am** are consistent among all 4 stations

Figure 4: Net Change in Panelists by Hour by Day of Week

	Overnight					Morning Drive					Midday					Evening Drive					Evening			
Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sunday	(37)	(15)	11	(15)	(1)	25	32	29	167	63	55	207	(20)	(56)	101	(11)	(42)	(85)	(149)	(58)	(108)	(47)	(70)	(23)
Monday	(4)	(3)	(6)	14	4	149	294	429	(306)	(98)	17	66	80	(20)	73	123	(13)	(72)	(311)	(71)	(109)	(7)	(54)	(40)
Tuesday	2	0	5	0	17	137	301	411	(276)	(99)	(7)	90	91	(100)	88	91	27	(15)	(375)	(69)	(123)	(55)	(19)	(60)
Wednesday	3	3	(2)	36	(16)	182	303	443	(335)	(150)	(3)	70	45	(34)	78	39	5	(36)	(274)	(143)	(93)	0	(25)	(73)
Thursday	(23)	11	(18)	14	33	101	337	570	(357)	(117)	(84)	151	2	(107)	89	145	0	(59)	(351)	(118)	(121)	3	(60)	(39)
Friday	5	(19)	(27)	25	16	132	278	426	(308)	(35)	30	159	58	(128)	21	272	(81)	(63)	(358)	(126)	(127)	(6)	(45)	(95)
Saturday	(7)	(13)	(4)	(3)	9	28	14	134	144	97	138	118	90	(96)	18	45	25	(160)	(157)	(149)	(65)	(73)	(26)	(84)

Net Change in Panelists (In - Out)

Hour of the Day

- **Daypart** trends show a net positive influx around 5 am, picking up momentum by 6 am and plateauing by 7 am with highest positive net volume of 411-570 listeners

- **Evening Drive** has less net variability until 6 pm, where net change records a high of -375 Out vs In

- **Midday** volume pick up around 11 am, slight increases around noon, and dramatic drop off by 1 pm

- 3 pm Fridays have largest net increase of +272

- Highest lost occurs during **7-8 pm in the evening**

Figure 5: % of Participants Out per Minute by Day Part by Station

Proportion of Participants Out (# participants out / # total participants)

	Weekend	Evening	Evening_drive	Midday	Morning_drive	Overnight
Station 2	-31.3%	-30.2%	-37.9%	-32.1%	-28.7%	-11.2%
Station 1	-32.7%	-31.2%	-39.1%	-33.4%	-31.6%	-10.2%
Station 3	-21.9%	-19.2%	-31.1%	-25.9%	-25.9%	-12.3%
Station 4	-33.2%	-35.8%	-39.3%	-37.3%	-33.4%	-13.0%
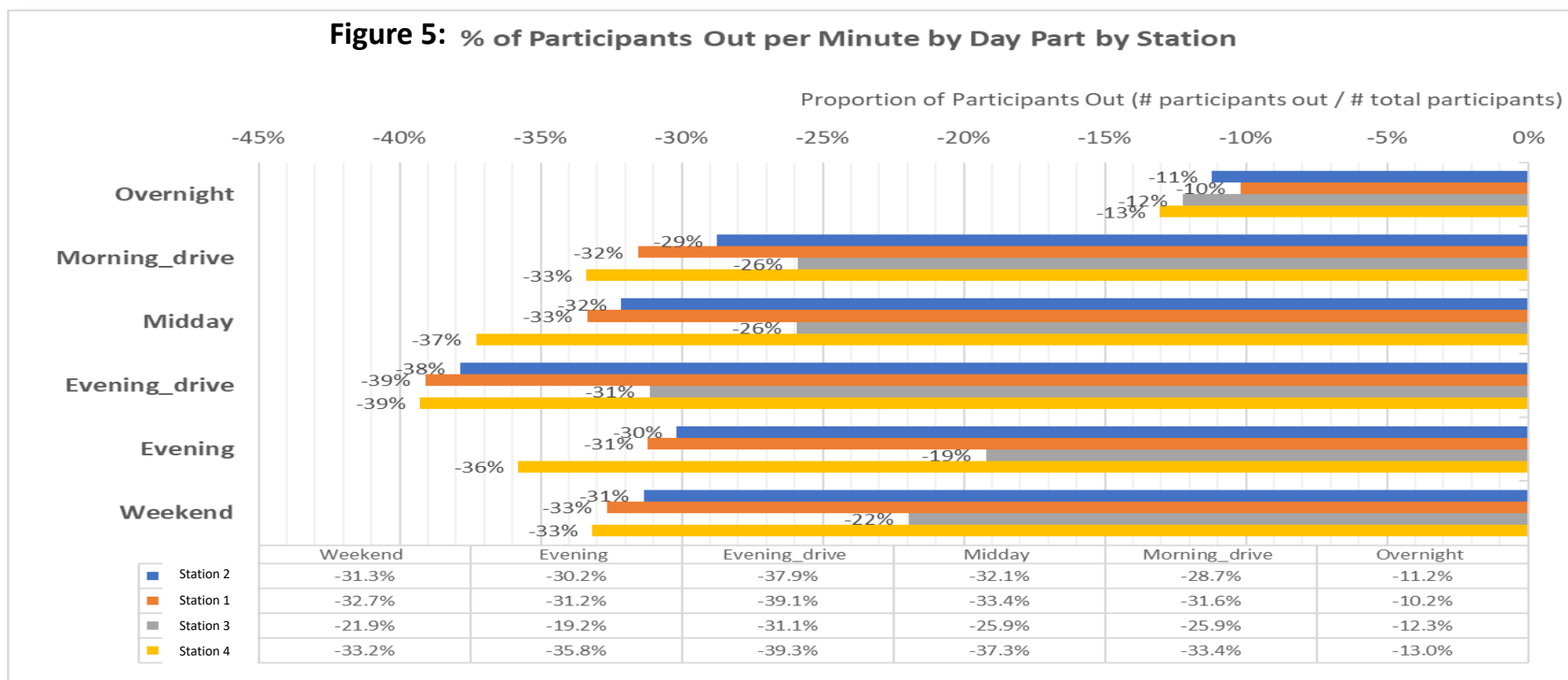
From a Relative Perspective:

- **40%** of panelists leave/min during the **Evening Drive.** High average rate driven by the mass exodus at **6 pm**

- '% Participants Lost' during **Midday, Evening and Weekend** daypart range between **30-35%**

- Excluding Overnight, **Morning Drive** segment experiences lowest "out" rate at **~25-30%**

Figure 6: % Distribution of Commercial Breaks by Minutes

	Quartile 1		Q2	Q3		Quartile 4		

- 0-1: 4.2%
- 2-3: 6.9%
- 4-5: 17.9%
- 6-7: 29.5%
- 8-9: 22.5%
- 10-11: 10.7%
- 12-13: 3.1%
- 14-15: 1.7%
- >16: 3.5%

Minutes

Figure 7A: % Participation Commercials vs. No Commercials

- Commercial: -10.1%
- No Commercial: -8.0%
- -2.1%
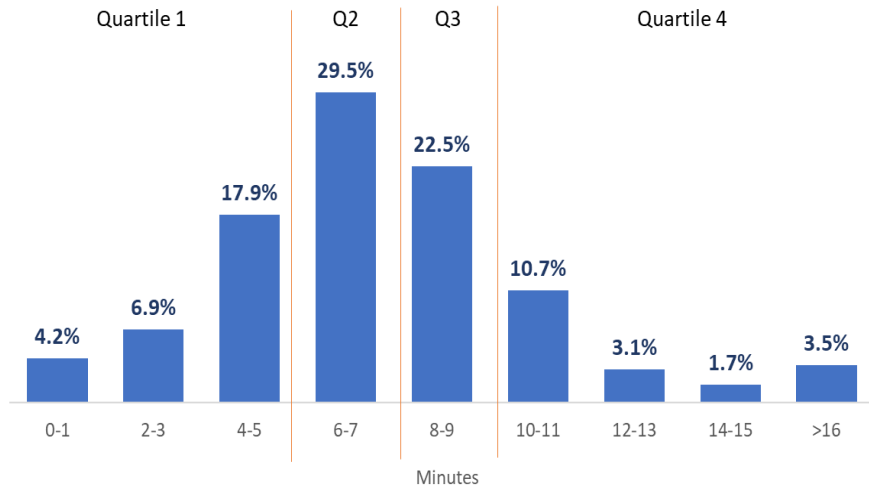
- Majority of breaks are at **7 minutes**

- This accounts for **30%** of all commercial breaks

- Outliers are above **15 minutes** per IQR

- The typical song segment is about 21 minutes

- Hence, total segment length (including songs and commercials) is **roughly at 30 minutes**
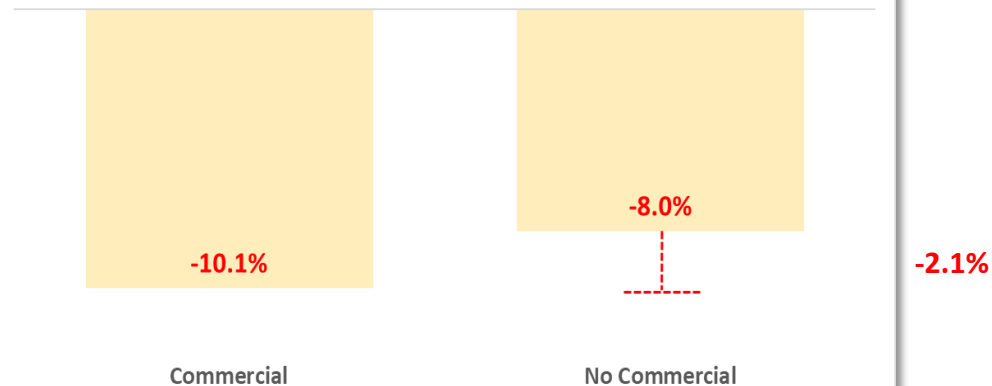
- **Commercials drive a 2% increase** in panelists out: -10.1% vs. -8.0% organically

- Stratification of 6-7 min commercial breaks show % participant optout **decreases after the 3rd minute**

- **90%** of lead-in audience remain during break

Min 1	Min 2	Min 3	Min 4	Min 5	Min 6	Min 7
-10.2%	-14.5%	-16.0%	-13.3%	-10.3%	-9.7%	-9.6%

Figure 7B: % Participant Loss: Commercials vs. No Commercials
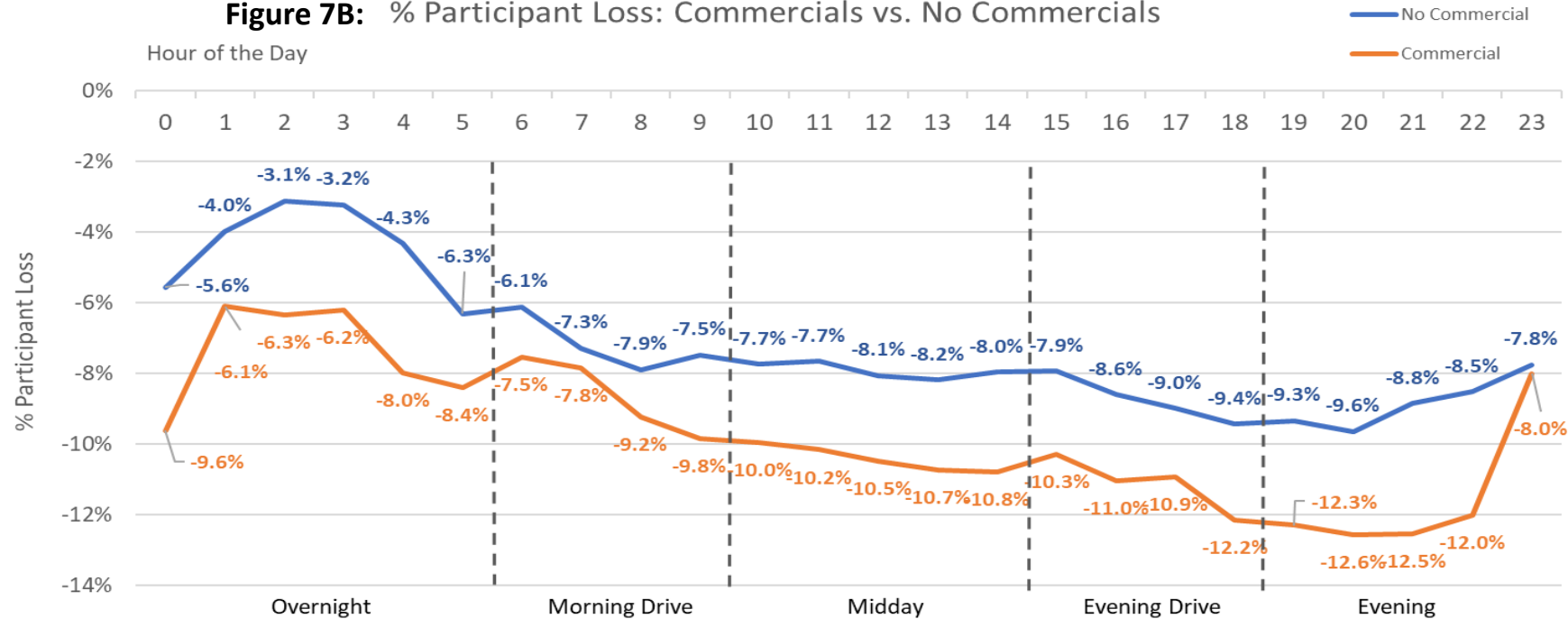
Daypart	No Commercial	Commercial	Variance
Overnight	-4.4%	-7.4%	-3.0%
Morning Drive	-7.2%	-8.6%	-1.4%
Midday	-7.9%	-10.4%	-2.5%
Evening Drive	-8.7%	-11.1%	-2.4%
Evening	-8.8%	-11.5%	-2.7%

Commercial Sensitivity Throughout the Day

- **Morning Drive** has lowest impact, **-1.4%,** from commercials
- While **Evening** has biggest impact at **-2.7%**

Station 1

Number of Panelists Sum - by DayPart
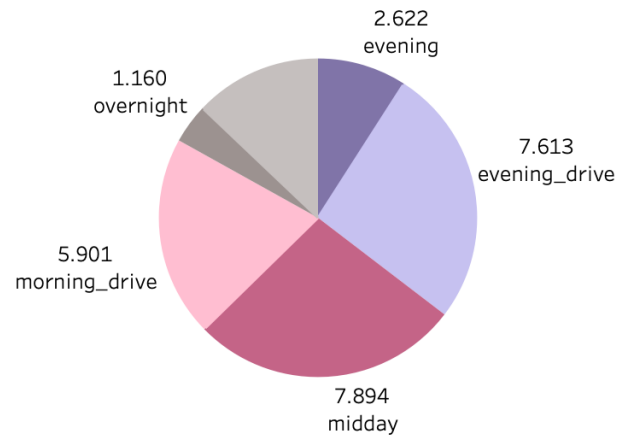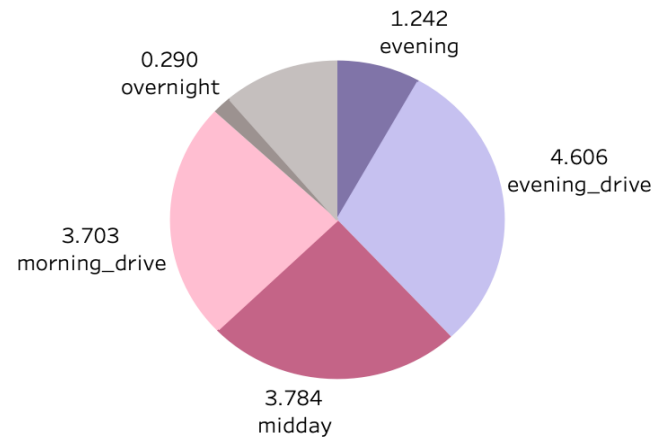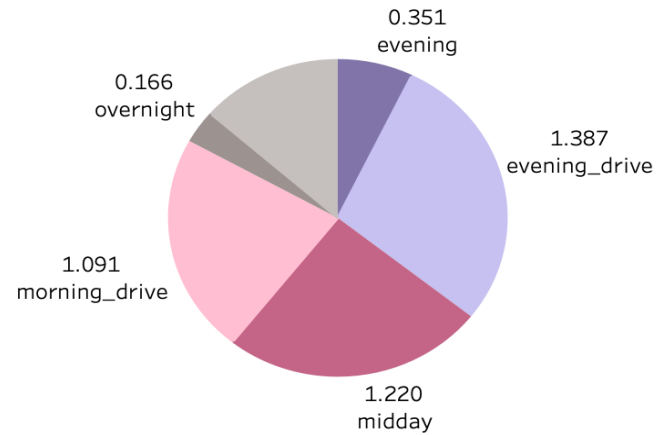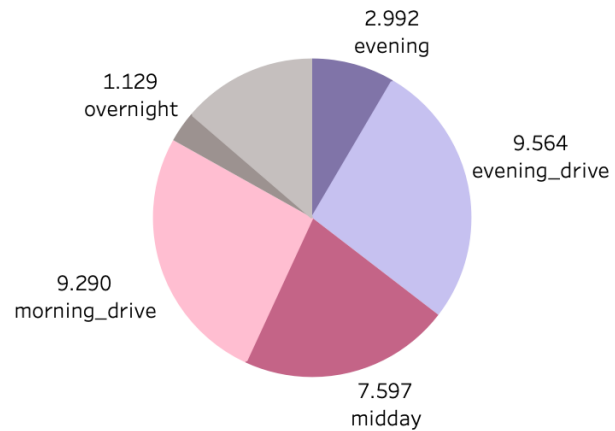
Avg Number of Panelists - By Hour
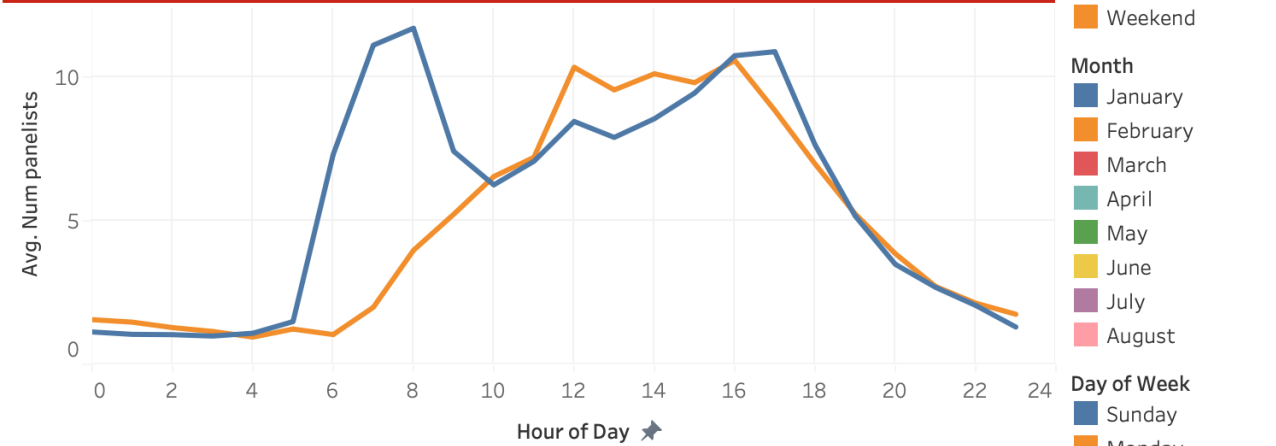
Number of Panelists - By Day of Week
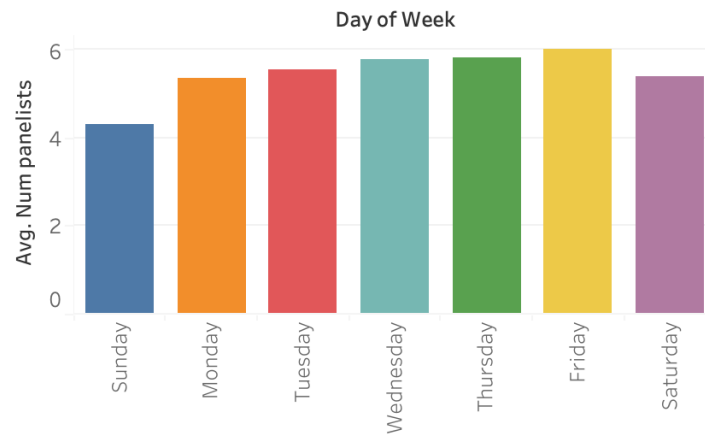
Number of Panelists - By Month

Station 2

Station 3

Station 4
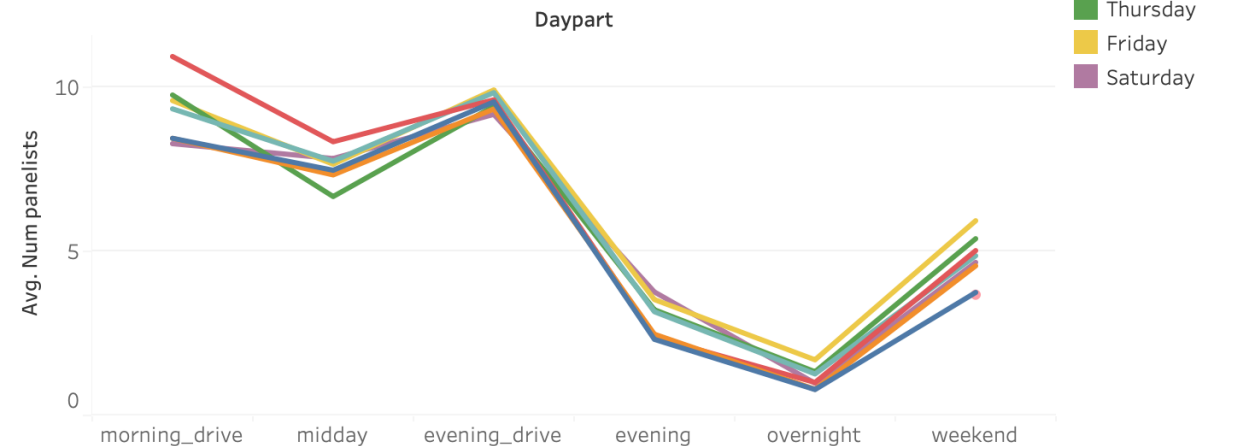
Distinct Count Commercials

Avg. Abs Panelists Out
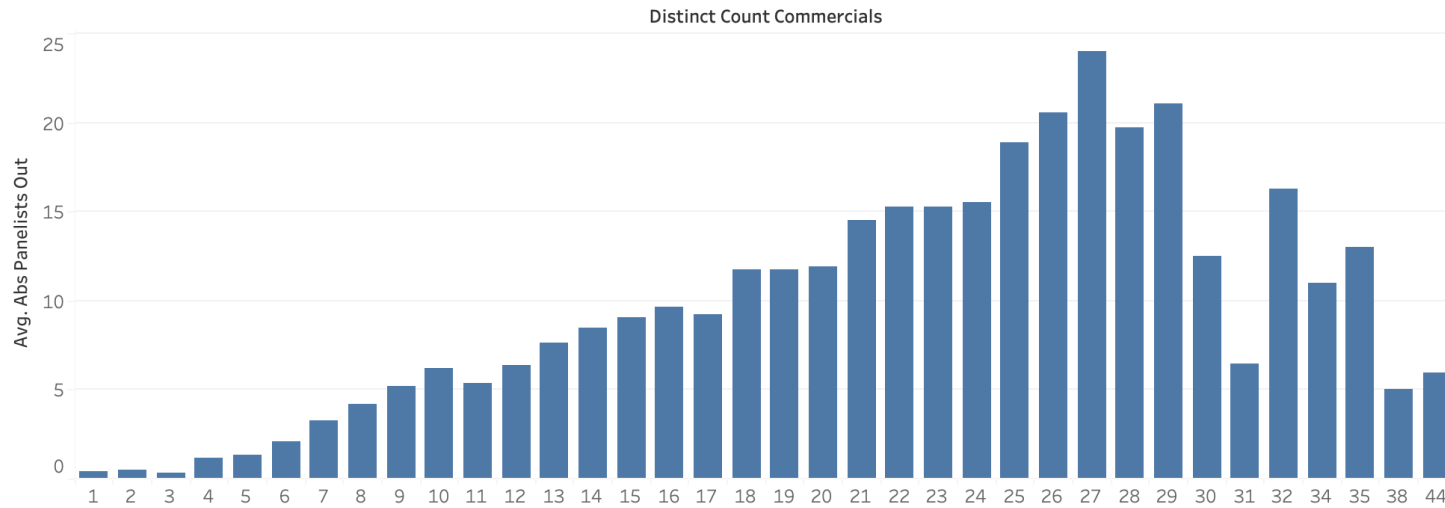
Avg Count and Length of Commercial Breaks

Segment	Abs Panelists Out	DistinctCountCommercials	Duration in Seconds
Grand Total	6.47	11.26	00:06:12
1	0.00	3.00	00:01:15
2	5.00	11.00	00:06:15
3	0.00	6.00	00:04:45
4	0.00	5.00	00:02:45
5	0.00	8.00	00:05:00
6	0.00	9.00	00:04:15
7	0.00	7.00	00:03:00
8	0.00	9.00	00:05:30
9	0.00	8.00	00:03:45
10	2.00	12.00	00:05:30
11	0.00	10.00	00:05:30
12	0.00	10.00	00:04:45
13	2.00	10.00	00:05:00
14	3.00	8.00	00:04:00
15	0.00	8.00	00:04:00

Commercial Breaks for Station 4

Station 1

**Panelist Out Proportion Avg - By Month

Timestamp

**Panelist Out Proportion Avg - By Daypart and Day of Week

Day of Week / Daypart

Station 2

**Panelist Out Proportion Avg - By Month

Timestamp

**Panelist Out Proportion Avg - By Daypart and Day of Week

Day of Week / Daypart

Station 4

**Panelist Out Proportion Avg - By Month

Timestamp

**Panelist Out Proportion Avg - By Daypart and Day of Week

Day of Week / Daypart

Station 3

**Panelist Out Proportion Avg - By Month

Timestamp

**Panelist Out Proportion Avg - By Daypart and Day of Week

Day of Week / Daypart
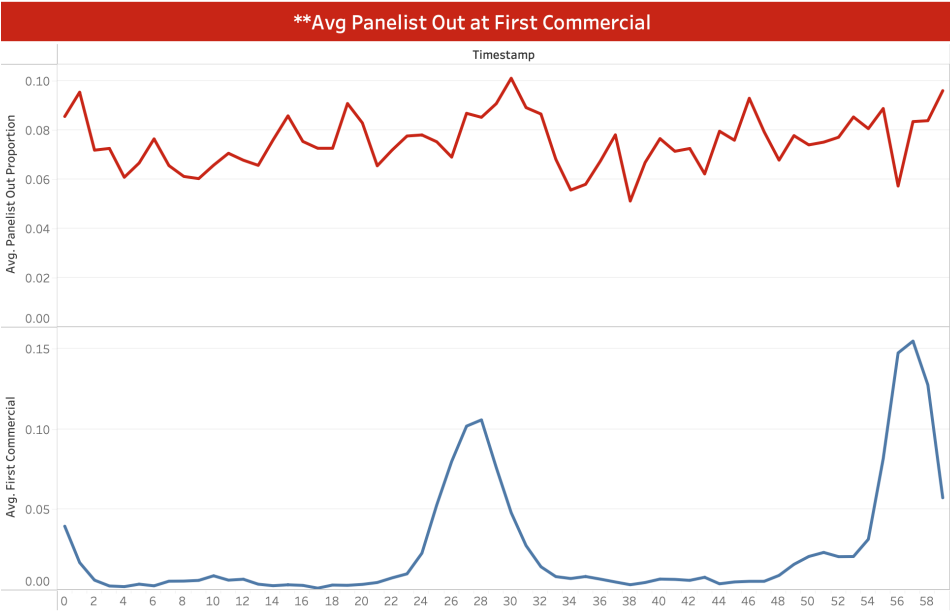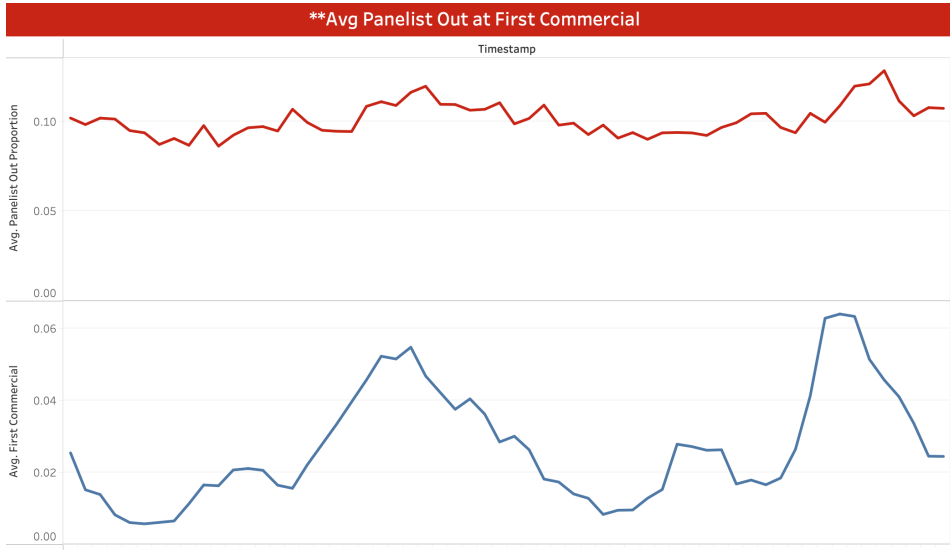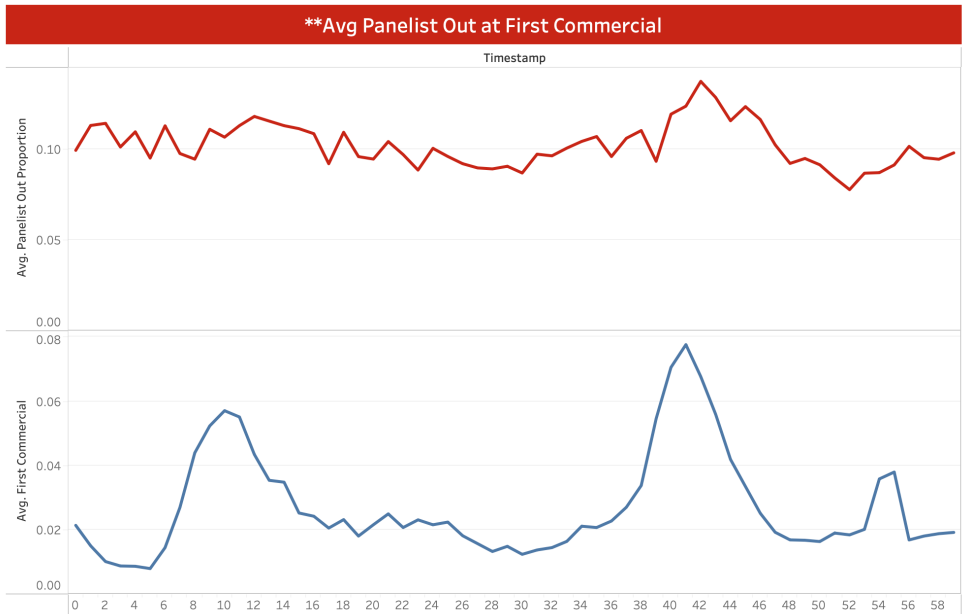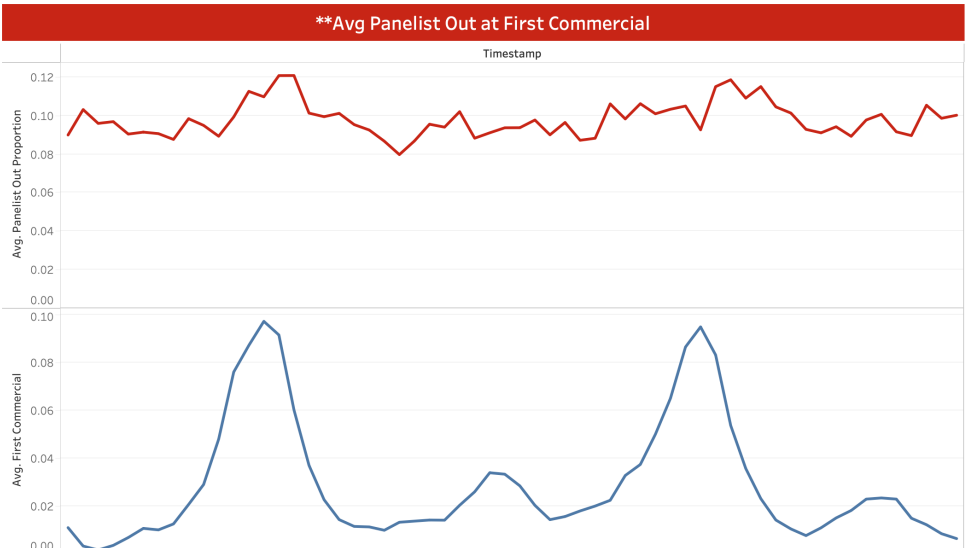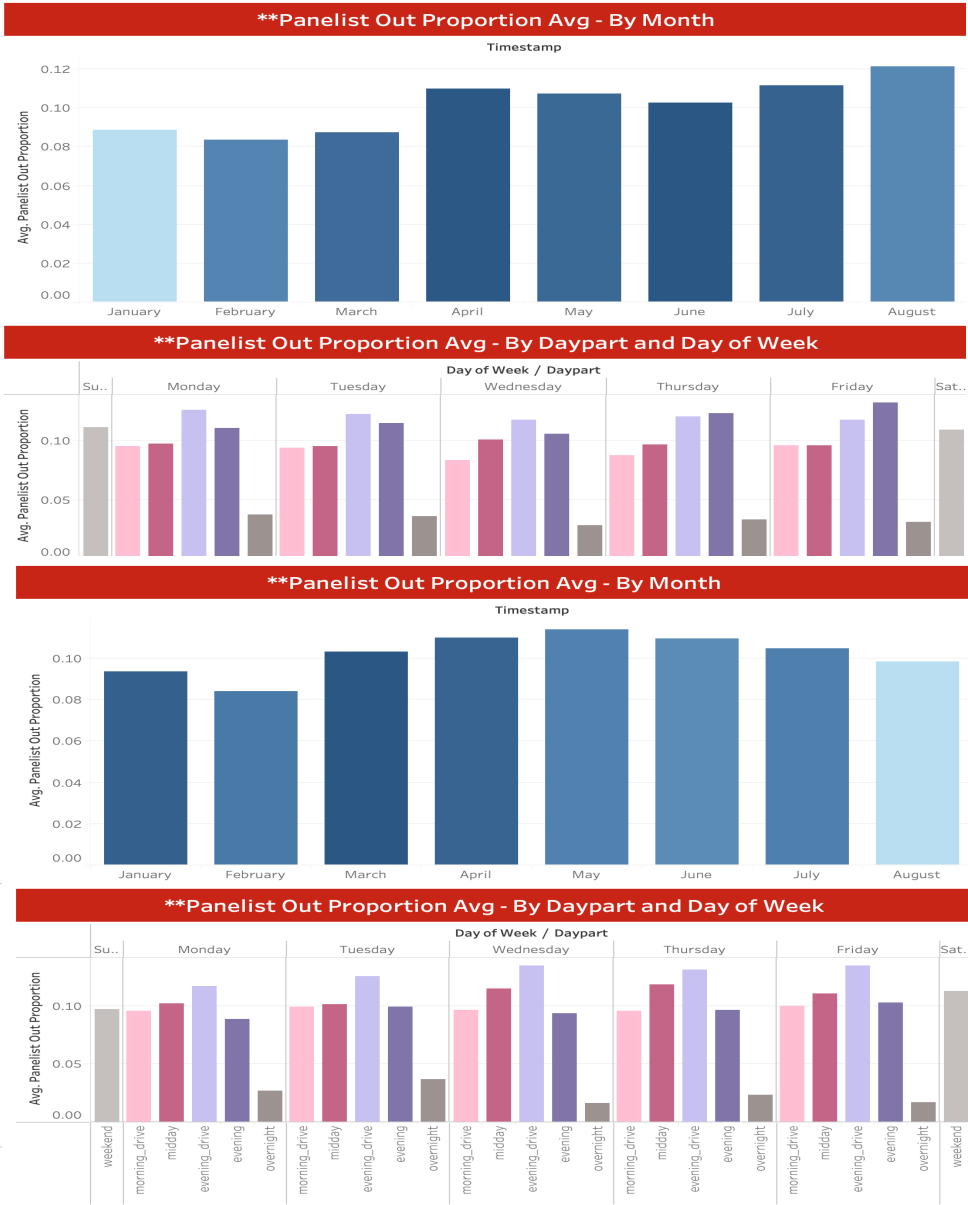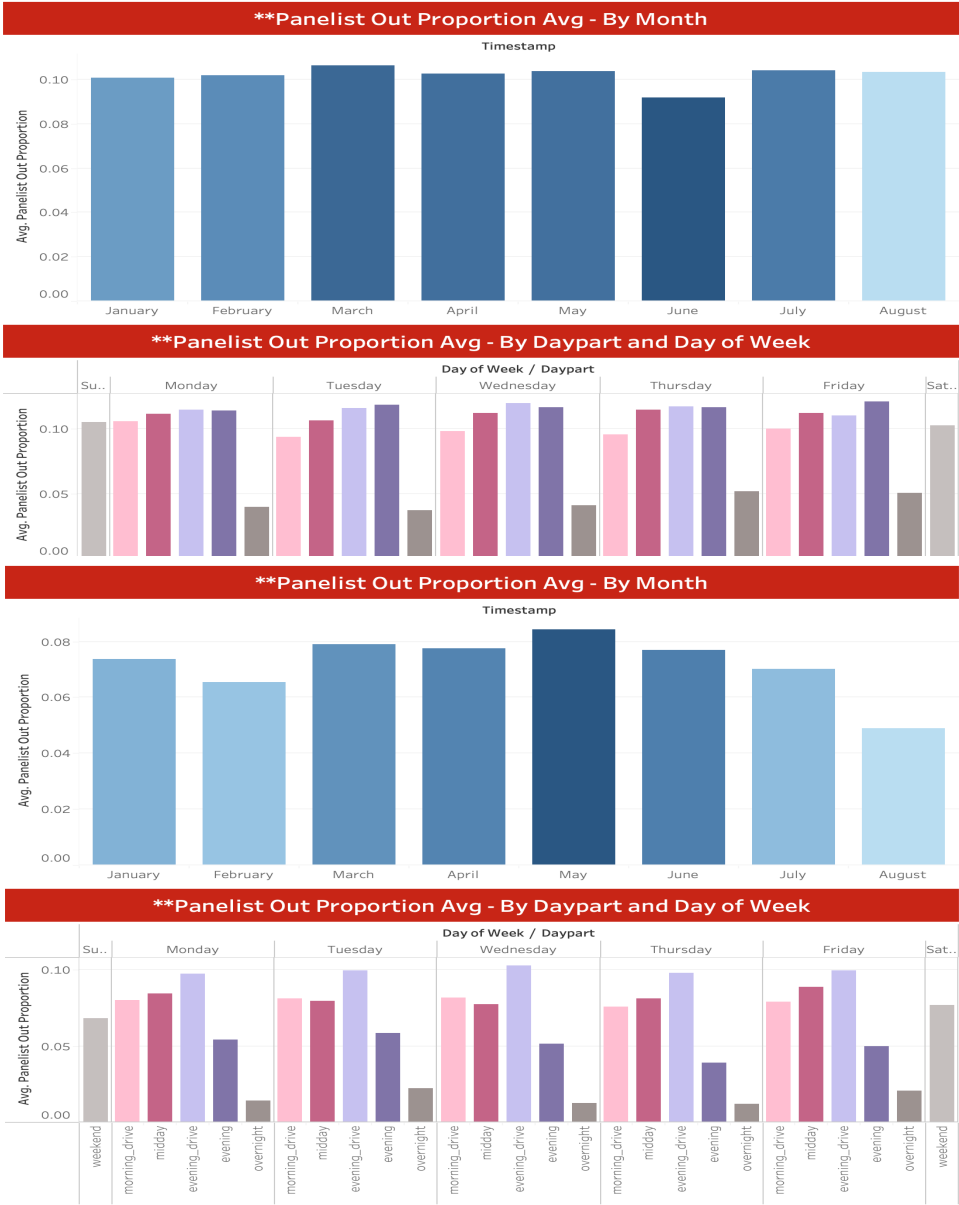
Station 1

Station 4

Station 2

Station 3

Avg Distinct Commercials & Songs - By Hour
Unrounded Timestamp

Count - Songs & Commercials - By month
Timestamp

Station 1

Panelists Out - By Commercial Length.

CommercialDuration

| 00:00:15 | 00:00:30 | 00:01:00 | 00:01:30 | 00:02:00 | 00:02:45 |

- 20,065 / 20,065
- 73,881 / 73,881
- 12,879 / 12,879
- 130 / 130
- 12 / 12
- 9 / 9

Station 4

Panelists Out - By Commercial Length.

CommercialDuration

| 00:00:15 | 00:00:30 | 00:01:00 | 00:01:30 | 00:02:00 | 00:02:20 |

- 23,799 / 23,799
- 73,465 / 73,465
- 17,592 / 17,592
- 152 / 152
- 40 / 40
- 4 / 4

Station 2

Panelists Out - By Commercial Length.

CommercialDuration

| 00:00:15 | 00:00:30 | 00:01:00 | 00:01:30 | 00:02:00 |

- 36,195 / 36,195
- 76,813 / 76,813
- 26,394 / 26,394
- 107 / 107
- 77 / 77

Station 3

Panelists Out - By Commercial Length.

CommercialDuration

| 00:00:30 | 00:01:00 | 00:01:30 | 00:02:00 |

- 54,468 / 54,468
- 22,374 / 22,374
- 25 / 25
- 55 / 55

Average Commercials Per Hour & Duration

Hour	Stn 4	3	2	1
0	15	3	19	14
1	14	4	19	11
2	13	4	18	10
3	13	4	18	9
4	14	4	19	10
5	23	19	25	25
6	27	21	27	27
7	25	9	23	19
8	22	13	24	24
9	36	25	33	26
10	35	15	27	23
11	25	18	18	26
12	0	6	17	15
13	32	19	25	24
14	34	19	21	15
15	25	21	28	26
16	0	19	28	27
17	22	9	15	16
18	36	21	28	25
19	34	17	24	25
20	32	14	10	13
21	5	15	24	26
22	3	17	22	22
23	32	22	23	21
Total AVG	21.54	14.08	22.29	19.96

Station	Avg Duration Of Commercial	Avg Duration Of Song
4	0:00:32	0:03:05
3	0:00:39	0:03:02
2	0:00:32	0:02:59
1	0:00:31	0:02:57

Ratings

- ❤ Four Stations

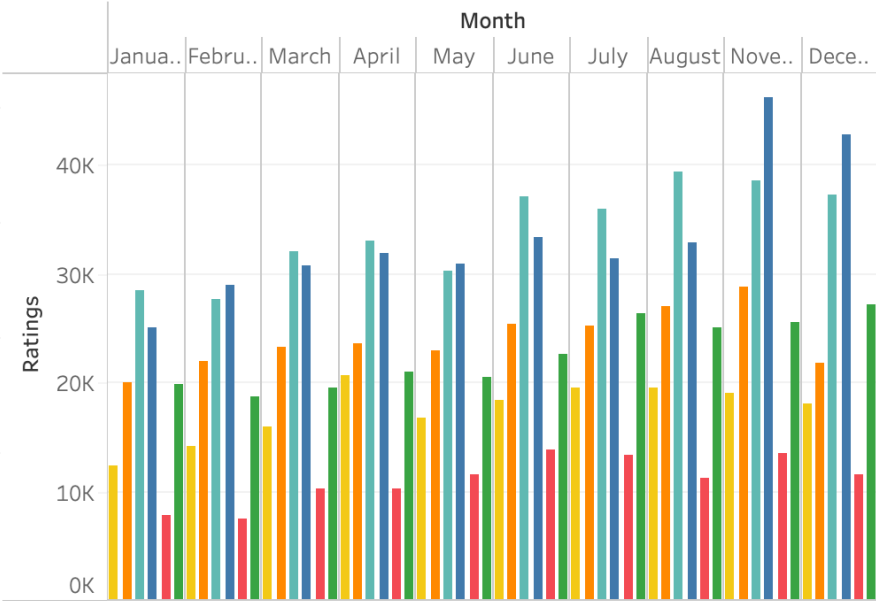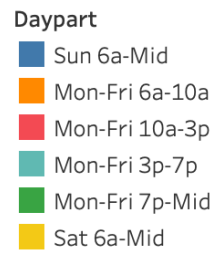- ❤ Shows how many people listened to each station for each daypart during various months of 2021

Station 1

Month
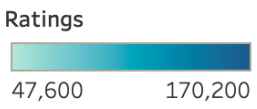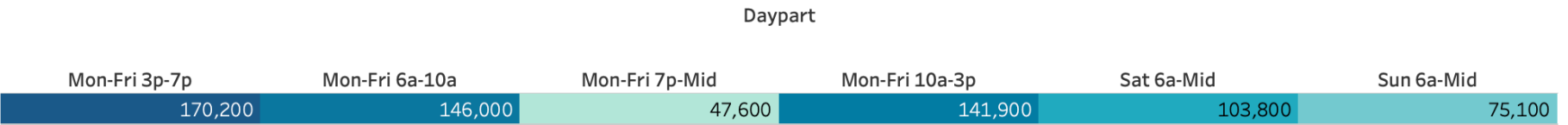
January	February	March	April	May	June	July	August	November	December
113,700	119,100	131,800	140,400	132,900	150,600	151,700	155,400	171,700	158,600

Daypart

Mon-Fri 3p-7p	Mon-Fri 6a-10a	Mon-Fri 7p-Mid	Mon-Fri 10a-3p	Sat 6a-Mid	Sun 6a-Mid
340,900	242,300	113,100	344,200	230,100	177,500

Ratings

113,100 — 344,200

Daypart
- Sun 6a-Mid
- Mon-Fri 6a-10a
- Mon-Fri 10a-3p
- Mon-Fri 3p-7p
- Mon-Fri 7p-Mid
- Sat 6a-Mid

Ratings Per Month

Ratings Per Daypart Per Month

Station 2

Month

January	February	March	April	May	June	July	August
88,100	79,200	91,900	93,900	81,700	73,400	79,300	97,100

Daypart

Mon-Fri 3p-7p	Mon-Fri 6a-10a	Mon-Fri 7p-Mid	Mon-Fri 10a-3p	Sat 6a-Mid	Sun 6a-Mid
170,200	146,000	47,600	141,900	103,800	75,100

Ratings

47,600 — 170,200

Daypart
- Sun 6a-Mid
- Mon-Fri 6a-10a
- Mon-Fri 10a-3p
- Mon-Fri 3p-7p
- Mon-Fri 7p-Mid
- Sat 6a-Mid

Ratings Per Month

Ratings Per Daypart Per Month

Station 3

Month

January	February	March	April	May	June	July	August
23,900	20,700	23,500	25,800	28,900	29,000	20,600	24,200

Daypart

Mon-Fri 3p-7p	Mon-Fri 6a-10a	Mon-Fri 7p-Mid	Mon-Fri 10a-3p	Sat 6a-Mid	Sun 6a-Mid
44,900	37,300	12,100	43,700	32,700	25,900

Ratings

12,100   44,900

Daypart
- Sun 6a-Mid
- Mon-Fri 6a-10a
- Mon-Fri 10a-3p
- Mon-Fri 3p-7p
- Mon-Fri 7p-Mid
- Sat 6a-Mid

Ratings Per Month

Ratings Per Daypart Per Month

Station 4

Month

January	February	March	April	May	June	July	August	September	October	November
186,400	200,800	218,200	198,500	189,100	243,900	187,700	195,200	169,500	199,100	230,900

Daypart

Mon-Fri 3p-7p	Mon-Fri 6a-10a	Mon-Fri 7p-Mid	Mon-Fri 10a-3p	Sat 6a-Mid	Sun 6a-Mid
498,600	507,300	162,000	390,800	378,500	282,100

Ratings

169,500   243,900

Daypart
- Sun 6a-Mid
- Mon-Fri 6a-10a
- Mon-Fri 10a-3p
- Mon-Fri 3p-7p
- Mon-Fri 7p-Mid
- Sat 6a-Mid
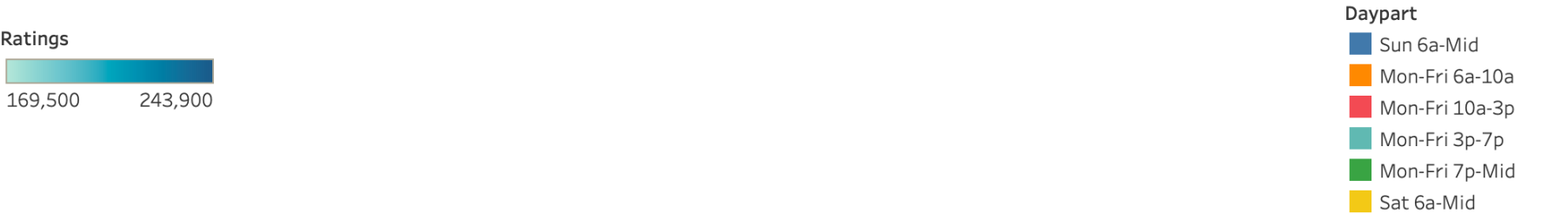
Ratings Per Month

Ratings Per Daypart Per Month
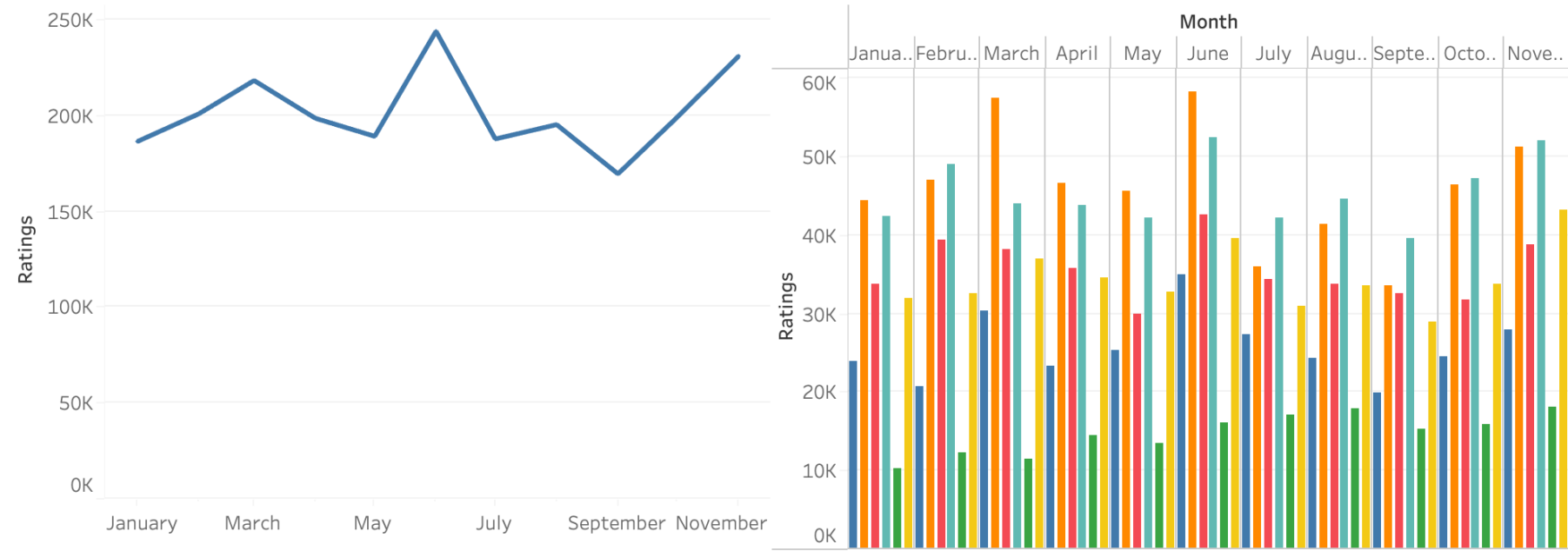
Recommendations

- Less sensitivity to commercials during the morning drive between 7-8 am, leverage "Premium Slot" marketing

- Participants leave at highest rate between minutes 2 and 3 of a commercial, strategic opportunity to coordinate "same time" commercial breaks between multiple stations within same market own by this "Radio Company"

- Opportunity to add commercials during midday hours, 10-2pm on weekdays and Fridays, especially during 3-5 pm of evening drive

- Weekend audience stability between 12-4pm represents opportunity

Next Steps

- Evaluate impact of COVID pandemic on listening audience with pre-COVID, 2019 data to validate if current 2021 trends hold

- Extend data evaluation to 12 months to better understand/confirm lack of seasonal trends

- Add demographics (age and gender) data to correlate impact

- Evaluate On-Air Radio Host Ratings

Z100 new york

On-Air Schedule

Mo Tu We Th Fr Sa Su

Shelley Rome
10:00 PM - 2:00 AM

Nick Gomez
2:00 AM - 6:00 AM

Elvis Duran
6:00 AM - 10:00 AM

Ryan Seacrest
10:00 AM - 2:00 PM

Maxwell & Crystal
2:00 PM - 6:00 PM

Josh Martinez
6:00 PM - 11:00 PM

Phill Kross
11:00 PM - 12:00 AM