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How Bulimia Nervosa Relates to Addictive Behavior

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Abstract

Using longitudinal data that tracks bulimic behavior among young girls (National Heart, Lung, and Blood Institute Growth and Health Study), we examine (1) whether bulimic behavior is consistent with addiction criteria as stated in the Diagnostic and Statistical Manual of Mental Disorders DSM-IV (APA, 1994); and 2) whether the persistence in bulimia nervosa (BN) reflects tolerance formed from an addiction or if it can be attributed to slow learning about the deleterious health effects of BN. Making the case for treating BN as an addiction has important policy implications. First, it suggests that the timing of educational policy and treatment is crucial: preventive educational programs aimed at instructing girls about the deleterious health effects of BN, as well as treatment interventions, will be most effective if provided in the early stages. Second, it would put those exhibiting BN on more equal footing (from a treatment reimbursement perspective) with individuals with drug or alcohol addictions.

Keywords: Eating disorders, Bulimia Nervosa, Addiction

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1 Introduction

Eating disorders are a growing health concern. Surprisingly, estimates from the National Eating Disorders Association indicate that as many as 9 million women in the US are battling with an eating disorder (NEDA, 2008). A large portion of those are incidents of bulimia nervosa (BN), which disproportionately affects women (Gidwani, 1997). Our work is motivated by the high incidence of BN in the population (APA, 2000) and evidence that bulimics persist in their behaviors. The repeated episodes of bulimic behavior may be due to the potentially addictive nature of BN or may arise solely from differences across individuals (Ham, Iorio, & Sovinsky, 2012). It has been well-documented that addicts exhibit higher BN prevalence rates relative to non-addicts (Bulik, et al., 1992; Gilchrist, et al. 2007; Harrop & Marlatt, 2010; Peveler & Fairburn, 1990; Wiederman & Pryor, 1996). Further, among the purging subtypes of BN (i.e., self-induced vomiting; misuse of laxatives, diuretics, or enemas) there is a higher than usual prevalence of substance abuse (Killeen, et al., 2011; Umberg, et al., 2012). These findings suggest that there may be addictive component to BN (i.e., a randomly chosen person becomes chemically/ biologically addicted to the process over time if they binge and purge now) (Marks, 1990; Gearhardt, et al., 2011; Barry, et al., 2009; Davis & Carter, 2009; Davis & Claridge, 1998; Vandereycken, 1990). On the other hand, a common set of personality traits may predispose an individual to potentially excessive behaviors.[2] That is, some individuals may have strong tastes (which may be unobservable) for bingeing and purging which are persistent over time or evolve slowly. Therefore, the propensity to engage repeatedly in bulimic activities could be due to differences, both observed and unobserved, in preferences that are time invariant (i.e., due to individual heterogeneity) and/or to the addictive nature of BN (i.e., due to 'true state dependence').[3]

In Ham, Iorio, Sovinsky (2012), we found that up to two-thirds of BN persistence is due to true state dependence, and that the past four years of behavior positively and significantly impact current behavior after we controlled for individual heterogeneity. Having established robust evidence in favor of state dependence, the purpose of this work is to draw a quantitative link between addiction and the true state dependence in bulimic behavior. In particular, we are interested in (1) whether BN behavior is consistent with addiction criteria as stated in the Diagnostic and Statistical Manual of Mental Disorders DSM-IV (APA, 1994); and 2) whether

[2] A number of papers document the high comorbitity of BN with individual traits or personality characteristics. See for example, Lilenfeld, et al., 1998; Bulik, et al., 2003, Holderness, et al., 1994 and Krahn, 1991.

[3] This difference is referred to as 'state dependence' versus 'heterogeneity' in the econometrics literature. See the large literature starting with the seminal work of Heckman (1981).

the persistence in BN reflects tolerance formed from an addiction or if it can be attributed to slow learning about the deleterious health effects of BN.

Making the case for treating BN as an addiction has important policy implications. First, if BN reflects an addictive component, it is reasonable to expect that the longer an individual experiences BN the less responsive she will be to policy aimed at combatting the behavior. In this respect the timing of policy intervention is crucial: preventive educational programs aimed at instructing girls about the deleterious health effects of BN, as well as treatment interventions, will be most effective if provided in the early stages. Second, making the case for BN being an addiction would put those exhibiting BN on more equal footing (from a treatment reimbursement perspective) with individuals abusing drugs or alcohol. In some states this is a current policy issue, since in several states treatment for alcoholism and drug addiction is covered but ED treatment is not covered or is covered less generously.[4] In fact, only 6% of people with bulimia receive mental health care (Hoek & van Hoeken, 2003), while a majority of states cover treatment for alcoholism and drug addiction (Center for Mental Health Services, 2008).[5]

2 Methods

2.1 Subjects

Data for these analyses are derived from the National Heart, Lung, and Blood Institute (NHLBI) Growth and Health Study (NGHS), a longitudinal observational study initiated in 1985 by NHLBI (NHLBI Research Group, 1992). The study surveyed girls who were aged 9 through 10 years at entry (N=2379). The same cohort was interviewed once a year over the period 1988-1997. Questions about BN related behavior were asked every second year; we use data from the years 1990, 1992, 1994, 1996, and 1997. The follow-up rate was 89% after ten years.

The respondents were from schools in Richmond, California and Cincinnati, Ohio, and from families enrolled in a health maintenance organization in the Washington, DC area. Schools were selected to participate in the study based on census tract data with approximately equal

[4] Recently the Mental Health Parity Act of 2008 was implemented (in 2010). The act requires large employer-provided insurance policies that cover mental health or addictions must cover them at the same level as they cover other medical issues. Note that the act does not require policies to cover mental health issues per se. Also, policies that do offer mental health benefits don't have to cover every mental health issue (HR 6983: Wellstone Mental Health Parity and Addiction Equity Act of 2008). State mental health parity laws apply to privately insured plans offered through an employer. These laws vary significantly from state to state.

[5] Daly (2008) found that typical coverage by insurance companies for EDs failed to provide adequate reimbursement for the most basic treatment as recommended by the American Psychiatric Association.

fractions of African American and White children where there was the least disparity in income and education between the two ethnic groups. The majority of the cohort was randomly drawn from families with nine (or ten) year-old girls that participated in the Health Maintenance Organization (HMO). A small percentage was recruited from a Girl Scout troop located in the same geographical area as the HMO population.

2.2 Measures

Demographic Instruments In the first survey year family information was collected, including parental (or guardian) educational attainment and household income. The highest level of parental education was included in bracketed form: high school or less, some college less than four years, or four years or more of college. Likewise, household income was reported bracketed as less than $20,000; between $20,000 and $40,000; or $40,000 or more. Other demographic instruments include age and whether the respondent was White or African American.

Eating Disorders Inventory Bulimia Subscale Starting in 1990 (wave 3), when the girls were aged 11-12, the NHLBI survey included the questions related to bulimic behaviors. These questions were asked subsequently in waves 5, 7, 9, and 10. The questions were further refined in Striegel-Moore, et al. (2000) so they would be easily understood by young respondents. The answers to these questions were used to construct an Eating Disorders Inventory Bulimia subscale (hereafter the ED-BN index) for each respondent (Garner, et al., 1983). In particular, the latter index is constructed based on the subjects responses ("always"=1, "usually"=2, "often"=3, "sometimes"=4, "rarely"=5, and "never"=6) 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 given 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 contributing points and ranges from 0 to 21 in the data. For instance, if a respondent answers "sometimes" to all questions, her ED-BN index will be zero.[6] The ED-BN index is widely used (Rush, et al., 2008), and it was designed to assess the psychological traits relevant to bulimia. See Garner, et al. (1983) for more details of the development and validation of the ED-BN index. As Table 1 indicates, the mean ED-BN index is 1.2.

Eating Disorders Inventory The NHLBI Growth and Health survey also contains questions

[6] Note that the answers to the individual questions are not available in the data.

used to construct five Eating Disorders Inventory subscales that measure a respondent's potential for personality traits/disorders. The first index is a measure of each girl's dissatisfaction with her body. The ED Body Dissatisfaction index is reported every year and is a sum of respondents answers to nine items intended to assess satisfaction with size and shape of specific parts of the body. Hereafter we refer to it as the body dissatisfaction index. We also use three additional indices recording tendencies toward: perfectionism (hereafter the perfectionism index), feelings of ineffectiveness (hereafter the ineffectiveness index), and interpersonal distrust (hereafter the distrust index). For ease of exposition, we provide details on the questions used to form the ED subscales in Appendix A.

The ED-BN Index is positively correlated with all the indices measuring personality traits. In particular, the correlation between the ED-BN Index with the body dissatisfaction index is 0.22. This is consistent with previous work showing that BN patients inappropriately evaluate themselves based on body shape and weight (APA, 2000). The correlations between the ED-BN Index with the perfectionism index, the ineffectiveness index, and the distrust index are 0.23, 0.44, and 0.21, respectively. These correlations are consistent with the findings in Pearlstein (2002), who reported several personality traits that increase risk for development of BN (e.g., low self-esteem and perfectionism, among others).

We report descriptive statistics in Table 1. The survey is an exogenously stratified sample, designed to be approximately equally distributed across race, income, and parent's education level as the descriptive statistics in Table 1 confirm.

Table 1: Means and standard deviations (N=2379)

Variable	Mean	Standard Deviation	Minimum	Maximum
ED-BN Index	1.279	2.682	0	21
Body Dissatisfaction Index	8.039	7.554	0	27
Distrust Index	3.589	3.492	0	21
Ineffectiveness Index	2.752	3.915	0	29
Perfectionism Index	6.468	3.290	0	18
Age	14.363	2.991	9	21
White	0.480	0.499	0	1
Parents High School or Less	0.255	0.436	0	1
Parents Some College	0.393	0.488	0	1
Parents Bachelor Degree or More	0.352	0.477	0	1
Income less than $20,000	0.318	0.466	0	1
Income in [$20000, $40000]	0.315	0.465	0	1
Income more than $40,000	0.367	0.482	0	1

Variable labels are: ED-BN Index (The Eating Disorders Inventory Bulimia subscale).

Table 2 reports the descriptive statistics of the ED-BN index across years. As this table shows, we have enough observations and variation in the data in each wave to estimate a statistical (dynamic) model of bulimic behavior.

Table 2: Means and standard deviations of ED-BN Index

Year	Mean	Standard Deviation	N	Minimum	Maximum
1989	1.814	3.287	2198	0	21
1991	1.610	3.021	2011	0	20
1993	1.098	2.342	1879	0	18
1995	0.860	2.054	1995	0	21
1996	0.955	2.279	2071	0	21

In order to describe the persistence in the ED-BN index, overall and across socioeconomic groups, we constructed transition matrices based on four ED-BN categories: ED-BN index equal to 0, in the range $[1-5]$, in the range $[6-10]$, and greater than 10. Table 3 provides the transition rates across two year intervals for these categories. Note first that the higher is the ED-BN category the lower is the probability of having an index value of 0 two years later (i.e., at time $t+1$) across all demographic groups. Second, the higher the ED index in t, the more likely is the girl to be in the greater than 10 category at $t+1$. For instance, the conditional probability of having an index greater than 10 in $t+1$ given that a girl has it in t is 20%, while the same probability for someone with a ED-BN index in the range $[1-5]$ in t is 2% and it is less than 0.05% for someone with an index equal to zero in t.[7] Across demographic groups, the conditional probability of having an index greater than 10 in $t+1$ conditional on a girl that has it in t is 24% for girls from low-income families, while it is only 11% for girls from high-income families. If we simply look at the correlation between the index in t and the index in $t+1$, we estimate it to be 0.48, and, not surprisingly, this estimate is very statistically significant. These results show that there is substantial persistence in the ED-BN index, and this persistence differs among demographic groups.

[7] The same general pattern comes through when we consider a more narrow breakdown of the ED-BN index.

Table 3: ED-BN Index Transition Probabilities by Demographic Groups

	ED-BN Index Range at t+1			
ED-BN Index Range at t	0	[1,5]	[6,10]	>10
0	80.16	17.90	1.50	0.43
[1,5]	51.92	39.80	6.47	1.82
[6,10]	31.38	42.86	17.80	7.96
>10	21.93	37.97	20.32	19.79
Race:				
African American	78.53	19.29	1.74	0.44
	52.69	38.77	6.58	1.96
	32.48	42.34	17.15	8.03
	22.03	38.14	22.03	17.80
Race:				
White	82.01	16.31	1.26	0.42
	50.28	41.64	6.40	1.68
	30.20	42.28	19.46	8.05
	20.90	38.81	16.42	23.88
Income:				
Less than $20,000	76.58	20.67	2.29	0.46
	52.06	38.41	6.69	2.84
	29.07	44.19	18.60	8.14
	18.60	33.72	24.42	23.26
Income:				
More than $40,000	81.97	16.86	0.87	0.31
	51.44	41.27	5.92	1.37
	34.71	35.54	21.49	8.26
	29.73	45.95	13.51	10.81
Parents Education:				
High School or Less	78.15	18.94	2.47	0.44
	53.95	37.03	6.77	2.26
	29.93	45.26	14.60	10.22
	20.83	36.11	20.83	22.22
Parents Education:				
Bachelor Degress or More	81.50	16.98	1.01	0.51
	50.99	41.73	5.92	1.37
	32.71	35.51	23.36	8.41
	21.43	40.48	14.29	23.81
Marginal Probability				
of ED-BN Index at t+1	68.57	25.59	4.17	1.67

2.3 Statistical Analysis

We regress the ED-BN index, y_{it}, on lagged bulimic behavior as captured by a one period lag of the ED-BN index, y_{it-1}. We control for demographic characteristics as well as personality traits that may affect bulimic behavior, these are contained in X_{it}. Finally, there may be an individual specific component to bulimic behavior that is not captured by demographic characteristics and that is persistent over time, which is denoted by δ_i. Finally v_{it} is a normally distributed contemporaneous shock for person i at time t that accounts for non-observable time changing

factors that may effect y_{it}. Specifically,

$$y_{it} = \beta_0 + \beta_1 y_{it-1} + \beta_2 X_{it} + \delta_i + v_{it}. \quad (1)$$

As in any dynamic model, we need to address the endogeneity of lagged behavior (when faced with the prospect of omitted variables bias, or unobserved heterogeneity). In order to obtain a consistent estimate of β_1, and purge any effect of unobserved heterogeneity, we use an instrumental variables approach. In particular, we estimate the parameters by Two-Stage-Least-Squares (henceforth, 2SLS) using the time changing portion of X_{it-1} as excluded instrumental variables.[8] Identification follows the arguments of Arellano & Bond (1991). Namely, identification requires exogeneity of some of the explanatory variables conditional on the unobserved individual heterogeneity. As such, all lagged values of exogenous variables serve to identify the parameters of the model. We refer the reader to our companion paper Ham, Iorio, Sovinsky (2012) for more discussion of the methodology used to identify and obtain consistent estimates in the dynamic model outlined in equation (1).

3 Results

In this section, we examine the potential addictive nature of BN. According to the DSM-IV, in order to be classified as an addiction, a behavior or substance abuse must satisfy at least three of seven criteria in a given year: 1) experiencing a persistent desire for the substance or behavior or an inability to reduce or control its use, 2) use of the substance or behavior continuing despite known adverse consequences, 3) withdrawal, 4) tolerance (more is needed for the same effect), 5) taking a larger amount of the substance or taking the substance for a longer period, than was intended, 6) spending much time seeking or consuming the substance or recovering from its effects, and 7) use of the substance or behavior interfering with important activities.

It is straightforward to note that BN fulfills criterion 1 (inability to control its use) as one of the diagnostic criteria for BN involves loss of control over the eating process.[9] Regarding criterion 2, Ham, Iorio, and Sovinsky (2012) document that young women persist in BN. Due to data limitations we are not able to determine if the respondents are aware of the negative

[8] We could use additional lags of the explanatory variables as instruments, but this would reduce our sample size considerably.

[9] Corwin & Grigson (2009) note that other diagnostic criteria for bingeing related disorders approximate the DSM-IV criteria for addiction. These include binge-type consumption, (i.e., criterion 5); bingeing is followed by inappropriate compensatory behavior (i.e., criterion 2); bingeing occurs at least twice a week for 3 months (i.e., criterion 5). Their argument is not based on an empirical analysis, but rather on the relation between the DSM-IV addiction and BN criteria.

consequences of their behavior, however a number of the adverse health effects will be readily apparent to anyone who continues with BN behavior, such as an inflamed and irritated esophagus, tooth decay, muscle weakness, gastric rupture, and anemia. In this sense the continued behavior is consistent with addiction criterion 2 (i.e., use continues despite known adverse consequences). There is separate scientific evidence of withdrawal symptoms (criterion 3) in laxative use, which is a purging behavior (Colton, et al., 1998). We will next provide empirical evidence in favor of criterion 4 (tolerance).

Finding a positive and significant coefficient on past experience (β_1), after we address the endogeneity issue, is consistent with the hypothesis that the behavior under consideration is addictive. In the case of BN, in our companion paper we show that when we do not attempt to give a causal interpretation to β_1, which then reflects both unobserved heterogeneity and state dependence, we obtain a coefficient of 0.34, using the Ordinary-Least-Square estimator (OLS). On the contrary, the 2SLS estimate of β_1 is 0.149, (see Ham, Iorio, and Sovinsky, 2012, Table 4, column 1) suggesting that up to two-thirds of the variation in the persistence can be attributed to state dependence.[10]

Note that the presence of state dependence in BN is necessary for BN to fulfill the tolerance criterion in the DSM-IV classification of an addiction.[11] However, there may be competing explanations that generate state dependence in BN, but that do not involve tolerance or increased use over time. For instance, it may be the case that individuals are initially uncertain of the deleterious side effects associated with bulimia, but they slowly learn through experimentation that BN is harmful. The slow learning explanation for state dependence has the implication that the longer individuals have experienced bulimic behavior in the past the less likely they are to experience it in the future. To explore the potential for slow learning in explaining state dependence, we first consider an AR(2) process[12] and then construct an "intensity" stock variable that is the sum of the ED-BN index over all previous periods. We also consider an alternative "threshold" stock in which past behavior contributes to the stock only if the girl engaged in more intense BN behavior in the past (defined as a value of the ED-BN greater than 6).[13] The threshold stock reflects the idea that a person learns the harmful consequences of

[10] It is important to stress that one could not reach this finding without using econometric techniques to distinguish between persistence due to true state dependence and that due to unobserved heterogeneity.

[11] Increased behavior could either indicate that individuals are engaging more in the behavior to obtain i) the same effect over time (tolerance) or ii) stronger effects over time. Thus we say increased use is a necessary condition for tolerance, but not a sufficient one.

[12] That is, both y_{it-1} and y_{it-2} matter in explaining y_{it}.

[13] There is not enough variation to consider an alternative stock in which past behavior contributes to the stock only if the ED-BN index is greater than 10.

BN only when the intensity of the past behavior is relatively high. Note that while such stock measures could be problematic in samples with older individuals (as earlier BN behavior would be out of sample and thus unobserved), this is not an issue in our sample since the girls are quite young when first interviewed.

Table 4: Two-Stage Least Squares Regression Estimates

Variables	(1)	(2)	(3)	(4)
Number of Periods Lagged ED-BN Index				
One Period	0.149***	0.120*	0.140***	0.136***
	(0.035)	(0.065)	(0.042)	(0.045)
Two Periods		0.111***		
		(0.037)		
Stock Variables				
Intensity Stock (sum of ED-BN Index)			0.007	
			(0.017)	
Threshold Stock (sum of binary if ED-BN Index > 6)				0.138
				(0.269)
Control Variables				
White	-0.134*	-0.064	-0.130*	-0.131*
	(0.084)	(0.076)	(0.069)	(0.069)
Age	-0.065***	0.048*	-0.070***	-0.071***
	(0.018)	(0.026)	(0.020)	(0.020)
Parents Some College	-0.066	-0.040	-0.065	-0.061
	(0.097)	(0.090)	(0.081)	(0.082)
Parents Bachelor Degree or more	-0.035	0.044	-0.032	-0.029
	(0.105)	(0.100)	(0.092)	(0.093)
Income in [$20000, $40000]	-0.240***	-0.022	-0.237***	-0.237***
	(0.097)	(0.093)	(0.083)	(0.083)
Income more than $40,000	-0.288***	-0.112	-0.286***	-0.287***
	(0.094)	(0.100)	(0.089)	(0.089)
Distrust Index	-0.002	0.012	-0.003	-0.003
	(0.015)	(0.012)	(0.010)	(0.011)
Ineffectiveness Index	0.230***	0.191***	0.230***	0.230***
	(0.022)	(0.016)	(0.012)	(0.012)
Perfectionism Index	0.096***	0.044***	0.095***	0.095***
	(0.013)	(0.012)	(0.010)	(0.010)
Constant	1.138***	-0.849*	1.212***	1.227***
	(0.330)	(0.467)	(0.335)	(0.339)
Sample Size (N)	5426	3402	5426	5426

Standard errors robust to heteroskedasticity and intra-group correlation are reported in parenthesis.
* indicates significant at 10%; ** significant at 5%; *** significant

The 2SLS results in Table 4 provide strong evidence against the slow learning interpretation of state dependence in BN. We should note that our sample size is limited by the fact that the personality indices are not available in wave 7. However, we can increase our sample size if we assume that the personality index values vary smoothly from waves 5 to 9, and use interpolated values of the personality indices in wave 7, which doubles our sample size. We present the 2SLS estimates using the imputed data.

The first column includes the first lag of ED-BN index. Column (2) specifies an AR(2) process where one and two lags of the personality indices are used as instrumental variables. Further, column (3) includes one lag of the ED-BN index and the intensity stock, while column (4) replaces the intensity stock with the threshold stock. In columns (3) and (4) we use the lag and the sum over all previous waves of each personality index as instrumental variables.

Our results in column (2) show that the first and second lag coefficients (recall that each lag is two years) are both statistically significant and equal to 0.12 and 0.11, respectively.[14] These results cast doubt on slow learning as a driving force in state dependence, as the latter suggests that experiencing BN for four years would most likely reduce current behavior. Further evidence against the learning interpretation comes from columns (3) and (4). If learning was important we would expect the coefficients on the stock variables to be negative and statistically significant, but instead they are both positive and insignificant. Thus we conclude that learning does not explain state dependence in the persistence of BN. These findings corroborate our hypothesis that it is the tolerance that contributes to explain state dependence.

4 Discussion

We argue that BN fulfills at least three of the DSM-IV criteria necessary to be classified as an addiction. Specifically, these are the inability to control the behavior (criterion 1), the behavior continues despite known adverse consequences (criterion 2), and tolerance (criterion 4) . While criterion 1 is straightforward to show, based on the definition of BN, criteria 2 and 4 require more indepth empirical anaylsis. In this paper, we show that the persistence in BN reflects tolerance formed from an addiction as opposed to slow learning about the deleterious health effects of BN. In order to be classified as an addiction, a behavior or substance abuse must satisfy at least three criteria. Hence, based on our findings, we argue that BN should be classified as an addiction.

These results suggest some directions for future policy aimed at combating BN. First, since state dependence is the most important cause of BN persistence, it is reasonable to expect that the longer an individual experiences BN the less responsive she will be to policy aimed at combatting it. In this respect it is important to instruct a wide range of young women on the deleterious effects of BN and the importance of getting help, especially at the initial stages of bulimic behaviors. Second, our results strongly suggest that BN should be treated as an addiction. This is important in the sense that we argue those exhibiting BN should be treated in an analogous way (from a treatment reimbursement perspective) to those individuals abusing

[14] The data are not rich enough to allow us to estimate an AR(3).

drugs or alcohol.

Appendix

A Data Variable Definitions

Our variable definitions follow those we used in Ham, Iorio, Sovinsky (2012). We describe the construction of the ED-BN index in the main text of this 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.[15]

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,

[15] 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.

"sometimes"=4, "rarely"=5, and "never"=6 in questions 1,2,3,4,5,7, and 10; and "always"=6, "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.

Table A1 provides more details on the variables used in the paper.

Table A.1: Variable Definitions

Variable	Description	Coding
ED-BN Index	Eating Disorders Bulimia Subscale	Categorical Variable; Range 0-21
Body Dissatisfaction Index	Measures Poor Body Image Concerns	Categorical Variable; Range 0-27
Perfectionism Index	Measures Driveness for Perfection	Categorical Variable; Range 0-18
Ineffectiveness Index	Measures Feelings of Ineffectiveness	Categorical Variable; Range 0-29
Distrust Index	Measures Interpersonal Distrust	Categorical Variable; Range 0-21
Age	Respondent Age	
White	Respondent Race is White	=1 if Race is White; =0 if African American
Parents High School or Less	Highest Education of Parents	Dummy Variable Highest Education High School or Les
Parents Some College	Highest Education of Parents	Dummy Variable Highest Education Some College
Parents Bachelor Degree or Mor	Highest Education of Parents	Dummy Variable Highest Education College Degree or
Income less than $20,000	Household income (in 1988$)	Dummy Variable Household Income is Less than $20,0
Income in [$20000, $40000]	Household income (in 1988$)	Dummy Variable Household Income is in Range [$20,0
Income more than $40,000	Household income (in 1988$)	Dummy Variable Household Income is Higher than $40

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