

An Analysis of the Perceived and Objective Diet Quality of Young Adults in the United States

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Background

- The diet quality (DQ) of Americans falls short by a large margin, in nearly every dietary sub-component (Hiza et al., 2013; Wilson et al., 2015).
- The DQ of young adults (YA) is low, potentially the lowest of all adult sub-groups (Debate et al., 2001; Hiza et al., 2013; Kang et al., 2014; Larson et al., 2013; Lutz et al., 2017; Zamora et al., 2010).
- DQ is associated with risk of all-cause mortality, coronary heart disease, diabetes, stroke, and cancer (Chiuve et al., 2012; Schwingshackl & Hoffmann, 2017).
- Low DQ also puts YA young at risk of weight gain, which is common during this life stage and is a strong predictor of overweight status in future years (Greaney et al., 2009; Guo et al., 2000; Hankinson et al., 2010; Nelson et al., 2008).
- Healthy Eating Index (HEI) score is a valid and reliable measure that operationalizes DQ with a score based on 12 sub-scores (Guenther et al., 2013; Guenther et al., 2014)

Healthy Eating Index- 2010 Scores (Max Score)	
HEI Total Score (100)	
Total Fruit (5)	Total Protein Foods (5)
Whole Fruit (5)	Seafood & Plant Proteins (5)
Total Vegetables (5)	Fatty Acids (10)
Greens & Beans (5)	Refined Grains (10)
Whole Grains (10)	Sodium (10)
Dairy (10)	Empty Calories (20)

- Perceived diet quality (PDQ) is one characteristic researches study in relationship to objective diet quality (ODQ) because a discrepancy between the two may be a barrier to adopting healthy habits (Lechner et al., 1997; Variyam et al., 2001).
- Evidence on what YA perceive to be “healthy” is limited (De Vlieger et al., 2017; Larson et al., 2006).

Study Overview

Purpose: Explore the association between PDQ and ODQ in YA in the US.

Ho1 There will be no significant relationship between mean overall DQ score, as measured by HEI-2010, by level of PDQ (excellent, very good, good, fair, poor).

Ho2 There will be no relationship between mean HEI sub-scores (total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy (including soy products), total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and empty calories) by level of PDQ (excellent, very good, good, fair, poor).

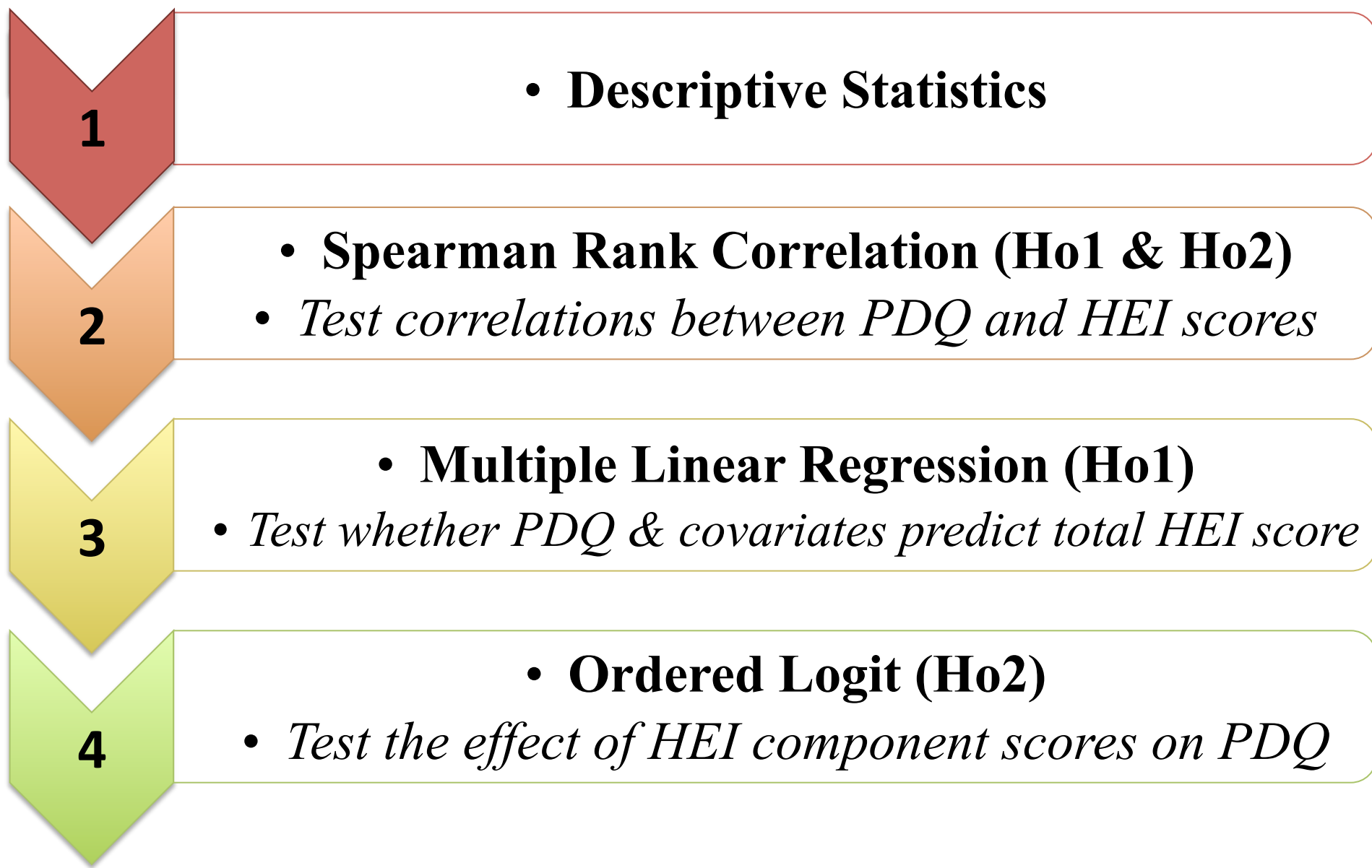
Methods

Data Set: NHANES 2013-2014
Sub-Sample: Individuals ages 18-30, per study definition of YA, with complete data on the dependent variables

Variable (type)	Instrument	Notes
Objective Diet Quality (continuous)	NHANES 24 hour recall data HEI-2010	Total DQ score out of 100 12 sub-components
Perceived Diet Quality (ordinal)	NHANES Diet Behavior and Nutrition Survey: “In general, how healthy is your overall diet?”	Possible responses: Excellent, Very good, Good, Fair, Poor
Covariates (categorical, continuous)	NHANES Demographics Questionnaires	Included: Sex, race/ethnicity, education, & income

* These variables were chosen due to evidence of associations with DQ (Debate et al., 2002; Hiza et al., 2013; Kang et al., 2014; Lotfield et al., 2015; Sijtsma et al., 2012).

Figure 1: Overview of the Statistical Plan



Statistical Software Used: SAS, SPSS, STATA

Results

Table 1: Sample Characteristics (N = 1261)

Characteristic	Total Sample (n, % sample)	Mean HEI score (SE)
Gender		
Male	620(49.2)	47.2 (.5)
Female	641(50.8)	50.2 (.5)
Age (Years)		
18-21	495(39.3)	47.6 (.6)
22-25	361(28.6)	48.6 (.7)
26-30	405(32.1)	50.3 (.7)
Race/Ethnicity		
Mexican American	205(16.3)	48.6 (.9)
Other Hispanic	125(9.9)	53.2 (1.3)
Non-Hispanic White	474(37.6)	46.8 (.7)
Non-Hispanic Black	253(20.1)	46.6 (.7)
Non-Hispanic Asian	133(10.5)	55.6 (1.1)
Other Race, Multi-Racial	71(5.6)	48.9 (1.7)
Education Level		
Less than 9 th grade	24(1.9)	45.8 (2.3)
9 th -11 th grade ^a	263(20.9)	45.2 (.8)
HS grad/GED or equiv.	345(27.4)	46.9 (.7)
Some college or AA degree	437(34.7)	48.9 (.6)
College grad or above	191(15.1)	56.7 (1.0)
Refused	1(1)	
Family Income to Poverty Ratio		
<130%	525(41.6)	46.8 (.6)
130-299%	327(25.9)	48.8 (.8)
300-499%	189(15.0)	50.2 (1.0)
≥500%	134(10.6)	53.4 (1.3)

^a Includes 12th grade with no diploma.

Table 2: Spearman Rank Correlations between PDQ & HEI Scores (N = 1261)

	PDQ
Total HEI score	-.238***
Total Fruit	-.141***
Whole Fruit	-.185***
Total Vegetables	-.124***
Greens and Beans	-.131***
Whole Grains	-.156***
Dairy	-.011
Total Protein Foods	-.074**
Seafood & Plant Proteins	-.090**
Fatty Acids	-.055
Refined Grains	.047
Sodium	-.077**
Empty Calories	-.221***

*p < .05, **p < .01, ***p < .001

Table 4: Linear Regression Model to Predict HEI Total Scores Based on PDQ and Study Covariates

	OR	95% CI
HEI Component Score		
Total Fruit	0.974	0.890, 1.066
Whole Fruit	1.092*	1.007, 1.184
Total Vegetables	1.042	0.945, 1.143
Greens & Beans	1.029	0.964, 1.099
Whole Grains	1.044*	1.003, 1.086
Dairy	1.008	0.965, 1.052
Total Protein Foods	0.975	0.873, 1.090
Seafood & Plant Proteins	1.019	0.964, 1.076
Fatty Acids	0.988	0.946, 1.032
Refined Grains	1.019	0.983, 1.057
Sodium	1.007	0.967, 1.050
Empty Calories	1.053 **	1.022, 1.084
Race ^a		
Mexican American	0.422***	0.303, 0.588
Other Hispanic	0.771	0.518, 1.146
Non-Hispanic Black	0.719*	0.528, 0.979
Non-Hispanic Asian	1.095	0.747, 1.604
Other Race or Multiracial	0.663	0.408, 1.076
Education ^b		
9-11 th grade	1.078	0.500, 2.325
HS grad/ GED or equiv.	1.248	0.580, 2.683
Some college or AA degree	1.153	0.537, 2.474
College grad or above	1.455	0.651, 3.254
Family Income to Poverty ^c	1.018	0.946, 1.097
Gender		
Female	0.932	0.749, 1.161

*p < .05, **p < .01, ***p < .001; †p < 0.1, ‡p < .1

^a Non-Hispanic White was the reference category for ethnicity/race.

^b Less than 9th grade was the reference category for education.

^c Family income: poverty was entered into the model as a continuous variable.

- Multiple regression analysis showed that excellent, very good, and good PDQ are significant predictors of total HEI score compared to the referent category of poor PDQ, but the full model only predicted 16.7% of the variance in total HEI score.
- The ordered logit showed that whole fruit, whole grains, and empty calories have a significant effect on the odds of having a higher PDQ (fair, good, very good, excellent) instead of a poor PDQ, but the increase in odds is low.

Conclusions

Diet Quality of Young Adults

- The mean HEI score for the sample (48.7) was well below the maximum score of 100, showing poor adherence to the *Dietary Guidelines for Americans*.

Perceived and Objective Diet Quality in Young Adults

- Most measures of ODQ are significantly correlated with PDQ, but the relationships are weak.
- YA who rated their diets “very good” had higher total HEI scores than those who rated their diets “excellent.”
- DQ in YA may differ by PDQ, sex, race/ethnicity, income, and education level. However, these variables do not have much predictive ability on HEI score. More research is needed to understand predictors of ODQ.
- Overall, there are significant relationships between PDQ and ODQ, but other variables play a substantial role in explaining these two types of DQ.

Perceived Diet Quality in Young Adults

- YA may not give much consideration to their adherence to food group recommendations when making judgments about their DQ.

Diet Quality and Race/Ethnicity in Young Adults

- The model did not predict significantly different total HEI scores for Non-Hispanic Blacks and Whites, which is discordant with past findings (Debate et al., 2002; Kang et al., 2014; Sijtsma, et al., 2012; Zamora et al., 2010).
- Mexican Americans may be less likely to rate their DQ higher (versus lower) than Non-Hispanic Whites, even though they have significantly higher total HEI scores.

References

- Chiuve, S.E., Fung, T.T., Rimm, E.B., Hu, F.B., McCullough, M.L., Wang, M., Stamper, M.J., Willet, W.C. (2012). Alternative dietary indices both strongly predict risk of chronic disease. *Journal of Nutrition*, 142(6), 1009-1018. doi: 10.3945/jn.111.157222
- De Vlieger, N.M., Collins, C., & Bucher, T. (2017). What is a nutritious snack? Level of processing and macronutrient content influences young adults' perceptions. *Appetite*, 114, 55-63. doi: 10.1016/j.appet.2017.03.021
- Debate, R.D., Topping, M., & Sargent, R.G. (2001). Racial and gender differences in weight status and dietary practices among college students. *Adolescence*, 36, 819-833.
- Greaney, M.L., Less, F.D., White, A.A., Dayton, S.F., Riebe, D., Blissmer, B., & Greene, G.W. (2009). College students' barriers and enablers for healthful weight management: a qualitative study. *Journal of Nutrition Education and Behavior*, 41(4), 281-286. doi: 10.1016/j.jneb.2008.04.354
- Guenther, P.M., Casavale, K.O., Reedy, J., Kirkpatrick, S.I., Hiza, H.A., Kuczyński, K.J., ... Krebs-Smith, S.M. (2013). Update of the Healthy Eating Index: HEI-2010. *Journal of the Academy of Nutrition and Dietetics*, 113(4), 569-580. doi: 10.1016/j.jand.2012.12.016
- Guenther, P., Kirkpatrick, S., Reedy, J., Krebs-Smith, S., Buckman, D., Dodd, K., ... Carroll, R. (2014). The Healthy Eating Index-2010 is a valid and reliable measure of diet quality according to the 2010 Dietary Guidelines for Americans. *The Journal of Nutrition*, 144(3), 388-407. doi: 10.3945/jn.113.163079
- Guo, S.S., Huang, C., Maynard, L.M., Omerath, E., Torone, B., Chumlea, W.C., & Siervogel, R.M. (2000). Body mass index during childhood, adolescence and young adulthood in relation to adult overweight and adiposity: The Fels Longitudinal Study. *International Journal of Obesity*, 24(12), 1628-1635. doi: 10.1038/sj.ijo.0811451
- Hankinson, A.L., Davidgill, M.L., Bouchard, C., Carnethon, M., Lewis, C.E., Schreiner, P.J., & Sidney, S. (2010). Maintaining a high physical activity level over 20 years and weight gain. *Journal of the American Medical Association*, 304(23), 2603-2610. doi: 10.1001/jama.2010.1843
- Hiza, H.A., Casavale, K.O., Guenther, P.M., Davis, C.A. (2015). Diet quality of Americans differs by age, sex, race/ethnicity, income, and education level. *Journal of the Academy of Nutrition and Dietetics*, 113(2), 297-306. doi: 10.1016/j.jand.2012.08.011
- Kang, J., Ciecierski, C.C., Main, E.L., Carroll, A.J., Gidea, M., Craft, L.L., ... Hittman, B. (2014). A latent class analysis of cancer risk behaviors among U.S. college students. *Preventive Medicine*, 64, 121-125. doi: 10.1016/j.ypmed.2014.03.023
- Larson, N., Fulkerson, J., Story, M., & Neumark-Sztainer, D. (2013). Shared meals among young adults are associated with better diet quality and predicted by family meal patterns during adolescence. *Public Health Nutrition*, 16(5), 883-893. doi: 10.1017/S1368980012002039
- Larson, N.I., Perry, C.L., Story, M., & Neumark-Sztainer, D. (2006). Food preparation by young adults is associated with better diet quality. *Journal of the American Dietetic Association*, 106(12), 2001-2007. doi: 10.1016/j.jada.2006.09.008
- Lechner, L., Brug, J., & De Vries, H. (1987). Misperceptions of fruit and vegetable consumption: Differences between objective and subjective estimation of intake. *Journal of Nutrition Education*, 20, 313-320. doi: 10.3602/jne.v20i4.18668
- Lotfield, E., Yi, S., Immenwahr, S., & Eisenhower, D. (2015). Construct validity of a single-item, self-rated question of diet quality. *Journal of Nutrition Education and Behavior*, 47(2), 181-187. doi: 10.1016/j.jneb.2014.09.003
- Lutz, L.J., Gaffney-Stomberg, E., Williams, K.W., McGraw, S.M., Niro, P.J., Karj, J.P., Cable, S.J., ... McCullough, J.P. (2017). Adherence to the Dietary Guidelines for Americans is associated with psychological resilience in young adults: A cross-sectional study. *Journal of the Academy of Nutrition and Dietetics*, 117(3), 398-403. doi: 10.1016/j.jand.2016.05.018
- Nelson, N.I.C., Story, M., Larson, N.I., & Neumark-Sztainer, D., & Lytle, L.A. (2008). Emerging adulthood and college-aged youth: An overlooked age for weight-related behavior change. *Obesity*, 16, 2205-2211. doi: 10.1038/oby.2008.365 18719655
- Schwingshackl, L., Bogensberger, B., Hoffmann, G. (2017). Diet quality as assessed by the Healthy Eating Index, the Alternate Healthy Eating Index, the Dietary Approaches to Stop Hypertension Score, and health outcomes: a updated systematic review and meta-analysis of cohort studies. *Journal of the Academy of Nutrition and Dietetics*.
- Siljama, F., Meyer, K., Steffen, L., Shikany, J., Van Horn, L., Hamack, L., ... Jacobs, D. (2012). Longitudinal trends in diet and effects of sex, race, and education on dietary quality score change: The Coronary Artery Risk Development in Young Adults study. *American Journal of Clinical Nutrition*, 95(3), 580-586. doi: 10.3945/ajcn.111.020719
- Wilson, M.M., Reedy, J., & Krebs-Smith, S.M. (2010). Update of diet quality: Where it is, where it is heading, and what it could be. *Journal of the Academy of Nutrition and Dietetics*, 110(2), 302-310. doi: 10.1016/j.jand.2015.09.020
- Variyam, J.N., Shim, Y., & Blaylock, J. (2001). Consumer misperceptions of diet quality. *Journal of Nutrition Education*, 33(6), 314-321.
- Zamora, D., Gordon-Larsen, P., Jacobs, D.R., & Popkin, B.M. (2010). Diet quality and weight gain among Black and White young adults: The Coronary Artery Risk Development in Young Adults (CARDIA) study 1985-2005. *American Journal of Clinical Nutrition*, 92(4), 784-793. doi: 10.3945/ajcn.2010.20161

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