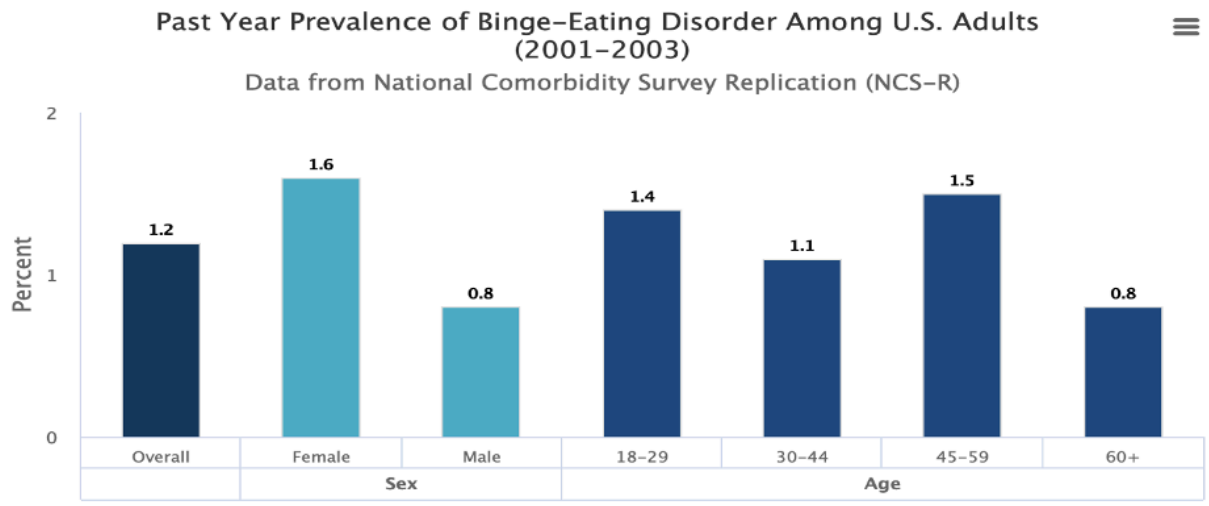
Exploring Eating Disorders and Eating Behaviors in the U.S.

According to the National Institute of Mental Health, eating disorders "are serious and sometimes fatal illnesses that cause severe disturbances to a person's eating behaviors. Obsessions with food, body weight, and shape may also signal an eating disorder. Common eating disorders include binge eating disorder, bulimia nervosa, and, less common but very serious, anorexia nervosa." Based on extensive evidence, the National Eating Disorders Association Eating Disorders notes that eating disorders "affect everyone, regardless of gender, age, race, ethnicity, culture, size, socioeconomic status, or sexual orientation. Misconceptions about who eating disorders affect have real consequences, leading to fewer diagnoses, treatment options, and pathways to help for those who don't fit the stereotype."

DAY 1: Part I

1. **Binge eating disorder** involves "recurrent binge eating episodes during which a person feels a loss of control and marked distress over his or her eating. Unlike bulimia nervosa, binge eating episodes are not followed by purging, excessive exercise or fasting. As a result, people with binge eating disorder often are overweight or obese." The data below shows the 2001-2003 past year prevalence of binge eating disorder among U.S. adults.



(i) Plot the data on a scatterplot that shows the prevalence percentage for each age range, and determine whether the data appears to be linearly related.

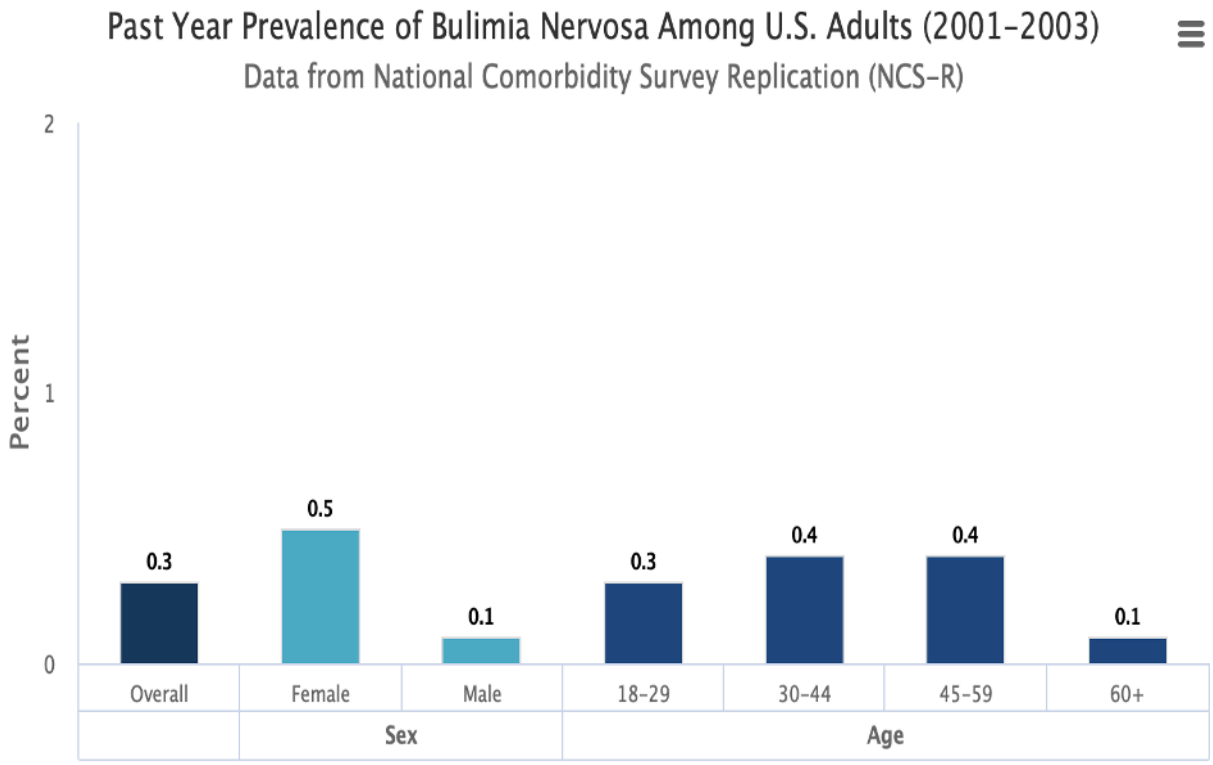
(ii) Verify that the average prevalence rate of binge eating disorder for this data set is 1.2%. How does this compare with the 2.8% lifetime prevalence of binge eating disorder?

(iii) What can you infer about the prevalence of binge eating disorder between males and females from 2001 to 2003?

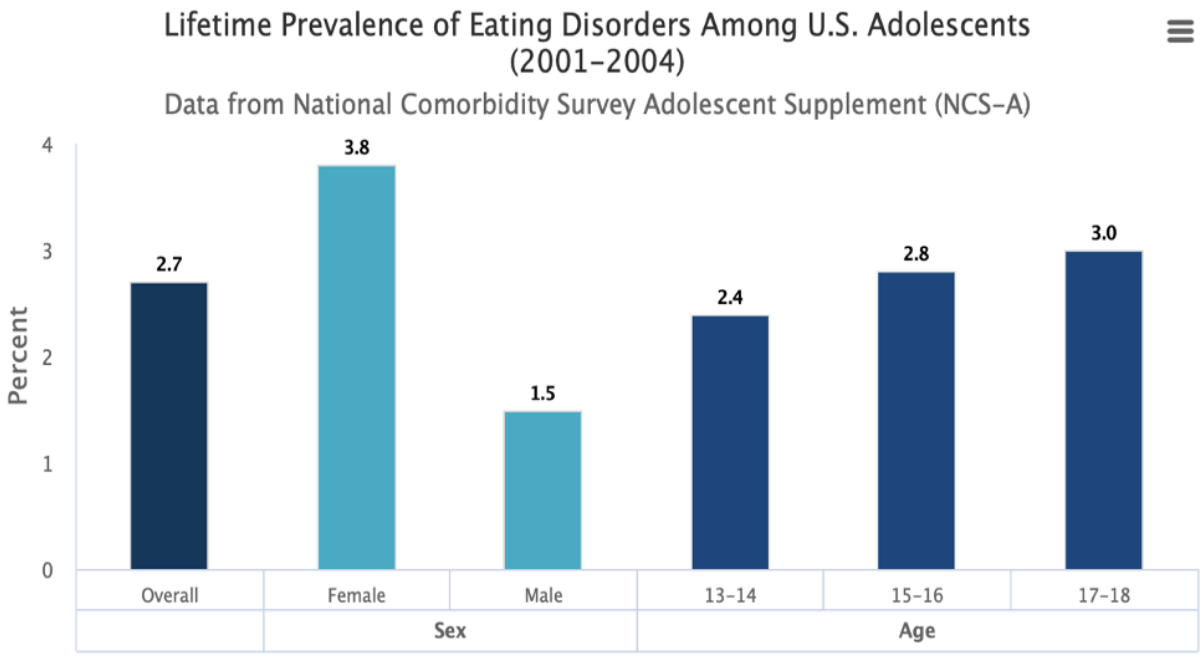
2. **Bulimia nervosa** is "binge eating (eating large amounts of food in a short time, along with the sense of a loss of control) followed by a type of behavior that compensates for the binge, such as purging (e.g., vomiting, excessive use of laxatives, or diuretics), fasting, and/or excessive exercise." **Anorexia nervosa** involves "a significant and persistent reduction in food intake leading to extremely low body weight in the context of age, sex, and physical health; a relentless pursuit of thinness; a distortion of body image and intense fear of gaining weight; and extremely disturbed eating behavior. Many people with anorexia see themselves as overweight, even when they are starved or severely malnourished. Unlike anorexia nervosa, people with bulimia can fall within the normal range for their weight. But like people with anorexia, they often fear gaining weight, want desperately to lose weight, and are intensely unhappy with their body size and shape."

(i) Plot the data below on a scatterplot that shows the past year prevalence percentage for each age range, and determine whether the data set appears to be linearly related.

(ii) What can you infer about the prevalence of bulimia nervosa between males and females from 2001 to 2003?



3. (i) Plot the data below on a scatterplot that shows the lifetime prevalence of eating disorders (e.g., anorexia nervosa, bulimia nervosa, and binge eating disorder) among U.S. adolescents ages 13 to 18 years from 2001 to 2004.



(ii) The data set appears to show that prevalence increased modestly with age. Do you agree?

(iii) Find a linear function that fits the data set. Is the linear model reasonable (i.e., valid) within and outside the domain and range of the data set. Why or why not?

(iv) Make an inference about the prevalence rates of eating disorders between U.S. male and female adolescents from 2001 to 2003.

4. The table below came from the 2011 Healthcare Cost and Utilization Project Report on national estimates of hospitalizations for eating disorders by age and by gender over the decade from 1999-2000 to 2008-2009.

	1999–2000 *Average over 1999 and 2000*	**2005–2006** *Average over 2005 and 2006*	**2007–2008** *Average over 2007 and 2008*	**2008–2009** *Average over 2008 and 2009*
By age				
Under 12	522 (2%)	1,139 (4%)	863 (3%)	896 (3%)
12–19	5,435 (23%)	6,435 (23%)	6,004 (20%)	5,749 (19%)
19–30	6,389 (27%)	7,626 (27%)	9,131 (30%)	8,319 (28%)
30–45	7,274 (31%)	7,057 (25%)	7,835 (25%)	7,393 (25%)
45–65	2,755 (12%)	4,083 (15%)	5,044 (16%)	5,185 (18%)
>=65	1,429 (6%)	1,779 (6%)	1,859 (6%)	1,976 (7%)
By sex				
Male	2,267 (10%)	3,100 (11%)	3,228 (11%)	3,462 (12%)
Female	21,535 (90%)	25,002 (89%)	27,497 (89%)	26,034 (88%)

(i) Construct a single scatterplot that contains all the above data sets in a visual format. Label your axes and determine which data sets appear to be linearly related.
(ii) Use Desmos to help you quickly obtain linear functions for each data set by age and by gender. What social justice-driven inferences can you draw from your graphs?

5. Follow the same instructions in item (4) to make sense of the table below that provides the national estimates of hospital stays for the indicated types of eating disorders.

	1999–2000 *Average over 1999 and 2000*	**2005–2006** *Average over 2005 and 2006*	**2007–2008** *Average over 2007 and 2008*	**2008–2009** *Average over 2008 and 2009*
[illegible]				
Specific types of eating disorders:				
Anorexia nervosa	8,932 (38%)	10,413 (37%)	10,986 (36%)	10,108 (34%)
Bulimia nervosa	7,286 (31%)	6,770 (24%)	6,762 (22%)	6,257 (21%)
Psychogenic vomiting	702 (3%)	707 (3%)	634 (2%)	576 (2%)
Pica	964 (4%)	1,350 (5%)	1,777 (6%)	1,862 (6%)
Other/unspecified eating disorders	7,330 (31%)	10,338 (37%)	11,501 (37%)	11,406 (39%)

DAY 2: Part II

Simone et al.'s 2022 longitudinal study identified patterns in unhealthy weight control behaviors (e.g., fasting and purging) and binge eating behaviors from adolescence to adulthood across intersecting gender and ethnic/racial identities in the U.S. Such behaviors are associated with negative long-term health outcomes (e.g., eating disorders, substance abuse, and adverse mental health outcomes). The study involved 1314 male and female participants who responded at each measurement occasion over four time spans. The first wave of data collection (1998–1999) took place when the participants were in middle and high school. Subsequent waves were collected 5 (2003–2004), 10 (2008–2009), and 15 (2014–2015) years later.

The participants responded to questions that could be answered with a Yes or No. Some of the questions under unhealthy weight control behaviors include: *Have you done any of the following things in order to lose weight or to keep from gaining weight during the past year?* (1) fasted; (2) ate very little food; (3) used a food substitute (powder or a special drink); (4) skipped meals; (5) smoked more cigarettes; (6) took diet pills; (7) made myself vomit; (8) used laxatives; or (9) used diuretics. Some of the binge eating questions include: *In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge-eating)? During the times when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating?* Responses were organized by prevalence.

6. The table below provides details about the sample participants and the percentages of their responses on the items.

Characteristic Variable	Women (n = 639)		Men (n = 675)	
	N	%	N	%
Ethnicity/Race (EAT-I)				
Asian American	137	21.4	143	21.2
Black/African American	133	20.8	143	21.2
Hispanic/Latino/Latina	43	6.8	32	4.7
White	326	51.0	357	52.8
Unhealthy weight control behaviors				
Adolescence (11–18 years)	364	56.9	210	31.1
Late Adolescence (18–23 years)	391	61.2	247	36.5
Young Adulthood (20–31 years)	345	54.0	231	34.2
Adulthood (27–33 years)	342	53.5	280	41.4
Binge Eating				
Adolescence (11–18 years)	129	16.3	25	4.4
Late Adolescence (17–23 years)	102	15.5	31	4.4
Young Adulthood (21–37 years)	138	20.6	102	14.3
Adulthood (27–33 years)	167	25.0	139	19.6

(i) Use Desmos to construct two scatterplots, one that models the prevalence of unhealthy weight control behaviors and another one that models the prevalence of binge eating behaviors over the four time spans.

(ii) Compare the unhealthy weight control and binge eating behaviors among males and females. When are those behaviors highest for each male and female group?

(iii) Determine which trajectories are linear, and explain what they mean in relation to the prevalence of those two behaviors.

7. The table on the next page provides details about the sample participants' responses on the items categorized by race and ethnicity.

(i) Use Desmos to construct two scatterplots, one that models the prevalence of unhealthy weight control behaviors and another one that models the prevalence of binge eating behaviors over the four time spans. When you read the table, focus only on the prevalence percentages. Then for each scatterplot, develop prevalence trajectories for male and female participants categorized by ethnicity (e.g., male Asian American trajectory, female Asian American trajectory, etc.) over the four time spans, and determine which trajectories are trending linearly.

(ii) Establish inferences about the prevalence trajectories for each behavior by gender and ethnicity. Are there ethnic differences in the trajectories? How do they compare relative to the white participants?

(iii) Generate social justice implications from this longitudinal study. You may read section 4 of the following article (available on Canvas) to help you develop your response on this item: Simone, M., Telke, S., Anderson, L. M., Eisenberg, M., & Neumark-Sztainer, D. (2022). Ethnic/racial and gender differences in disordered eating behavior prevalence trajectories among women and men from adolescence into adulthood. *Social Science & Medicine (1982)*, *294*, 114720–114720.

(iv) Identify at least one social justice-driven action or strategy for dealing with eating disorders and eating behaviors that will benefit all individuals, especially those from minoritized groups.

Gender Eating Behavior Ethnicity/Race	EAT-I: Adolescence (ages 11–18)		EAT-II: Late Adolescence (ages 17–23)		EAT-III: Young Adulthood (ages 20–27)		EAT-IV: Adulthood (ages 27–33)	
	%	95% CIs	%	95% CIs	%	95% CIs	%	95% CIs
Women								
UWCBs ($p = .018$)								
Asian American	70.2	61.3, 79.0	68.2	58.9, 77.6	60.2	50.4, 70.0	61.8	52.2, 71.4
Black/African American	51.1	37.0, 65.3	53.6	39.5, 67.8	56.7	42.8, 70.6	65.5	53.3, 77.8
Hispanic/Latina	82.4	67.8, 97.0	68.7	45.4, 91.2	59.6	37.6, 81.7	62.5	41.2, 83.7
White	52.1	47.9, 56.3	61.7	57.7, 65.8	49.5	45.3, 53.7	44.6	40.4, 48.8
Binge Eating ($p = .057$)								
Asian American	11.9	5.8, 18.1	11.8	5.3, 18.2	14.8	8.5, 21.1	16.1	8.7, 23.5
Black/African American	15.0	3.8, 26.2	8.8	0.0, 17.7	10.6	1.4, 19.8	12.0	3.0, 21.1
Hispanic/Latina	31.1	10.5, 51.8	9.7	1.0, 18.6	8.4	1.0, 16.1	17.9	2.7, 29.8
White	9.0	6.6, 11.5	10.8	8.2, 13.4	18.2	14.9, 21.5	17.8	8.5, 21.1
Men	EAT-I		EAT-II		EAT-III		EAT-IV	
UWCBs ($p = .964$)								
Asian American	41.9	28.0, 55.8	55.2	41.9, 68.5	50.7	37.2, 64.3	56.7	43.4, 70.0
Black/African American	28.0	12.8, 43.2	32.2	15.4, 48.9	24.6	9.4, 39.8	36.9	20.0, 53.9
Hispanic/Latino	60.7	32.8, 88.7	68.0	41.9, 94.1	61.2	33.1, 89.3	66.2	39.3, 92.8
White	25.7	20.8, 30.5	28.5	23.7, 33.3	29.0	24.2, 33.8	34.9	30.0, 40.0
Binge Eating ($p = .003$)								
Asian American	1.7	0.0, 5.0	2.6	0.0, 6.7	5.9	0.0, 13.3	6.6	1.0, 12.4
Black/African American	7.8	0.0, 19.5	NA	NA	12.0	1.0, 23.4	12.3	0.1, 24.5
Hispanic/Latino	22.8	0.0, 58.7	7.5	0.0, 18.2	26.8	0.0, 61.9	7.5	0.0, 18.2
White	1.7	0.01, 3.4	2.1	0.3, 3.8	5.6	3.4, 7.8	9.1	5.8, 12.5

Note. UWCBs = unhealthy weight control behaviors; % = prevalence estimate.