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Personality Traits and Bulimia Nervosa

John C. Ham, Daniela Iorio, and Michelle Sovinsky*

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Abstract

Bulimia Nervosa is a detrimental eating disorder that impacts millions of women. We examine the role played by socioeconomic factors and personality traits in bulimic behavior. Using data on eating disordered behavior from the National Heart, Lung, and Blood Institute Growth and Health Study, we present results showing that personality traits are significant determinants of bulimic behavior, even after controlling for race and class. This finding suggests that policies based on both the SES characteristics and the personality traits will be more effective for targeting those at risk.

Keyword

Keywords: Bulimia Nervosa, Race, Income, Education

JEL Codes: I1

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1 Introduction

More than 20 million women suffer from an eating disorder (ED) over their lifetime. Bulimia Nervosa (BN) is an ED characterized by recurrent episodes of binge-eating followed by compensatory behavior. The binge-purge cycle usually repeats several times a week, and as a result, BN can cause serious health problems. The negative impact is even more detrimental for the young due to the irreversible effects on development.¹ Moreover, bulimics persist in their behaviors (Keel, et al., 2005; Ham, Iorio, and Sovinsky, 2013). Hence, as with any persistent disease, BN is likely to negatively affect human capital accumulation (e.g., cause students to miss class) and reduce on-the-job training (e.g., if it prevents individuals from holding stable employment). Thus BN can impose serious costs to in terms of physical health, treatment costs, increased absence from work, and reduced human capital accumulation.

Given the number of people affected and the importance of the effects, BN should be a primary health concern. However, public campaigns targeting BN remain scarce. As realized by the Senate Committee, who emphasized the need for research on the incidence of ED across demographic groups, implementation is difficult given how little is known about the disorder including whom should be targeted by health campaigns (Department of Health and Human Services, 2006).

We examine the impact of social economic status and personality traits on BN by analyzing data from the National Heart, Lung, and Blood Institute Growth and Health Study (henceforth NHLBIS), which is a panel data set on female adolescents' behaviors. A notable aspect of the NHLBIS is that *all* respondents were asked a large number of questions related to bulimic behavior, *independent* of any diagnoses or treatment they had received. This stands in contrast to many data sets, where often a measure of ED or BN behavior is available only if the respondent had been diagnosed with, or was being treated for, an ED.

Based on the observation that people with ED tend to share similar behavioral traits we allow personality traits to impact BN. Psychological measures have been valuable in describing race and class differences in health disparities, and a relationship between these measures and BN is discussed in the medical literature.² As Adler and Rehkopf (2008) stress, these factors

¹ For example, the cycle of bingeing and purging can lead to electrolyte and chemical imbalances that affect the heart (i.e., irregular heartbeats and possibly heart failure). Other health concerns include the inflammation of the esophagus, gastric rupture, tooth decay, muscle weakness, and anemia (American Psychiatric Association, 1993). The harmful side effects consist of pubertal delay or arrest and impaired acquisition of peak bone mass resulting in growth retardation and increased risk of osteoporosis (Society for Adolescent Medicine, 2003).

² The best-known contributor to the development of EDs is body dissatisfaction: 40 – 60% of elementary school girls (ages 6-12) are concerned about their weight or shape. All the statistics mentioned above are obtained from a report of the National Eating Disorder Association, (NEDA 2012).

may diminish the role of race and class in health outcomes simply because the personality traits are influenced by race and class. Interestingly, when we add personality traits we find that they are significant determinants of BN, even after controlling for race and class. In fact the impact of SES variables are stronger once personality traits are included, suggesting that outreach be based on both the SES characteristics and personality traits.

Other research on EDs includes Hudson et al. (2007) who document various types of ED behaviors among women and men (in a univariate framework) using data from the National Comorbidity Survey Replication. Reagan and Hersch (2005) investigate the frequency of bingeing behavior (but not purging) using cross-sectional data from the Detroit metropolitan area. They find that there are no race effects on bingeing behavior, and that marital status, neighborhood, and income play a role among women. Compared to Reagan and Hersch (2005), we focus on BN and not just purging. Secondly we do not condition on neighborhood effects, since a family's neighborhood can be determined by their race and income. We also have somewhat wider geographic variation. Finally we examine the role of personality characteristics in explaining race and class differences in BN.

A related epidemiological study using the NHLBIS is Striegel-Moore et al. (2000), who examine correlations between BN and race and between BN and parental education. Their univariate results show that BN is higher among African Americans girls.³ They only condition on race.⁴ We use the NHLBIS (together with another dataset) in Ham, Iorio, and Sovinsky (2015), where we show that the distribution of bulimic behavior across socioeconomic groups may crucially differ if we consider all individuals potentially at risk rather than focus only on diagnosed individuals, who are more likely to be White. The current paper is also related to the literature examining disparities in health outcomes by income, race, and education (see e.g., Currie and Hyson, 1999; Khanam et al., 2009, Smith, 2007), but none of these papers examine differences in incidence and treatment.

The outline of the paper is as follows. In section 2 we describe the data and present basic statistics on BN. In section 3 we present the results regarding the predictive role of socioeconomic status and personality traits in the incidence and intensity of bulimic behaviors. We conclude in section 4.

³ The epidemiological literature that estimated the incidence of BN across racial or income groups often suffers from at least one of the following: i) focuses on univariate correlations, ii) creates a selection problem by only considering those diagnosed with an eating disorder, or iii) does not distinguish between correlations and causal factors. See the related literature section for a further discussion.

⁴ Given the stratified sampling used to collect the NHLBIS, race and income are orthogonal in the data, so simply omitting income will not bias the results.

2 Data Description

The NHLBIS consists of ten annual waves of 2198 girls from schools in Richmond, California and in Cincinnati, Ohio.⁵ It contains demographic and socioeconomic information such as age, race, parental education, and initial family income (in categories). It was constructed to have equal numbers of African Americans and Whites, and to have approximately equal representation across income groups by race (Kimm et al., 2002).

Questions on BN behavior were asked in five waves starting when the girls were aged 11-12 years. The questions were formulated to be consistent with diagnostic criteria for BN and were adjusted to be easy to understand for young respondents.⁶ The survey contains an Eating Disorders Inventory-BN scale, which measures degrees of BN symptoms. The ED-BN index is constructed from ordered responses (always, usually, often, sometimes, rarely, and never) to seven items: 1) I eat when I am upset; 2) I stuff myself with food; 3) I have gone on eating binges where I felt that I could not stop; 4) I think about bingeing (overeating); 5) I eat moderately in front of others and stuff myself when they are gone; 6) I have the thought of trying to vomit in order to lose weight, and 7) I eat or drink in secrecy. A response of 4-6 on a question contributes zero points to the ED-BN index; a response of 3 contributes 1 point; a response of 2 contributes 2 points; and a response of 1 contributes 3 points. The ED-BN index is the sum of the points and ranges from 0 to 21 in our data. For instance, if a respondent answers “sometimes” to all questions, her ED-BN index will be zero.⁷ Therefore, a higher ED-BN score is indicative of more intense BN behavior.

According to the panel of medical experts that designed the index (Garner et al., 1983), a score higher than 10 indicates that the girl is very likely to have a clinical case of BN.⁸

⁵ The data also contain some information on from families enrolled in a health maintenance organization in the Washington, DC area. Due to confidentiality concerns, the data do not indicate where an individual lives. Selection of potential schools was based on census tract data that showed approximately equal fractions of African American and White children, and the least disparity in income and education between the respondents of the two ethnic groups. The majority of the cohort, selected via the Health Maintenance Organization (HMO), was randomly drawn from a membership list of potentially eligible families with nine (or ten) year-old girls. A small percentage was recruited from a Girl Scout troop located in the same geographical area as the HMO population.

⁶ Clinical criteria for BN, according to the Diagnostic and Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000), require the cycle of binge-eating and compensatory behaviors occur at least two times a week for three months or more and that the individual feel a lack of control during the eating episodes. Due to data restrictions, we cannot examine the prevalence of anorexia nervosa.

⁷ Note that the answers to the individual questions are not available in the data.

⁸ In order to externally validate the ED-BN index, a sample of women diagnosed with BN (according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria) was interviewed using the NHLBIS questionnaire: the average ED-BN index among this sample was 10.8. See Garner et al. (1983) for more details

Approximately 2.2% of the NHLBIS respondents scored higher than 10, which is close to the national average of clinical BN reported from other sources.⁹ We refer to a respondent with an ED-BN index greater than 10 as one exhibiting BN.

For all demographic variables except age we have one observation per person, while for the other variables we have multiple observations per person.¹⁰ The mean of the ED-BN index is 1.2, and the average age of the girls is approximately 14 years. Given the high correlation between income and education, it is not surprising that the girls are approximately equally distributed across parent’s education levels.

The data also contain indices that measure a potential for personality disorders (henceforth, “personality indices”).¹¹ The first index assesses how much the respondent is dissatisfied with the size and shape of specific parts of her body (henceforth the body dissatisfaction index). The remaining personality indices assess tendencies toward: perfectionism (henceforth the perfectionism index), feelings of ineffectiveness (henceforth the ineffectiveness index), and interpersonal distrust (henceforth the distrust index). For all the personality indices, a higher score indicates a higher tendency of the personality trait that the index quantifies. For ease of exposition, we provide details on the questions used to form the personality indices in Appendix A.

<Insert Table 1 here>

Table 1 illustrates the relationship between demographics, personality indices, and the ED-BN index. For a given demographic group, we present the percentage of young women with an ED-BN index of zero, in the range [1-5], [6-10] and greater than 10 (i.e., bulimia nervosa), in columns (1)-(4), respectively; thus each row adds up to 100. Immediately one sees that the popular conception that BN is a disorder that afflicts upper income class White girls is contradicted. For example, an ED-BN index equal to zero is more prevalent among Whites than African-Americans, but the reverse occurs for a positive ED-BN index.¹²

of the development and validation of the ED-BN index.

⁹ See for instance, Hudson et al. (2007) and National Eating Disorders Association (2012).

¹⁰ Given that parent’s education and race are very unlikely to change, except perhaps by remarriage, the only SES variable for which it would be interesting to have multiple observations is family income.

¹¹ See Garner et al., 1983 for a discussion of the association of these personality characteristics with EDs.

¹² One could be concerned that the ED-BN index might capture obesity instead of bulimic behavior. However, if the index was actually measuring obesity, we would expect a strong positive correlation between ED-BN scores and body mass index (BMI), while the correlation in the data for all girls is only 0.05, and is actually negative for African Americans. In addition, one might be concerned that correlation is driven by the highest ED-BN scores, and that the index represents obesity among those scoring 0-10. However, average BMI for girls with an ED-BN index above 5 (i.e., the midpoint of the 0 – 10 interval) is lower than average BMI for girls with an

Note also that there is a monotonic relationship between the SES variables and the ED-BN index in all brackets of the ED-BN index. Combined with the results for African Americans, Table 1 suggests that BN is more problematic among African American girls, girls from low income families, and girls from families with low parental education. One possibility is that the results for race or class will disappear once we condition on both variables. A multivariate analysis will allow for a full set of interactions to give us a richer understanding of the incidence of BN, and we find that the race and class differences persist when we do this. Once we establish these disparities, we then ask whether they are driven by differences in the personality indices. Indeed we see evidence of this possibility in the raw data, since the univariate correlations between each of the personality indices with both the ED-BN index and the incidence of clinical BN are positive, ranging from 0.22 to 0.44 and 0.11 to 0.27 respectively, and all of these correlations are statistically significant at the 1% level.

3 Understanding the SES-BN Gradient for those at Risk

Based on the consideration that personality traits may influence the association between SES and health (see e.g., Pulkki et al. 2003), we control both for socioeconomic traits as well as a number of personality traits. We investigate if race and income play a role in the determination of BN once we control for these personality characteristics as a way of understanding the racial and class differences in bulimic behavior.

We have a continuous ED-BN index, to exploit this variation we consider the regression

$$d_{it} = \beta_0 + \beta_1 X_i + \beta_2 p_{it} + \gamma_i + v_{it}, \quad (1)$$

where d_{it} is the ED-BN index, X_i represent SES variables, p_{it} denotes the vector of time-changing personality indices, γ_i is an individual specific effect and v_{it} is a contemporaneous shock for person i at time t . In what follows we cluster the standard errors by individual in all regression results to control for correlation across time due to individual component γ_i , as well as for any heteroskedasticity in v_{it} . Note if the estimates of β_2 are statistically significant we cannot interpret these effects as causal, since individuals may have unobservables that affect both d_{it} and p_{it} . At this point we simply consider whether adding them affects the size and significance of the SES coefficients (β_1) as an attempt to understand the latter.

One drawback of the regression model is that it ignores the large number of observations with an ED-BN index of zero. To address this we consider a Tobit model where the latent variable underlying the ED-BN index is

index of 5 or lower for both African Americans (22.48 versus 24.72) and Whites (20.55 versus 22.14). These statistics strongly suggest that the ED-BN index is not an obesity index.

$$d_{it}^* = \tilde{\beta}_0 + \tilde{\beta}_1 X_i + \tilde{\beta}_2 p_{it} + \tilde{\gamma}_i + \tilde{v}_{it}, \quad (2)$$

and the observed value, d_{it} , of the ED-BN index is

$$d_{it} = \begin{cases} 0 & \text{if } d_{it}^* \leq 0 \\ d_{it}^* & \text{otherwise.} \end{cases} \quad (3)$$

We assume that $\tilde{\gamma}_i$ and \tilde{v}_{it} are independent and distributed as i.i.d. (over time and individuals) as $N(0, \sigma_\gamma^2)$ and $N(0, \sigma_v^2)$ respectively. We again maximize the period by period Tobit likelihood function but adjust the standard errors to control for correlation across time due to the individual component γ_i .¹³

Table 2 contains the results. Column (1) presents the regression results with the distrust, ineffectiveness and perfectionism indices (but not the body dissatisfaction index) used as explanatory variables, while in column (2) we also include the body dissatisfaction index.¹⁴ Note first that race, age and family income, but not parental education, are statistically significant when we condition on personality indices (independent of which ones we condition on), although the size of the income differentials, but not the race differential, is reduced. Second, the ineffectiveness, perfectionism and body dissatisfaction indices, but not the distrust index, are significantly associated with the ED-BN index in the direction expected.

<Insert Table 2 here>

Since the personality indices and the ED-BN are (almost) continuous variables, it is perhaps most illuminating to consider elasticities measured at the mean values of these variables. Using the estimates in column (2), we find large elasticities of the ED-BN index with respect to the ineffectiveness, perfectionism, and body dissatisfaction indices, which are 0.56, 0.68, and 0.25, respectively. Alternatively, a (separate) five point increase in the ineffectiveness index and perfectionism index each increase the ED-BN index by about 1.3 and 0.7 respectively, while a (separate) five point increase in the body dissatisfaction index increases the ED-BN index by about 0.2. Note that each of these estimated coefficients is substantial when compared to the mean ED-BN index of 1.2. Column (5) contains the Tobit partial effects when we include the personality traits as explanatory variables. The results are close to those from the linear model.

¹³ Since the Tobit model will be inconsistently estimated with heteroskedasticity clustering cannot be used to adjust for heteroskedasticity.

¹⁴ We present results with and without the body dissatisfaction index as a regressor, since body dissatisfaction is more likely to be affected by BN behavior.

Each of the SES variables continue to be strongly related to BN behavior when we condition on the personality indices.

In column (3) we include race-income interactions in the linear model; the corresponding Tobit estimates are in column (6). The results confirm that low and middle income African Americans have the strongest tendency towards bulimic behavior.¹⁵ However, among Whites, low income girls have a substantially higher propensity toward BN than both middle and high income girls. Further, middle (high) income Whites present an ED-BN index that is 49% (36%) lower than low income African Americans. Finally, among the lowest income White households, the ED-BN index drops by about 25% if one moves from the lowest income family to a middle income family (that is, a 25% decrease relative to the mean ED-BN index). In columns (4) and (7) we report the linear and Tobit estimates with race-education interactions conditional on family income and all personality indices.¹⁶ While all whites have significantly lower ED-BN indices than all African Americans, and the disparity slightly increases with parental education, within the Whites parental education does not play a remarkable role.

In sum, our empirical findings reveal strong disparities in the bulimic patterns across SES groups that persist even when we condition on the personality characteristics. Moreover, our results are robust to different estimation methods (including both linear and non linear models).

4 Conclusions

We examine the role of SES and personality traits in ED behavior. We present results showing that personality traits are significant determinants of BN behavior, even after controlling for race and class. In fact the impact of SES variables are stronger once personality traits are included, suggesting that outreach be based on both the SES characteristics and the personality traits.

The importance of our results for policy is reinforced by our finding in other work (Ham, Iorio, and Sovinsky, 2013) that up to two-thirds of the persistence in BN is due to state dependence, which suggests that early interventions in terms of treatment may be very beneficial. In other words, there are significant class and race disparities for a disease where remaining untreated will magnify the severity of the disease. These results are policy relevant as they provide insight into which girls are at the greatest risk for BN and thus guide the direction of future outreach.

¹⁵ Specifically, among African Americans, girls from high income households score an average of 34 percentage points lower on the ED-BN index than girls from low income families. (All percentages are relative to the ED-BN mean.) Here the base case is African Americans from the lowest income households.

¹⁶ The base case is African Americans from the lowest educated families.

Appendix

A Data Variable Definitions

We describe the construction of the ED-BN index in the main text of the paper. The body dissatisfaction index is based on subject responses to nine items: 1) I think that my stomach is too big, 2) I think that my thighs are too large, 3) I think that my stomach is just the right size, 4) I feel satisfied with the shape of my body, 5) I like the shape of my buttocks, 6) I think my hips are too big, 7) I think that my thighs are just the right size, 8) I think that my buttocks are too large, 9) I think my hips are just the right size. This index ranges from 0 to 27, and responses are scored such that a higher score indicates more dissatisfaction.¹⁷

The perfectionism index is based on subject responses to six items: 1) In my family everyone has to do things like a superstar; 2) I try very hard to do what my parents and teachers want; 3) I hate being less than best at things; 4) My parents expect me to be the best; 5) I have to do things perfectly or not to do them at all; 6) I want to do very well. The subjects are offered the same responses, and the responses are scored in the same way as the ED-BN index.

The distrust index is based on subject responses to seven items: 1) I tell people about my feelings; 2) I trust people; 3) I can talk to other people easily; 4) I have close friends; 5) I have trouble telling other people how I feel; 6) I don't want people to get to know me very well; and 7) I can talk about my private thoughts or feelings. The scoring rule is as follows: "always"=1, "usually"=2, "often"=3, "sometimes"=4, "rarely"=5, and "never"=6 in questions 5 and 6; and "always"=6, "usually"=5, "often"=4, "sometimes"=3, "rarely"=2, and "never"=1 in questions 1, 2, 3, 4, and 7. A response of 4-6 on a given question contributes zero points to the distrust index; a response of 3 contributes 1 point; a response of 2 contributes 2 points; and a response of 1 contributes 3 points. The distrust index is a sum of all contributing points.

The ineffectiveness index is based on subject responses to ten items: 1) I feel I can't do things very well; 2) I feel very alone; 3) I feel I can't handle things in my life; 4) I wish I were someone else; 5) I don't think I am as good as other kids; 6) I feel good about myself; 7) I don't like myself very much; 8) I feel I can do whatever I try to do; 9) I feel I am a good person; 10) I feel empty inside. The scoring rule is as follows: "always"=1, "usually"=2, "often"=3, "sometimes"=4, "rarely"=5, and "never"=6 in questions 1,2,3,4,5,7, and 10; and "always"=6,

¹⁷ The scoring rule is as follows: "always"=6, "usually"=5, "often"=4, "sometimes"=3, "rarely"=2, and "never"=1 in questions 3, 4, 5, 7, and 9 and "always"=1, "usually"=2, "often"=3, "sometimes"=4, "rarely"=5, and "never"=6 in questions 1, 2, 6, and 8. Again a response of 4-6 on a given question contributes zero points to the body image index; a response of 3 contributes 1 point; a response of 2 contributes 2 points; and a response of 1 contributes 3 points. The body image index is the sum of the contributing points.

“usually”=5, “often”=4, “sometimes”=3, “rarely”=2, and “never”=1 in questions 6,8, and 9. A response of 4-6 on a given question contributes zero points to the ineffectiveness index; a response of 3 contributes 1 point; a response of 2 contributes 2 points; and a response of 1 contributes 3 points. The ineffectiveness index is a sum of all contributing points.

B Tables

Distribution of the ED-BN Index by Characteristics				
Variable	ED-BN Index			
	0 (1)	[1,5] (2)	[6,10] (3)	>10 (Clinical BN) (4)
Overall	66.57	26.21	5.06	2.16
White	70.35	24.02	3.91	1.72
African American	63.07	28.24	6.13	2.54
Parents High School or Less	62.26	27.88	6.57	3.29
Parents Some College	65.27	27.31	5.38	2.03
Parents Bachelor Degree or More	70.99	23.84	3.65	1.52
Household Income (in 1988\$):				
Income less than \$20,000	59.96	29.78	6.93	3.33
Income in [\$20000, \$40000]	68.35	25.1	4.41	2.14
Income more than \$40,000	70.67	24.08	3.97	1.28

Correlations of ED-BN Index with Personality Traits Indices		
Personality Characteristic Index	ED-BN Index	ED-BN Index >10 (Clinical BN)
Body Dissatisfaction Index	0.221	0.114
Distrust Index	0.213	0.107
Ineffectiveness Index	0.439	0.274
Perfectionism Index	0.229	0.145

Note: Correlations are significant at the 1% level using clustered standard errors.

Table 1: ED-BN Index, SES Variables, and Personality Indices

Demographic Variables, Personality Indices and the ED-BN Index

	Linear Model				Tobit Partial Effect		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
White	-0.178** (0.090)	-0.238*** (0.088)			-0.177*** (0.057)		
Age	-0.068*** (0.012)	-0.087*** (0.013)	-0.088*** (0.013)	-0.088*** (0.012)	-0.062*** (0.008)	-0.062*** (0.008)	-0.062*** (0.008)
Parents Some College	-0.086 (0.110)	-0.083 (0.110)	-0.081 (0.110)		-0.058 (0.072)	-0.057 (0.072)	
Parents Bachelor Degree or More	-0.162 (0.119)	-0.143 (0.119)	-0.158 (0.119)		-0.105 (0.078)	-0.117 (0.079)	
Income in [\$20000, \$40000]	-0.219* (0.112)	-0.232** (0.112)		-0.226** (0.112)	-0.163** (0.072)		-0.159** (0.072)
Income more than \$40,000	-0.233** (0.109)	-0.253** (0.109)		-0.252** (0.109)	-0.165** (0.072)		-0.164** (0.073)
White & Income less than \$20000			-0.335* (0.196)			-0.252** (0.113)	
White & Income in [\$20000, \$40000]			-0.584*** (0.133)			-0.402*** (0.081)	
White & Income more than \$40000			-0.433*** (0.134)			-0.299*** (0.086)	
Black & Income in [\$20000, \$40000]			-0.163 (0.147)			-0.124 (0.094)	
Black & Income more than \$40000			-0.414*** (0.136)			-0.273*** (0.087)	
White & High School Graduate				-0.308 (0.194)			-0.221** (0.116)
White & Some College				-0.366** (0.150)			-0.260*** (0.094)
White & Bachelor Degree or More				-0.383*** (0.146)			-0.279*** (0.093)
Black & Some College				-0.098 (0.144)			-0.069 (0.094)
Black & Bachelor Degree or More				-0.221 (0.172)			-0.159 (0.110)
Distrust Index	0.010 (0.013)	0.008 (0.013)	0.007 (0.013)	0.008 (0.013)	0.005 (0.008)	0.005 (0.008)	0.005 (0.008)
Ineffectiveness Index	0.287*** (0.018)	0.260*** (0.018)	0.260*** (0.018)	0.260*** (0.018)	0.169*** (0.011)	0.169*** (0.011)	0.169*** (0.011)
Perfectionism Index	0.136*** (0.014)	0.134*** (0.014)	0.134*** (0.014)	0.134*** (0.014)	0.088*** (0.008)	0.088*** (0.008)	0.088*** (0.008)
Body Dissatisfaction Index		0.040*** (0.006)	0.040*** (0.006)	0.040*** (0.006)	0.027*** (0.003)	0.027*** (0.004)	0.027*** (0.004)
Constant	1.063*** (0.243)	1.179*** (0.241)	1.215*** (0.248)	1.202*** (0.251)			
Sample Size	6308	6291	6291	6291	6308	6291	6291

Notes: Standard errors robust intra-individual correlation (and robust to heteroskedasticity for linear regressions) are in parenthesis.

* indicates significant at the 10% level; ** at 5%; *** at 1%. The variation in the sample size comes primarily from the fact that all personality indices but the body dissatisfaction index are not available in wave 7.

Table 2: Linear and Non-Linear Estimates

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