



# FINAL PROJECT: *DRUG REVIEWS, SENTIMENT ANALYSIS, AND FDA SAFETY*

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DATA 607

5/13/20

# PRESENTATION GOALS

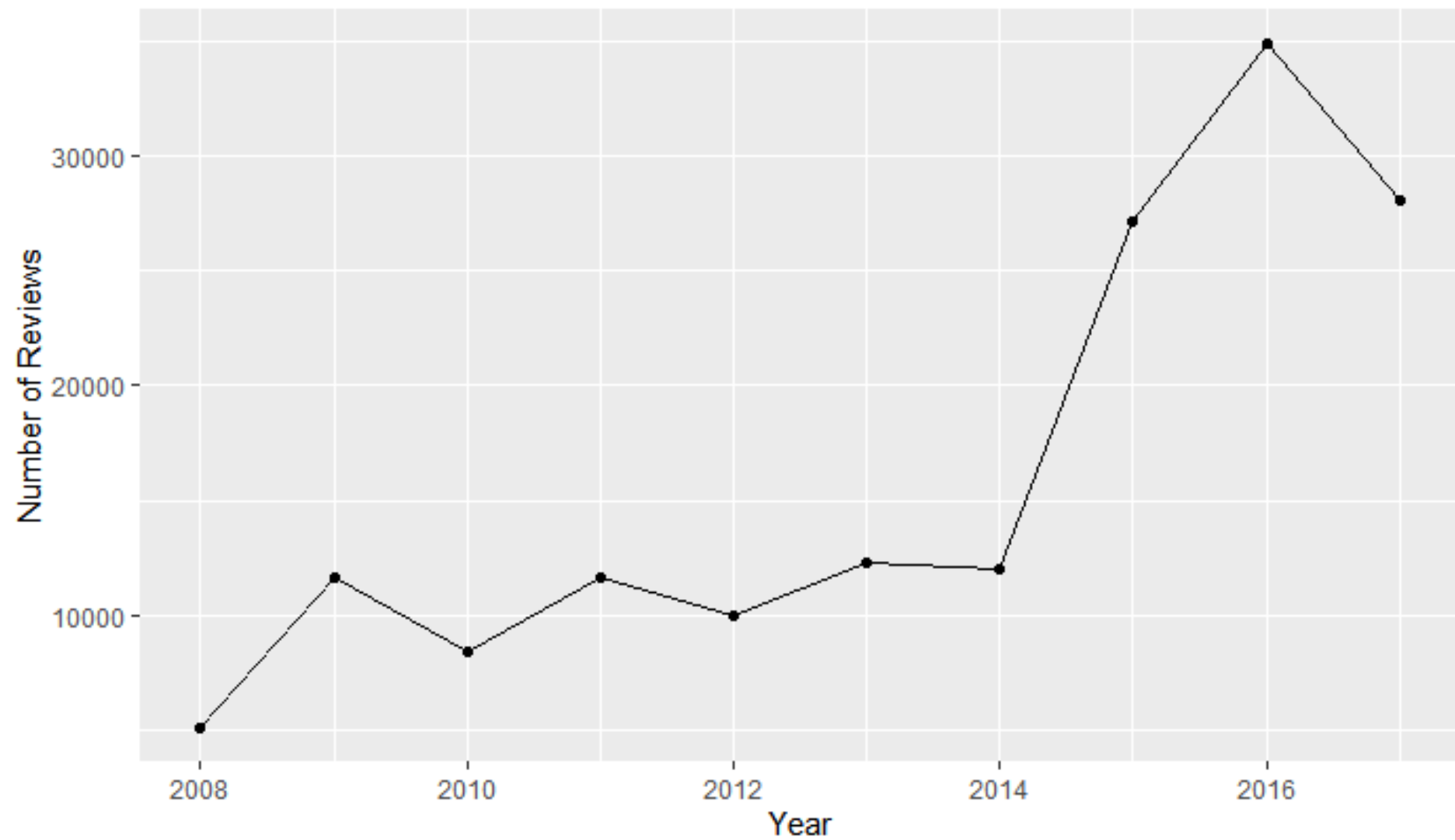
- Describe the characteristics of *Drugs.com* user reviews
- Identify review sentiments that may suggest side effects
- Compare patient reviews with openFDA API / FAERS reports

# REVIEWS CORPUS

- Drugs.com and Drugslib.com (n = 215,000, 3,500)
- Duration: 2008 – 2017
- Drug name and condition
- Numeric rating and text review



Number of reviews over time



# POPULAR MEDICATIONS

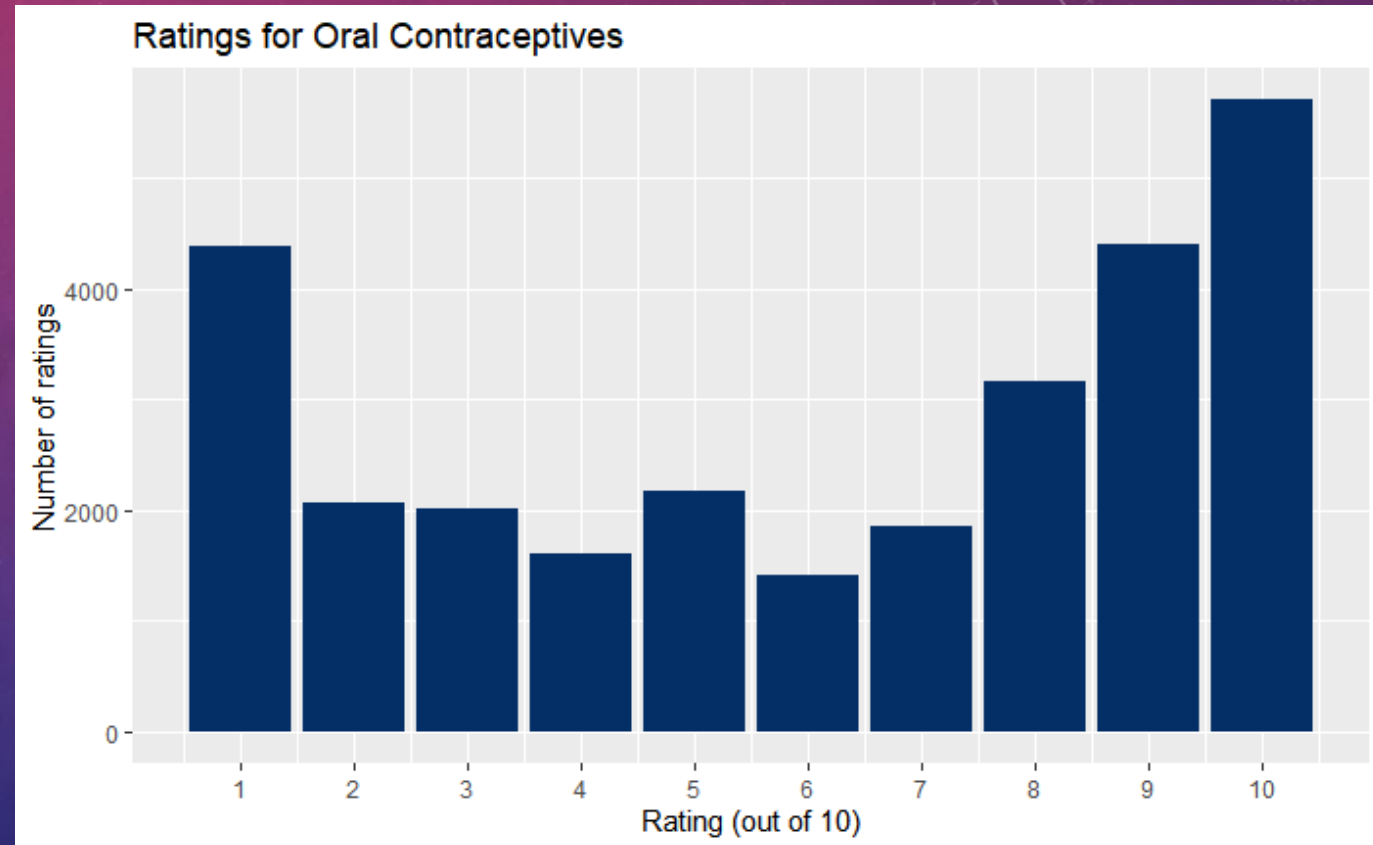
Levonorgestrel	Etonogestrel	Ethinyl estradiol / norethindrone
3657	3336	2850
Nexplanon	Ethinyl estradiol / norgestimate	Ethinyl estradiol / levonorgestrel
2156	2117	1888
Phentermine	Sertraline	Escitalopram
1543	1360	1292
Mirena	Implanon	Gabapentin
1242	1102	1047
Bupropion	Venlafaxine	Miconazole
1022	1016	1000
Medroxyprogesterone	Citalopram	Lexapro
995	995	952
Bupropion / naltrexone	Duloxetine	Metronidazole
950	934	922
Contrave	Drospirenone / ethinyl estradiol	Depo-Provera
920	890	882
(other)		
126229		

# CONDITIONS

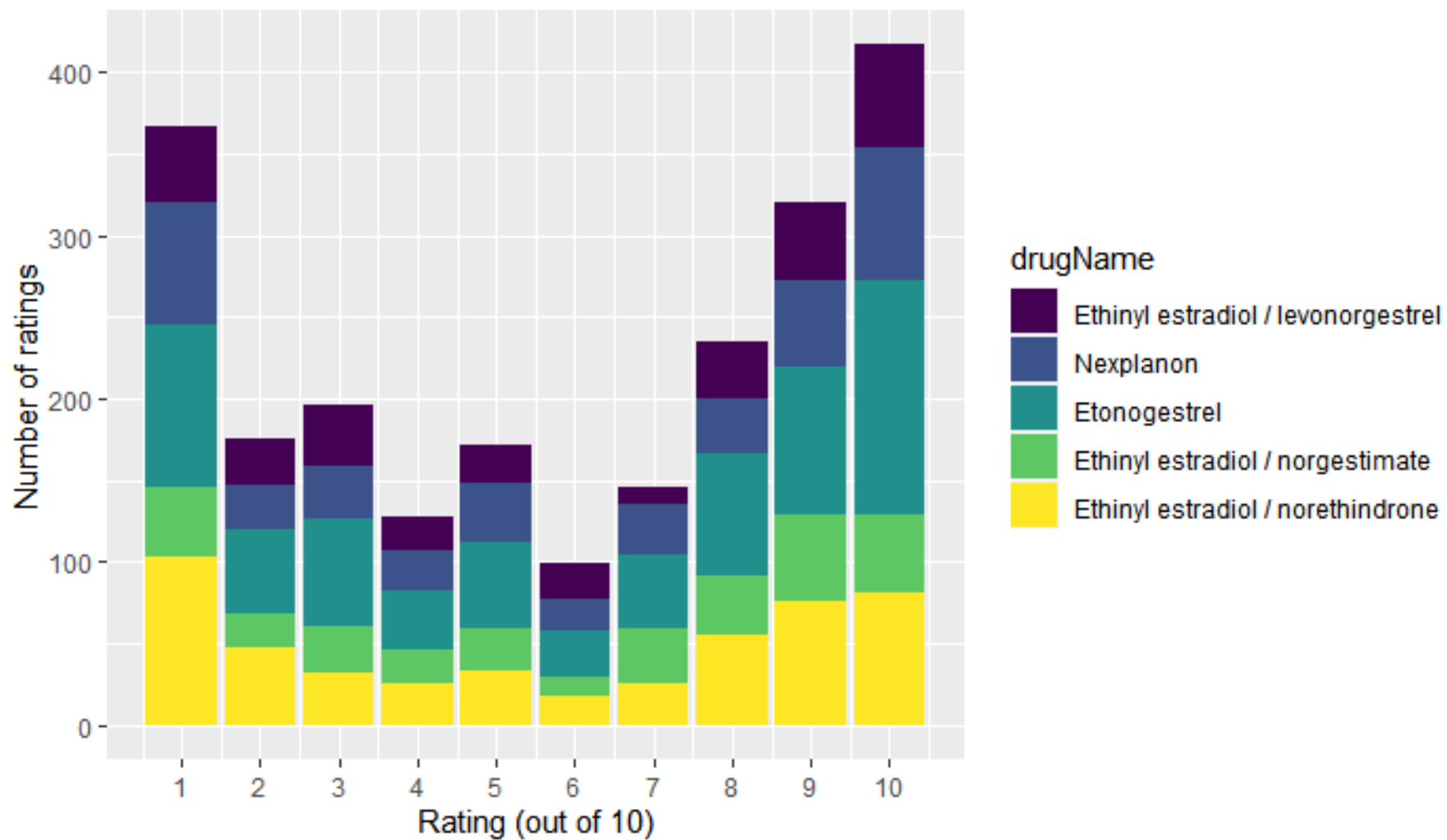
Birth Control	Depression	Pain	Anxiety
28788	9069	6145	5904
Acne	Bipolar Disorder	Insomnia	Weight Loss
5588	4224	3673	3609
Obesity	ADHD	Diabetes, Type 2	Emergency Contraception
3568	3383	2554	2463
High Blood Pressure	Vaginal Yeast Infection	Abnormal Uterine Bleeding	Bowel Preparation
2321	2274	2096	1859
Fibromyalgia	Smoking Cessation	Migraine	Anxiety and Stress
1791	1780	1694	1663
Major Depressive Disorder	Constipation	Panic Disorder	(other)
1607	1595	1463	61287
NA's			
899			

# RATINGS

- Typical distribution
- Bimodal at min, max
- Some distinctions found when filtering by drug

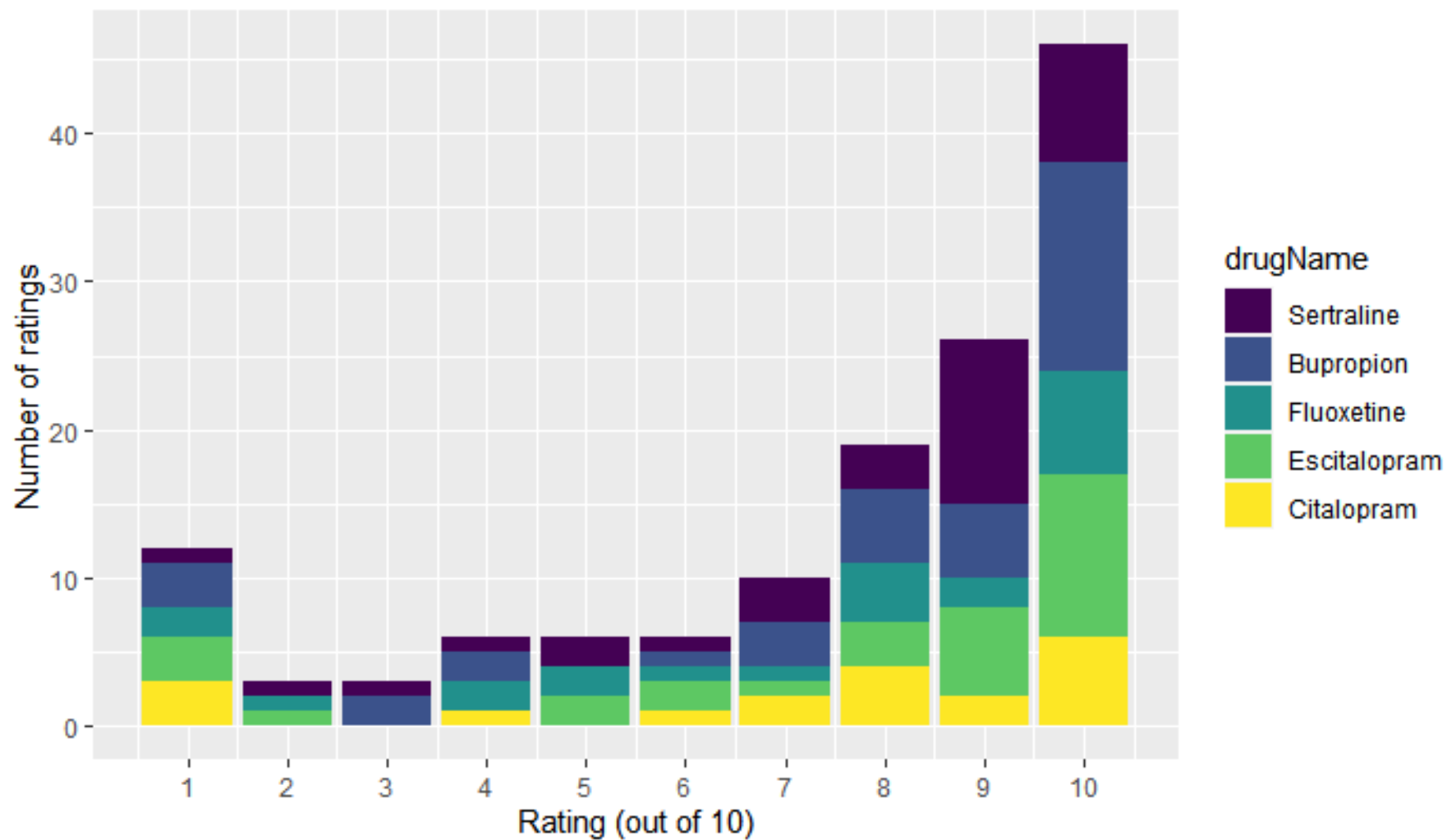


### Ratings for Top 5 Contraceptives

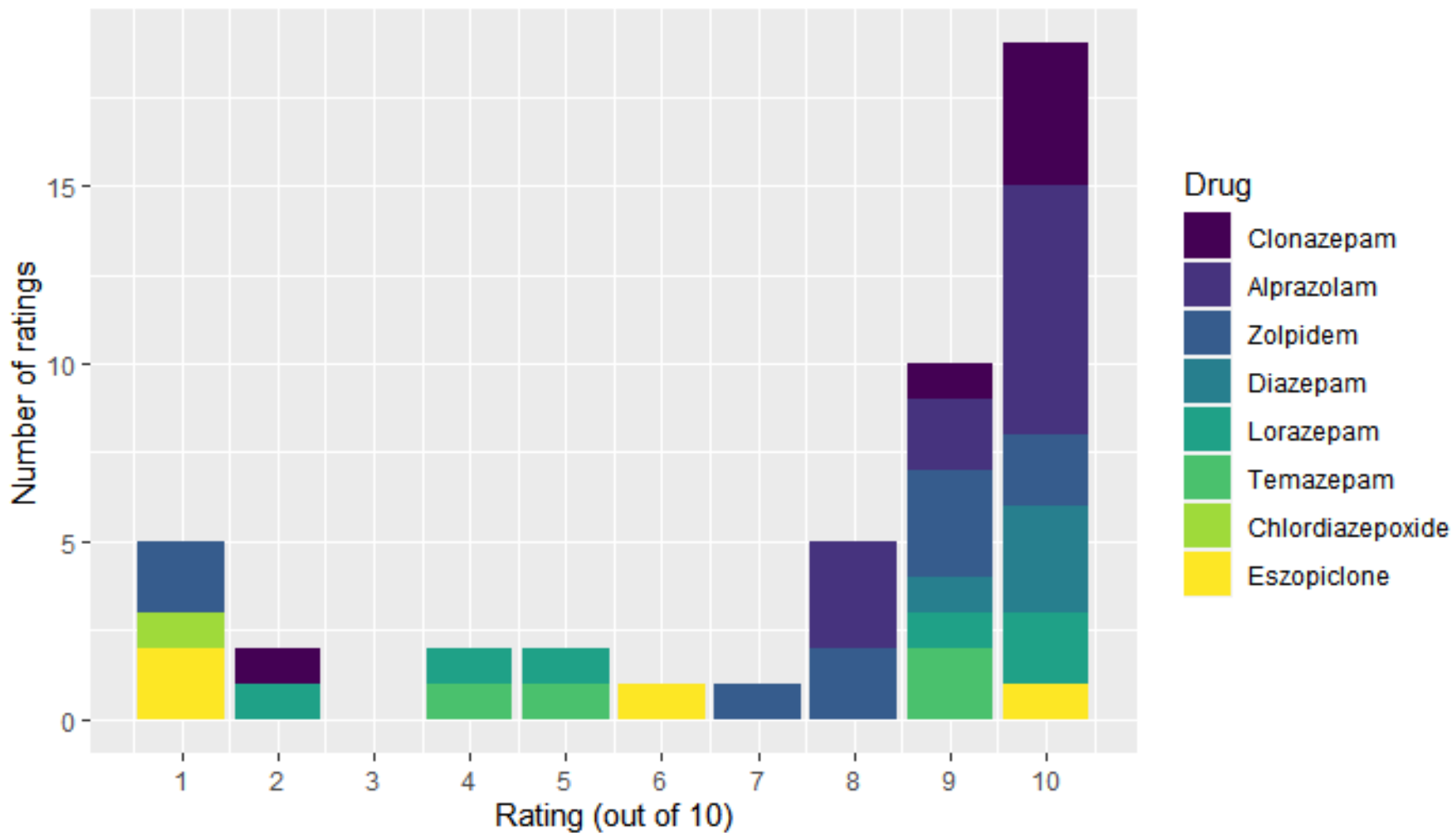




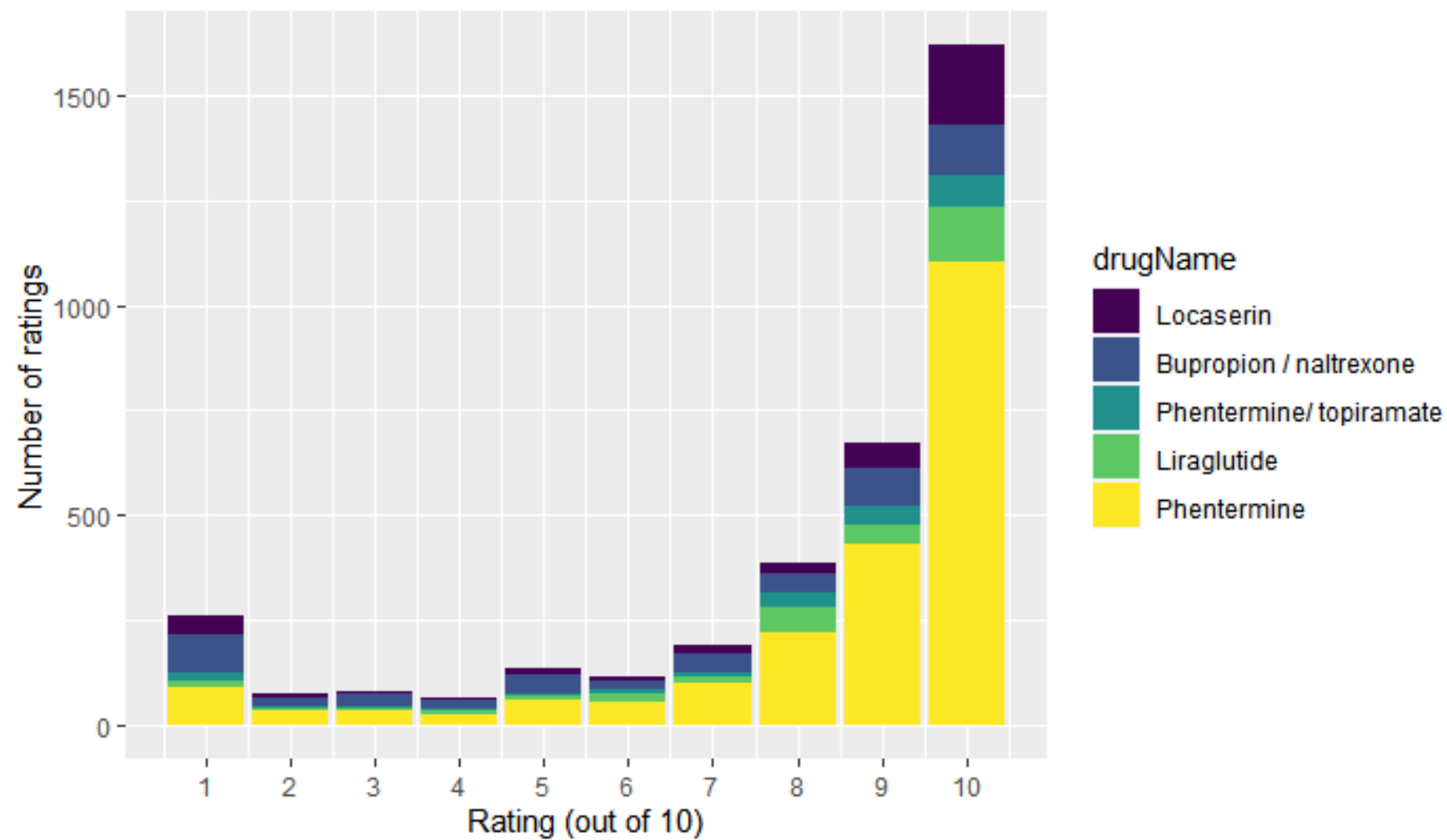
Ratings for Top 5 Treatments for Anxiety or Depression



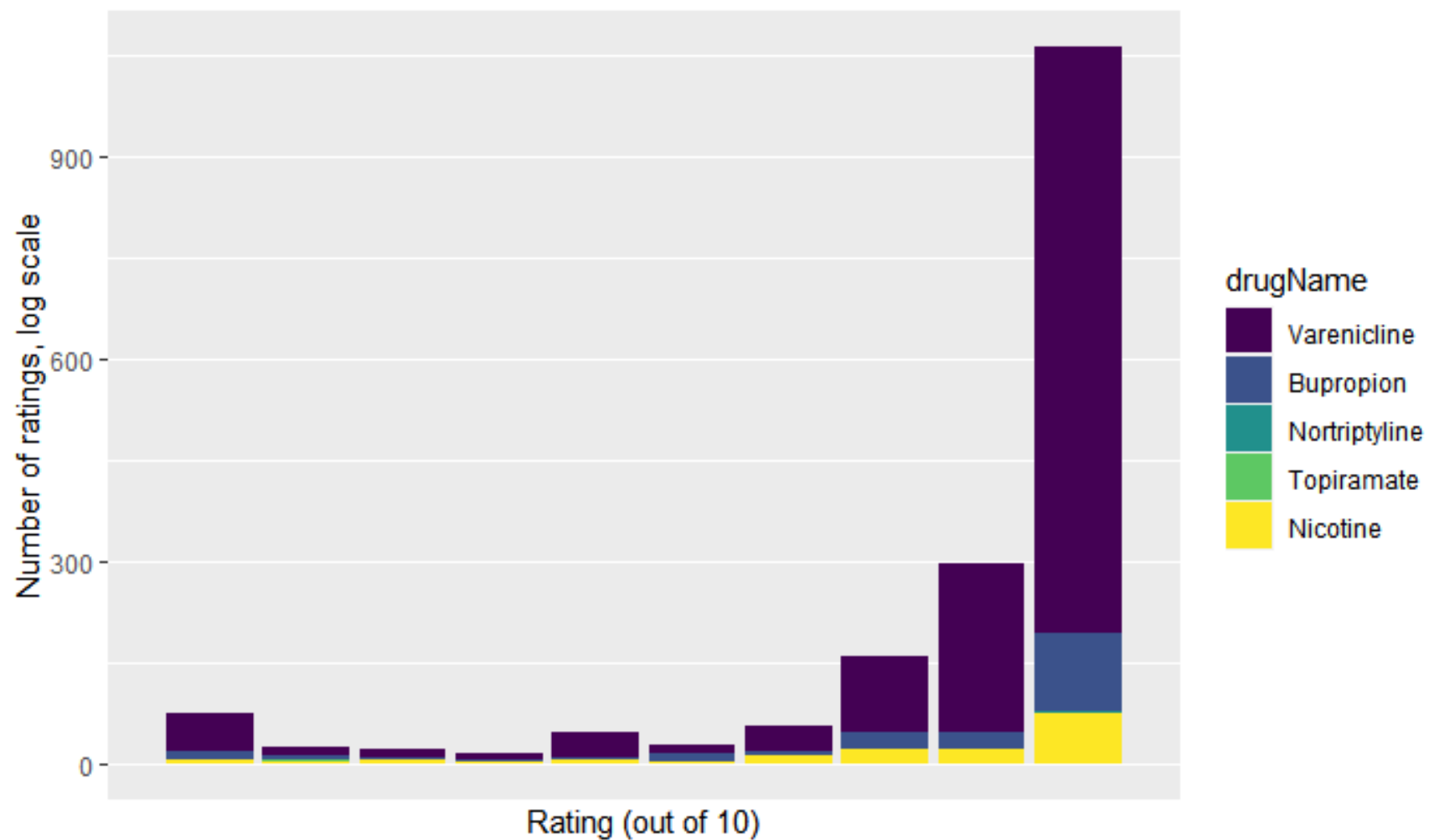
### Ratings of Sedatives



### Ratings for Weight Loss

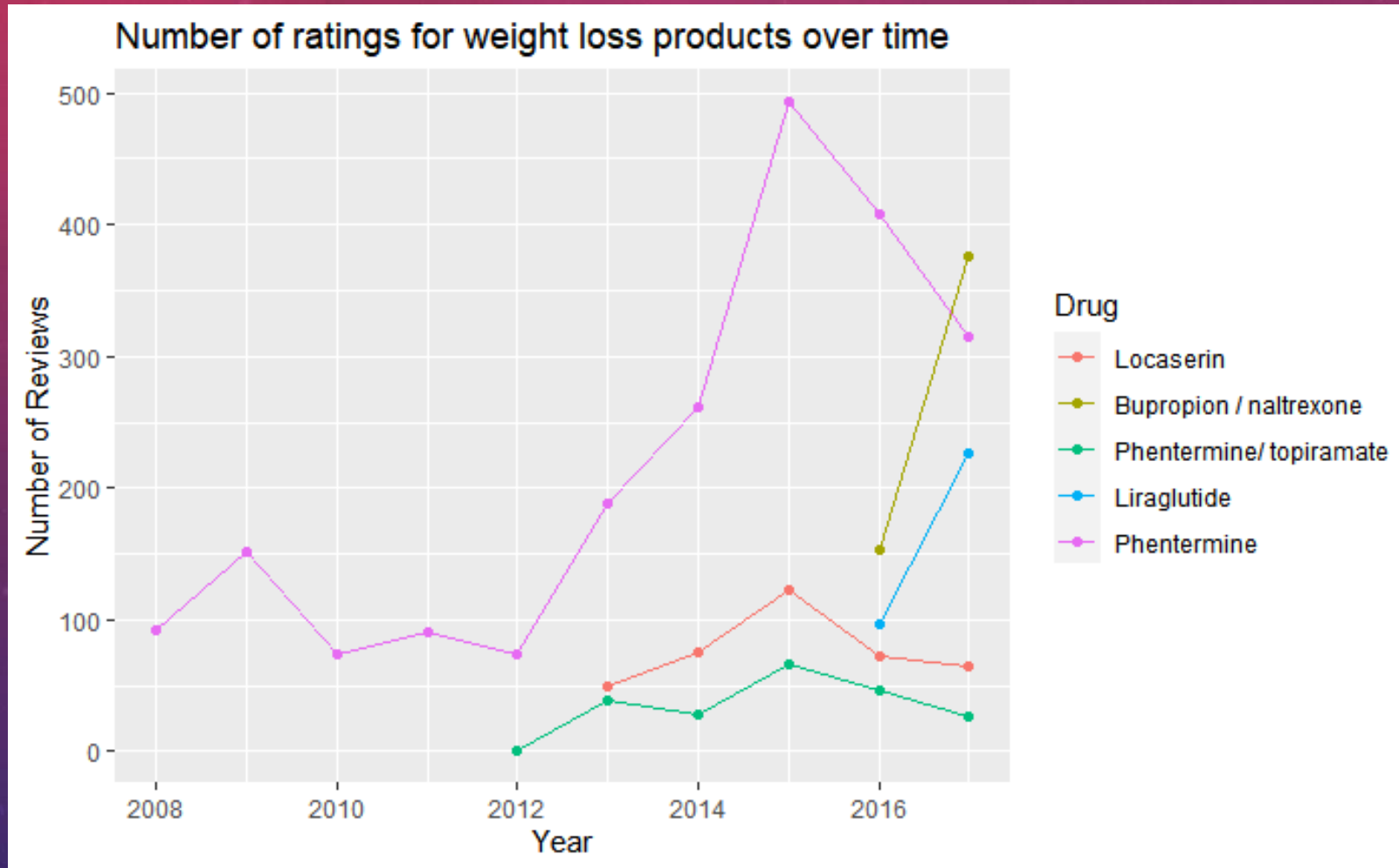


# Ratings for Smoking Cessation





# APPROVAL OF NEW TREATMENTS

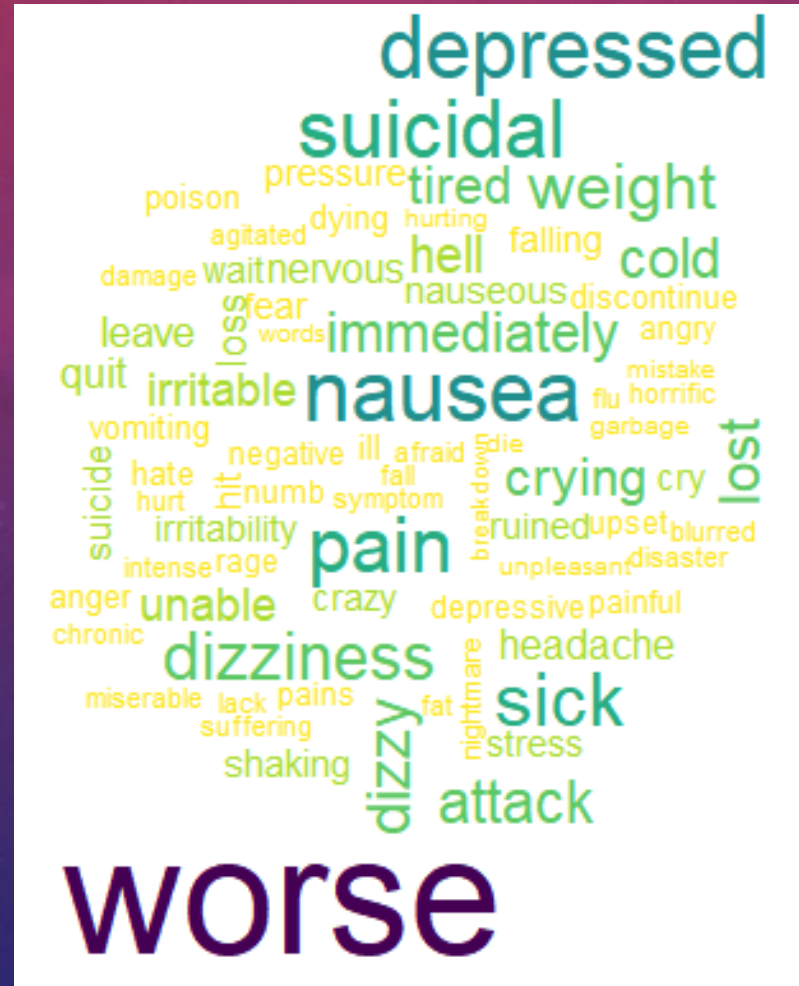


# REVIEWS SENTIMENTS

- *NRC* lexicon
- Review of 10 = positive sentiments
- **Review of 1 = negative sentiments**
- Visualization: word cloud by frequency

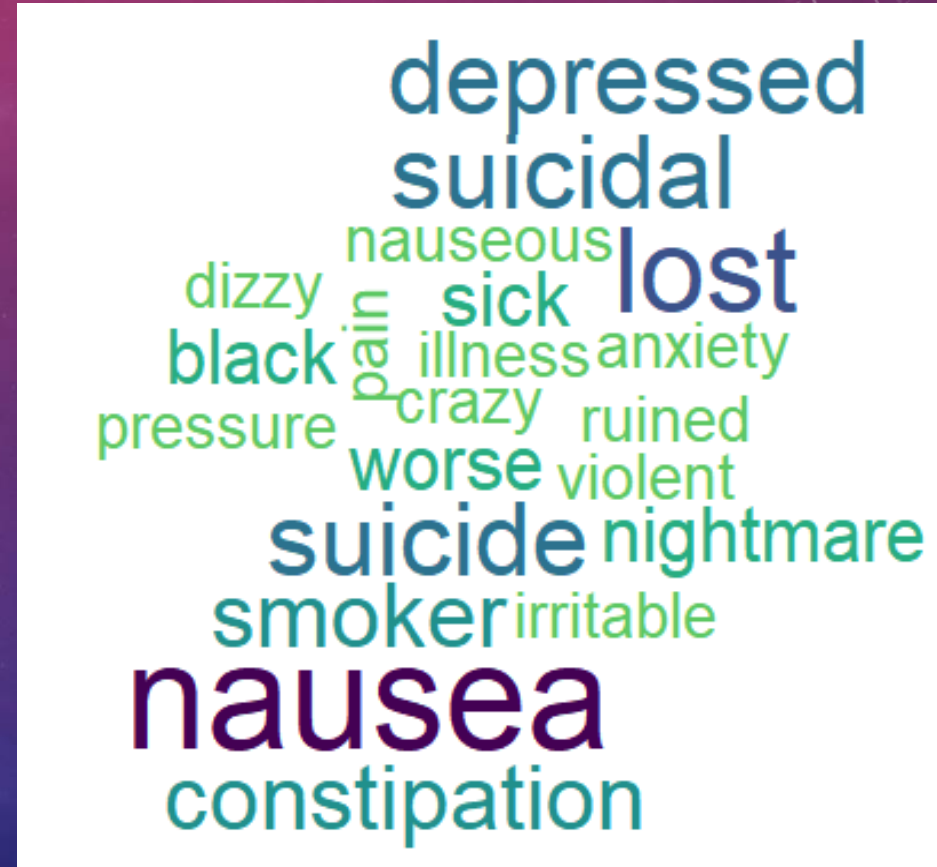
[illegible]

# DEPRESSION AND ANXIETY





## An abstract background featuring concentric circles and numbers, suggesting a clock or a circular scale. The numbers are arranged in a circular pattern, with some visible numbers being 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000. The background is a gradient of blue and purple.

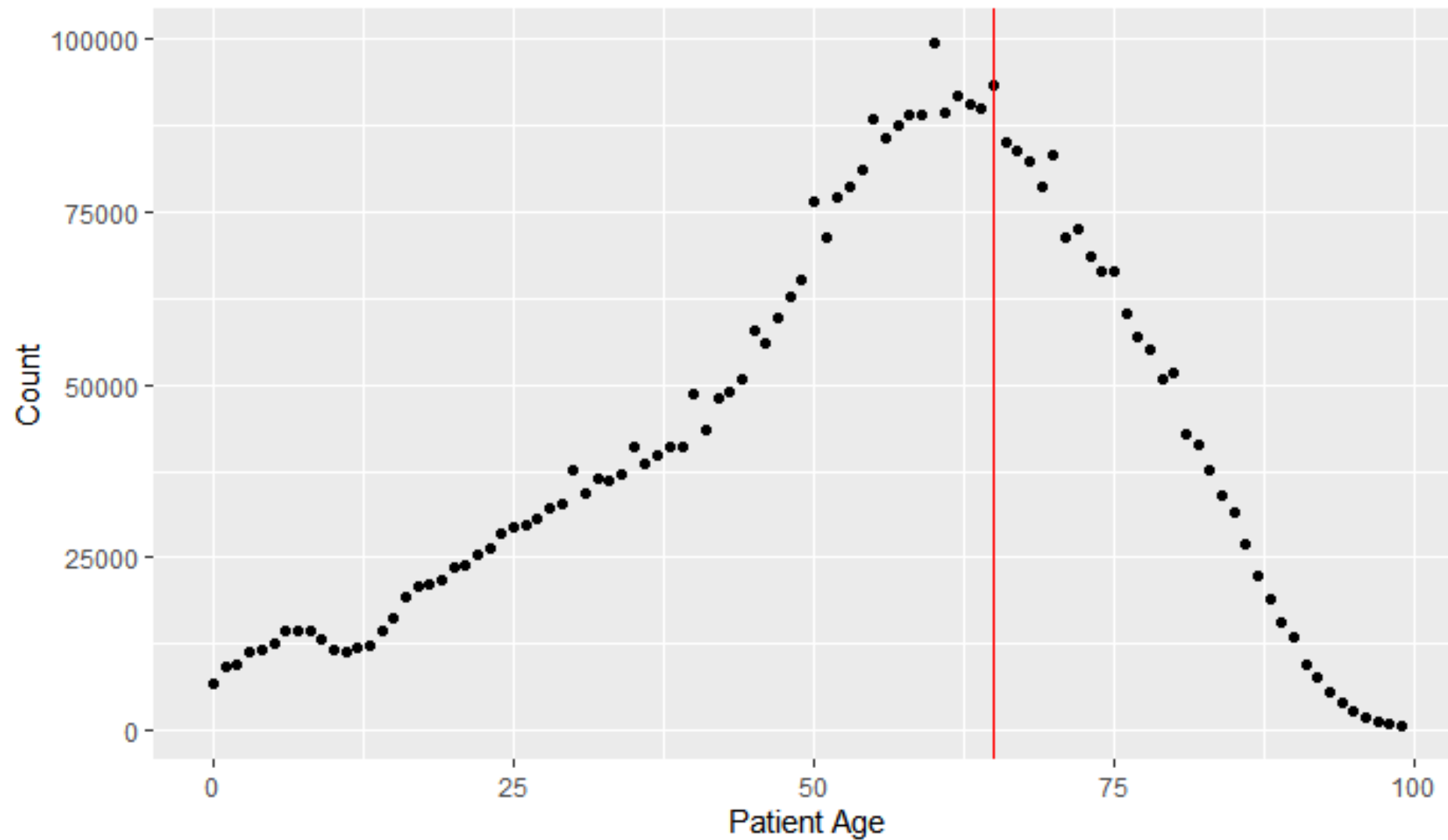




# OPENFDA API AND FAERS

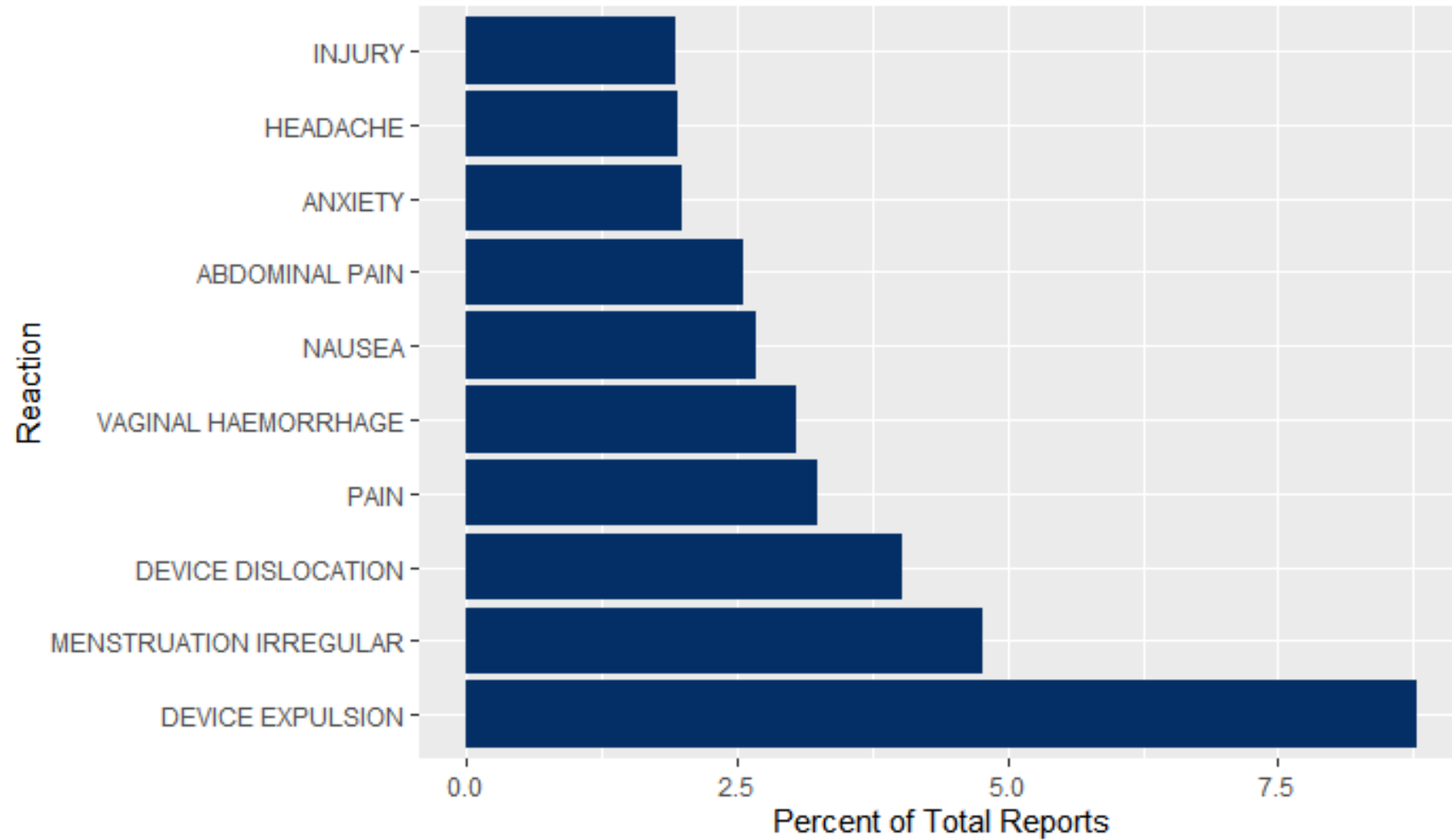
- FAERS = FDA Adverse Event Reporting System
- Driven by hospitalization, provider interventions
- JSON format
- Many details about severity of reaction

Ages of Patients with Reported ADE's, 2008 - 2017

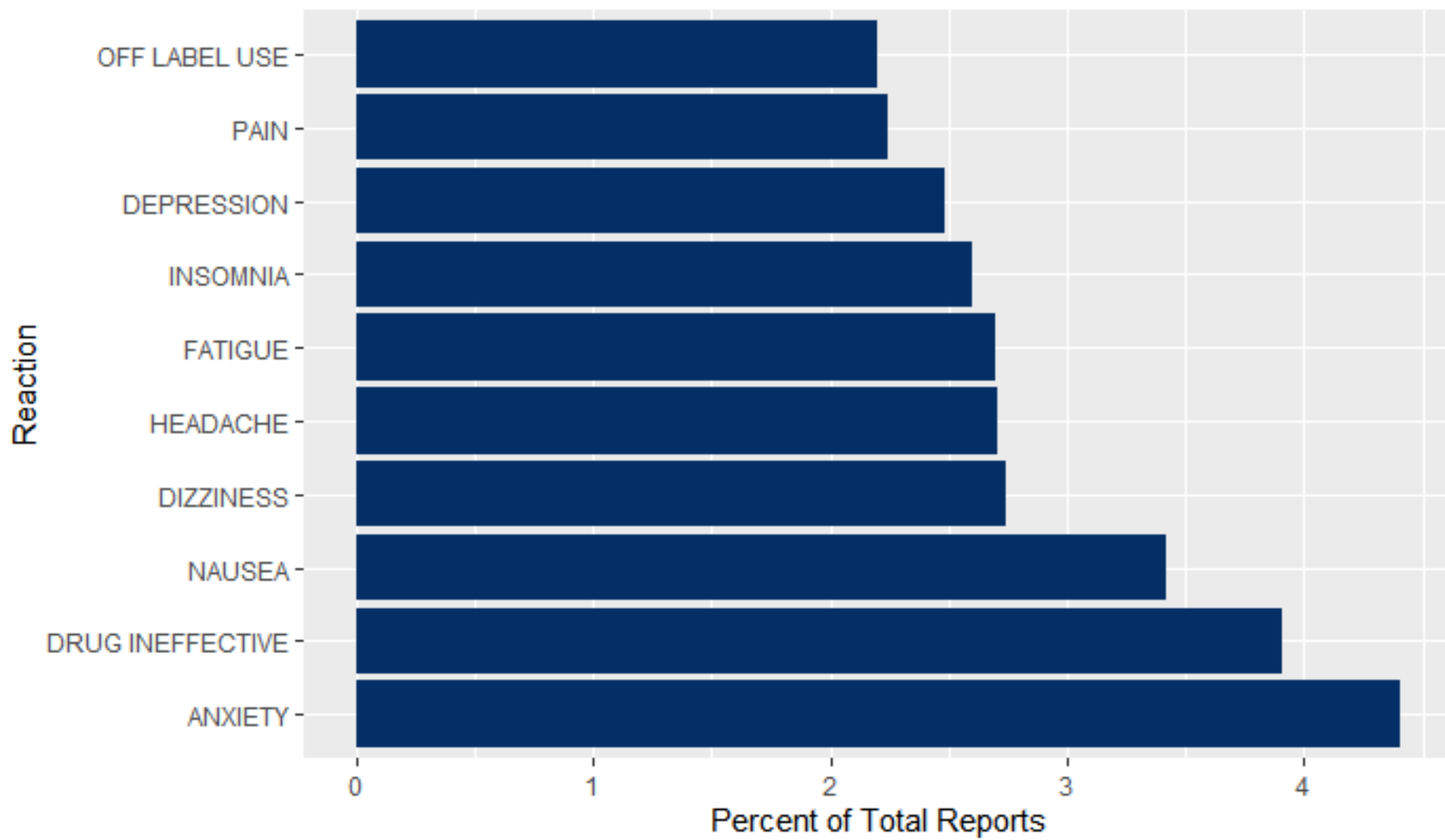




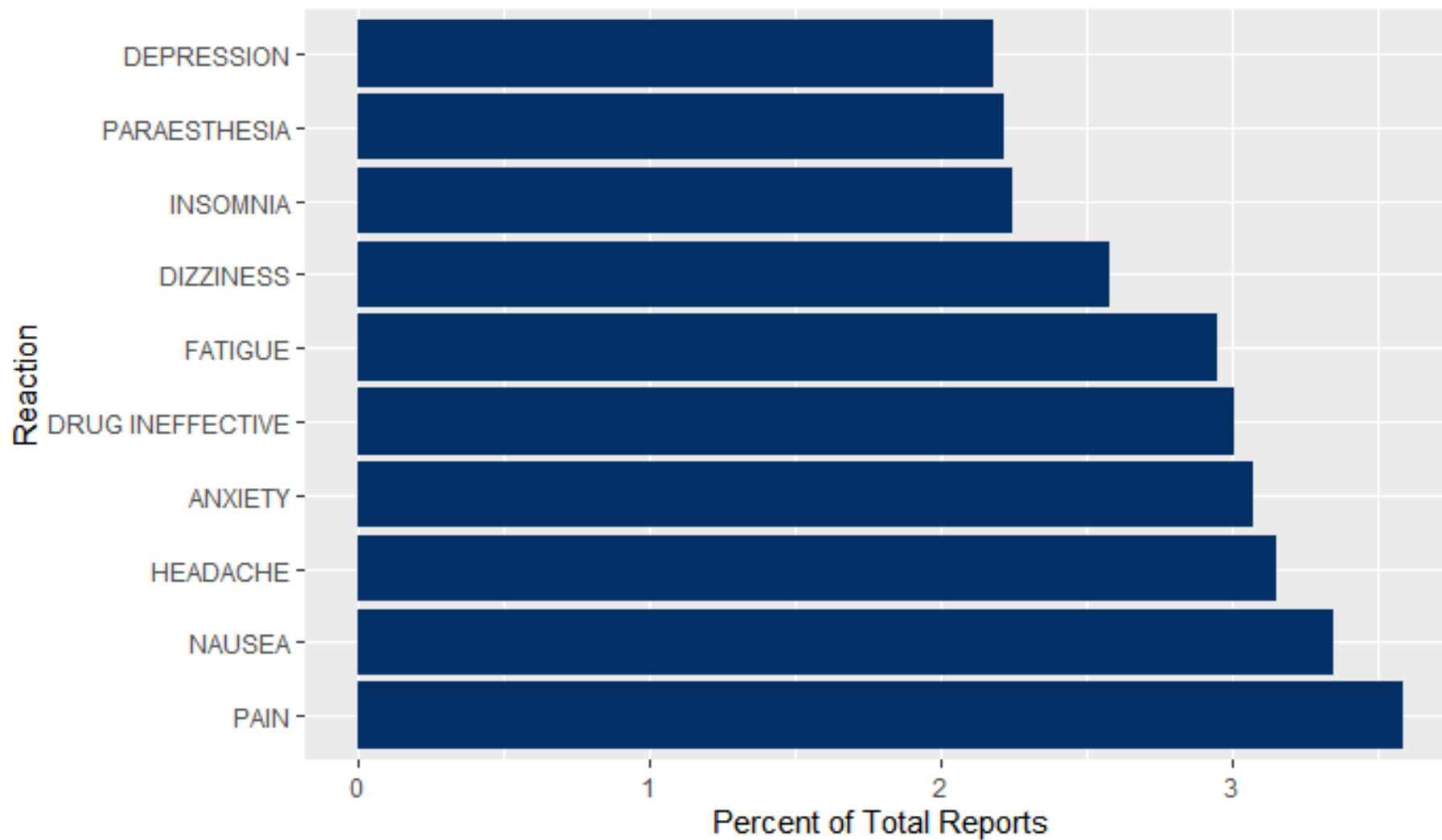
Frequency of ADE's associated with Birth Control Use, 2008 - 2017



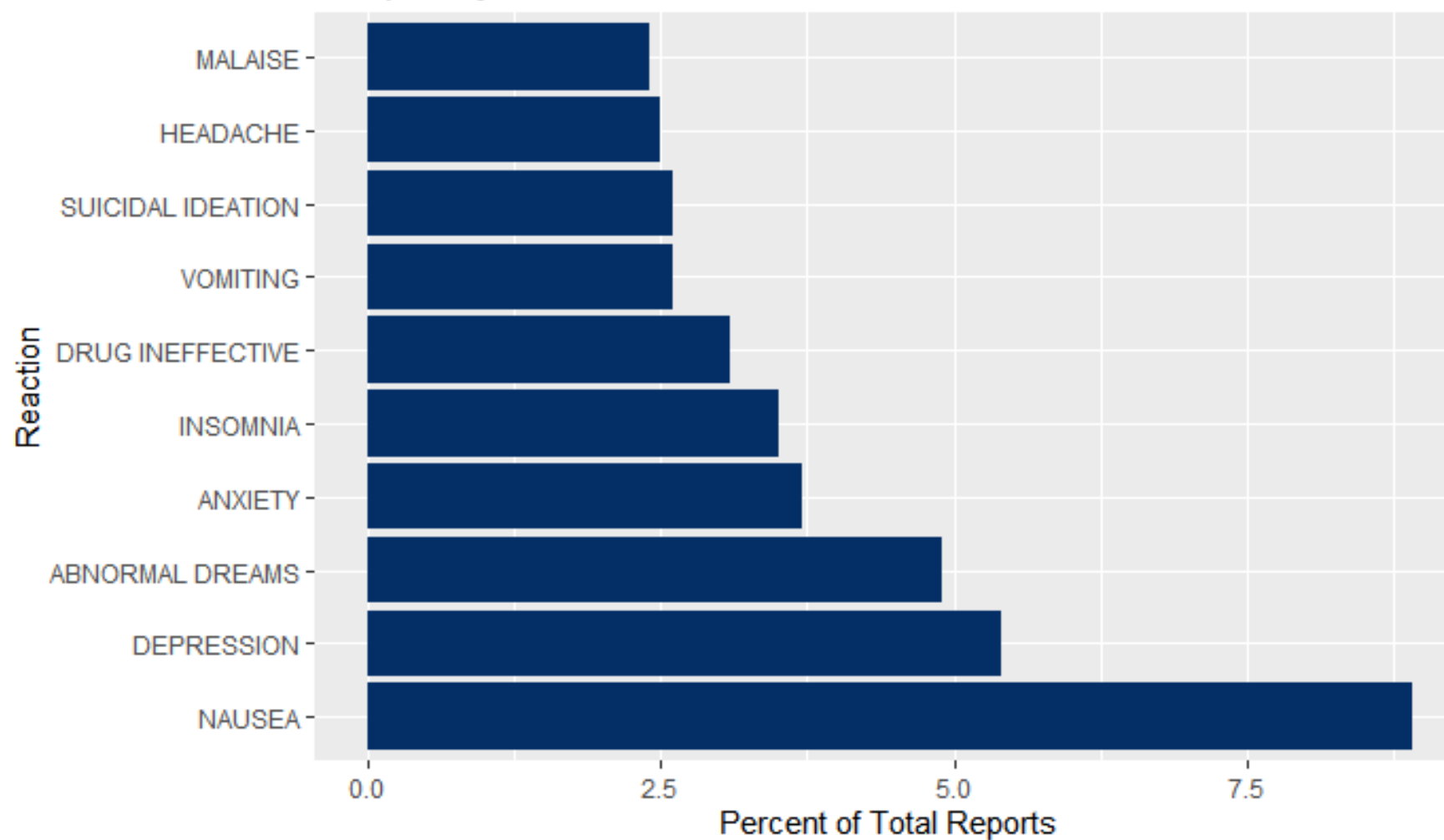
## ADE's associated with Anxiety and Depression Treatment, 2008 - 2017



Frequency of ADE's associated with Phentermine Use, 2008 - 2017



Frequency of ADE's associated with Chantix Use, 2008 - 2017





# SUMMARY/LIMITATIONS OF FINDINGS

- Patient reviews:
  - Shows effects on mood, tolerability
  - Younger, less complex patients?
  - "# users found this helpful"
- FAERS:
  - More severe, requiring intervention or ending treatment
  - Filter by severity, outcomes
- Benefit of joining to existing drug, disease compendia



# QUESTIONS?

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