**Supplemental Material**

**Coding Guidelines for Gastrointestinal Diseases**

Participants were coded as ***having*** a gastrointestinal disease if they 1) reported having an illness that predominantly impacts the gastrointestinal tract or 2) reported taking a medication that is predominantly used to treat a gastrointestinal disease unless they reported taking that medication for a disease that does not predominantly impact the gastrointestinal tract.

Examples of included diseases: gastroesophageal reflux disease (GERD, acid reflux, reflux, heartburn), Crohn’s Disease, Irritable Bowel Syndrome (IBS), diverticulitis, gastroparesis, ulcer (if in gastrointestinal tract), colitis (ulcerative colitis, microscopic colitis, eosinophilic colitis), gastritis, colon cancer, celiac disease (but *not* “wheat allergy” without additional specification).

Examples of included medications: omeprazole, Nexium, Pepcid, Prilosec, Protonix, ranitidine, Prevacid, pantoprazole, sulfasalazine, Colazal, Asacol, Zantac, Lialda, Bentyl, Levsin, Pentasa, hyoscyamine sulfate, Aciphex.

Participants were coded as **not having** a gastrointestinal diseaseif they reported taking a medication typically used to treat gastrointestinal diseases but specified that it was prescribed for a non-gastrointestinal illness, if they reported a condition that can affect digestion but is not primarily gastrointestinal in nature (e.g., diabetes, migraines, thyroid disorders), or if they reported an unrelated condition/medication (e.g., antidepressants, epilepsy).

If there was uncertainty regarding whether a condition/medication should be included, the coder would research the specific condition/medication to determine whether it primarily affected the gastrointestinal tract or whether it was primarily used to treat a gastrointestinal disease. If a gastrointestinal condition or medication was misspelled but could be readily identified (e.g., omaprazol, GERDs), it was coded as present.

**Table S1**. *Phenotypic associations between specific gastrointestinal diseases* *and eating disorder (ED) symptoms and diagnoses*

|  |
| --- |
| **GERD (*n* = 172)** |
| ***Dimensional ED Symptoms on the MTP-ED*** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | -.32 | .02 | **<.001** | [-.36, -.28] |
| GI disease | .20 | .07 | **.004**  | [.06, .34] |
| Income | -.01 | .01 | .583 | [-.04, .02] |
| Age | .07 | .02 | **<.001** | [.04, .10] |
| Sex | .64 | .03 | **<.001** | [.58, .70] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.11 | .06 | .097 | [-.23, .02] |
|  *Hispanic* | .002 | .10 | .985 | [-.20, .21] |
|  *Asian American* | .26 | .29 | .363 | [-.30, .82] |
|  *Native American* | .24 | .28 | .406 | [-.32, .79] |
|  *Multiracial* | -.01 | .13 | .951 | [-.27, .25] |
|  *Other/Not Specified* | .12 | .17 | .493 | [-.22, .45] |
|  |  |  |  |  |
| *BMI Included* |
| Intercept | -.34 | .02 | **<.001** | [-.38, -.31] |
| GI disease | .06 | .07 | .344 | [-.07, .20] |
| Income | .04 | .01 | **.011** | [.01, .06] |
| Age | -.005 | .02 | .758 | [-.03, .03] |
| Sex | .69 | .03 | **<.001** | [.64, .75] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .06 | **<.001** | [-.44, -.20] |
|  *Hispanic* | -.05 | .10 | .631 | [-.24, .15] |
|  *Asian American* | .39 | .26 | .134 | [-.12, .89] |
|  *Native American* | .19 | .26 | .462 | [-.32, .70] |
|  *Multiracial* | -.02 | .13 | .902 | [-.26, .23] |
|  *Other/Not Specified* | .14 | .16 | .379 | [-.17, .46] |
| BMI | .38 | .01 | **<.001** | [.36, .41] |
| ***Lifetime ED Diagnoses*** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .002 | .001 | **<.001** | [.001, .01] |
| GI disease | 2.10 | .94 | .097 | [.87, 5.05] |
| Income | .85 | .09 | .131 | [.68, 1.05] |
| Age | .97 | .10 | .746 | [.79, 1.19] |
| Sex | 7.59 | 2.06 | **<.001** | [4.46, 12.91] |
| *BMI Included* |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | 1.75 | .85 | .248 | [.68, 4.52] |
| Income | .86 | .10 | .198 | [.69, 1.08] |
| Age | 1.001 | .11 | .996 | [.81, 1.24] |
| Sex | 6.86 | 1.84 | **<.001** | [4.06, 11.59] |
| BMI | .88 | .08 | .184 | [.73, 1.06] |
| **IBS (*n* = 23)** |
| ***Dimensional ED Symptoms on the MTP-ED*** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | -.31 | .02 | **<.001** | [-.36, -.27] |
| GI disease | .19 | .19 | .300  | [-.17, .56] |
| Income | -.01 | .01 | .570 | [-.04, .02] |
| Age | .08 | .02 | **<.001** | [.04, .11] |
| Sex | .63 | .03 | **<.001** | [.58, .69] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.10 | .06 | .112 | [-.23, .02] |
|  *Hispanic* | .03 | .11 | .764 | [-.18, .24] |
|  *Asian American* | .26 | .29 | .357 | [-.30, .83] |
|  *Native American* | .21 | .30 | .496 | [-.39, .80] |
|  *Multiracial* | .004 | .13 | .978 | [-.25, .26] |
|  *Other/Not Specified* | .12 | .17 | .475 | [-.21, .45] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | -.34 | .02 | **<.001** | [-.38, -.31] |
| GI disease | .08 | .19 | .658 | [-.29, .45] |
| Income | .03 | .01 | **.017** | [.01, .06] |
| Age | -.002 | .02 | .917 | [-.03, .03] |
| Sex | .69 | .03 | **<.001** | [.64, .75] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .06 | **<.001** | [-.44, -.20] |
|  *Hispanic* | -.03 | .10 | .763 | [-.23, .17] |
|  *Asian American* | .39 | .26 | .136 | [-.12, .89] |
|  *Native American* | .18 | .28 | .527 | [-.37, .72] |
|  *Multiracial* | -.02 | .13 | .877 | [-.27, .23] |
|  *Other/Not Specified* | .15 | .16 | .362 | [-.17, .46] |
| BMI | .38 | .01 | **<.001** | [.35, .40] |
| ***Lifetime ED Diagnoses*** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .003 | .001 | **<.001** | [.001, .01] |
| GI disease | 4.52 | 3.90 | .081 | [.83, 24.52] |
| Income | .89 | .10 | .266 | [.72, 1.10] |
| Age | .96 | .10 | .730 | [.78, 1.19] |
| Sex | 6.93 | 1.86 | **<.001** | [4.10, 11.73] |
| *BMI Included* |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | 3.46 | 3.35 | .200 | [.52, 23.06] |
| Income | .88 | .10 | .282 | [.70, 1.11] |
| Age | 1.0002 | .11 | .998 | [.80, 1.24] |
| Sex | 6.52 | 1.77 | **<.001** | [3.83, 11.11] |
| BMI | .88 | .09 | .192 | [.72, 1.07] |
| **IBD (*n* = 32)** |
| ***Dimensional ED Symptoms on the MTP-ED*** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval**  |
| *BMI Excluded* |
| Intercept | -.31 | .02 | **<.001** | [-.35, -.27] |
| GI disease | -.23 | .17 | .171  | [-.56, .10] |
| Income | -.01 | .01 | .623 | [-.04, .02] |
| Age | .08 | .02 | **<.001** | [.04, .11] |
| Sex | .63 | .03 | **<.001** | [.58, .69] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.11 | .06 | .090 | [-.24, .02] |
|  *Hispanic* | .01 | .11 | .895 | [-.20, .22] |
|  *Asian American* | .26 | .29 | .358 | [-.30, .83] |
|  *Native American* | .21 | .30 | .499 | [-.39, .80] |
|  *Multiracial* | -.02 | .13 | .899 | [-.28, .24] |
|  *Other/Not Specified* | .12 | .17 | .476 | [-.21, .45] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | -.34 | .02 | **<.001** | [-.38, -.31] |
| GI disease | -.07 | .16 | .674 | [-.37, .24] |
| Income | .04 | .01 | **.014** | [.01, .06] |
| Age | -.002 | .02 | .915 | [-.03, .03] |
| Sex | .70 | .03 | **<.001** | [.64, .75] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .06 | **<.001** | [-.45, -.20] |
|  *Hispanic* | -.05 | .10 | .616 | [-.25, .15] |
|  *Asian American* | .39 | .26 | .135 | [-.12, .89] |
|  *Native American* | .17 | .28 | .531 | [-.37, 72] |
|  *Multiracial* | -.02 | .13 | .871 | [-.27, .23] |
|  *Other/Not Specified* | .15 | .16 | .364 | [-.17, .46] |
| BMI | .38 | .01 | **<.001** | [.35, .41] |
| ***Lifetime ED Diagnoses*** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .003 | .001 | **<.001** | [.001, .01] |
| GI disease | .82 | 1.03 | .875 | [.07, 9.56] |
| Income | .90 | .10 | .312 | [.73, 1.11] |
| Age | .96 | .10 | .700 | [.78, 1.18] |
| Sex | 6.86 | 1.82 | **<.001** | [4.07, 11.54] |
| *BMI Included* |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | .84 | 1.03 | .886 | [.07, 9.37] |
| Income | .88 | .10 | .286 | [.71, 1.11] |
| Age | 1.01 | .11 | .931 | [.81, 1.26] |
| Sex | 6.47 | 1.74 | **<.001** | [3.81, 10.97] |
| BMI | .86 | .09 | .132 | [.71, 1.05] |
| **Other GI Disease (*n* = 32)** |
| ***Dimensional ED Symptoms on the MTP-ED*** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | -.32 | .02 | **<.001** | [-.36, -.27] |
| GI disease | .38 | .17 | **.025**  | [.05, .72] |
| Income | -.01 | .01 | .574 | [-.04, .02] |
| Age | .07 | .02 | **<.001** | [.04, .11] |
| Sex | .63 | .03 | **<.001** | [.58, .69] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.10 | .06 | .109 | [-.23, .02] |
|  *Hispanic* | .01 | .11 | .889 | [-.19, .22] |
|  *Asian American* | .26 | .29 | .360 | [-.30, .82] |
|  *Native American* | .21 | .30 | .497 | [-.39, .80] |
|  *Multiracial* | -.02 | .13 | .902 | [-.28, .24] |
|  *Other/Not Specified* | .12 | .17 | .479 | [-.21, .45] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | -.35 | .02 | **<.001** | [-.38, -.31] |
| GI disease | .59 | .18 | **.001** | [.24, .94] |
| Income | .04 | .01 | **.013** | [.01, .06] |
| Age | -.003 | .02 | .823 | [-.03, .03] |
| Sex | .70 | .03 | **<.001** | [.64, .75] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .06 | **<.001** | [-.44, -.20] |
|  *Hispanic* | -.05 | .10 | .630 | [-.25, .15] |
|  *Asian American* | .39 | .26 | .137 | [-.12, .89] |
|  *Native American* | .18 | .28 | .527 | [-.37, .72] |
|  *Multiracial* | -.02 | .13 | .875 | [-.27, .23] |
|  *Other/Not Specified* | .14 | .16 | .368 | [-.17, .46] |
| BMI | .38 | .01 | **<.001** | [.35, .41] |
| ***Lifetime ED Diagnoses*** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | 8.62 | 6.39 | **.004** | [2.01, 36.89] |
| Income | .89 | .10 | .266 | [.72, 1.10] |
| Age | .95 | .10 | .644 | [.78, 1.17] |
| Sex | 6.87 | 1.82 | **<.001** | [4.09, 11.54] |
| *BMI Included* |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | 5.15 | 4.45 | .058 | [.95, 27.99] |
| Income | .88 | .10 | .270 | [.70, 1.10] |
| Age | 1.00 | .11 | .972 | [.80, 1.24] |
| Sex | 6.46 | 1.74 | **<.001** | [3.82, 10.94] |
| BMI | .86 | .09 | .139 | [.71, 1.05] |
| **GI Medication with No Specific Disorder Named (*n* = 46)** |
|  ***Dimensional ED Symptoms on the MTP-ED*** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | -.32 | .02 | **<.001** | [-.36, -.28] |
| GI disease | .44 | .14 | **.002**  | [.17, .72] |
| Income | -.01 | .01 | .664 | [-.03, .02] |
| Age | .07 | .02 | **<.001** | [.04, .10] |
| Sex | .64 | .03 | **<.001** | [.58, .69] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.09 | .06 | .154 | [-.22, .03] |
|  *Hispanic* | .02 | .11 | .849 | [-.19, .23] |
|  *Asian American* | .26 | .29 | .361 | [-.30, .82] |
|  *Native American* | .21 | .30 | .491 | [-.39, .81] |
|  *Multiracial* | -.001 | .13 | .995 | [-.26, .25] |
|  *Other/Not Specified* | .12 | .17 | .480 | [-.21, .45] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | -.35 | .02 | **<.001** | [-.38, -.31] |
| GI disease | .23 | .14 | .091 | [-.04, .50] |
| Income | .04 | .01 | **.012** | [.01, .06] |
| Age | -.004 | .02 | .785 | [-.03, .03] |
| Sex | .70 | .03 | **<.001** | [.64, .75] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.31 | .06 | **<.001** | [-.43, -.28] |
|  *Hispanic* | -.04 | .10 | .686 | [-.24, .16] |
|  *Asian American* | .38 | .26 | .137 | [-.12, .89] |
|  *Native American* | .18 | .28 | .521 | [-.37, .72] |
|  *Multiracial* | .01 | .12 | .943 | [-.24, .25] |
|  *Other/Not Specified* | .15 | .16 | .368 | [-.17, .46] |
| BMI | .38 | .01 | **<.001** | [.35, .40] |
| ***Lifetime ED Diagnoses*** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
|  |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | 7.93 | 5.33 | **.002** | [2.13, 29.57] |
| Income | .89 | .10 | .282 | [.72, 1.10] |
| Age | .95 | .10 | .639 | [.77, 1.17] |
| Sex | 6.47 | 1.70 | **<.001** | [3.87, 10.82] |
|  |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| GI disease | 7.02 | 5.06 | **.007** | [1.71, 28.86] |
| Income | .88 | .10 | .287 | [.70, 1.11] |
| Age | 1.001 | .11 | .994 | [.80, 1.25] |
| Sex | 6.31 | 1.70 | **<.001** | [3.73, 10.69] |
| BMI | .87 | .09 | .166 | [.72, 1.06] |

*Note:* BMI = body mass index; MTP-ED = Michigan Twins Project Eating Disorder Survey total score; GI = gastrointestinal; GERD = gastroesophageal reflux disease or heartburn; IBS = irritable bowel syndrome; IBD = inflammatory bowel disease (Crohn’s disease, ulcerative colitis, or colitis); other GI disease = gastrointestinal ulcers, diverticulitis, gastritis, celiac disease, gastroparesis, colon cancer, or other gastrointestinal disorder. Reference group for sex is male and reference group for GI disease is no GI disease (participants with GI diseases other than the category being examined were marked missing). For analyses of the MTP-ED, the reference group for race/ethnicity is White/non-Hispanic. Ethnicity was excluded from models of lifetime ED diagnoses to avoid estimation difficulties resulting from the small number of participants in some racial/ethnic groups; however, the overall pattern of results was identical if ethnicity was included as a dichotomous covariate (i.e., comparing White participants to participants of color). Effects significant at *p* <.05 are bolded.

**Table S2**. *Phenotypic associations between gastrointestinal disease* *and eating disorder (ED) symptoms and diagnoses, constraining the group with gastrointestinal diseases to individuals taking medication for their condition*

|  |
| --- |
| **Dimensional ED Symptoms on the MTP-ED across the Full Sample** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | -.32 | .02 | **<.001** | [-.36, -.28] |
| Gastrointestinal disease | .24 | .06 | **<.001** | [.12, .35] |
| Income | -.01 | .01 | .469 | [-.04, .02] |
| Age | .07 | .02 | **<.001** | [.04, .10] |
| Sex | .64 | .03 | **<.001** | [.59, .70] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.11 | .06 | .098 | [-.23, .02] |
|  *Hispanic* | .01 | .10 | .950 | [-.20, .21] |
|  *Asian American* | .26 | .29 | .372 | [-.31, .82] |
|  *Native American* | .23 | .28 | .419 | [-.33, .79] |
|  *Multiracial* | .05 | .13 | .682 | [-.20, .30] |
|  *Other/Not Specified* | .11 | .17 | .504 | [-.22, .45] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | -.35 | .02 | **<.001** | [-.38, -.31] |
| Gastrointestinal disease  | .13 | .06 | **.027** | [.01, .24] |
| Income | .03 | .01 | **.016** | [.01, .06] |
| Age | -.01 | .02 | .654 | [-.04, .02] |
| Sex | .70 | .03 | **<.001** | [.65, .75] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .06 | **<.001** | [-.44, -.20] |
|  *Hispanic* | -.05 | .10 | .628 | [-.24, .14] |
|  *Asian American* | .38 | .26 | .139 | [-.12, .88] |
|  *Native American* | .18 | .26 | .491 | [-.33, .68] |
|  *Multiracial* | .04 | .12 | .756 | [-.20, .28] |
|  *Other/Not Specified* | .14 | .16 | .392 | [-.18, .45] |
| BMI | .38 | .01 | **<.001** | [.36, .41] |
| **Dimensional ED Symptoms on the MTP-ED with Moderation by Sex** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | -.31 | .02 | **<.001** | [-.35, -.27] |
| GI disease | .11 | .09 | .210 | [-.06, .27] |
| Sex | .63 | .03 | **<.001** | [.58, .69] |
| GI disease x sex | .26 | .12 | **.032** | [.02, .49] |
| Income | -.01 | .01 | .489 | [-.04, .02] |
| Age | .07 | .02 | **<.001** | [.04, .10] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.11 | .06 | .101 | [-.23, .02] |
|  *Hispanic* | .01 | .10 | .934 | [-.19, .21] |
|  *Asian American* | .26 | .29 | .371 | [-.30, .82] |
|  *Native American* | .24 | .28 | .406 | [-.32, .79] |
|  *Multiracial* | .06 | .13 | .662 | [-.19, .30] |
|  *Other/Not Specified* | .12 | .17 | .498 | [-.22, .45] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | -.34 | .02 | **<.001** | [-.38, -.31] |
| GI disease  | .06 | .08 | .468 | [-.10, .21] |
| Sex | .69 | .03 | **<.001** | [.64, .75] |
| GI disease x sex | .15 | .12 | .188 | [-.07, .38] |
| Income | .03 | .01 | **.016** | [.01, .06] |
| Age | -.01 | .02 | .655 | [-.04, .02] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .06 | **<.001** | [-.44, -.20] |
|  *Hispanic* | -.05 | .10 | .634 | [-.24, .15] |
|  *Asian American* | .38 | .26 | .139 | [-.12, .88] |
|  *Native American* | .18 | .26 | .485 | [-.33, .69] |
|  *Multiracial* | .04 | .12 | .736 | [-.20, .28] |
|  *Other/Not Specified* | .14 | .16 | .389 | [-.18, .45] |
| BMI | .38 | .01 | **<.001** | [.36, .41] |
| **Lifetime ED Diagnoses across the Full Sample** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .003 | .001 | **<.001** | [.001, .01] |
| Gastrointestinal disease | 3.28 | 1.11 | **<.001** | [1.68, 6.38] |
| Income | .84 | .09 | .100 | [.68, 1.03] |
| Age | .95 | .10 | .617 | [.78, 1.16] |
| Sex | 7.05 | 1.80 | **<.001** | [4.28, 11.62] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | .003 | .002 | **<.001** | [.001, .01] |
| Gastrointestinal disease | 3.03 | 1.08 | **.002** | [1.50, 6.10] |
| Income | .85 | .09 | .157 | [.69, 1.06] |
| Age | .99 | .10 | .902 | [.80, 1.21] |
| Sex | 6.69 | 1.72 | **<.001** | [4.05, 11.06] |
| BMI | .89 | .08 | .210 | [.74, 1.07] |
| **Lifetime ED Diagnoses with Moderation by Sex** |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .003 | .001 | **<.001** | [.001, .01] |
| GI disease | 2.75 | 1.92 | .149 | [.70, 10.82] |
| Sex | 6.91 | 1.82 | **<.001** | [4.13, 11.57] |
| GI disease x sex | 1.26 | 1.00 | .769 | [.27, 5.94] |
| Income | .84 | .09 | .100 | [.68, 1.03] |
| Age | .95 | .10 | .616 | [.78, 1.16] |
| *BMI Included* |
| Intercept | .004 | .002 | **<.001** | [.001, .01] |
| GI disease | 1.80 | 1.44 | .463 | [.37, 8.65] |
| Sex | 6.36 | 1.67 | **<.001** | [3.81, 10.64] |
| GI disease x sex | 1.96 | 1.75 | .450 | [.34, 11.29] |
| Income | .85 | .10 | .159 | [.69, 1.06] |
| Age | .99 | .10 | .903 | [.80, 1.21] |
| BMI | .89 | .08 | .205 | [.74, 1.07] |

*Note:* BMI = body mass index; MTP-ED = Michigan Twins Project Eating Disorder Survey total score; GI = gastrointestinal. Reference group for sex is male. For analyses of the MTP-ED, the reference group for race/ethnicity is White/non-Hispanic. Ethnicity was excluded from models of lifetime ED diagnoses to avoid estimation difficulties resulting from the small number of participants in some racial/ethnic groups; however, the overall pattern of results was identical if ethnicity was included as a dichotomous covariate (i.e., comparing White participants to participants of color). Effects significant at *p* <.05 are bolded.

**Table S3.** *Model fit comparisons for the correlated factors twin models, constraining the group with GI diseases to individuals taking medication for their condition*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Model** | **Δχ2 (df)** | ***P*** | ***TLI*** | ***RMSEA*** | ***SRMR*** |
| *Disordered Eating – BMI Not Regressed Out* |
| Full model | — | — | .995 | .009 [.000, .024] | .040 |
| Constrain all C  | .580 (3) | .901 | 1.000 | .000 [.000, .020] | .041 |
| **Constrain all C, GI and DE E correlation** | .726 (4) | .948 | 1.000 | .000 [.000, .019] | .041 |
| Constrain all C, GI and DE A correlation | 10.940 (4) | .027 | .985 | .016 [.000, .028] | .052 |
| *Disordered Eating – BMI Regressed Out* |
| Full model | — | — | 1.000 | .000 [.000, .018] | .040 |
| Constrain all C | .574 (3) | .902 | 1.000 | .000 [.000, .014] | .041 |
| **Constrain all C, GI and DE E correlation** | .677 (4) | .954 | 1.000 | .000 [.000, .012] | .041 |
| Constrain all C, GI and DE A correlation | 5.319 (4) | .256 | 1.000 | .000 [.000, .019] | .046 |
| Constrain all C, GI and DE E and A correlations | 12.194 (5) | .032 | .992 | .011 [.000, .024] | .053 |
| *ED Diagnoses* |
| Full model | — | — | 1.000 | .000 [.000, .017] | .058 |
| Constrain all C | .000 (3) | 1.000 | 1.000 | .000 [.000, .008] | .058 |
| **Constrain all C, GI and ED E correlation** | .097 (4) | .999 | 1.000 | .000 [.000, .005] | .059 |
| Constrain all C, GI and ED A correlation | 2.600 (4) | .627 | 1.000 | .000 [.000, .014] | .070 |
| Constrain all C, GI and ED E and A correlations | 12.111 (5) | .033 | .975 | .012 [.000, .025] | .092 |

*Note:* DE = disordered eating; ED = eating disorder; GI = gastrointestinal disease; A = additive genetic; C = shared environmental; E = nonshared environmental; BMI = body mass index; Δχ2 = change in chi-square; df = degrees of freedom; TLI = Tucker–Lewis index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Squared Residual. Dashes indicate a parameter is not applicable. 95% confidence interval for RMSEA is presented in brackets. The best-fitting model description is bolded.

**Table S4.** *Parameter estimates for the best-fitting correlated factors twin models, constraining the group with GI diseases to individuals taking medication for their condition*

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Standardized Estimates – Full Model** | **Standardized Estimates – Best-Fitting Model** |
| *MTP-ED Disordered Eating Symptoms*  |
| **Disordered Eating (DE)** |  |  |
| Total A variance | **.48 [.28, .57]** | **.54 [.49, .58]** |
|  Total C variance | .05 [.00, .23] | — |
|  Total E variance | **.47 [.42, .52]** | **.47 [.42, .51]** |
|  |  |  |
| **GI Diseases** |  |  |
|  Total A variance | **.53 [.13, .65]** | **.63 [.55, .67]** |
|  Total C variance | .10 [.00, .47] | — |
|  Total E variance | **.37 [.34, .45]** | **.37 [.33, .45]** |
|  |  |  |
| Genetic correlation | **.39 [.07, 1.00]** | **.21 [.11, .32]** |
| Shared env. Correlation | -1.00 [-1.00, 1.00] | — |
| Nonshared env. correlation | -.01 [-.19, .19] | — |
|  |
| *MTP-ED Disordered Eating Symptoms with BMI Regressed Out*  |
| **Disordered Eating (DE)** |  |  |
| Total A variance | **.42 [.20, .51]** | **.48 [.43, .53]** |
|  Total C variance | .05 [.00, .25] | — |
|  Total E variance | **.53 [.47, .59]** | **.52 [.47, .57]** |
|  |  |  |
| **GI Diseases** |  |  |
|  Total A variance | **.52 [.11, .65]**  | **.63 [.55, .67]** |
|  Total C variance | .11 [.00, .47] | — |
|  Total E variance | **.37 [.34, .46]** | **.37 [.33, .45]** |
|  |  |  |
| Genetic correlation | **.36 [.004, 1.00]** | **.16 [.05, .27]** |
| Shared env. correlation | -1.00 [-1.00, 1.00] | — |
| Nonshared env. correlation | -.02 [-.21, .18] | — |
|  | *Eating Disorders* |  |
| **Eating Disorders (EDs)** |  |  |
| Total A variance | **.59 [.40, .73]** | **.59 [.40, .73]** |
|  Total C variance | .00 [.00, .00] | — |
|  Total E variance | **.41 [.27, .60]** | **.41 [.27, .60]** |
|  |  |  |
| **GI Diseases** |  |  |
|  Total A variance | **.63 [.46, .75]** | **.63 [.46, .75]** |
|  Total C variance | .00 [.00, .00] | — |
|  Total E variance | **.37 [.26, .54]** | **.37 [.26, .54]** |
|  |  |  |
| Genetic correlation | .25 [-.18, .54] | **.28 [.04, .46]** |
| Shared env. correlation | .39 [-.52, .85] | — |
| Nonshared env. correlation | .08 [-.44, .64] | — |

*Note*: GI = gastrointestinal; env. = environmental; A = additive genetic; C = shared environmental; E = nonshared environmental. Dashes represent parameters that were constrained to zero. 95% confidence intervals for path estimates are included in brackets, and significant parameters are bolded.

**Table S5.** *Model fit comparisons for the correlated factors twin models, excluding participants without cotwin data*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Model** | Δ**χ2 (df)** | ***p*** | ***TLI*** | ***RMSEA*** | ***SRMR*** |
| *Disordered Eating – BMI Not Regressed Out* |
| Full model | — | — | .987 | .020 [.000, .040] | .044 |
| Constrain all C  | .312 (3) | .958 | .995 | .012 [.000, .033] | .044 |
| **Constrain all C, GI and DE E correlation** | .873 (4) | .928 | .996 | .012 [.000, .032] | .045 |
| Constrain all C, GI and DE A correlation | 11.536 (4) | .021 | .976 | .027 [.007, .043] | .056 |
| *Disordered Eating – BMI Regressed Out* |
| Full model | — | — | .992 | .015 [.000, .037] | .046 |
| Constrain all C | .279 (3) | .964 | 1.000 | .003 [.000, .030] | .046 |
| **Constrain all C, GI and DE E correlation** | .434 (4) | .980 | 1.000 | .000 [.000, .029] | .046 |
| Constrain all C, GI and DE A correlation | 6.850 (4) | .144 | .988 | .018 [.000, .036] | .054 |
| Constrain all C, GI and DE E and A correlations | 15.009 (5) | .010 | .974 | .027 [.008, .043] | .065 |
| *ED Diagnoses* |
| Full model | — | — | .968 | .021 [.000, .043] | .065 |
| Constrain all C | .019 (3) | .999 | .993 | .010 [.000, .034] | .065 |
| **Constrain all C, GI and ED E correlation** | .096 (4) | .999 | .997 | .007 [.000, .032] | .065 |
| Constrain all C, GI and ED A correlation | 5.299 (4) | .258 | .970 | .020 [.000, .039] | .086 |
| Constrain all C, GI and ED E and A correlations | 12.833 (5) | .025 | .937 | .029 [.009, .046] | .112 |

*Note:* DE = disordered eating; ED = eating disorder; GI = gastrointestinal disease; A = additive genetic; C = shared environmental; E = nonshared environmental; BMI = body mass index; Δχ2 = change in chi-square; df = degrees of freedom; TLI = Tucker–Lewis index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Squared Residual. Dashes indicate a parameter is not applicable. 95% confidence interval for RMSEA is presented in brackets. The best-fitting model description is bolded.

**Table S6.** *Model fit for analyses constraining parameters across sex in the correlated factors twin models*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Model** | Δ**χ2 (df)** | ***p*** | ***TLI*** | ***RMSEA*** | ***SRMR*** |
| *Disordered Eating – BMI Not Regressed Out* |
| Full model | — | — | .997 | .010 [.000, .038] | .063 |
| **All parameters constrained across sex** | **4.096 (8)** | **.848** | **1.000** | **.000 [.000, .029]** | **.069** |
| *Disordered Eating – BMI Regressed Out* |
| Full model | — | — | 1.000 | .000 [.000, .025] | .060 |
| **All parameters constrained across sex** | **3.198 (8)** | **.921** | **1.000** | **.000 [.000, .014]** | **.062** |
| *ED Diagnoses* |
| Full model | — | — | .951 | .025 [.000, .049] | .075 |
| **All parameters constrained across sex** | **5.731 (9)** | **.767** | **.985** | **.014 [.000, .038]** | **.097** |

*Note:* ED = eating disorder; BMI = body mass index; Δχ2 = change in chi-square; df = degrees of freedom; TLI = Tucker–Lewis index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Squared Residual. Dashes indicate a parameter is not applicable. 95% confidence interval for RMSEA is presented in brackets. The best-fitting model description is bolded.

**Table S7.** *Parameter estimates for the full correlated factors twin models in males and females separately*

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Standardized Estimates – Full Model in Males** | **Standardized Estimates – Full Model in Females** |
| *MTP-ED Disordered Eating Symptoms*  |
| **Disordered Eating (DE)** |  |  |
| Total A variance | **.40 [.10, 57]** | **.55 [.34, .59]** |
|  Total C variance | .11 [.00, .38] | .00 [.00, .17] |
|  Total E variance | **.49 [.41, .57]** | **.45 [.41, .52]** |
|  |  |  |
| **GI Diseases** |  |  |
|  Total A variance | **.56 [.05, .67]** | **.64 [.13, .67]** |
|  Total C variance | .07 [.00, .52] | .002 [.00, .48] |
|  Total E variance | **.37 [.32, .51]** | **.36 [.32, .46]** |
|  |  |  |
| Genetic correlation | .39 [-.22, 1.00] | .25 [-.03, 1.00] |
| Shared env. correlation | -1.00 [-1.00, 1.00] | -.99 [-1.00, 1.00] |
| Nonshared env. correlation | .03 [-.22, .30] | .08 [-.16, .30] |
|  |
| *MTP-ED Disordered Eating Symptoms with BMI Regressed Out*  |
| **Disordered Eating (DE)** |  |  |
| Total A variance | **.42 [.12, 52]** | **.47 [.20, .54]** |
|  Total C variance | .03 [.00, .29] | .03 [.00, .26] |
|  Total E variance | **.55 [.47, .65]** | **.50 [.44, .57]** |
|  |  |  |
| **GI Diseases** |  |  |
|  Total A variance | **.58 [.04, .67]** | **.62 [.12, .67]** |
|  Total C variance | .05 [.00, .55] | .02 [.00, .50] |
|  Total E variance | **.37 [.32, .51]** | **.36 [.32, .46]** |
|  |  |  |
| Genetic correlation | .28 [-.17, 1.00] | .24 [-.22, 1.00] |
| Shared env. correlation | -1.00 [-1.00, 1.00] | -1.00 [-1.00, 1.00] |
| Nonshared env. correlation | -.01 [-.25, .25] | .04 [-.26, .32] |
|  | *Eating Disorders* |  |
| **Eating Disorders (EDs)** |  |  |
| Total A variance | **.08 [.001, .45]** | **.53 [.09, .70]** |
|  Total C variance | **.60 [.30, .80]** | .001 [.00, .34] |
|  Total E variance | **.32 [.09, .47]** | **.47 [.29, .72]** |
|  |  |  |
| **GI Diseases** |  |  |
|  Total A variance | **.42 [.06, .69]** | **.63 [.11, .76]** |
|  Total C variance | **.21 [.01, .48]** | .004 [.00, .48] |
|  Total E variance | **.37 [.22, .63]** | **.36 [.23, .56]** |
|  |  |  |
| Genetic correlation | -.97 [-1.00, 1.00] | .38 [-.12, 1.00] |
| Shared env. Correlation | **1.00 [.26, 1.00]** | .22 [-1.00, 1.00] |
| Nonshared env. Correlation | .32 [-.37, 1.00] | -.11 [-.59, .40] |

*Note*: GI = gastrointestinal; env. = environmental; A = additive genetic; C = shared environmental; E = nonshared environmental. 95% confidence intervals for path estimates are included in parentheses, and significant parameters are bolded. Although the full model suggested a possible sex difference in etiologic influences on eating disorder diagnoses, this may reflect the small number of males with eating disorders leading to difficulty distinguishing between A and C in the model, as effects could be constrained to equality across sex and dimensional models suggested few shared environmental influences on disordered eating in males.

**Table S8**. *Phenotypic associations between GI diseases and specific eating disorder diagnoses*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Odds Ratio** | **SE** | ***p*** | **95% Confidence Interval** |
| **Anorexia Nervosa** |
|  |
| *BMI Excluded* |
| Intercept | .002 | .001 | **<.001** | [.001, .01] |
| Gastrointestinal disease | 1.43 | .62 | .415 | [.61, 3.35] |
| Income | .85 | .11 | .195 | [.66, 1.09] |
| Age | .96 | .12 | .764 | [.76, 1.22] |
| Sex | 7.31 | 2.34 | **<.001** | [3.90, 13.68] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | .001 | .001 | **<.001** | [.0003, .01] |
| Gastrointestinal disease | 1.21 | .64 | .716 | [.43, 3.42] |
| Income | .76 | .12 | .072 | [.56, 1.02] |
| Age | 1.09 | .15 | .515 | [.84, 1.43] |
| Sex | 7.73 | 2.78 | **<.001** | [3.82, 15.63] |
| BMI | .68 | .10 | **.007** | [.52, .90] |
|  |  |  |  |  |  |
| **Bulimia Nervosa** |
|  |
| *BMI Excluded* |
| Intercept | .002 | .001 | **<.001** | [.0005, .01] |
| Gastrointestinal disease | 2.18 | .89 | .058 | [.97, 4.87] |
| Income | .77 | .11 | .071 | [.59, 1.02] |
| Age | 1.15 | .15 | .288 | [.89, 1.48] |
| Sex | 5.26 | 1.64 | **<.001** | [2.86, 9.69] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | .004 | .002 | **<.001** | [.001, .01] |
| Gastrointestinal disease | 2.11 | .85 | .062 | [.96, 4.64] |
| Income | .76 | .11 | .051 | [.58, 1.001] |
| Age | 1.21 | .15 | .126 | [.95, 1.55] |
| Sex | 4.81 | 1.42 | **<.001** | [2.69, 8.60] |
| BMI | .81 | .10 | .077 | [.64, 1.02] |
|  |  |  |  |  |  |
| **Binge-Eating Disorder** |
|  |
| *BMI Excluded* |
| Intercept | .001 | .001 | **<.001** | [.0002, .01] |
| Gastrointestinal disease | 3.98 | 1.64 | **.001** | [1.77, 8.94] |
| Income | .71 | .12 | **.035** | [.51, .98] |
| Age | 1.01 | .15 | .938 | [.76, 1.34] |
| Sex | 4.06 | 1.33 | **<.001** | [2.13, 7.72] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | .002 | .002 | **<.001** | [.0005, .01] |
| Gastrointestinal disease | 3.66 | 1.47 | **.001** | [1.67, 8.02] |
| Income | .86 | .14 | .374 | [.63, 1.19] |
| Age | .87 | .13 | .343 | [.65, 1.16] |
| Sex | 3.77 | 1.21 | **<.001** | [2.01, 7.07] |
| BMI | 1.49 | .17 | **<.001** | [1.19, 1.85] |

*Note:* GI = gastrointestinal; BMI = body mass index. Reference group for sex is male. Effects significant at *p* <.05 are bolded.

**Table S9**. *Phenotypic associations between GI diseases and ED symptoms/diagnoses among young adult participants ages 18-29 (N = 1,068)*

|  |
| --- |
| **Dimensional ED Symptoms on the MTP-ED** |
| **Predictor** | **β** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .38 | .20 | .060 | [-.02, .77] |
| Gastrointestinal disease | .51 | .20 | **.009** | [.13, .89] |
| Income | -.07 | .10 | .474 | [-.26, .12] |
| Age | .55 | .14 | **<.001** | [.28, .82] |
| Sex | .56 | .07 | **<.001** | [.42, .69] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.32 | .17 | .055 | [-.64, .01] |
|  *Hispanic* | -.25 | .25 | .328 | [-.75, .25] |
|  *Asian American* | .39 | .34 | .239 | [-.26, 1.05] |
|  *Native American* | -.84 | .60 | .166 | [-2.02, .35] |
|  *Multiracial* | .09 | .25 | .735 | [-.41, .58] |
|  *Other/Not Specified* | .12 | .28 | .663 | [-.43, .67] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | .20 | .19 | .289 | [-.17, .57] |
| GI disease | .47 | .20 | **.018** | [.08, .86] |
| Income | -.04 | .09 | .678 | [-.22, .14] |
| Age | .34 | .13 | **.009** | [.09, .60] |
| Sex | .56 | .06 | **<.001** | [.43, .68] |
| Race and Ethnicity  |  |  |  |  |  |
|  *Black/non-Hispanic*  | -.55 | .16 | **<.001** | [-.85, -.24] |
|  *Hispanic* | -.28 | .23 | .231 | [-.74, .18] |
|  *Asian American* | .44 | .31 | .155 | [-.16, 1.04] |
|  *Native American* | -.85 | .57 | .137 | [-1.96, .27] |
|  *Multiracial* | -.01 | .24 | .980 | [-.47, .46] |
|  *Other/Not Specified* | .17 | .26 | .523 | [-.34, .68] |
| BMI | .34 | .03 | **<.001** | [.28, .40] |
| **Lifetime ED Diagnoses** |
| **Predictor** | **OR** | **SE** | ***p*** | **95% Confidence Interval** |
| *BMI Excluded* |
| Intercept | .07 | .07 | **.010** | [.01, .53] |
| Gastrointestinal disease  | 8.16 | 5.06 | **.001** | [2.42, 27.53] |
| Income | 1.68 | .80 | .276 | [.66, 4.25] |
| Age | 2.18 | 1.56 | .275 | [.54, 8.87] |
| Sex | 4.16 | 1.80 | **.001** | [1.78, 9.71] |
|  |  |  |  |  |  |
| *BMI Included* |
| Intercept | .06 | .06 | **.007** | [.01, .46] |
| GI disease | 9.68 | 6.18 | **<.001** | [2.77, 33.85] |
| Income | 1.51 | .77 | .418 | [.56, 4.09] |
| Age | 1.99 | 1.47 | .351 | [.47, 8.49] |
| Sex | 4.16 | 1.81 | **.001** | [1.77, 9.76] |
| BMI | 1.12 | .19 | .495 | [.81, 1.55] |

*Note:* GI = gastrointestinal; BMI = body mass index. Reference group for sex is male and reference group for race/ethnicity is White/non-Hispanic. Due to smaller sample size, the family-level random intercept was not included in analyses of ED diagnoses. Effects significant at *p* <.05 are bolded.