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A Longitudinal Investigation of the Relationship between Disordered Eating Attitudes and Behaviors and Parent-Child Conflict: A Monozygotic Twin Differences Design

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Abstract

Few studies have examined nonshared environmental risk factors for disordered eating, and none have done so using a longitudinal design. The current project employed a longitudinal, monozygotic twin differences design to examine parent-child conflict as a nonshared environmental risk factor for disordered eating. Participants included 468 monozygotic female twins (234 pairs) from the Minnesota Twin Family Study, followed every three years from ages 11 to 17. Twin differences in disordered eating were assessed with the Total Score, Body Dissatisfaction, Weight Preoccupation and Binge Eating subscales of the Minnesota Eating Behavior Survey. Differences in parent-child conflict were assessed with the Parental Environment Questionnaire. Cross-lagged models were used to examine longitudinal associations among these variables, controlling for within-age associations. Only the longitudinal association between twin differences in disordered eating at age 14 and differences in parent-child conflict at age 17 was significant; twin differences in disordered eating predicted later differences in parent-child conflict *rather than the reverse*. Findings suggest differences in parent-child conflict between genetically identical twins may be a consequence of, rather than a risk factor for, differences in disordered eating.

Twin studies suggest 50–60% of the variance in eating disorders is accounted for by genetic factors, with the remaining variance accounted for by nonshared environmental influences (Bulik, Sullivan, & Kendler, 1998; Bulik, Sullivan, Wade, & Kendler, 2000; Kendler et al., 1991; Keski-Rahkonen et al., 2005; Klump, Kaye, & Strober, 2001; Klump, Miller, Keel, McGue, & Iacono, 2001; Wade, Bulik, Neale, & Kendler, 2000). Indeed, a longitudinal study using twins from the Minnesota Twin Family Study (MTFS) (Klump, Burt, McGue, & Iacono, 2007) found nonshared environmental factors accounted for 44–54% of the variance in disordered eating across adolescence. Despite the large percentage of variance accounted for by the nonshared environment, specific nonshared environmental factors remain understudied (Klump, Wonderlich, Lehoux, Lilienfeld, & Bulik, 2002).

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The most powerful design for identifying nonshared environmental factors is the discordant monozygotic (MZ) twin study. This method compares environmental risk factors in MZ twins who are discordant (i.e., one twin is affected while the other is unaffected) for disordered eating. Discordant MZ twin studies provide an ideal opportunity to study nonshared environmental effects, as reared together MZ twins share 100% of their genes and shared environmental influences. Thus, co-twin discordance must be due to nonshared environmental factors (or measurement error) (Plomin, DeFries, McClearn, & McGuffin, 2001).

Two discordant MZ twin studies have examined nonshared environment in eating disorders. In both studies, differential parental treatment was identified as an important nonshared environmental factor for eating pathology. Specifically, Bulik, Wade and Kendler (2001) found MZ twins with bulimia nervosa (BN) reported greater overall family conflict than their co-twins. Given the twins lived in the same household, perceptions of their family environment may differ. Similarly, Wade, Gillespie and Martin (2007) found MZ twins with BN reported higher levels of parent-child conflict than unaffected co-twins.

Despite the consistency of results, these studies had key limitations. First, sample sizes in both studies were small ($N = 14\text{--}20$ twin pairs). Small sample sizes limit statistical power and increase the potential for sampling errors, limiting the generalizability of findings. Second, both studies examined cross-sectional data, therefore, it remains unclear whether differential parent-child relationships *contribute* to twin differences in eating disturbances, or *result* from twin differences in eating pathology (e.g., a twin's repeated self-induced vomiting causes increased parent-child conflict). Finally, previous studies relied on retrospective reports in which adult twins were asked about their relationship with their parents during childhood and adolescence. This is problematic, given the decreased reliability of retrospective reports as a result of deterioration of memories, hindsight bias, and recall bias (Hardt & Rutter, 2004). In eating disorders, retrospective reports may be biased toward reporting more negative parent-child interactions as a result of a tendency to attribute current problems to past events (Hardt & Rutter, 2004).

The present study sought to extend prior research via a prospective longitudinal MZ twin differences design, examining parent-child conflict as a nonshared environmental influence on disordered eating attitudes and behaviors. Using data from the MTFs (see Klump et al., 2007), we examined MZ twins who reported disordered eating attitudes and behaviors and conflict with parents at ages 11, 14 and 17. We hypothesized MZ twins with greater parent-child conflict would report more disordered eating than their co-twin over time.

Method

Participants

Participants included 234 female MZ twin pairs drawn from the MTFs. Families were excluded from participation if their twins were adopted, lived farther than a day's worth of driving away from the University of Minnesota, one or both twins were deceased, or had mental or physical handicaps that would preclude them from completing the assessments. Retention rates were excellent, with 88% of the original sample retained over a six-year period.

Twins were identified through birth records. Recruitment efforts resulted in successfully contacting 90% of all twins born in Minnesota between 1971–1985, with 82.7% of those contacted agreeing to participate. There are no significant differences in rates of parental psychopathology or self-reported socioeconomic status between MTFs participants and other families in Minnesota with adolescent twins (Iacono, Carlson, Taylor, Elkins, & McGue, 1999). MTFs twins are representative of the ethnic composition of the state at the time (over 95% Caucasian).

Zygosity Determination

Zygosity was determined by examining agreement between three independent measures. First, staff rated the physical similarity of co-twins using face shape, ear shape, hair color, and eye color. Second, parents rated the degree of physical similarity between twins using a zygosity questionnaire. Third, an algorithm aggregated data from the cephalic index, fingerprint ridge counts, and the ponderal index. Discrepancies among these three methods, occurring in 33.4% of the sample, were resolved using serological procedures examining 12 blood group antigens and protein polymorphisms.

Measures

Disordered Eating

Disordered eating was assessed with the Minnesota Eating Behavior Survey (MEBS)¹. The MEBS is a 30 true/false item self-report questionnaire assessing current disordered eating attitudes and behaviors in individuals as young as 10. Exploratory factor analysis of MEBS resulted in four factors (Klump, McGue, & Iacono, 2000; von Ranson, Klump, Iacono, & McGue, 2005) in addition to the Total Score: Body Dissatisfaction (i.e., dissatisfaction with size and/or shape of body), Weight Preoccupation (i.e., preoccupation with dieting or weight), Binge Eating (i.e., thinking about or engaging in binge eating), and Compensatory Behavior (i.e., thinking about or engaging in inappropriate compensatory behaviors for weight control). The MEBS is a highly reliable instrument (see below) for assessing disordered eating across adolescence (von Ranson et al., 2005). We chose to use the MEBS, rather than clinical diagnoses, because the MEBS and clinical diagnoses share similar magnitudes of genetic and environmental influences (Bulik et al., 1998; Klump, Miller et al., 2001), and because the MEBS is continuous rather than categorical, thereby increasing statistical power.

We used the MEBS Total Score, Body Dissatisfaction, Weight Preoccupation and Binge Eating subscales. The Compensatory Behavior subscale was excluded as it exhibits low internal consistency ($\alpha = .40$) and infrequent item endorsement in preadolescents (Klump et al., 2000). Although the MEBS Total Score is an aggregate of the other MEBS subscales, it has been used most extensively in previous MTFS research (see Klump et al., 2007; Klump et al., 2000), including those attesting to the importance of nonshared environmental effects (Klump et al., 2007). In addition, this scale reflects overall level of disordered eating attitudes and behaviors across all subscales which the individual MEBS subscales do not. The inclusion of the Total Score therefore allows us to examine a broader range of disordered eating attitudes and behaviors than individual subscales.

Internal consistency for MEBS Total Score, Body Dissatisfaction, Weight Preoccupation, and Binge Eating is high for all ages examined ($\alpha = .69-.89$) (Klump et al., 2000; von Ranson et al., 2005). Concurrent validity for the MEBS scales is good, showing moderate-to-high correlations with similar scales from the Eating Disorders Examination Questionnaire (von Ranson et al., 2005). Discriminant validity is excellent, as females with an eating disorder scored significantly higher on all scales compared to controls (Klump et al., 2000; von Ranson et al., 2005). In addition, the subscales also discriminate between specific eating disorder diagnoses; for example, the Binge Eating subscale differentiates individuals with Bulimia Nervosa from individuals with other eating disorder diagnoses that do not include binge eating (von Ranson et al., 2005). Importantly, overlap among the subscales tends to be low-to-

¹The Minnesota Eating Behavior Survey (MEBS; previously known as the Minnesota Eating Disorder Inventory (M-EDI)) was adapted and reproduced by special permission of Psychological Assessment Resources, Inc., 16204 North Florida Avenue, Lutz, Florida 33549, from the Eating Disorder Inventory (collectively, EDI and EDI-2) by Garner, Olmstead, Polivy, Copyright 1983 by Psychological Assessment Resources, Inc. Further reproduction of the MEBS is prohibited without prior permission from Psychological Assessment Resources, Inc.

moderate, as over half the variance (i.e., 52–90%) in each subscale is unique to that scale (von Ranson et al., 2005).

Parent-Child Conflict

Twin perceptions of parent-child conflict were assessed with the 12-item parent-child conflict scale from the Parental Environment Questionnaire. The Parental Environment Questionnaire is a 50 item self-report measure in which twins report on the quality of their relationship with each parent separately (Elkins, McGue, & Iacono, 1997). The parent-child conflict scale measures the degree of hostility or discontent within the parent-child relationship (e.g., “*My parent often criticizes me*”) and exhibits high internal consistency (range = .81 to .88) (Elkins et al., 1997). This scale also shows moderate-to-high correlations ($r = .55$) with other measures of parent-child conflict (e.g., Conflict dimension of the Family Environment Scale) (Elkins et al., 1997). We averaged the twin-maternal and twin-paternal conflict reports at each age, yielding an overall estimate of parent-child conflict for each twin (Burt, McGue, Iacono, & Krueger, 2006). The use of an averaged parent-child conflict variable was ideal given the high intercorrelations between twin-reported conflict with mother and father ($r = .70-.85$), and because findings remained unchanged when associations were examined separately by each parent (data not shown). The use of an averaged parent-child conflict score is also similar to previous research examining overall parent-child conflict (Bulik, Wade, & Kendler, 2001; Wade, Gillespie, & Martin, 2007).

Body Mass Index (BMI)

BMI ($\text{weight (kg)}/\text{height}^2 \text{ (m)}$) was calculated using weight and height measured with a level platform physician’s scale.

Statistical Analyses

Prior to all analyses, we regressed out BMI from each twin’s MEBS scores at all ages examined to ensure associations between disordered eating attitudes and behaviors and parent-child conflict were not accounted for by BMI². Within-twin associations between disordered eating and conflict were then examined via Pearson correlations to verify an association between these variables existed, before examining if a *nonshared environmental* association was present. Within-twin pair differences were then defined by difference scores calculated between Twin 1’s and Twin 2’s score on the MEBS and parent-child conflict, at all ages. In all difference score calculations, Twin 2’s score was subtracted from Twin 1’s and the difference score sign was retained in order to establish the direction of differences within twin pairs (i.e., positive scores mean Twin 1 scored higher; negative scores mean Twin 2 scored higher). Descriptive statistics were calculated for all difference scores.

Pearson correlations were again used to examine initial associations between twin differences in disordered eating attitudes and behaviors and parent-child conflict both within (e.g., age 11 disordered eating with age 11 conflict) and across (e.g., age 11 conflict with age 14 disordered eating) age. Cross-lagged models were fit to the twin difference scores using methods designed and implemented by Burt et al. (2006). These models were used to examine cross-sectional and longitudinal relationships among variables of interest (see Figure 1). Cross-lagged models control for pre-existing associations, therefore, with one exception (see Results), the models only examine associations between *adjacent* ages under the assumption that resultant effects are cumulative. Indeed, because cross-lagged models control for both stability and within-age

²To ensure that BMI could not account for our results, the cross-lagged models were also conducted with twin difference scores for BMI as an independent variable. Results remained unchanged from those presented herein, and thus, the data are not shown.

associations, they provide a particularly rigorous test of causality within a longitudinal design (Burt et al., 2006).

The statistical program AMOS (Arbuckle, 2003) was used to fit raw data to the models (Figure 1). AMOS imputes missing data using regression imputation methods (predicted values substitute missing values), allowing for the inclusion of complete and “incomplete” (i.e., data missing in one co-twin; $N = 28\text{--}62$ pairs, depending on the variable of interest and age) twin pairs. A non-significant chi-square was indicative of a good fit, as was a Root Mean Square Error of Approximation close to zero. The percentage of variance accounted for by a given path was obtained by squaring the standardized regression weight.

Results

Descriptive statistics for MEBS and parent-child conflict scores at all ages are presented in Table 1. We have also included the percentage of participants who scored above the clinical cut-offs on each MEBS scores. These cut-offs were determined previously (see von Ranson et al., 2005) by calculating the mean MEBS scores for combined samples of young women with anorexia nervosa and bulimia nervosa.

As shown in Table 1, there was an adequate range of disordered eating and parent child-conflict in terms of raw scores. The percentage of participants scoring above the MEBS clinical cut-offs was also 5–27%, suggesting that our findings likely speak to a range of disordered eating attitudes and behaviors.

Means and standard deviations for difference scores are also included in Table 1. Absolute values of difference scores are presented to highlight the magnitude of sibling differences, although final analyses were conducted on signed sibling differences. The mean difference score for conflict at all ages is approximately 5.0. Given that conflict scores ranged from 12 to 48, a mean difference score of 5.0 suggests moderate differences in the way twins rate parental criticism, care, control, and harshness. Similarly, mean difference scores for the MEBS were small-to-moderate in magnitude with a sufficient amount of variability to examine within-and across-age associations. Total Score at all ages showed the greatest variability, with difference scores ranging from 0 to 24. The range in scores for Body Dissatisfaction, Weight Preoccupation and Binge Eating were also adequate (i.e., 0–8).

Within-Twin (i.e., Phenotypic) Associations

Within-twin correlations between disordered eating attitudes and behaviors and parent-child conflict were calculated using raw scores and are presented in Table 2. Within-twin correlations were calculated both within-age (i.e., cross-sectional) and across-age (i.e., longitudinal). All within-age correlations (e.g., correlations between MEBS scores and parent-child conflict at age 11) were significant and positive, suggesting that within-twins, higher levels of disordered eating are associated with higher levels of parent-child conflict at ages 11, 14, and 17. Importantly, most significant across-age, longitudinal relationships were between earlier *disordered eating* and parent-child conflict three years *later*. This suggests the direction of effect may be opposite to our initial prediction. Specifically, based on our hypothesis, we would have expected earlier parent-child conflict to predict later disordered eating. Instead, most significant across-age correlations were between disordered eating at age 11 and parent-child conflict at age 14 (i.e., $r's = .14\text{--}.21, p < .01$) or age 14 disordered eating and parent-child conflict at age 17 (i.e., $r's = .16\text{--}.28, p < .01$). This suggests parent-child conflict may be a consequence of, rather than a risk factor for, disordered eating attitudes and behaviors.

Within-Pair (i.e., Nonshared Environmental) Associations

Correlations—Associations between MZ twin differences in parent-child conflict and disordered eating attitudes and behaviors are also shown in Table 2. As a reminder, because MZ twins share 100% of their genes, significant correlations among difference scores are indicative of nonshared environmental influences. There were fewer significant associations than those observed within-twin, but the pattern of correlations was the same. Specifically, within-age, differential parent-child conflict was associated with differences in disordered eating, such that the twin reporting higher levels of conflict also tended to report more disordered eating than her co-twin ($r's = .16-.41, p's < .05$). Across age, associations were again contrary to expectations. Twin differences in earlier parent-child conflict were not significantly associated with later disordered eating (e.g., $r's < .10$, all $p's > .05$). Instead, disordered eating attitudes and behaviors at ages 11 and 14 were significantly and positively associated with twin differences in conflict at age 17 (i.e., $r's = .16-.27, p's < .05$). This finding tentatively suggests parent-child conflict may be a *consequence* of disordered eating rather than a nonshared environmental risk factor.

Cross-Lagged Analyses—Figure 2 presents the cross-lagged models for MEBS and parent-child conflict difference scores. Standardized path estimates are presented, and the percentage of variance accounted for by each path can be calculated by squaring the path coefficient. All of the cross-lagged models provided a good fit to the data, as evidenced by nonsignificant chi-squares and Root Mean Square Error of Approximation values equal to or close to zero.

A measure of stability in MEBS scores (see b11 and b33 in Figure 1) and parent-child conflict (see Figure 1, b22 and b44) is obtained by examining the percentage of variance accounted for by each variable over time. In terms of stability in MEBS scores across age, Total Score and Weight Preoccupation were most stable, with earlier twin difference scores accounting for 8–22% of the variance three years later. By contrast, differences in Body Dissatisfaction, Binge Eating and parent-child conflict were less stable over time, where earlier scores accounted for only 2–11% of the variance three years later. Stability also differed somewhat by age for all variables, with the most stable associations found between ages 14 and 17 years (8–22%; Figure 2).

The cross-lagged models also estimate within-age correlations that examine cross-sectional associations between MEBS scales and parent-child conflict (see r_1, r_2, r_3 in Figure 1). With few exceptions, within-age correlations from the cross-lagged models were significant (see Figure 2), indicating nonshared environmental mediation between twin differences in disordered eating and parent-child conflict within-age. Moreover, as the age 14 and 17 correlations are residuals and only minimally smaller than their corresponding Pearson correlations (see Table 2), the findings indicate that most of the association between sibling differences in conflict and disordered eating appears to be age-specific rather than predictive across time.

Finally, the models also include cross-lagged paths that examine across-age (i.e., longitudinal) associations between twin differences in disordered eating and parent-child conflict. We tested the significance of paths consistent with our original hypothesis (i.e., earlier twin differences in parent-child conflict predicting later differences in disordered eating) (see b21 and b43 in Figure 1). In addition, and consistent with the across age correlations in Table 2, we also tested adjacent paths between earlier twin differences in disordered eating and later differences in parent-child conflict (see b12 and b34 in Figure 1). Notably, given the significant correlation between twin differences in Binge Eating at age 11 and conflict at age 17 (see Table 1), this non-adjacent path was also included for the Binge Eating model only (although it was non-significant – see Figure 2c).

In contrast to within-age relationships, most cross-lagged (across-age) associations (r 's = $-.10$ – $.13$) were non-significant and notably smaller than their respective Pearson correlations (see Table 2). Where significant across-age associations were found (i.e., across ages 14 and 17), the direction of effect was not as originally anticipated. Twin differences in Total Score and Weight Preoccupation at age 14 predicted differential parent-child conflict at age 17 (accounting for 2–4% of the variance), suggesting twin differences in disordered eating attitudes and behaviors during mid-adolescence lead to twin differences in parent-child conflict during late adolescence. Notably, this cross-lagged association was also present at a trend-level ($p = .09$) for Binge Eating.

Because results were counter to our predictions, we ran post hoc cross-lagged analyses in twins whose MEBS scores at age 11 were most discordant (i.e., within the top tertile of difference scores; Total Score $M=7.33$, $SD=2.46$; Body Dissatisfaction $M=2.78$, $SD=1.15$; Weight Preoccupation $M=3.84$, $SD=1.11$; Binge Eating $M=2.6$, $SD=1.01$). The pattern of results was similar to the full sample (data not shown), suggesting our results extend to a more discordant group.

Discussion

The present study is the first to attempt to examine prospective, nonshared environmental risk factors for disordered eating attitudes and behaviors. Within age, twin differences in perceived parent-child conflict exhibited robust associations with twin differences in disordered eating attitudes and behaviors, such that MZ twins reporting more conflict with parents also reported higher levels of disordered eating. In contrast, most cross-lagged paths were non-significant, suggesting this association had little predictive value for explaining differential development of disordered eating attitudes and behaviors over time. Moreover, when significant effects were present, the direction of effects was opposite to what was predicted - differences in disordered eating (i.e., Total Score, Weight Preoccupation and to a lesser extent, Binge Eating) predicted differences in parent-child conflict across time, rather than the reverse. Taken together, findings suggest conflict in families of adolescents with disordered eating attitudes and behaviors may be the environmental product of, rather than a precursor to, disordered eating. Moreover, these cross-lagged associations were specific to mid-adolescence, suggesting developmental shifts in this relationship during a key period of risk for eating disorders.

Parent-child conflict has not traditionally been viewed as a product of disordered eating (Johnson & Flach, 1985; Vidovic, Juresa, Begovac, Mahnik, & Tocilj, 2005), but rather a risk factor (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). Given this, discordant twin studies of eating disorders have suggested higher levels of perceived parent-child conflict in affected versus unaffected MZ twins were indicative of parent-child conflict as a risk factor for eating pathology (Bulik et al., 2001; Wade et al., 2007). These studies, however, were cross-sectional and unable to determine the direction of the effects. Our cross-lagged models extend these findings and show parent-child conflict may be a consequence of disordered eating attitudes and behaviors.

Current findings are striking given cross-lagged models control for within-age associations, thereby ensuring the results reflect across time associations only. To date, no previous studies have examined conflict as a consequence of disordered eating attitudes and behaviors. However, data from related fields illustrate the importance of the effects found. Families of chronically ill children show higher levels of parent-child conflict than control families (Wamboldt & Wamboldt, 2000). This could be due to the increased stress of caring for an ill child, which may result in higher levels of conflict in general, and parent-child conflict specifically. Thus, the greater conflict found between parents and twins with disordered eating may be a reaction to having an ill child rather than a precursor to the illness (Blair, Freeman,

& Cull, 1995). Indeed, recent work on caregiver burden illustrates that caring for a loved one with an eating disorder leads to more conflicted family relations (Treasure, Gavan, Todd, & Schmidt, 2003; Treasure, Whitaker, Whitney, & Schmidt, 2005; Whitney et al., 2005).

This study also highlights potential developmental shifts in parent-child relationships during adolescence. Cross-lagged associations were significant during mid-adolescence (from 14 to 17), but were not significant from 11 to 14 or 11 to 17. These differential environmental effects may be due to increased parent-child conflict that is generally observed between these ages (Cicchetti & Rogosch, 2002). Adolescence typically begins between 11 and 14 and is frequently associated with increased parent-child conflict (Cicchetti & Rogosch, 2002). This increased conflict is believed to be because the adolescent attempts to exert his/her autonomy and break away from parental control (Cicchetti & Rogosch, 2002). It may be more difficult for the twin with disordered eating to gain independence from parents, as parents may fear for the health of the twin and exert more control (Whitney et al., 2005). Future research should examine these predictive patterns, to ensure developmental effects replicate across studies. In addition, more work is needed to determine whether increased parent-child conflict during mid-adolescence influences the course and outcome of the illness, or if the effects are time-limited. Given conflicted family relationships impact the family's ability to care for relatives with eating disorders (Treasure et al., 2003), knowing when these effects are likely to occur is significant for treatment and prevention.

Future research should address limitations of the current work. First, measures of parent-child conflict and disordered eating attitudes and behaviors were self-reports. Evidence suggests binge eating assessed with self-reports may be less reliable than interview methods (Johnson, Grieve, Adams, & Sandy, 1999; Steinberg et al., 2004). Thus, interview-based measures may produce more pronounced associations between parent-child conflict and Binge Eating, which should be examined in future work. Second, observer ratings of conflict between children and parents would provide a direct measure of parent-child conflict (Burt et al., 2006). Future research should include questionnaire, interview, and direct observation measures to ensure findings replicate. Finally, the current study is unable to elucidate if differences in parent-child conflict reported among MZ twins is due to differing perceptions of the co-twins, or objective differences in how they are treated. Although delineating the source of MZ twin differences is difficult, both alternatives may be contributing factors (Plomin, Asbury, Dip, & Dunn, 2001). Additional research using observational methods may help to clarify this issue.

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Figure 1. Cross-Lagged Model Examining Longitudinal Relationships between Variables
 Partial regression coefficients are on the cross-age paths ('b'). Within-age correlations are illustrated by curved lines ('r'). Residual variance at ages 14 and 17 are denoted by the letter 'e.' The figure was reproduced by permission from Burt et al. (2006).

Figure 2. Cross-Lagged Models of Twin Differences in Disordered Eating Attitudes and Behaviors and Parent-Child Conflict

Standardized path coefficients are represented using single-headed arrows; correlations are represented with double-headed arrows.

Root Mean Square Error of Approximation=RMSEA

*** $p < .001$, ** $p < .01$, * $p < .05$, two-tailed.

Table 1

Descriptive Statistics for MEBS and Parent-Child Conflict

Variables	Age 11 (N=344-434)					Age 14 (N=344-423)					Age 17 (N=344-387)				
	Mean	SD	Min	Max	% >Cutoff	Mean	SD	Min	Max	% >Cutoff	Mean	SD	Min	Max	% >Cutoff
Raw Scores:															
TS	5.49	4.80	0	21	5%	5.47	5.55	0	23	7%	6.04	5.51	0	24	7%
BD	1.12	1.68	0	6	8%	1.76	2.08	0	6	17%	2.02	2.13	0	6	18%
WP	2.47	2.30	0	8	7%	2.17	2.37	0	8	7%	2.34	2.35	0	8	8%
BE	1.06	1.33	0	7	15%	.82	1.28	0	7	10%	.93	1.32	0	7	11%
Conflict	18.38	5.13	12	41	--	20.71	6.11	12	42	--	21.17	6.28	12	40.50	--
Difference Scores:															
TS	3.44	2.93	0	16	--	3.63	3.83	0	19	--	3.78	4.01	0	24	--
BD	.93	1.24	0	6	--	1.38	1.52	0	6	--	1.28	1.52	0	6	--
WP	1.72	1.58	0	7	--	1.62	1.72	0	7	--	1.81	1.90	0	8	--
BE	1.04	1.16	0	7	--	.91	1.16	0	5	--	.91	1.11	0	6	--
Conflict	4.21	3.90	0	18	--	4.78	3.61	0	20	--	4.70	3.88	0	18.5	--

Note. N=number of twins; TS= Total Score (30 items); BD= Body Dissatisfaction (6 items); WP= Weight Preoccupation (8 items); BE= Binge Eating (7 items); Min=minimum; Max=maximum. Absolute sibling difference scores are presented here to highlight the range of sibling differences. However, analyses were conducted on signed sibling differences. Clinical cut-off scores for the MEBS scales were determined using mean MEBS scores for young women with anorexia nervosa and bulimia nervosa. These cut-offs are as follows: TS=15.6; BD=4.0; WP=6.1; BE=2.5.

Table 2

Correlations between Disordered Eating and Parent-Child Conflict.

Within-Twin Correlations												
Age 11 (N=432-434)				Age 14 (N=423)				Age 17 (N=387)				
Parent-Child Conflict (N=371-415)	TS	BD	WP	BE	TS	BD	WP	BE	TS	BD	WP	BE
Age 11	.30**	.19**	.24**	.27**	.16**	.07	.08	.26**	.07	.05	.04	.07
Age 14	.21**	.17**	.14**	.17**	.38**	.27**	.30**	.37**	.20**	.16**	.15**	.16**
Age 17	.15**	.10	.09	.13*	.25**	.16**	.20**	.28**	.35**	.27**	.24**	.34**

Within-Twin Pair Difference Score Correlations												
Age 11 (N=410-414)				Age 14 (N=412)				Age 17 (N=366)				
Parent-Child Conflict (N=344-402)	TS	BD	WP	BE	TS	BD	WP	BE	TS	BD	WP	BE
Age 11	.21**	.08	.20**	.15	.07	-.006	-.014	.09	-.03	.03	-.03	-.09
Age 14	.08	.08	.05	.08	.27**	.22**	.16*	.24**	.11	.14	.06	.04
Age 17	.16*	.04	.06	.17*	.27**	.10	.22**	.22**	.41**	.26**	.32**	.30**

Note. N=number of twins; TS= Total Score; BD= Body Dissatisfaction; WP= Weight Preoccupation; BE= Binge Eating.

* p < .05;
** p < .01