



# Interpersonal influences on late adolescent girls' and boys' disordered eating

Lauren B. Shomaker\*, Wyndol Furman

Department of Psychology, University of Denver, 2155 South Race Street, Denver, CO, 80208, United States

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## ABSTRACT

Perceived socio-cultural pressure to be thin has an important impact on disordered eating during early and middle adolescence, but less is known about late adolescence. Most prospective studies included only girls, and less is known about the influence on boys. This study investigated interpersonal influences on changes in late adolescent boys' and girls' symptoms of disordered eating over one year. Participants were a community sample of late adolescents 16–19 years of age ( $N = 199$ ; 49.75% girls), their mothers, and friends. Structural equation modeling revealed that interpersonal pressure to be thin and criticism about appearance predicted increases in disordered eating over time. Late adolescents', mothers' and friends' reports of pressure were associated with disordered eating at Time 1 and Time 2. Further, adolescents' perceptions and friends' reports of pressure to be thin predicted changes in disordered eating over time. Findings underscore the significance of interpersonal relationships for disordered eating during late adolescence in both girls and boys.

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## 1. Introduction

Disordered eating – ranging from somewhat restrained or dysregulated eating (e.g., binge eating or purging) to full-syndrome clinical diagnoses (Rodin, Silberstein, & Striegel-Moore, 1985) – has substantial negative consequences for psychosocial adjustment and physical health (Shisslak, Crago, & Estes, 1995). Late adolescence represents an important developmental window for understanding changes in disordered eating. Average body mass index (BMI;  $\text{kg}/\text{m}^2$ ) steadily increases among girls and boys during late adolescence and into early adulthood (Cole, Bellizzi, Flegal, & Dietz, 2000), perhaps making individuals more susceptible to attempts to lose weight. Further, late adolescence is characterized by widespread symptoms of disordered eating, with estimates of 20–56% for girls and 31–39% for boys (Ackard, Fulkerson, & Neumark-Sztainer, 2007; Croll, Neumark-Sztainer, Story, & Ireland, 2002; Heatherton & Baumeister, 1991; Mintz & Betz, 1988; Polivy & Herman, 1987; Striegel-Moore, Silberstein, & Rodin, 1986). Importantly, not only is this developmental period marked by pronounced disordered eating symptoms, but the emergence, maintenance, and desistance of psychopathology during late adolescence has significant consequences for whether problems will subside or persist throughout the remainder of the lifespan (Cairns & Cairns, 1994).

The media clearly plays a role in transmitting socio-cultural messages about appearance and impacting individual's attitudes about their bodies (Aglia & Tantleff-Dunn, 2004; Groesz, Levine, & Murnen, 2002).

However, interpersonal theories of disordered eating place emphasis on the role of relationships (Wilfley, Pike, & Striegel-Moore, 1997). In particular, close relationships are hypothesized to serve as proximal environmental factors impacting individuals' eating behavior. In theory, feedback about appearance from close others, such as parents, friends, and romantic partners, may have an especially important influence on late adolescents' disordered eating (Tantleff-Dunn & Gokee, 2004). Romantic partners and close friends become increasingly salient in late adolescents' lives (Furman, Brown, & Feiring, 1999; Furman & Buhrmester, 1992) and thus, are likely to exert an influence on eating behavior. Likewise, parents clearly remain important relationships for most individuals throughout late adolescence (Furman & Buhrmester, 1992). Hence, the current study aimed to prospectively examine the effects of interpersonal pressures from mothers, friends, and romantic partners on changes in late adolescents' symptoms of disordered eating over the course of one year.

Existing research suggests that interpersonal influences play a role in shaping changes in adolescents' eating behavior. Perceptions of pressure to be thin, as assessed with a composite of self-reported interpersonal and media pressures, predicted the onset of disordered eating symptoms and diagnostic eating disorders among early to middle adolescent girls (McKnight Investigators, 2003; Stice & Agras, 1998). In cross-sectional studies, perceived pressure to be thin or criticism about appearance from parents, peers, or the media was correlated with disordered eating symptoms among college women (Pauls & Daniels, 2000; Stice, 1998; van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002). Further, perceived pressure to be thin from parents, peers, or the media prospectively predicted increases in disordered eating among high school senior girls over a 9-month period (Stice, 1998; Stice, Mazotti, Krebs, & Martin, 1998). Thus, prior work has begun

\* Corresponding author. Present address: Department of Medical and Clinical Psychology, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD, 20814, United States. Tel.: +1 301 295 2397.

E-mail address: lauren.shomaker@usuhs.mil (L.B. Shomaker).

to delineate the impact of interpersonal pressures on disordered eating in young women, but further longitudinal investigations of parental, peer, and romantic partner pressures in late adolescence are warranted.

One domain that merits further attention is the effects of interpersonal pressures on adolescent boys' disordered eating, especially in late adolescence. The existing data, however, suggest more similarities than differences in interpersonal influences on boys' and girls' disordered eating (Ricciardelli & McCabe, 2004). Girls perceive greater pressure to be thin (Vincent & McCabe, 2000), yet boys and young men also experience pressure to attain a body type characterized by little body fat as well as lean muscle (Cafri, Blevins, & Thompson, 2006). Indeed, almost an entire third of adolescent boys desire a thinner body shape (McCabe & Ricciardelli, 2001; Neumark-Sztainer, Story, Falkner, Beuhring, & Resnick, 1999; Ricciardelli & McCabe, 2001). Gender disparities in prevalence of disordered eating symptoms are considerably less substantial when sub-clinical (vs. clinical) levels in community samples are considered (Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002), and disordered eating is associated with equivalent psychosocial impairment among males and females (Keel, Klump, Leon, & Fulkerson, 1998; Woodside et al., 2001).

In a recent series of cross-sectional studies, perceived socio-cultural pressure to lose weight was related to use of extreme weight loss behavior among middle adolescent boys (McCabe & Ricciardelli, 2003, 2005; Ricciardelli & McCabe, 2001; Smolak, Murnen, & Thompson, 2005; Vincent & McCabe, 2000). Moreover, the effects of interpersonal pressure on eating behavior in pre-adolescent and early to middle adolescent boys have been examined longitudinally in two cohorts. In a large community sample of youth ages 9–14 years, perceived pressure to be thin or to have little fat from fathers predicted greater odds of boys and girls becoming a constant dieter a year later (Field et al., 2001). Among early to middle adolescent boys in Australia, perceived pressure from parents and peers to lose weight was found to be associated with increased strategies to lose weight over an 8-month and 16-month period (McCabe & Ricciardelli, 2005; Ricciardelli & McCabe, 2003). It is unclear whether interpersonal pressures continue to exert an influence on boys' disordered eating during late adolescence, a period marked by increases in such symptoms (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997).

Further, existing findings on interpersonal influences on girls' and boys' disordered eating have primarily been based on assessments of adolescents' own perceptions of interpersonal pressures. Yet, it is important that assessments of interpersonal pressures incorporate others' as well as adolescents' reports of these pressures. Relying solely on adolescents' own reports of pressure to be thin or criticism makes it difficult to ascertain whether pressures actually occur in relationships or are primarily perceived (Baker, Whisman, & Brownell, 2000). Moreover, the use of any single reporter's perspective is not as strong psychometrically and presents potential problems of bias and method variance (Schwarz, Barton-Henry, & Pruzinsky, 1985). In some cross-sectional studies, mothers' reports of criticism of appearance and weight were positively correlated with adolescent daughters' reports of disordered eating symptoms (Baker et al., 2000; Moreno & Thelen, 1993; Pike & Rodin, 1991), but relatively few prospective studies have included multiple reporters of criticism or pressure to be thin.

The current study examined interpersonal influences on disordered eating over time in a representative, community sample of late adolescent girls and boys. Previous studies have typically relied on a combined socio-cultural pressure to be thin construct (Stice, 2002), but we assessed media pressure to be thin and interpersonal relationship pressures separately in order to distinguish between the potential influences of the two. Additionally, we utilized adolescent, mother, and friend reports of interpersonal pressure to be thin and criticism about appearance so as to be able to incorporate multiple perspectives regarding interpersonal pressures, and to secondarily examine whether the links between pressures and disordered eating varied as a function of who the reporter was. We hypothesized that media pressure to be thin,

interpersonal pressure to be thin, and interpersonal criticism about appearance at Time 1 would each uniquely predict disordered eating at Time 2. We included body image satisfaction, body mass index (BMI; kg/m<sup>2</sup>) and pubertal timing in the model because of their associations with interpersonal influences and disordered eating. Although we expected girls would experience greater pressure to be thin and engage in more disordered eating than boys, we hypothesized that interpersonal interactions would relate to disordered eating similarly for the two genders.

## 2. Methods

### 2.1. Participants

Participants were drawn from a sample of 200 adolescent girls (50%) and boys involved in an ongoing longitudinal study of interpersonal relationship influences on adolescent psychosocial adjustment and psychopathology. The sample was originally recruited when adolescents were in the 10th grade from a diverse range of neighborhoods and schools in a large Western metropolitan area. Participants were selected such that the sample was representative of the ethnic distribution of the United States; thus, the sample consisted of 11.5% African Americans, 12.5% Hispanics, 1.5% Native Americans, 1% Asian Americans, 4% biracial, and 69.5% White, non-Hispanics as assessed by participants' self-report. The sample was of average intelligence (WISC-III Vocabulary Standard Score  $M=9.80$ ,  $SD=2.44$ ) and comparable to national norms on multiple measures of substance use, internalizing and externalizing symptomatology (Furman, Low, & Ho, 2009). Approximately 55% of participants' mothers reported that they had a college degree, as would be expected from an ethnically representative sample from this particular Metropolitan area.

The present paper used two time points of data spaced 12 months apart. At the first time point used in the present study, 99 adolescent boys and 100 adolescent girls participated; almost all were in the 12th grade at that time. Age was calculated on the basis of their date of birth and date of appointment. Subjects ranged in age from 16 to 19 years ( $M=18$  years, 0 months,  $SD=.51$ ). Only 1 of the original study participants ( $N=200$ ) did not complete this assessment wave. Time 2 of the present project took place 12 months after Time 1. At Time 2, 4 of the original study participants did not participate, leaving a sample of 196 adolescents (98 boys, 98 girls).

Mothers and a close friend nominated by the focal adolescent were also asked to participate in the ongoing study at each time point. One-hundred seventy-four mothers participated at Time 1. One-hundred sixty-eight mothers participated at Time 2. Additionally, 159 close friends participated in the study at Time 1, and 141 friends participated in the study at Time 2. Close friends' self-identified racial/ethnic backgrounds were similar to those of the focal adolescents. We examined differences between participants who had a mother or friend participate and those who did not on 18 demographic and key study variables and found only one difference. Ethnic minority status was associated with greater odds of not having a friend participate in the study.

### 2.2. Procedure

Letters and brochures describing the project were sent to a broad sample of families with adolescents residing in various zip codes and to lists of students enrolled in various high schools. The study was advertised as one investigating teens and their relationships; no specific selection criteria existed regarding psychological symptomatology such as eating disorders. To ensure maximal response, families were paid \$25 to hear a staff member describe the project to them in their home. Adolescents who were interested in the project were scheduled for lab visits. Of the families that heard the description, 85.5% expressed interest and carried through with the study. At Time

2, 50.5% of participants reported that they were not residing at home; these youth had transitioned from home to start a job, attend college or vocational school. If participants were unable to come to the lab for their Time 2 visit, our staff traveled to collect their data. Adolescents and their mothers and friends were financially compensated for participating in the study. The confidentiality of participants' data was protected by a Certificate of Confidentiality issued by the U.S. Department of Health and Human Services.

### 2.3. Measures

#### 2.3.1. Demographics

Adolescents reported their height and weight at each time point. Self-reports of these variables have been demonstrated to correlate highly with objective measurements (Elgar & Stewart, 2008; Goodman, Hinden, & Khandelwal, 2000). Height and weight were used to compute body mass index (BMI kg/m<sup>2</sup>). Mothers' reports of adolescents' pubertal timing were used to assess when participants had gone through puberty. Specifically, mothers were asked what grade her daughter experienced her first menstrual period, or what grade her son went through a growth spurt when he increased rapidly in height. Because BMI and puberty norms are different for girls and boys, these variables were standardized within gender.

#### 2.3.2. Interpersonal pressure to be thin and criticism about appearance

At Time 1, adolescents completed the Pressure to be Physically Attractive Questionnaire (PPAQ; Shomaker & Furman, 2008). This measure was designed to assess multiple reports of pressure to be thin and criticism about physical appearance in specific, interpersonal relationships. The pressure to be thin scales tapped adolescents' perceptions of how often their mother, close friend and romantic partner provided social reinforcement of thinness (3 items per relationship). A sample item was, "This person gives me compliments when I look like I've lost weight." The criticism scales (4 items per relationship) assessed how often adolescents were criticized about their physical appearance by their mother, friend, and romantic partner. A sample item was, "This person criticizes aspects of my physical appearance." Items were rated on a 5-point Likert scale and averaged to derive the following scales: mother pressure to be thin, friend pressure to be thin, romantic partner pressure to be thin, mother criticism, friend criticism, and romantic partner criticism. The questionnaire was piloted in a sample of 99 college undergraduates and its scales showed good internal reliability ( $\alpha > .75$ ). In a separate, pilot sample of adolescents, the interpersonal pressure to be thin and criticism scales demonstrated good convergent validity with the Perceived Sociocultural Pressure Scale (Stice, Nemeroff, & Shaw, 1996), a measure of perceived pressure to be thin from family, peers, romantic partners, and the media ( $M r = .47$ ).

Mothers and close friends completed parallel versions of the PPAQ in which they reported how often they engaged in the behaviors described above toward the focal adolescent. Mother report of mother pressure to be thin and criticism and friend report of friend pressure to be thin and criticism showed good internal reliability ( $\alpha > .70$ ). Also, consistent with previous work examining cross-informant reports of behavior (Achenbach & McConaughy, 1997; Achenbach, McConaughy, & Howell, 1987), adolescents' and their mothers' or friends' reports of pressure to be thin and criticism were moderately related ( $M r = .32$ ). Accordingly, in order to make use of both sources, mothers' and adolescents' reports were averaged to create cross-informant pressure to be thin and criticism composites ( $\alpha = .76$  &  $.85$ , respectively). Likewise, close friends' and adolescents' reports of close friends' pressure to be thin and criticism were averaged to calculate cross-informant composites. Internal consistencies for these composites were acceptable ( $\alpha = .73$  &  $.83$ , friend pressure to be thin and criticism composites, respectively). Reports of pressure to be thin and

criticism from romantic partners were based on the participants' reports alone ( $\alpha = .76$  and  $.88$ ).

#### 2.3.3. Media pressure to be thin

The media subscale of the Perceived Sociocultural Pressure Scale (Stice et al., 1996) was used to assess how much participants perceived that the media communicated a strong message that thinness was important. This measure consists of two items rated on a 5-point Likert scale. The overall measure has demonstrated adequate internal consistency, convergent validity, and test-retest reliability (Franzoi & Shields, 1984; Stice, 1998; Stice et al., 1996), and in the current sample, the media scale had acceptable internal consistency ( $\alpha = .62$ ).

#### 2.3.4. Body image satisfaction

Four measures of adolescent body image satisfaction were gathered. Adolescents completed the Satisfaction and Dissatisfaction with Body Parts Scale (Berscheid, Walster, & Bohrnstedt, 1973), on which they rated how satisfied they were with nine body parts on a 5-point Likert scale ( $\alpha = .93$ ). This measure has demonstrated acceptable internal reliability, test-retest consistency, and criterion validity in the prediction of disordered eating symptoms (Stice & Agras, 1998; Stice & Shaw, 2004). Adolescents also reported on how satisfied they were with their physical appearance on the physical appearance scale of the Adolescent Self-Perception Profile (Harter, 1988). This scale contains five items that assess participants' feelings of satisfaction with their overall physical appearance ( $\alpha = .90$ ). Data support this scale's construct and predictive validity (Harter, 1999). Additionally, mothers and friends completed a parallel version of the physical appearance scale (Harter, 1988) to assess their perceptions of the target adolescent's satisfaction with her or his physical appearance. Mothers' and friends' reports on this scale were internally reliable ( $\alpha = .87$  to  $.90$ ) and were moderately related to adolescents' own reports ( $r = .42$  to  $.52$ ,  $p < .001$ ).

#### 2.3.5. Disordered eating

Adolescents completed the Eating Attitudes Test-26 (EAT-26) as a continuous assessment of their symptoms of disordered eating (Button & Whitehouse, 1981; Garner, Olmsted, Bohr, & Garfinkel, 1982; Rosen, Silberg, & Gross, 1988). Using a 6-point Likert scale, they reported how often 26 statements about disordered eating attitudes and behaviors were true for themselves. The dieting scale measured dieting behaviors and drive for thinness. The bulimia and food preoccupation scale tapped binge eating and vomiting. The oral control scale assessed perceived social pressure to gain weight. The EAT-26 has demonstrated acceptable reliability and validity in clinical as well as community samples of adolescent and late adolescent girls and boys (Button & Whitehouse, 1981; Garner et al., 1982; Rosen et al., 1988).

### 2.4. Statistical analyses

All variables were examined to determine if the data were normally distributed (Behrens, 1997). Outliers were adjusted to fall 1.5 times the interquartile range below the 25th percentile or above the 75th percentile (i.e. to the whiskers in Tukey's (1977) boxplot). Scores had acceptable levels of skew and kurtosis with the exception of perceived criticism from romantic partners, which was log transformed to achieve normality. Descriptive analyses were generated on all key variables. Independent samples *t*-tests were conducted to determine gender differences on mean levels of measures. Pearson correlations were used to examine the inter-correlations among key variables. Structural equation modeling (SEM) based on full information maximum likelihood estimation was conducted with AMOS 5.0 (Arbuckle, 2003) to evaluate the factor structure and hypothesized relationships among variables. Compared to other statistical approaches, SEM has a number of advantages, including the ability to model multiple latent variables measured by multiple indicators (Kline, 2005; Nelson, Aylward, &



Steele, 2008). Such a comprehensive approach accounts for measurement error and minimizes Type I error by reducing the number of analyses run (Kline, 2005). Following recommended guidelines for SEM (Cole & Maxwell, 2003), a confirmatory factor analysis (CFA) was first conducted to ensure that the proposed factor structures were acceptable for the measurement of each construct. Because model chi-square ( $\chi^2_M$ ) is highly sensitive to sample size, two additional fit indices were examined to interpret the acceptability of the measurement model for describing the data: a) Steiger–Lind root mean square error of approximation (RMSEA), and b) Bentler comparative fit index (CFI). A cut-off criterion for RMSEA of equal or less than .08 was considered a reasonable error of approximation (Browne & Cudeck, 1993). For CFI, a value equal or greater than .90 was considered indicative of a reasonably good fitting model (Kline, 2005). The unique variances of the same relationship or index (e.g., mother pressure to be thin composite and mother criticism composite, or dieting Time 1 and dieting Time 2) were allowed to correlate with each (Cole, Ciesla, & Steiger, 2007; Cole & Maxwell, 2003). To ensure factorial invariance, loadings were set to be equal across time for the disordered eating measurements. We next utilized SEM to examine the primary hypotheses. Because standardized BMI (BMI-z) and pubertal timing (puberty-z) were associated with study variables, we controlled for the effects of these variables on disordered eating in the structural model.

### 3. Results

#### 3.1. Descriptive information and correlations

Descriptive information pertaining to study variables is displayed in Table 1. There were a number of mean-level gender differences. Girls perceived more media pressure to be thin than boys. Pressure to be thin from mothers and friends was higher among girls than boys. Compared to girls, boys experienced more criticism about appearance from friends and romantic partners. The pattern of gender differences

**Table 1**  
Means and standard deviations of study variables.

	Girls		Boys		<i>d</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Body Mass Index (BMI; kg/m <sup>2</sup> )	21.85	2.92	22.34	3.16	.49	1.11
Pubertal timing (grade)	7.15	1.10	8.20	1.13	1.04	6.28***
T1 media pressure to be thin	2.80	1.11	1.83	.78	-.96	-6.96***
T1 mother pressure to be thin composite	2.13	.84	1.50	.58	-.62	-5.41***
Mother pressure to be thin (adolescent)	2.41	1.12	1.77	1.00	-.64	-3.97***
Mother pressure to be thin (mother)	1.82	.85	1.30	.55	-.53	-4.74***
T1 friend pressure to be thin composite	2.43	.86	1.55	.62	-.88	-6.24***
Friend pressure to be thin (adolescent)	2.21	1.11	1.51	.81	-.70	-4.71***
Friend pressure to be thin (friend)	2.60	1.17	1.49	.71	-1.12	-6.95***
T1 romantic pressure to be thin (adolescent)	2.25	1.26	1.92	1.16	.33	1.60
T1 mother criticism composite	1.31	.38	1.30	.33	.02	.27
Mother criticism (adolescent)	1.36	.44	1.30	.40	-.06	-.95
Mother criticism (mother)	1.16	.25	1.20	.25	.04	.94
T1 friend criticism composite	1.22	.30	1.37	.35	.16	2.58**
Friend criticism (adolescent)	1.20	.37	1.37	.43	.17	2.72**
Friend criticism (friend)	1.23	.32	1.37	.43	.14	2.16*
T1 romantic partner criticism (adolescent)	.08	.13	.13	.13	.06	2.64**
T1 appearance satisfaction	2.87	.71	2.93	.62	-.06	-.64
T1 appearance satisfaction (mother)	2.98	.66	3.04	.62	-.06	-.62
T1 appearance satisfaction (friend)	2.90	.67	3.01	.61	-.11	-1.02
T1 body parts satisfaction	3.20	.93	3.44	.81	.25	-1.96*
T1 dieting	2.16	.79	1.50	.48	.66	7.00***
T1 oral control	1.89	.56	1.65	.52	.24	3.12**
T1 bulimia/food preoccupation	1.42	.48	1.24	.36	.19	3.08**
T2 dieting	2.29	.96	1.68	.68	.62	5.00***
T2 oral control	1.91	.56	1.68	.51	.22	2.83**
T2 bulimia/food preoccupation	1.59	.62	1.35	.47	.24	3.00**

Note. BMI was derived from self-reported height and weight. The *d* and *t* columns refer to the magnitude of the gender difference and its significance.  $n_{\text{girls}} = 72-99$ .  $n_{\text{boys}} = 59-98$ . \*\*\* $p < .001$ . \*\* $p < .01$ . \* $p < .05$ .

and similarities was very consistent regardless of whether the adolescent, friend, or mother was the reporter. Girls rated their satisfaction with specific body parts lower than that of boys, and girls scored higher on all three dimensions of disordered eating at Time 1 and Time 2.

Table 2 presents the intercorrelations among variables. Time 1 BMI-z was positively associated with Time 1 interpersonal pressure to be thin and Time 1 and Time 2 disordered eating measures, and negatively associated with Time 1 body image satisfaction. Time 1 interpersonal pressure to be thin measures were negatively correlated with Time 1 body image measures and positively related to indices of disordered eating at Time 1 and Time 2. Similarly, adolescents' reports of criticism by mother and friends at Time 1 were inversely correlated with Time 1 body image satisfaction and positively related to Time 1 and Time 2 disordered eating scales. Time 1 self-reported romantic partner criticism also was associated with oral control at Time 2. Measures of Time 1 body image satisfaction were negatively correlated with disordered eating scales at both Time 1 and Time 2. These associations were typically consistent across reporter.

#### 3.2. Confirmatory factor analysis

The measurement model fit the data adequately,  $\chi^2 (88, N = 199) = 163.60$ ,  $p < .001$ , RMSEA = .07, CFI = .92. As summarized in Table 3, all manifest variables significantly loaded on their hypothesized latent variables. Because the constructs examined in the current study have typically been examined with respect to girls, we utilized multiple-group modeling to investigate whether the factor loadings were invariant for the two genders. Specifically, the fit of a model in which the factor loadings were constrained to be equal for girls and boys was compared to a model in which the parameters were unconstrained. The constrained multiple-group model did not significantly differ from the unconstrained model,  $\Delta\chi^2 (11, N = 199) = 16.47$ ,  $p = .12$ , suggesting adequate measurement invariance across gender.

#### 3.3. Structural equation modeling

As with the confirmatory factor analysis, we conducted multiple-group structural modeling to examine whether the relations among the latent constructs in the hypothesized model differed for girls and boys. An unconstrained model was not a significantly better fit to the data than a model in which the structural and measurement paths were constrained to be equal for boys and girls,  $\Delta\chi^2 (12, N = 199) = 15.13$ ,  $p = .18$ . Thus, gender did not act as a significant moderator of the hypothesized relations in the model, and a single model was estimated for the combined sample.

The primary model provided an adequate fit to the data,  $\chi^2 (123, N = 199) = 216.10$ ,  $p = .001$ , CFI = .91, RMSEA = .06 (Fig. 1). Within Time 1, BMI-z showed a positive association with interpersonal pressure to be thin ( $b = .33$ ,  $p < .001$ ) and disordered eating ( $b = .26$ ,  $p < .001$ ) and an inverse association with body image satisfaction ( $b = -.29$ ,  $p < .001$ ). Time 1 perceived media pressure to be thin and interpersonal pressure to be thin were positively related ( $b = .28$ ,  $p = .002$ ), though neither were related to interpersonal criticism ( $p > .54$ ). Time 1 perceived media pressure ( $b = -.34$ ,  $p < .001$ ) and interpersonal pressure to be thin ( $b = -.21$ ,  $p = .03$ ) were inversely associated with Time 1 body image satisfaction and positively associated with Time 1 disordered eating ( $bs = .48$  &  $.39$ ,  $ps < .001$ , media and interpersonal respectively). Also, Time 1 body image satisfaction showed an inverse relation with Time 1 disordered eating ( $b = -.49$ ,  $p < .001$ ).

As shown in Fig. 1, both interpersonal pressure to be thin and interpersonal criticism about appearance predicted Time 2 disordered eating, even after accounting for Time 1 disordered eating, body image satisfaction, BMI-z, and puberty-z. No other variable was predictive of changes in disordered eating over time after controlling for the other variables in the model.

**Table 2**  
Intercorrelations among key study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	
1. BMI-z	–																										
2. Puberty-z	–.16	–																									
3. T1 media thin	.01	–.08	–																								
4. T1 mother thin <sup>C</sup>	.32*	–.15*	.19*	–																							
5. Mother thin <sup>A</sup>	.26*	–.13	.25*	.88*	–																						
6. Mother thin <sup>M</sup>	.34*	–.03	.13	.80*	.36*	–																					
7. T1 friend thin <sup>C</sup>	.13	–.06	.24*	.50*	.57*	.19*	–																				
8. Friend thin <sup>A</sup>	.20*	–.02	.20*	.60*	.66*	.30*	.76*	–																			
9. Friend thin <sup>F</sup>	.02	–.09	.32*	.28*	.32*	.17	.83*	.41*	–																		
10. T1 partner thin <sup>A</sup>	.22*	–.07	.15	.51*	.64*	–.04	.50*	.60*	.26*	–																	
11. T1 mother crit <sup>C</sup>	.20*	–.05	.03	.31*	.27*	.26*	.14	.23*	.06	.19*	–																
12. Mother crit <sup>A</sup>	.10	–.13	.10	.21*	.24*	.10	.19*	.24*	.10	.20*	.87*	–															
13. Mother crit <sup>M</sup>	.20*	.08	–.07	.23*	.10	.33*	.00	.05	.00	.05	.67*	.24*	–														
14. T1 friend crit <sup>C</sup>	–.03	–.16	–.05	.00	.05	–.08	.06	.09	–.04	.09	.27*	.33*	.12	–													
15. Friend crit <sup>A</sup>	.01	–.14	–.01	–.02	.00	–.11	.03	.10	–.11	.12	.32*	.41*	.09	.77*	–												
16. Friend crit <sup>F</sup>	–.04	–.04	–.06	.00	.03	.00	.08	.07	.06	.06	.15	.09	.23*	.75*	.28*	–											
17. T1 partner crit <sup>A</sup>	–.09	–.16	–.05	–.07	–.01	–.17	.08	.07	–.01	.07	.36*	.49*	–.03	.38*	.50*	.06	–										
18. T1 app satisf <sup>A</sup>	–.16*	–.04	–.29*	–.12	–.13	–.10	–.17*	–.14	–.15	–.07	–.14	–.16*	–.02	.03	–.08	.08	–.07	–									
19. T1 app satisf <sup>M</sup>	–.14	–.18*	–.13	–.11	–.06	–.11	.06	–.02	.04	.07	–.10	.01	–.10	.05	.00	.02	.15	.47*	–								
20. T1 app satisf <sup>F</sup>	–.16	.06	–.18*	–.17*	–.16	–.15	–.17	–.18*	–.16	.01	–.11	–.11	–.04	–.05	–.01	–.06	.07	.42*	.45*	–							
21. T1 body satisf <sup>A</sup>	–.28*	.03	–.28*	–.18*	–.17*	–.15*	–.17*	–.19*	–.18*	–.07	–.24*	–.29*	–.11	.06	–.07	.07	–.14	.71*	.33*	.31*	–						
22. T1 dieting	.25*	–.05	.44*	.36*	.33*	.31*	.29*	.28*	.32*	.15	.19*	.19*	.13	–.09	–.02	–.04	–.12	–.30*	–.18*	–.21*	–.45*	–					
23. T1 oral	–.05	–.04	.16*	.05	.08	.06	.16*	.18*	.09	.10	.24*	.29*	.10	.13	.20*	.07	.14	–.11	–.16*	–.12	–.19*	.41*	–				
24. T1 bulimia	.20*	–.02	.32*	.15*	.11	.17*	.07	.09	.15	.08	.16*	.20*	–.05	.12	.12	.04	.01	–.28*	–.20*	–.13	–.29*	.63*	.42*	–			
25. T2 dieting	.21*	–.04	.35*	.31*	.34*	.17*	.39*	.33*	.34*	.25*	.21*	.24*	.03	.07	.02	.04	.04	–.24*	–.07	–.18*	–.31*	.69*	.29*	.43*	–		
26. T2 oral	–.08	–.09	.09	–.05	.01	–.10	.05	.15	–.02	.09	.08	.23*	–.12	.14	.17*	.04	.28*	–.02	–.09	–.11	–.13	.23*	.52*	.16*	.39*	–	
27. T2 bulimia	.11	–.03	.33	.16*	.24*	.03	.25*	.21*	.27*	.24*	.15*	.20*	–.09	.15	.11	.11	.10	–.26*	–.11	–.22*	–.29*	.50*	.29*	.57*	.69*	.38*	

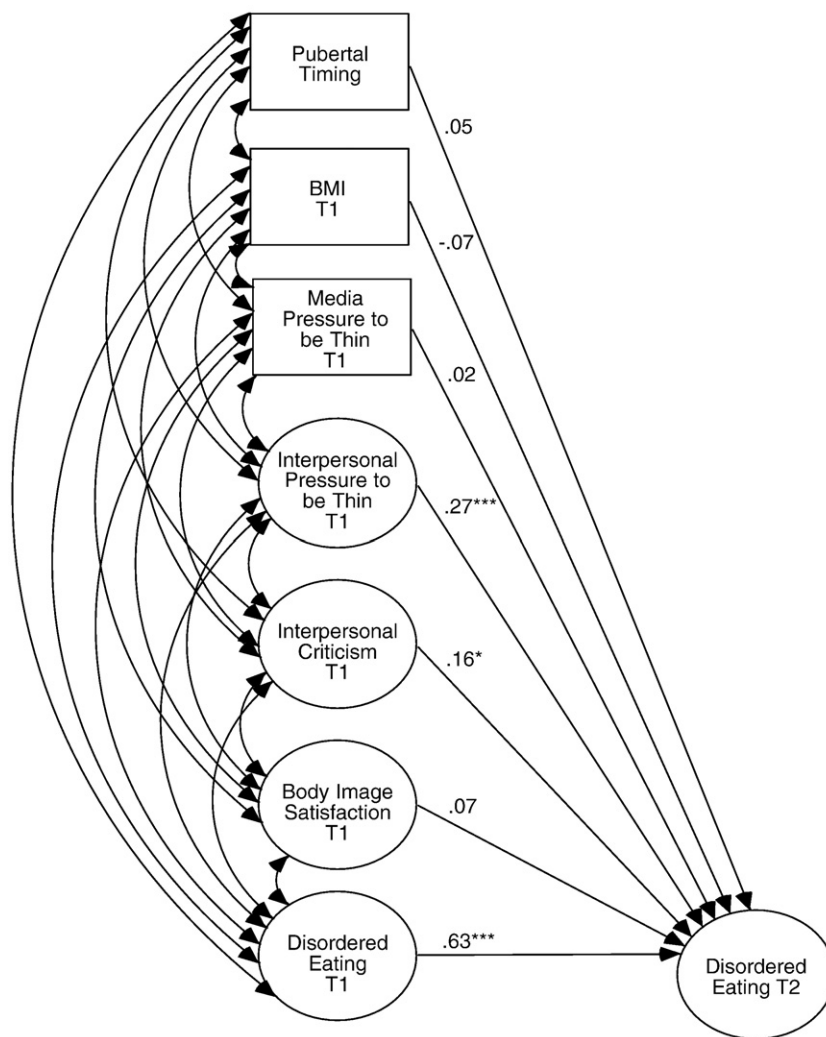
Note. BMI-z was derived from self-reported height and weight. T1 = Time 1. T2 = Time 2. C = composite of adolescent and other report. A = adolescent report. M = mother report. F = friend report. N = 110–199. \*p < .05.

**Table 3**  
Standardized confirmatory factor loadings of principal latent variables.

Latent variable	Manifest variable	Loading
Interpersonal pressure to be thin T1	Mother composite (adolescent and mother report)	.67
	Friend composite (adolescent and friend report)	.76
	Romantic partner (adolescent report)	.68
Interpersonal criticism T1	Mother composite (adolescent and mother report)	.61
	Friend composite (adolescent and friend report)	.48
	Romantic partner (adolescent report)	.63
Body image satisfaction T1	Body satisfaction	.82
	Appearance satisfaction (adolescent report)	.86
	Appearance satisfaction (mother report)	.51
	Appearance satisfaction (friend report)	.49
Disordered eating T1	Dieting	.88
	Bulimia and food preoccupation	.72
	Oral control	.51
Disordered eating T2	Dieting	.88
	Bulimia and food preoccupation	.79
	Oral control	.45

We conducted a series of secondary, follow-up analyses to determine whether the observed links between the latent constructs of interpersonal influences and disordered eating reflected adolescents' self-perceptions of pressures, others' perceptions, or both. Retaining all other variables in the model, the latent cons-

tructs for interpersonal pressures were replaced with either adolescent self-report of mother, friend, or romantic partner pressure to be thin or criticism, mother-report of pressure to be thin or criticism, or friend-report of pressure to be thin or criticism. Adolescents' own reports of interpersonal pressure to be thin from



**Fig. 1.** Structural model of media pressure to be thin, interpersonal pressure to be thin, interpersonal criticism about appearance, body image and disordered eating. Manifest variables that loaded on latent factors are not depicted (see Table 3). Significant covariances among Time 1 variables are described in the text. Standardized estimates of path coefficients are presented. \*\*\* $p < .001$ , \* $p < .05$ .

mothers ( $b = .17, p = .01$ ), close friends ( $b = .16, p = .02$ ), and romantic partners ( $b = .21, p = .002$ ) consistently predicted changes in disordered eating at Time 2. Adolescents' reports of criticism from romantic partners ( $b = .14, p = .05$ ) remained associated with Time 2 disordered eating, whereas adolescents' reports of mother and friend criticism were not significant ( $ps > .10$ ). Additionally, friends' reports of pressure to be thin toward the focal adolescent at Time 1 were significantly associated with Time 1 disordered eating ( $b = .30, p = .001$ ) and predicted Time 2 disordered eating ( $b = .14, p = .05$ ). Mothers' reports of pressure to be thin toward their children at Time 1 were associated with Time 1 disordered eating ( $b = .32, p < .001$ ), but did not predict changes in disordered eating at Time 2 ( $p = .18$ ). Neither friends' nor mothers' reports of criticism were significantly associated with disordered eating at either time ( $ps > .27$ ).

#### 4. Discussion

This study found evidence that close relationships influence disordered eating during late adolescence. Interpersonal pressure to be thin and interpersonal criticism about physical appearance were associated with concurrent reports of disordered eating. Further, late adolescents' perceptions and friends' reports of such pressures predicted increases in disordered eating over the course of a year. These findings are consistent with prior work indicating the importance of perceived socio-cultural pressure to be thin in the emergence of disordered eating symptoms among early and middle adolescent girls (McKnight Investigators, 2003; Stice & Agras, 1998). By late adolescence, disordered eating symptoms show moderate to high stability (Vohs, Heatherton, & Herrin, 2001). Yet, the current findings suggest that rates of disordered eating are not fully determined by late adolescence, when such symptoms often become most pronounced (Hoek & van Hoeken, 2003; Hudson, Hiripi, Pope, & Kessler, 2007). Convergent with past studies of late adolescent girls (Stice, 1998; Stice et al., 1998), changes in late adolescent girls' and boys' disordered eating continued to be influenced by perceptions of ongoing interpersonal relationships. It is of particular note that relationships in the last year of high school predicted changes in late adolescent girls' and boys' disordered eating over the course of the following year when a substantial proportion of individuals had transitioned from living at home. Whether such associations continue to occur later in emerging or young adulthood remains to be determined.

Both pressure to be thin and criticism about appearance uniquely contributed to the prediction of disordered eating over time. Judging from the mean ratings of these variables, pressure to be thin occurred with much greater frequency than overt criticism, and the constructs showed little relation to each other. Whereas overt criticism about physical appearance is readily recognizable as negative in valence, messages encouraging thinness may be seemingly benign. Indeed, thinness or leanness is so widely valued in Western culture – especially for girls and young women – that social reinforcement of thinness simply may not be recognized as detrimental.

As expected (Vincent & McCabe, 2000), late adolescent girls experienced greater interpersonal pressure to be thin than boys in relationships with mothers and peers. On the other hand, boys reported greater criticism about appearance. In spite of these mean-level differences, gender did not significantly moderate the links between interpersonal pressures and disordered eating outcomes. Said differently, the pattern of relations among pressures and disordered eating was similar for late adolescent girls and boys. Consistent with previous studies of early to middle adolescent boys' disordered eating (Field et al., 2001; McCabe & Ricciardelli, 2005; Ricciardelli & McCabe, 2003), such findings contest socio-cultural theory's traditional assumptions that pressure to be thin is exclusively relevant for girls. Interpersonal messages reinforcing the import of

thinness or leanness appear to influence boys' as well as girls' disordered eating behavior.

In further work, however, it will be important to incorporate additional interpersonal pressures, such as those encouraging the pursuit of muscularity. Muscularity may be of particular import for adolescent boys (Cafri et al., 2005), but we believe that it would be important to examine its significance for both genders. Both adolescent boys and girls desire a muscular and toned body (McCabe, Ricciardelli, & Finemore, 2002), although the extent of desired thinness and muscularity are typically different for girls and boys (Vartanian, Giant, & Passino, 2001). In that respect, our study may have underestimated potential gender differences in the relative importance of different elements of one's physique, as it was necessary to use the same variables for all participants.

Unlike most prior studies that have relied on adolescents' perceptions only, the current study included multiple informants' reports of interpersonal pressures. The use of multiple reporters avoids the inherent limitations of any single perspective as well as having appealing psychometric properties (Schwarz et al., 1985). Moreover, the assessment of mothers' and friends' reports, as well as adolescents' reports, of their respective relationships shed some interesting light on the nature of interpersonal pressures. The different informants' reports were moderately related which is consistent with the correspondence typically found between youth and parent or peer reports of a youth's behaviors (Achenbach et al., 1987; Frank, Van Egeren, Fortier, & Chase, 2000; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Such findings suggest that on the one hand, adolescents' perceptions of interpersonal pressures are in part related to what others report doing in these relationships. On the other hand, moderate correspondence suggests that each reporter's perception of pressure to be thin or criticism provides a unique perspective of that relationship.

Furthermore, both mothers' and friends', as well as adolescents', reports of interpersonal pressures, especially pressure to be thin, were correlated with late adolescents' disordered eating symptoms concurrently. Friends' own reports of pressure to be thin toward the adolescent also predicted changes in disordered eating a year later. These results fit with prior studies suggesting that peer networks emphasizing weight concerns and disordered eating attitudes affect college sorority women's disordered eating behavior (Allison & Park, 2004; Crandall, 1988). Developmentally, the peer domain becomes exceedingly salient in late adolescence and emerging adulthood, as close friends surpass parents as sources of support and advice (Furman & Buhrmester, 1992). Thus, messages about thinness from close friends may be especially important for eating behavior during late adolescence. It would be interesting to further investigate whether close friends exert a unique influence on disordered eating above and beyond the broader effects of the peer network, as has been demonstrated for other health-risk behaviors (e.g., La Greca, Prinstein, & Fetter, 2001).

At the same time, adolescents' perceptions were the most consistent and strongest predictor of changes in disordered eating over time. Such a pattern is not terribly surprising and is consistent with past cross-sectional work (Baker et al., 2000; Cooley, Toray, Wang, & Valdez, 2008; Kanakis & Thelen, 1995). How late adolescents perceive their relationships may hold more importance for their eating behavior than how others' perceive their relationships with the focal adolescent. Similarly, it is noteworthy that adolescents' perceptions of pressures in different relationships – with mothers, friends, and romantic partners – were interrelated. An important direction for future research is to determine whether those adolescents who perceive an emphasis on physical attractiveness from their parents are selectively attracted to peers (friends or romantic partners) who also encourage thinness. Interestingly, prior data suggest a role for both peer selection and socialization processes in bulimic symptomatology among college students (Zalta & Keel, 2006).



Prior work on socio-cultural pressure to be thin typically has not distinguished between media and relationship influences on disordered eating (Stice, 2002), but the current findings underscore the importance of this distinction. Media and interpersonal pressures were both associated with disordered eating cross-sectionally, but only interpersonal interactions predicted changes in disordered eating over time. Evidence exists for the immediate negative effects of exposure to media images of the thin ideal (Groesz et al., 2002), whereas the current study assessed media influence over one year. Perhaps the media serves as an important factor for body image dissatisfaction and disordered eating in the short-term, whereas interpersonal relationships have more enduring effects on disordered eating over a longer time period. The present findings highlight the importance of developing preventive interventions that address interpersonal influences on eating behavior (Tanofsky-Kraff et al., 2007).

Consistent with prior cross-sectional work (Keery, van den Berg, & Thompson, 2004; van den Berg et al., 2002), body image satisfaction was inversely correlated with disordered eating within Time 1. However, body image satisfaction was not predictive of changes in disordered eating over time for either girls or boys. These results are inconsistent with previous findings that body image dissatisfaction predicted increases in disordered eating among middle adolescent girls (Johnson & Wardle, 2005; Killen et al., 1996; Stice & Agras, 1998). Yet, the findings are in agreement with other studies that have not found evidence that body image satisfaction predicted change in disordered eating in late adolescence (Vohs, Voelz et al., 2001). One possibility for this discrepancy is that body image satisfaction is a more stable aspect of self-image during late adolescence, making it less likely to predict changes in disordered eating at this age span. Alternatively, other dimensions of body image (e.g., investment in body image) or the interaction of body image with other individual vulnerabilities may be more relevant to changes in late adolescents' disordered eating (McCabe & Ricciardelli, 2003; Vohs, Bardone, Joiner, Abramson, & Heatherton, 1999; Vohs, Voelz et al., 2001).

Although the influence of interpersonal interactions on disordered eating is based on sound theory, it is important to note that correlational studies cannot reach causal conclusions. It is noteworthy that the findings were observed after accounting for body image, BMI, and pubertal timing. However, measures of BMI and puberty relied on participants' reports, rather than objective measurements, and thus may be subject to bias. Specifically, a tendency for overweight individuals to underreport their weight (Elgar & Stewart, 2008) may have resulted in underestimating the true effects of weight status on disordered eating. Additionally, disordered eating was assessed with a continuous measure of symptoms, which is limited by exclusive reliance on self-reports in comparison to clinicians' judgments in diagnostic interviews. Replication with more objective measurements of such variables is important.

The current study only focused on direct interpersonal influences on disordered eating because prior work has highlighted the important role of perceived pressure to be thin on the development of disordered eating in adolescent girls (Stice, 2002). Yet, it is certainly possible that other, more indirect messages about thinness or leanness also influence disordered eating. For example, some work suggests that parents' or peers' modeling of weight concerns or own disordered eating attitudes and behaviors affect adolescents' disordered eating (Allison & Park, 2004; Crandall, 1988; Eisenberg, Neumark-Sztainer, Story, & Perry, 2005; Pike & Rodin, 1991; Stice, 1998; Stice, Presnell, & Spangler, 2002). Similarly, discussions about weight loss and dieting with peers may affect adolescents' own eating behavior (Paxton, Schutz, Wertheim, & Muir, 1999). In addition, some messages from parents, peers, and romantic partners may presumably have a positive impact on body image and healthy eating behavior. Indeed, an important avenue for further research is to understand what interpersonal variables serve to discourage disordered eating symptomatology.

The current study used a relatively representative community sample, which permits greater generalizability. Although socio-cultural

context is associated with body image attitudes and behavior (Wardle et al., 2004), disordered eating is not simply a concern limited to "golden girls" (i.e., upper-class, Caucasian girls), but is a significant mental health concern for youth from diverse backgrounds (French et al., 1997). Similarly, by including boys as well as girls, the present results revealed no significant gender differences in the overall patterns of relations among pressures, body image, and outcomes. Further work is now necessary to identify the cognitive and psychological mechanisms by which interpersonal influences may exert their effects on late adolescent boys' and girls' disordered eating. Exploration into factors such as thinness expectancies or personality attributes might help explain the process by which interpersonal factors affect disordered eating behavior in late adolescence (Annus, Smith, Fischer, Hendricks, & Williams, 2007; MacBrayer, Smith, McCarthy, Demos, & Simmons, 2001). Such investigations will ultimately inform our ability to intervene more effectively with those at risk for the emergence or persistence of disordered eating symptoms in late adolescence.

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