Psychosocial influences on eating behavior

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Disclosure statement

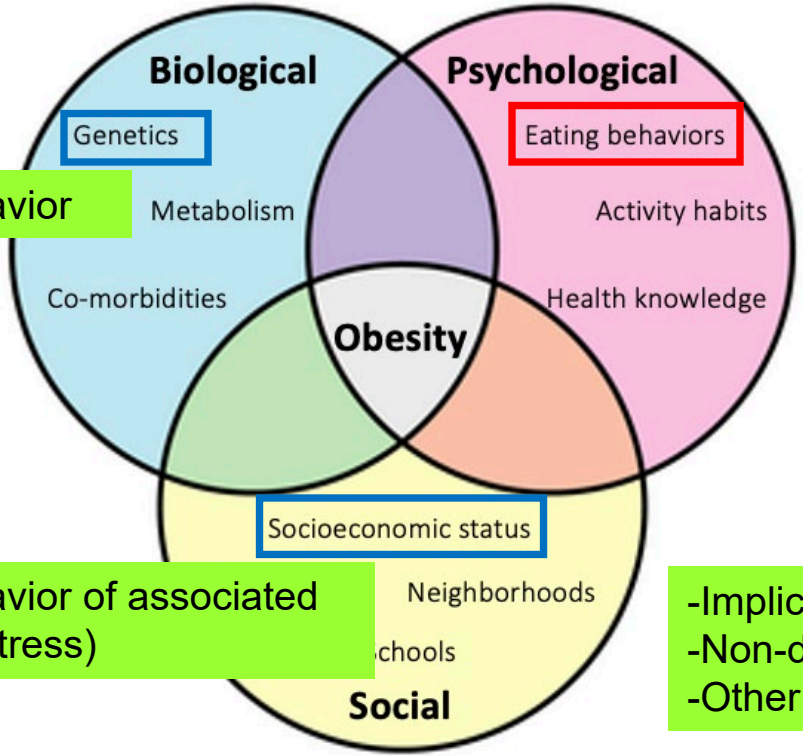
- No conflicts of interest to declare.

Nutrition >> Eating behavior

Precision nutrition >> best achievable diet, and best ways to support an individual to achieve it

Rainier Ridao / Ekaterina Shakharova / CDC on Unsplash

The biopsychosocial model



-Influence on eating behavior

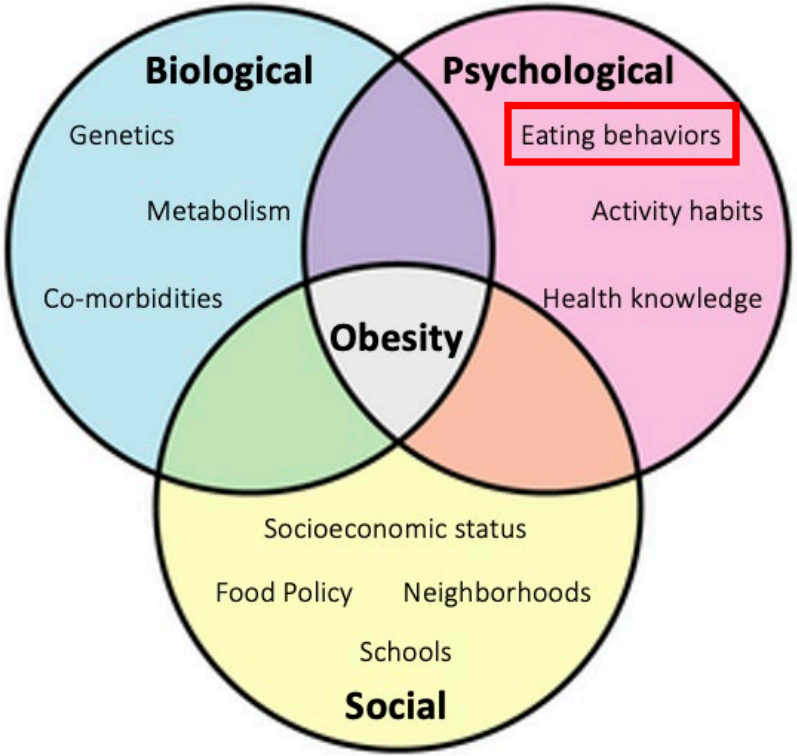
-Types of eating behavior
-Prevalence
-Relationships with diet

-Relationships with food environment
-Relationships with intervention outcomes

-Influence on eating behavior of associated factors (food insecurity, stress)

-Implications for diet?
-Non-diet implications?
-Other behavioral strategies?

The biopsychosocial model



-Types of eating behavior
-Prevalence
-Relationships with diet

Appetitive characteristics

- What are appetitive characteristics?
  - Early emerging, enduring dispositions toward food, or eating styles, that differ between individuals
  - E.g. Food cue responsiveness
    - How responsive one is to external food cues e.g. sight of food
  - E.g. Satiety responsiveness
    - How responsive one is to internal cues e.g. gut hormones

Carnell & Wardle, 2008 Proc Nut Soc

Satiety responsiveness/Slowness in eating[a] (Factor 1; 28% variance)	
My child gets full up easily	.71
My child has a big appeitite	.57
My child leaves food on his/her plate at the end of a meal	.66
My child gets full before his/her meal is finished	.72
My child cannot eat a meal if s/he has had a snack just before	.59
My child eats slowly	.78
My child takes more than 30 minutes to finish a meal	.71
My child finishes his/her meal very quickly	.72
My child eats more and more slowly during the course of a meal	.77
Fussiness (Factor 2; 13% variance)	
My child enjoys tasting new foods	.88
My child enjoys a wide variety of foods	.74
My child is interested in tasting food s/he hasn't tasted before	.84
My child refuses new foods at first	.85
My child decides that s/he doesn't like food, even without tasting it	.82
My child is difficult to please with meals	.64
Food responsiveness (Factor 3; 9% variance)	
My child's always asking for food	.65
If given the chance, my child would always have food in his/her mouth	.79
Given the choice, my child would eat most of the time	.81
If allowed to, my child would eat too much	.71
Even if my child is full up, s/he finds room to eat his/her favourite food	.56

Enjoyment of food (Factor 4; 7% variance)	
My child enjoys eating	.68
My child loves food	.64
My child is interested in food	.57
My child looks forward to mealtimes	.62
Desire to drink (Factor 5; 5% variance)	
If given the chance, my child would always be having a drink	.89
If given the chance, my child would drink continuously throughout the day	.90
My child is always asking for a drink	.88
Emotional undereating (Factor 6; 4% variance)	
My child eats less when s/he is upset	.84
My child eats less when s/he is angry	.73
My child eats less when s/he is tired	.60
My child eats more when s/he is happy	.70
Emotional overeating (Factor 7; 3% variance)	
My child eats more when anxious	.85
My child eats more when annoyed	.71
My child eats more when worried	.79
My child eats more when s/he has nothing else to do	.28[b]

FOOD AVOIDANT

FOOD APPROACH

Child Eating Behavior Questionnaire (CEBQ)

Wardle et al, 2001 J Child Psychol & Psychia; Carnell & Wardle, 2007 Appetite

1 'Enjoyment of food'	My baby seemed contented while feeding My baby enjoyed feeding time My baby loved milk My baby became distressed while feeding (R)
2 'Food responsiveness'	If given the chance my baby would always be feeding Even when my baby had just eaten well s/he was happy to feed again if offered My baby could easily take a feed within 30 minutes of the last one My baby was always demanding a feed If allowed to my baby would take too much milk My baby frequently wanted more milk than I provided
3 'Slowness in eating'	My baby fed slowly My baby finished feeding quickly (R) My baby took more than 30 minutes to finish feeding My baby sucked more and more slowly during the course of a feed
4 'Satiety responsiveness'	My baby got full up easily My baby got full before taking all the milk I thought s/he should have My baby found it difficult to manage a complete feed
	My baby had a big appetite

Baby Eating Behavior Questionnaire (BEBQ)

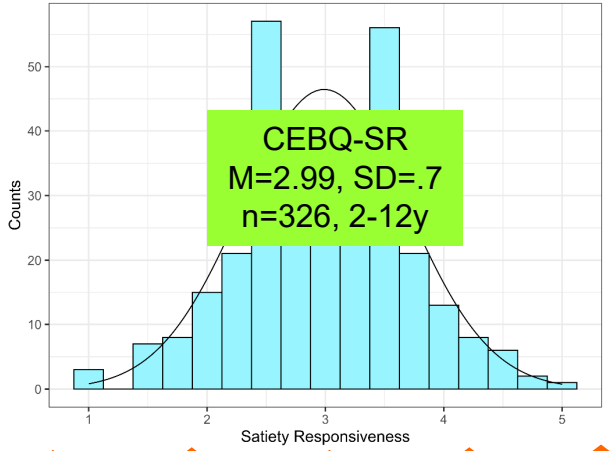
Llewellyn, van Jaarsveld, Johnson, Carnell & Wardle, 2011 Appetite

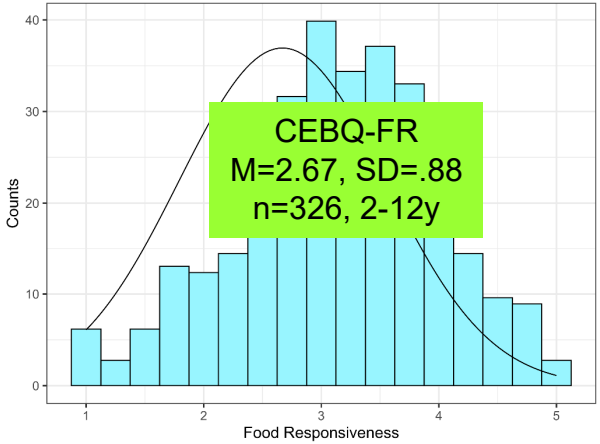
AEBQ scales	Internal reliability (n = 954)
Hunger[a]	0.751
Food responsiveness[a]	0.753
Emotional over-eating[a]	0.904
Enjoyment of food[a]	0.859
Satiety responsiveness[b]	0.753
Emotional under-eating[b]	0.896
Food fussiness[b]	0.877
Slowness in eating[b]	0.884

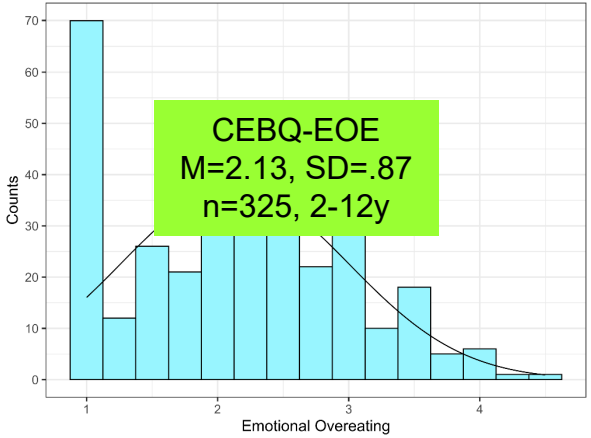
Adult Eating Behavior Questionnaire (AEBQ)

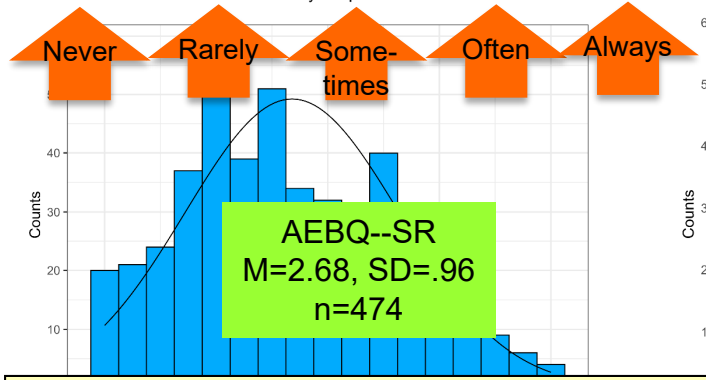
Prevalence?

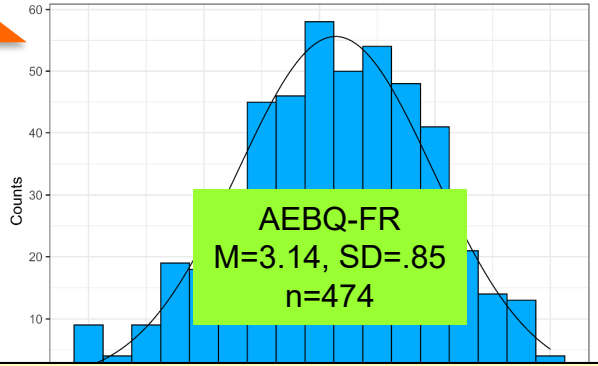
Appetitive characteristics – Prevalence (CEBQ, AEBQ)

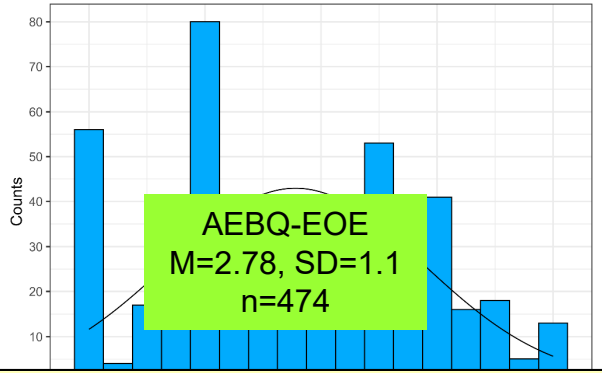










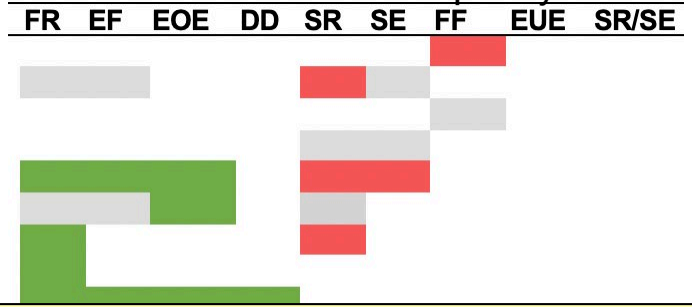


Relationships with diet?

Appetitive characteristics – Relationships with weight/adiposity

- Systematic review and meta-analysis in children aged 1-18y
- 20 countries, 14 languages, 314 full-text articles
- 57 (46 cross-sectional, 11 longitudinal) met inclusion criteria (measure fidelity, non-overlap in samples) = n=36,535 1-14y
- Cross-sectional data – robust associations w adiposity
  - Food approach, +ve (FR **r=0.22**; EF r=0.17; EOE r=0.15; DD r=0.10)
  - Food avoidant, -ve (SR **r=-0.21**; SE r=-0.15; FF r=-0.08; EUE r=-0.09)

CEBQ>> later adiposity



BEBQ>>later adiposity

Less data available for AEBQ but seems to follow similar pattern, potentially with weaker weight associations for FR & SR, but stronger weight associations for EOE.

Appetitive characteristics – Relationships with diet

SR>>lower SE foods>>lower weight?

- Syrad et al (2016, AJCN) CEBQ at 16mo, 3d diet diaries at 21mo in n=1102
  - Higher SR -- smaller meal *size*
- Fildes et al (2015, IJBNPA) CEBQ at 3-4mo, food prefs in n=1044 & n=167
  - Higher SR+SE+FF -- lower FV liking
- Carnell et al (2016, Appetite) CEBQ at 4-5y, lunch intake over 5 days
  - Higher SR -- lower lunch intake, less FV %,
- Vilela et al (2018, Appetite) CEBQ at 7y, FFQ 4+7y in n=4537
  - Higher SR+FF – less increase in diet variety
- Vilela et al (2019, Appetite) CEBQ at 7y, FFQ 4+7y in n=1359
  - Higher SR – higher eating frequency 7y

[Unpub]

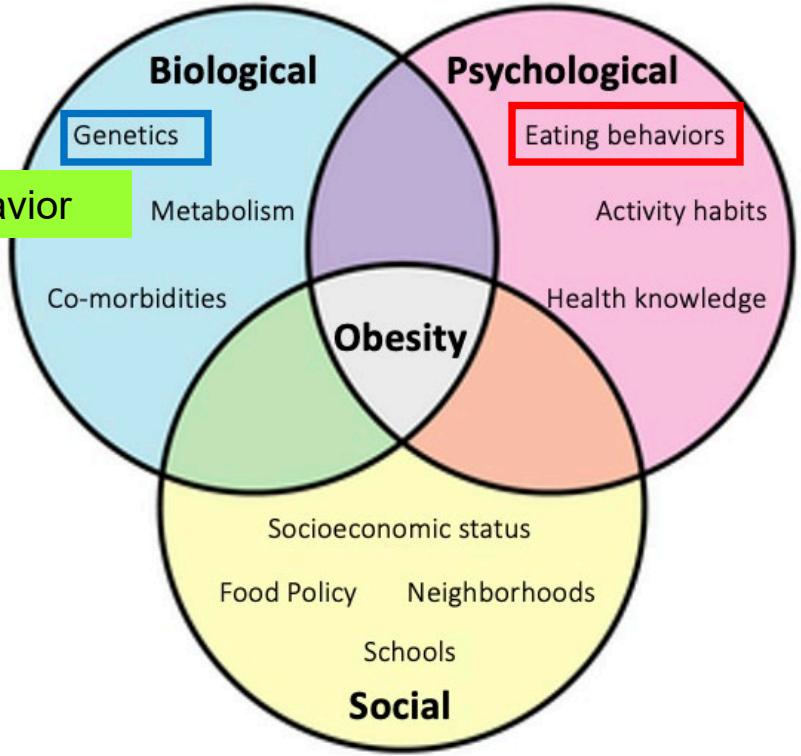
- AEBQ-SR positively correlated w frequency of intake of sweets, savory snacks, fast food, sugar-sweetened beverages

Similar findings for AEBQ. Need to consider both appetite and food preferences/habits when developing personalized nutrition plans.

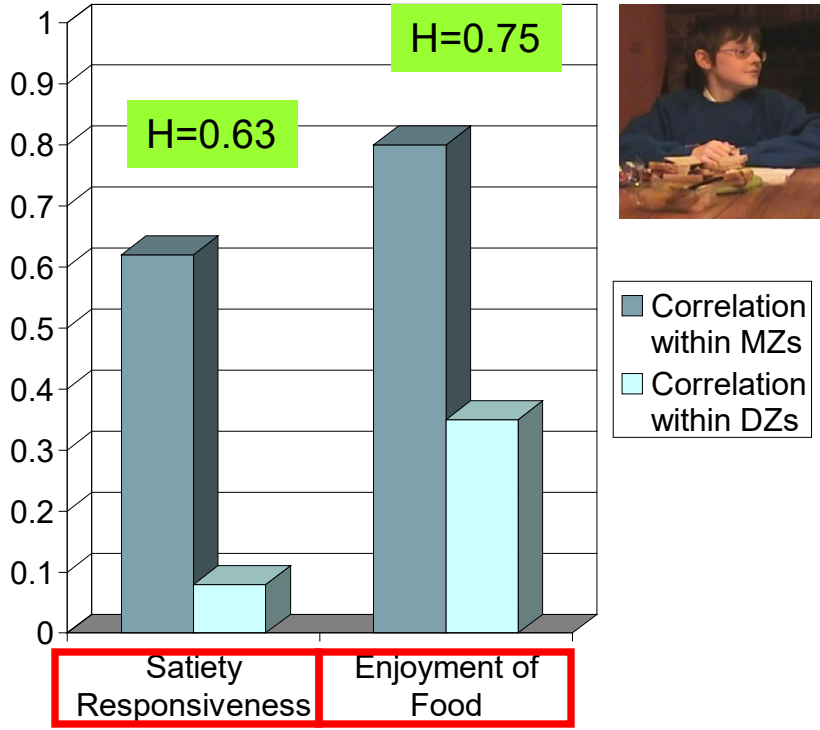
Where do appetitive characteristics come from?

The biopsychosocial model

-Influence on eating behavior

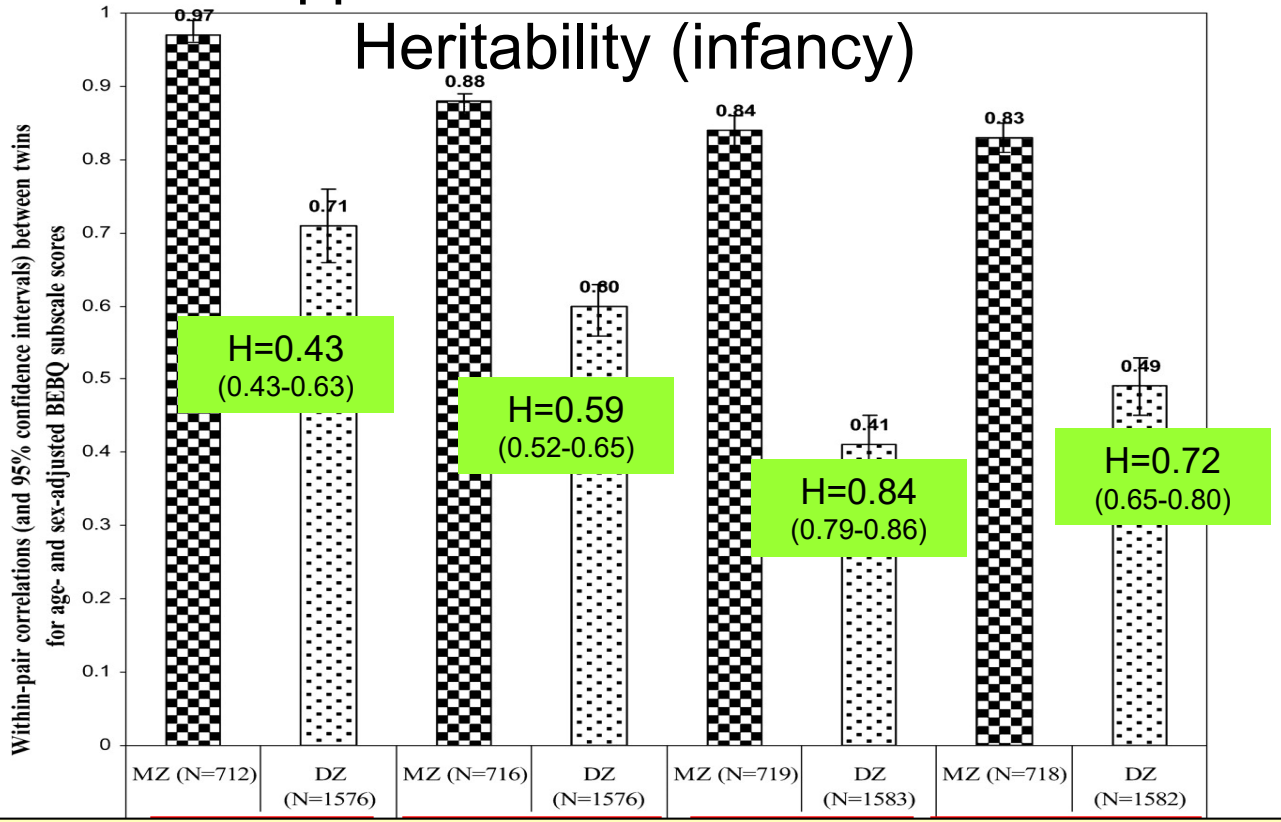


Appetitive characteristics – Heritability (8-11y)



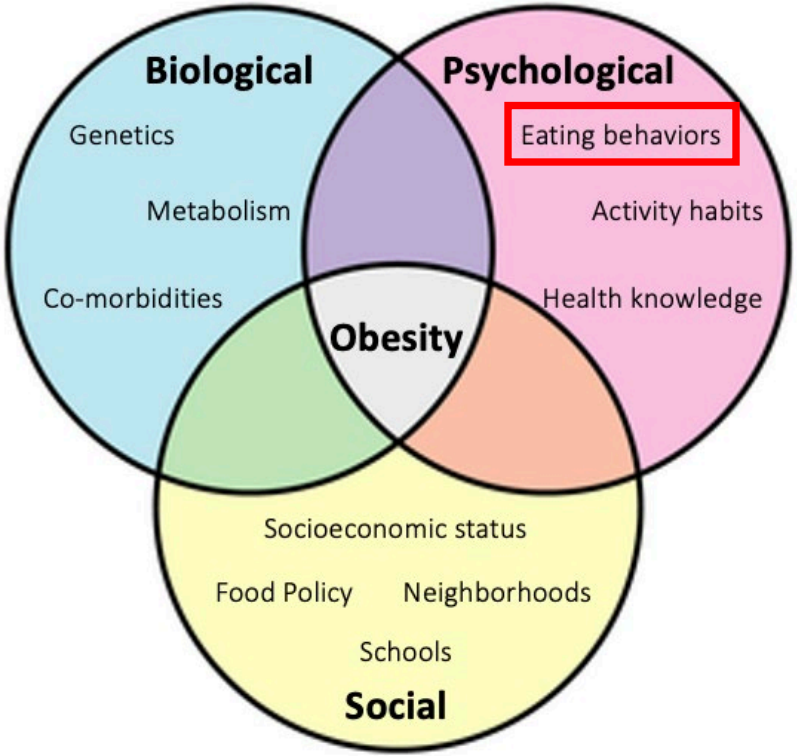
EOE and EUE show more environmental influence (4y) (*Herle et al, 2018*).

Appetitive characteristics – Heritability (infancy)



Personalized nutrition? These behaviors emerge early and are genetically determined to some extent and may be hard to change. May need to work with them rather than against them.

The biopsychosocial model



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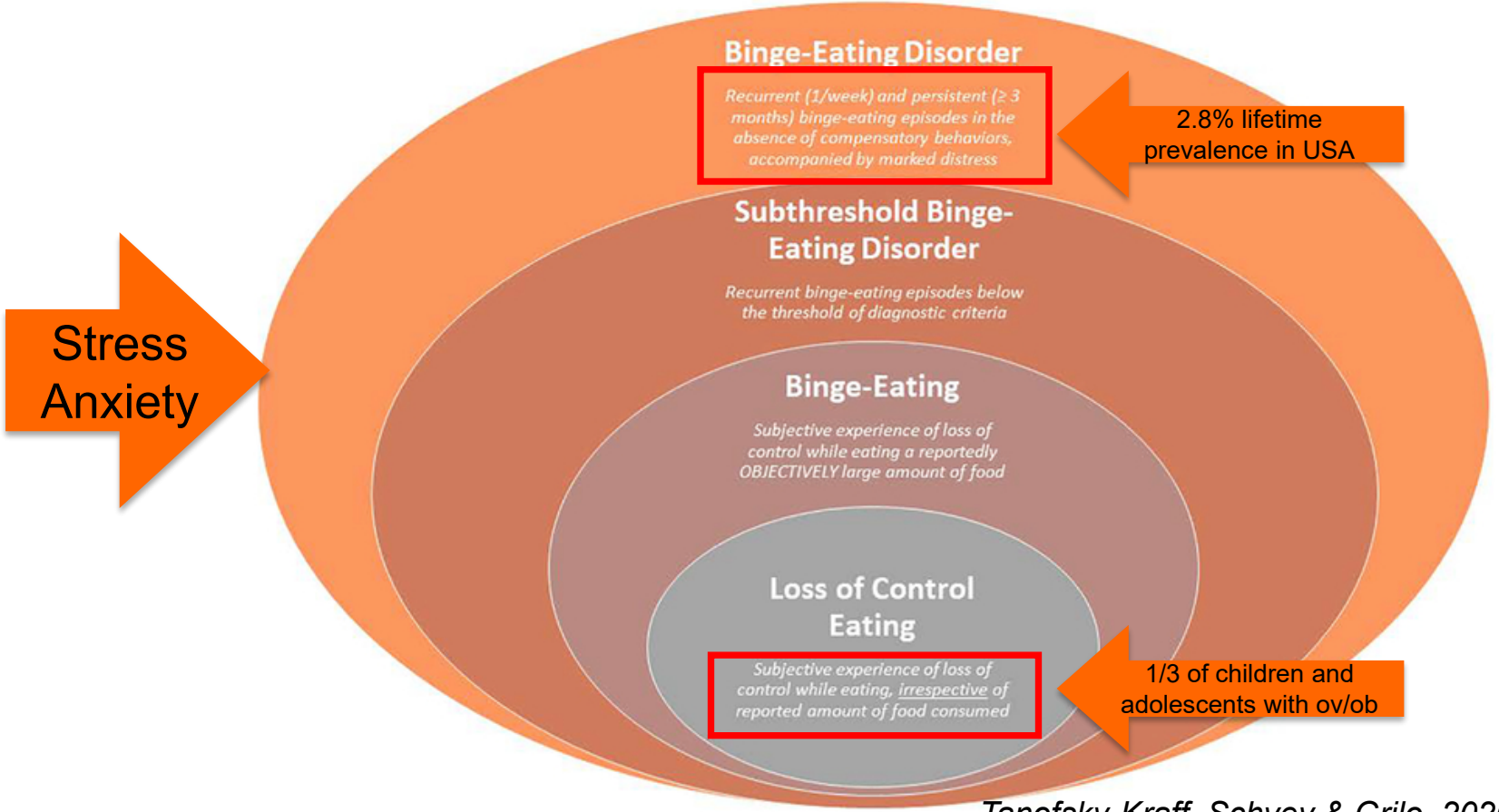
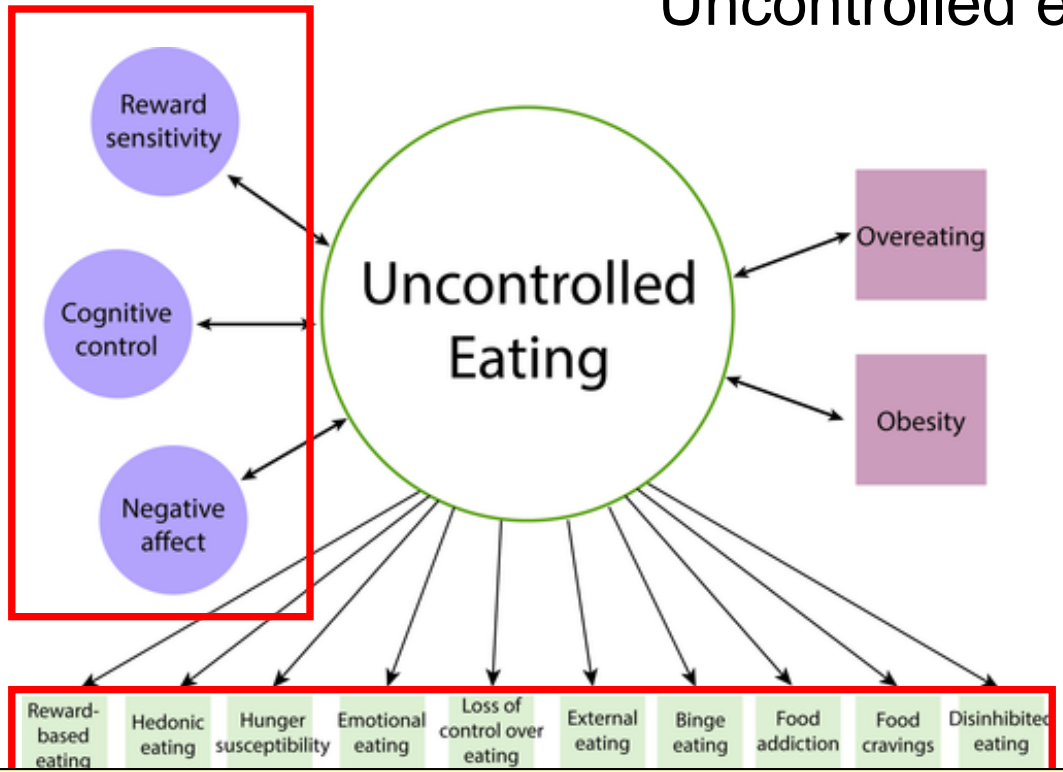
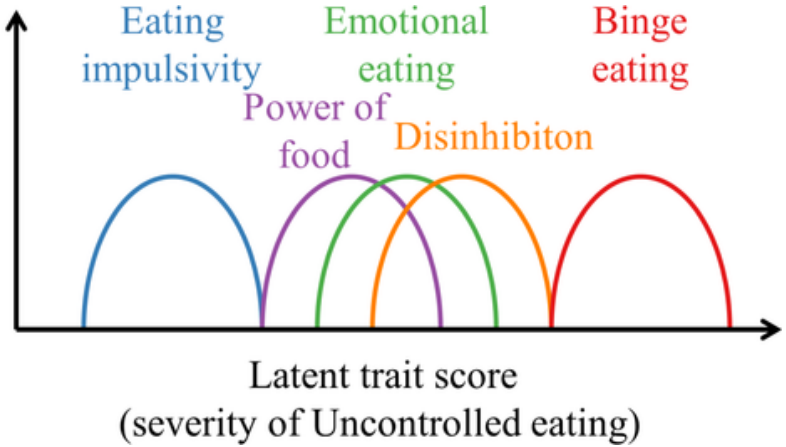
Binge eating



Tanofsky-Kraff, Schvey & Grilo, 2020 Am Psychol

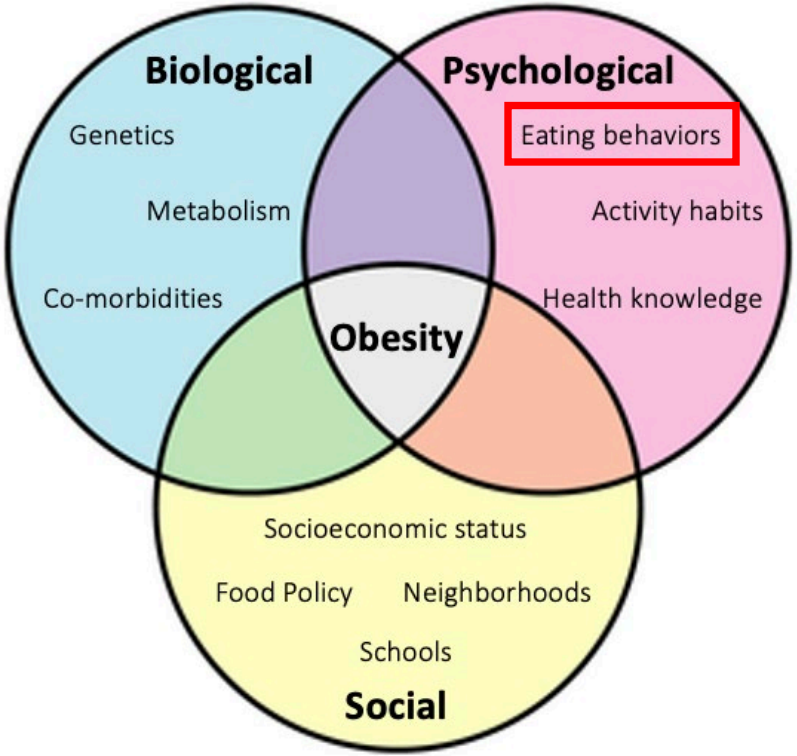
Uncontrolled eating





Personalized nutrition? Different measures are available to assess eating behaviors. Some may be more appropriate than others but may all tap into an underlying continuum of 'uncontrolled eating'.

The biopsychosocial model



-Types of eating behavior
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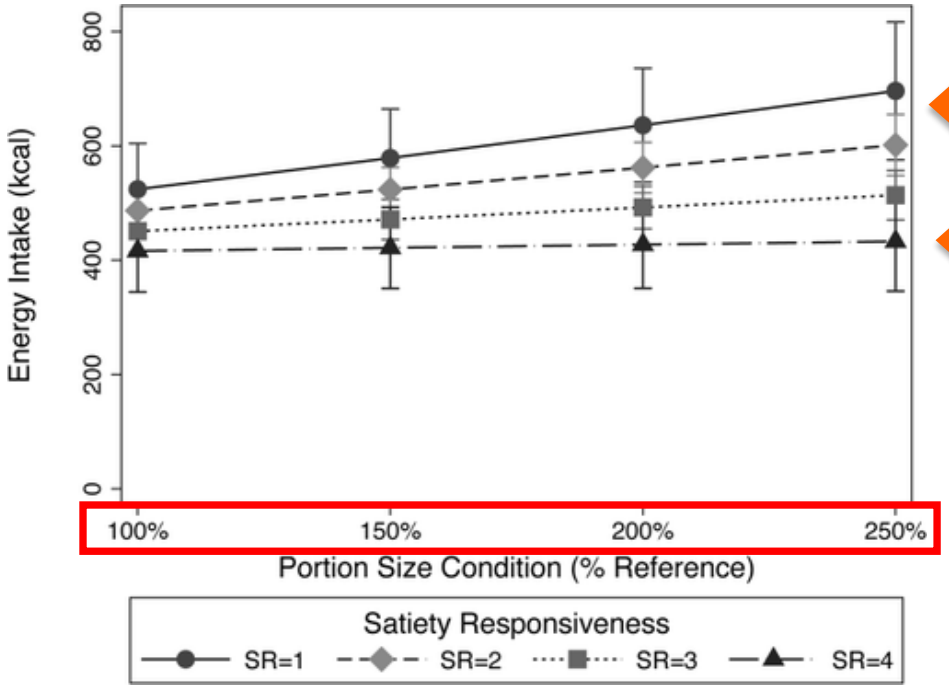
-Relationships with food environment
-Relationships with intervention outcomes

Appetitive characteristics affect how individuals respond to the food environment (portion sizes)

N=100 5-6y, non-Hispanic black
4 x dinner conditions of varying portion size



Lowest Satiety Responsiveness

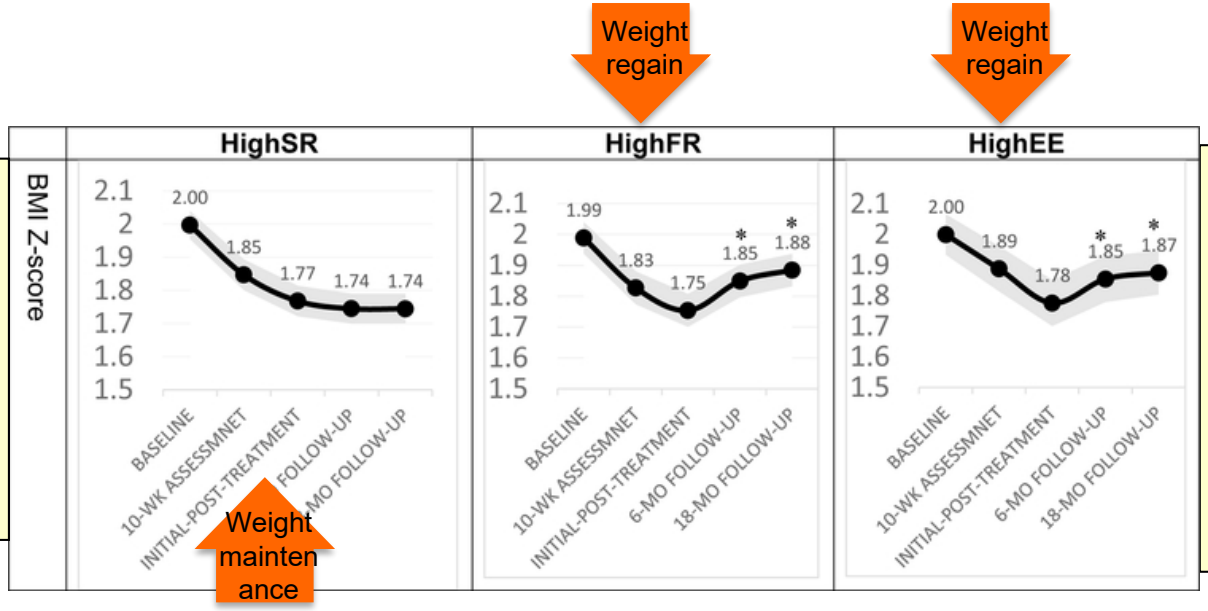
Highest Satiety Responsiveness

Children with low Satiety Responsiveness most vulnerable to effect of large portion sizes on increasing intake.

Mooreville et al, 2015 Obesity

Children's appetitive characteristics affect maintenance of weight loss in behavioral obesity treatment

Children with overweight or obesity, N=150 mean age 10.4y, 67% girls, family-based behavioral weight loss treatment

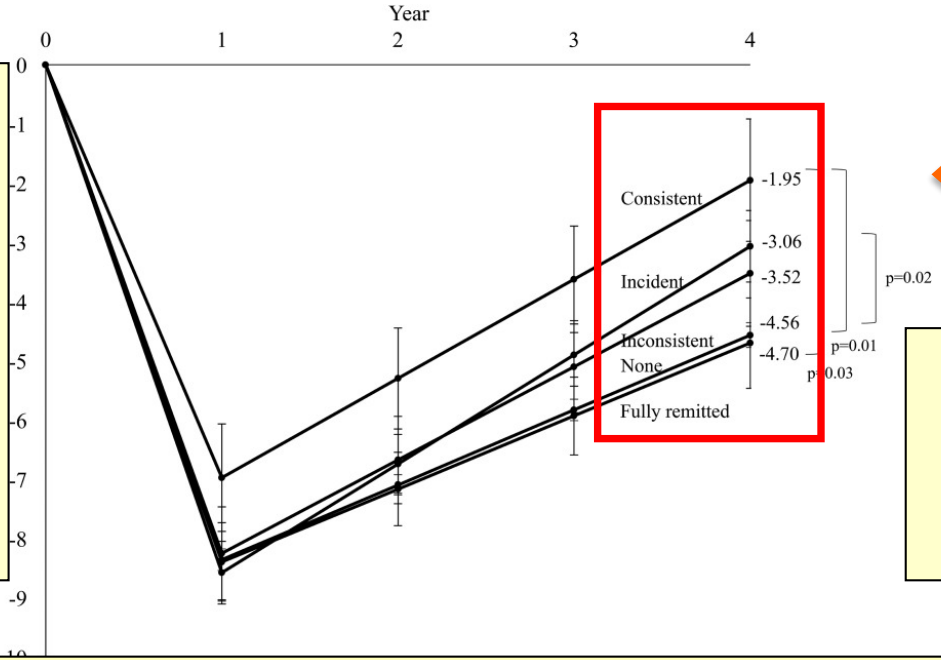


Child appetite affects intervention outcome – children with high food responsiveness and emotional eating find it harder to maintain dietary changes.

Boutelle et al, 2021 Appetite

Binge eating in adults influences weight loss from dietary intervention

4-y data from Look AHEAD, RCT of intensive lifestyle intervention vs diabetes support & education. N=4901 adults with T2D/ov/ob. All diets hypocaloric but varied in protein. Assessed appetite over past week at baseline and 6mo.

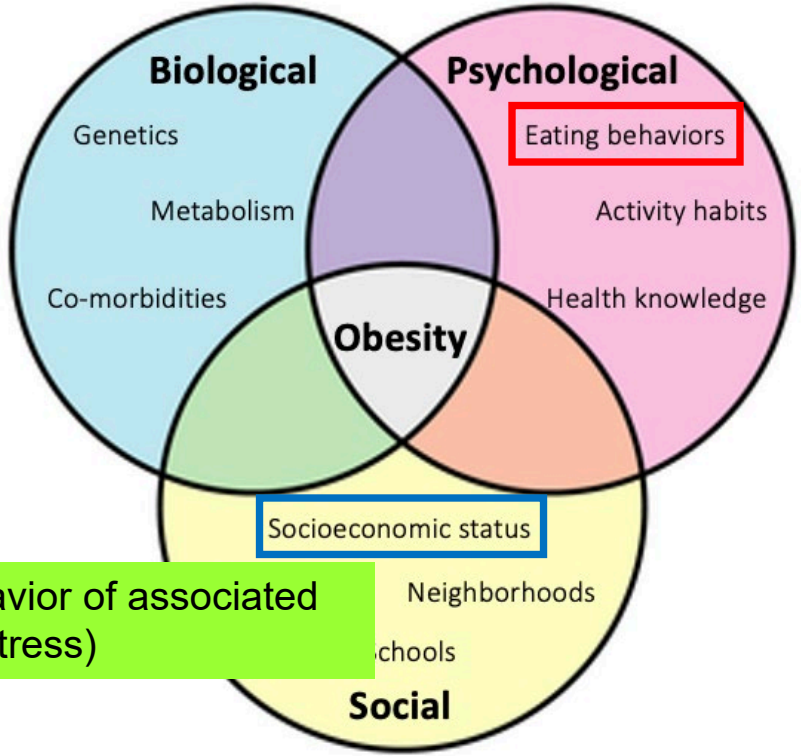


Least weight loss at 4y

Binge eating affects intervention outcome – those with consistent binge eating have poorer weight loss outcomes after 4y of intervention.

Personalized nutrition? Eating behaviors may affect how individuals respond to their dietary environment and how well they adhere to dietary recommendations. Need to assess and take into account.

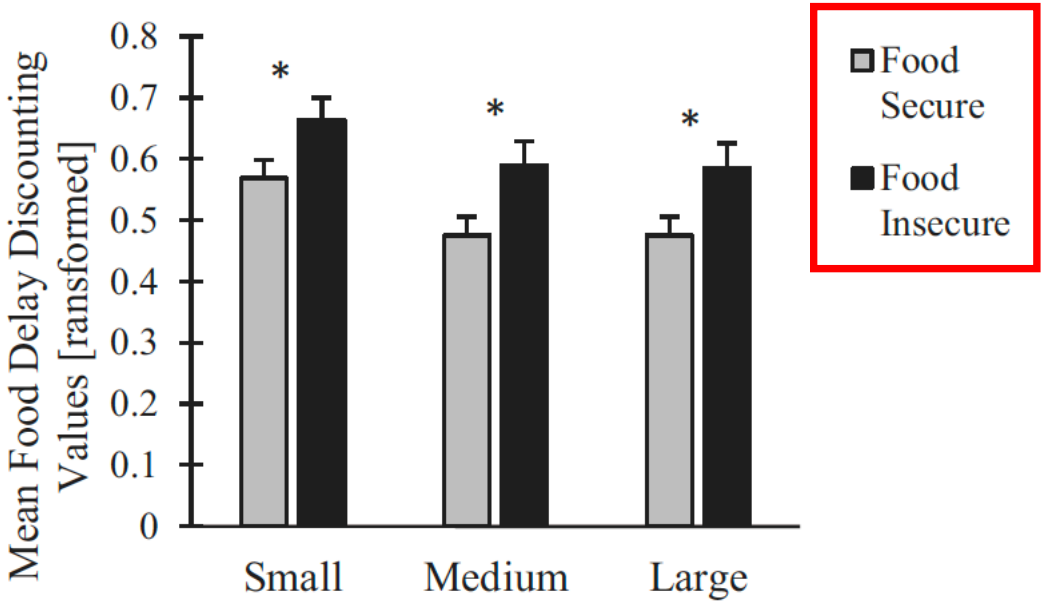
The biopsychosocial model



-Influence on eating behavior of associated factors (food insecurity, stress)

Food insecurity and delay discounting for food

DD = the degree to which an individual is inclined to pick a reward (food/non-food) which is smaller+sooner vs. larger+later

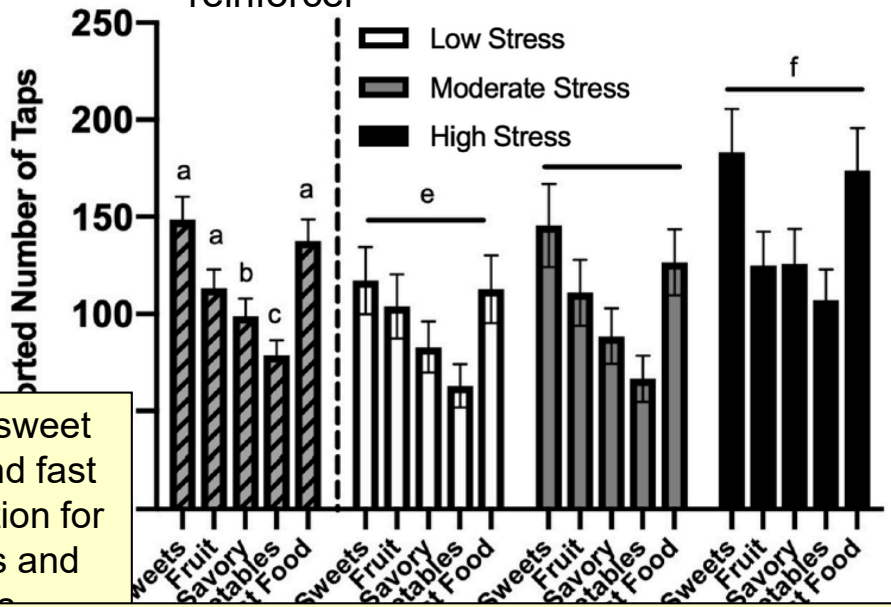


Food insecurity affects decision making in relation to food – women with food insecurity are more likely to opt for smaller, sooner food rewards.

Psychosocial stress influences reinforcing value of food

RVF = the motivation to obtain food, or how hard/long someone will work to obtain food, in contrast to how hard/long they will work for an alternative reinforcer

N=429 adults, 272F, 157M, May-June 2020
Assessed COVID pandemic-associated stress and willingness to work (finger taps) for hypothetical delivery of portion of preferred food from various food categories

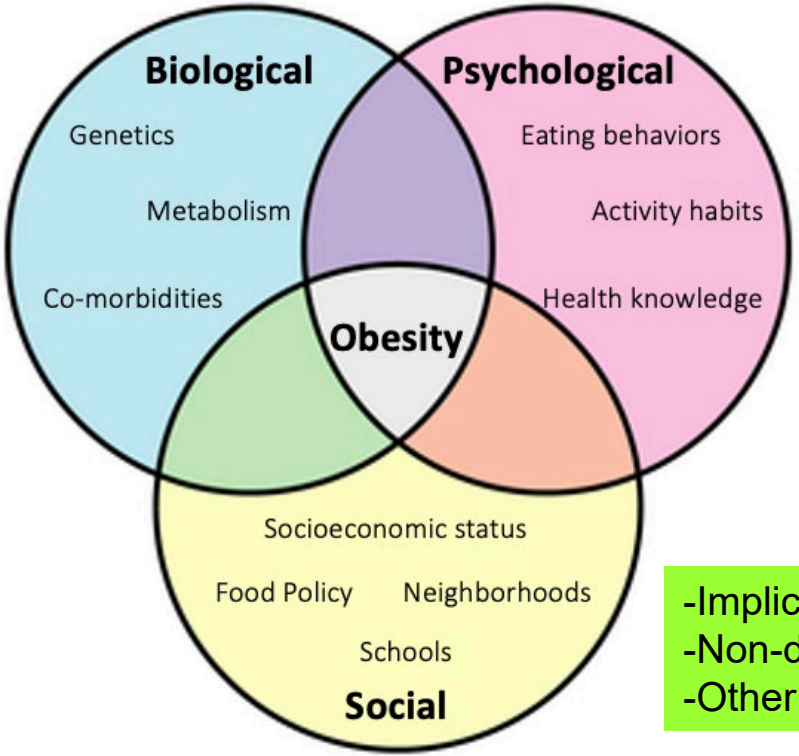


Motivation for sweet snacks, fruit and fast foods > motivation for savory snacks and

Higher COVID-related stress, greater food motivation.

Psychosocial factors affect food-related decision making and may be important to consider in context of personalized nutrition recommendations.

The biopsychosocial model



-Implications for diet?
-Non-diet implications?
-Other behavioral strategies?

Low SR?

High SR?

Diet/ food environment

High FR?

Binge eating?

Stress eating?

Non-dietary workarounds

Reduce stressors
Alternative coping strategies

Other behavioral strategies

Regulation Of Cues (ROC) treatment (children, adults; obesity, overeating, binge eating)

-Appetite Awareness Training (AAT)

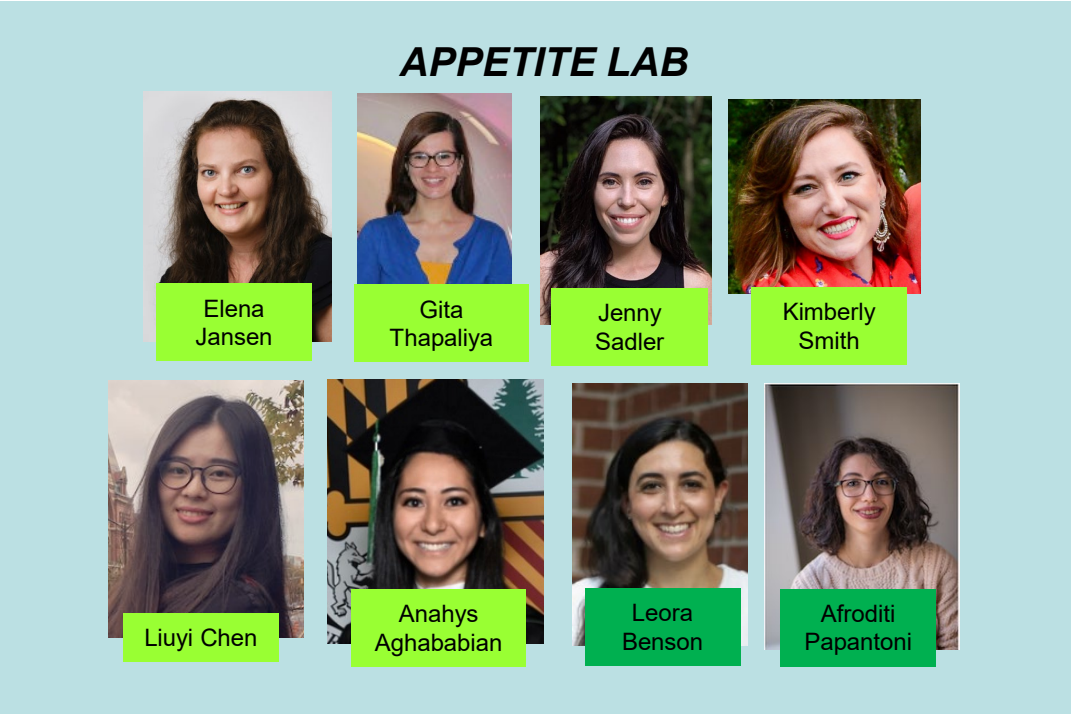
-Cue Exposure Treatment for Food (CET-Food)

Boutelle, Manzano & Eichen, 2020 P&B

Summary and remaining questions

- Appetitive characteristics, which show genetic influence, influence diet and weight in children and adults >> need to understand more about development through the life course
- Appetitive characteristics may influence the effect of food environment factors or interventions on diet and weight >> need to consider individual differences in population and intervention research
- Considering an individual's appetitive as well as physiological characteristics may help increase the impact of personalized nutrition >> need to directly assess effect of such combined interventions

Acknowledgements



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