

Prediction of disturbed eating attitudes in adolescent girls: A 3-year longitudinal study of eating patterns, self-esteem and coping

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ABSTRACT. OBJECTIVE: *The purpose was to examine the extent to which yearly assessments of eating patterns and attitudes, self-esteem and coping strategies over a 3-year period among adolescent girls predicted the degree of disturbed eating attitudes at the year 3-assessment. Our main hypothesis was that such attitudes year 3 would be predicted by eating attitudes, restrained, emotional, and external eating behaviour, as well as by low self-esteem and coping by acting out or avoidance. METHOD:* Three-hundred and seventy-eight Swedish adolescent girls were assessed once a year for three years. **RESULTS:** *The results suggest that eating patterns and attitudes were the strongest predictors of disturbed eating attitudes year 3. Self-esteem and coping had a limited predictive value for eating attitudes year 3, and the effect of self-esteem appeared to be mediated by coping. DISCUSSION:* *The results suggest that early eating patterns (e.g., more disturbed eating attitudes and restrained eating behaviors) and attitudes are potentially important predictors for the development of more serious eating disturbances among adolescent girls. (Eating Weight Disord. 13: 87-94, 2008). ©2008, Editrice Kurtis*

INTRODUCTION

Eating disorders and weight concerns among adolescents have become an important health issue (1, 2) since partial or full syndrome eating disorders are present in 1-10% of the population (3-5). There is general consensus that eating disorders have multifaceted pathologies (1), although the determinants of their etiology have yet been to be established in detail (2, 6, 7). A number of risk factors for the development of eating disorders have been suggested in the literature, some of them are dieting (1, 8-10), weight and shape concerns (2, 11, 12), low self-esteem (13, 14), and not commonly assessed, emotionally oriented coping (15).

Dieting practices are considered to be one of the most important risk factors for bulimia nervosa (11). Also, a consistent finding in a number of studies (16-19) is the relation between on the one hand, unhealthy eating attitudes, and on the other, more severely disturbed eating attitudes and partial syndrome eating disorders 2-8 years later. Although dieting is common among children and adolescents, little is known about its developmental course (20). We have previ-

ously reported that teenage girls who reported consistent dieting behaviour over 3 years also display more disturbed eating attitudes than those of their peers who dieted less frequently or not at all (Halvarsson-Edlund, Lunner, & Sjöden, submitted). Cross-sectional research has indicated an increase of restrained and emotional eating behaviors with age among adolescents (21, 22). This makes it important to understand what factors influence young girls to develop weight concerns and dieting behaviors (2, 23).

Low self-esteem or self-evaluation may serve as an antecedent for eating disorders (11, 14, 24). There is evidence that patients with eating disorders have lower self-esteem than normal controls (25, 26). Also, low self-esteem has been found to be associated with fatness-concerns in a non-clinical adolescent sample (27). Hoare et al. (21) demonstrated among 10-16 year-old girls, that the higher the level of restrained, emotional, and external eating, the lower the self-esteem. Furthermore, low self-esteem (19) and depressive affect (18) are associated with eating problems in adolescents. A prospective study by Button et al. (28) demonstrated that girls who displayed low self-esteem at

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age 11-12 were at increased risk for developing eating disorders at age 15-16. However, Calam et al. (17) have demonstrated that psychosocial factors such as self-esteem and perfectionism are weaker predictors of future eating disorders than are early eating characteristics. These results suggest that more research is needed in order to understand the role of self-esteem in the development of eating disturbances.

Relatively little attention had been paid to the relations between coping and eating disorders (29). Some studies have suggested an association between increased use of maladaptive coping (e.g., avoidance, catastrophizing and emotionally focused approaches) and eating pathology (15, 30-32). Contrasting findings have been reported by Paxton et al. (33), who found no differences in a non-clinical sample in the use of avoidance coping between adolescents with restrained, or binge eating and those with non-disturbed eating. In a previous study, we found no differences in coping between frequent, intermittent and non-dieters over a 3-year period (Halvarsson-Edlund, submitted). However, there were significant, but weak correlations between the use of avoidant coping and disturbed eating attitudes. Fryer et al. (29) have shown that stressors and emotion-focused coping are associated with low self-esteem in adolescents, which in turn is strongly related to disturbed eating attitudes.

The above mentioned variables will be studied in the present paper, as a step towards an empirical exploration of their potential value in predicting disturbed eating attitudes among adolescents. Studies of empirically determined risk factors for early identification of girls at increased risk for developing eating- and weight-related problems have been called for (34).

The aim of the present study was to examine the extent to which yearly assessment of eating patterns and attitudes, self-esteem and coping strategies over a 3-year period among adolescent girls predicted the degree of disturbed eating attitudes at the year 3-assessment. Our main hypothesis was that such attitudes year 3 would be predicted by eating attitudes, restrained, emotional, and external eating behaviour, as well as by low self-esteem and coping by acting out or avoidance. The basis for this notion is the previously demonstrated association between self-esteem, coping and disturbed eating (13, 15).

METHOD

Design

This investigation is part of a prospective longitudinal study of risk and protective factors

related to the development of eating disturbances in girls (35). The study spanned seven years and the present paper is based on data from the first three years.

Subjects

Subjects were 13- and 15-year old girls in Grades 7 and 9 [year 1 (mean age 14.4; range: 13.0-17.0)] in Uppsala County (central Sweden, pop. ≈290,000). The study sample was achieved by random selection of classes from a register of all schools in Uppsala County. Invitations were mailed to all girls and their parents and a mailed acceptance was required for participation. Parental data will be presented elsewhere. Recruitment was terminated when the number of girls who had accepted the invitation had reached at least 250 per age group. Year 1, 1056 girls were invited to participate, and 522 (49%) gave their written acceptance, 158 actively declined to participate, and 376 did not reply to the invitation. All participants (and those giving an accepting reply Year 1 but who were unable to participate) were re-invited through the same procedure years 2 and 3. The number of girls participating were 586 Year 1 (including 64 girls who had either not replied or declined participation in response to the mailed invitations, but who decided to participate on the day of the data collection), 440 year 2, and 470 year 3. A total of 378 girls participated in all three assessments, and the present analysis is based on data from this group (Table 1).

Procedure

Separate written invitations were sent to the girls and their parents, including information about the procedure and purpose of the study, and that their answers were to be treated confidentially. Informed consent was required in order for the girls to participate. The girls completed questionnaires during regular class time supervised by the research staff. The participants were informed about the longitudinal design of the study, and that they would receive new invitations each year.

The Research Committee at the Faculty of

TABLE 1
Number of participants each year of assessment.

	Subjects			
	Year 1	Year 2	Year 3	All assessments
13-year-old (yr 1)	304	261	270	232
15-year-old (yr 1)	282	179	200	146
Total	586	440	470	378

Medicine, Uppsala University has approved the project.

Instruments

A Swedish version (36) of the Children's Eating Attitudes Test (ChEAT) (37) was used. The ChEAT is a 26-item self-report instrument in which each item is scored on a 6-point Likert Scale ("never"- "always"). The response reflecting the most disturbed eating attitude is scored 3, the adjacent response 2, and the next response 1. Remaining three responses are not scored. Data will be presented in terms of these values referred to as ChEAT-scores (38). Higher scores are indicative of more disturbed eating attitudes. ChEAT scores above 20 have been suggested to be a cut-off for developing clinical eating disorders (39). Items 19 (10, 40, 41) and 25 (10) have been reported to have low item-total correlations and were excluded.

We employed a Swedish version (42) of the Dutch Eating Behaviour Questionnaire (DEBQ; 22), modified for children. The DEBQ contains 33 items forming 3 subscales: "Restrained eating" (10 items), "Emotional eating" (13 items) and "External eating" (10 items). Higher scores mean that the individual agrees more often with the behaviour or attitude. The subscales have been reported to possess high internal consistency with alphas between 0.80 and 0.95 (22). For the present version, alphas have been reported between 0.77 and 0.86 (42). Factor analysis based on responses from a Swedish child population (ages 9-10) revealed that all items except four loaded on the appropriate factor (42).

A Swedish version of the Adolescent Coping Orientation for Problem Experiences (43) (A-Cope-Swedish version) (S); (44) was employed (permission by original authors). A-Cope-S is an inventory designed to identify behaviors adolescents use in order to manage problems or difficult situations. The original version (A-Cope) consists of 54 items forming 12 subscales (43). The scores range from 1 to 5 ("never"- "most of the time") on a Likert-type scale where 5 indicate the most frequent use of a coping strategy. Reversed scoring is used for eight items (nine items in the original version) that concern coping strategies normatively evaluated as undesirable, e.g., smoking, drinking (43). Thus, a high score indicates less frequent use of the strategy described in these items. Higher scores are thus indicative of more frequent use of adaptive coping (or less use of maladaptive coping for the reversed items).

Analysis of the factor structure and internal consistency of the subscales of the original A-Cope among Swedish adolescents revealed inadequate psychometric features (44).

Therefore, a Swedish version of the A-Cope was developed (A-Cope-S). Principal component analysis yielded a 6-factor solution (factor loadings ≥ 0.40) including 28 items. The subscales are (item numbers of the original A-Cope): Distractions ($\alpha 0.75$; items 7, 9, 10, 11, 18), Acting out ($\alpha 0.68$; items 19, 26, 28, 49), Social support ($\alpha 0.77$; items 12, 15, 22, 27, 29, 31, 41, 50), Problem solving ($\alpha 0.61$; items 25, 32, 45, 47), Avoidance ($\alpha 0.65$; items 8, 16, 42, 46) and Take light ($\alpha 0.62$; items 3, 20, 36). The items with reversed scoring in the original A-Cope are reversed in the A-Cope-S as well (items: 7, 8, 19, 26, 28, 42, 46). The psychometric properties and the development of the A-Cope-S have been presented elsewhere (44).

Self-esteem was assessed by the questionnaire "I think I am" (45), which consists of items derived from a number of well-established instruments for the assessment of self-esteem (45). Higher scores indicate better self-esteem. It includes 72 items that are divided into 5 subscales: Physical traits, Skills and abilities, Psychological well-being, Relation to family and Relation to others. In the present study, the total score will be used as an assessment of global self-esteem. Adequate subscale-total correlations (0.71-0.82) have been demonstrated, and split-half reliability has been reported to be 0.91-0.93 (45).

Statistical methods

Simple correlations were first computed between the predictor variables at all assessments and ChEAT scores year 3. Predictors showing statistically significant correlations were entered simultaneously in a standard multiple regression analysis. The dependent variable was ChEAT scores year 3, and the predictor variables were ChEAT scores years 1 and 2, and DEBQ scores, A-Cope-S scores and Self-Esteem at all three assessments. An additional multiple regression analysis was performed with the eating patterns and attitudes variables excluded in order to explore the exclusive contribution to the prediction of ChEAT scores year 3 by the psychological variables (Self-Esteem and Coping). Assessment of multicollinearity was performed by computation of bivariate correlations between the independent variables.

RESULTS

Bivariate correlations

Eating attitudes

Table 2 presents the correlations between each of the predictor variables and the ChEAT scores year 3. There were a number of signifi-

TABLE 2
Bivariate correlations^a between each of the predictor variables and ChEAT score year 3.

Predictor variable		Outcome variable	
Instrument	Subscale	Year of assessment	ChEAT yr 3
ChEAT	Total	1	0.64***
	Total	2	0.75***
DEBQ ^b	RE	1	0.52***
	RE	2	0.63***
	RE	3	0.73***
	EmE	1	0.24***
	EmE	2	0.28***
	EmE	3	0.25***
	ExE	1	n.s.
	ExE	2	n.s.
	ExE	3	n.s.
A-Cope-S	Distractions	1	n.s.
	Distractions	2	n.s.
	Distractions	3	0.13*
	Acting out	1	n.s.
	Acting out	2	n.s.
	Acting out	3	-0.14**
	Social support	1	-0.15**
	Social support	2	n.s.
	Social support	3	n.s.
	Problem solving	1	n.s.
	Problem solving	2	n.s.
	Problem solving	3	n.s.
	Avoidance	1	0.12*
	Avoidance	2	n.s.
	Avoidance	3	-0.17**
Take Light	1	n.s.	
Take Light	2	n.s.	
Take Light	3	0.11*	
A-Cope-S	Self-esteem	1	-0.26***
	Self-esteem	2	-0.29***
	Self-esteem	3	-0.37***

^aPearson product moment correlation; *p<0.05, **p<0.01, ***p<0.0001.
^bRE: Restraint eating scale, EmE: Emotional eating scale, ExE: External eating scale

cant correlations, and as expected, the instruments assessing eating attitudes and dieting behaviours (ChEAT years 1 and 2; DEBQ-Restrained Eating years 1-3) demonstrated the highest correlations with ChEAT scores year 3. Emotional Eating correlated less strongly with ChEAT scores year 3. There were no correlations with DEBQ-External Eating. With the exception of the DEBQ-Emotional Eating scale, these correlations increased with proximity in time to the year 3 ChEAT scores.

Coping

There were few significant correlations between the A-Cope-S subscales and ChEAT scores year 3, and they were much lower than

those demonstrated for the Eating Attitudes. The coping scales found to be associated with ChEAT scores year 3 were Distraction year 3, Acting Out year 3 (negative), Social Support year 1 (negative), Avoidance years 1 and 3 (negative) and Take Light year 3.

Self-Esteem

Significant negative correlations were found between Self-Esteem at all three assessments and ChEAT scores year 3, and they increased over time.

Multiple regression analysis

Assessment of multicollinearity by computation of bivariate correlations between the independent variables demonstrated that all correlation coefficients except three were below 0.70 (Self-Esteem year 2 and 3: 0.76; DEBQ RE year 1 and 2: 0.74; ChEAT scores year 1 and DEBQ-RE year 1: 0.71). In order to reduce the impact of multicollinearity, Self-esteem year 3, DEBQ-RE year 2, and ChEAT scores year 1 were excluded, in accordance with a procedure suggested by Tabachnik et al. (46). After exclusion of 5 outliers ± 3 SE, the standardized residuals ranged between -2.8 and 3.0. Remaining variables showing significant bivariate correlations were entered in a standard multiple regression analysis in order to investigate their relative contribution to the prediction of the year-3 ChEAT scores.

The entered set of variables explained 75% of the total variance (n=338 due to 35 girls having >20% missing items in the ChEAT) in the year-3 ChEAT scores (F=69.1, p<0.0001, R²= 0.75). The result showed (Table 3) that the ChEAT scores year 3 were significantly predicted by ChEAT scores year 2, explaining 16% of the variance. The DEBQ Restrained Eating Scale years 1 (negative) and 3, as well as the Emotional Eating Scale years 2 (negative) and 3 also contributed to the prediction of the ChEAT scores year 3, explaining 12.2%, 1.4%, 0.6% and 0.6% of the variance, respectively. Among the psychological variables, A-Cope Take Light year 3 (negative) and Self-Esteem year 1 (negative) were the only significant contributors to the prediction of ChEAT scores year 3, contributing 0.4% and 0.3% respectively.

Thus, the ChEAT scores year 2 contributed most to the prediction of ChEAT scores year 3, followed by the DEBQ Restrained Eating Scale years 1 and 3. The contributions of the remaining variables were insubstantial. It should be noted that on the one hand, higher ChEAT scores year 2, and more restrained and emotional eating year 3 were related to higher ChEAT scores year 3. On the other hand,

restrained eating year 1 and emotional eating year 2 were negatively related to ChEAT scores year 3. The positive bivariate correlations between, on the one hand DEBQ Restrained Eating Scale year 1, DEBQ Emotional Eating Scale year 2, and, on the other ChEAT scores year 3 (Table 2), and the negative β -weights in the regression analysis (Table 3) suggest the presence of suppressor variables (46). In order to investigate this notion, additional multiple regression analyses were conducted, successively leaving out the independent variables for which the bivariate correlations and the β -weights had the same sign. The results indicated that the DEBQ Restrained Eating Scale year 3 served as a suppressor variable for DEBQ Restrained Eating year 1. This means that the presence of the DEBQ Restrained Eating data year 3 accounts for the negative β -weight for the year 1 observation. A specific suppressor variable could not be identified for the DEBQ Emotional Eating Scale year 2.

Despite the significant bivariate correlations between Self-Esteem years 1 and 2, and ChEAT scores year 3, Self-Esteem had almost no impact on ChEAT scores year 3 in the regression analysis. One explanation may be that the eating related variables account for all the shared variance between Self-Esteem and ChEAT scores year 3, and therefore the impact of Self-Esteem is eliminated in this regression model. In order to explore the exclusive impact

of the psychological variables, we ran an additional analysis without the eating-related variables. Thus, the psychological variables (Coping and Self-Esteem) that showed significant bivariate correlations with ChEAT scores year 3 (Table 2), and that correlated <0.70 among themselves (Self-Esteem year 3, DEBQ-RE Year 2, ChEAT scores year 1 were excluded) were entered into a standard multiple regression analysis. The entered set of variables explained 14% of the total variance ($n=377$) in the year-3 ChEAT scores ($F=7.4$, $p<0.0001$, $R^2=0.14$). ChEAT scores year 3 were significantly predicted by A-Cope-S-Distractions year 3 ($\beta=0.29$, $p<0.05$), A-Cope-S-Take Light Year 3 ($\beta=-0.46$, $p<0.05$) and Self-Esteem year 2 ($\beta=-0.05$, $p<0.05$), explaining 2.2%, 1.9%, and 1.4% of the variance respectively. Higher ChEAT scores were thus related to more use of distraction, less use of take light and lower self-esteem. These results indicate limited predictive value of these psychological variables even when all eating related variables were excluded. Furthermore, there was no support for the notion that the eating-related variables mediated the effect of self-esteem.

Additional multiple regression analyses were conducted in order to find out what combination of variables accounts for the shared variance between Self-Esteem and ChEAT scores year 3. Regression models were built starting with Self-Esteem year 1 and 2 only as predictor variables, and then successively adding the coping variables included in the previous models until self-esteem years 1 and 2 failed to predict ChEAT scores year 3. This yielded a significant model where self-esteem years 1 and 2 contributed significantly to the prediction of ChEAT scores year 3, explaining 34% of the variance ($F=9.2$, $p<0.0001$, $R^2=34$). Variables included in the model were Self-Esteem years 1 and 2, Social Support year 1, and Avoidance years 1 and 3. Significant contributors to the prediction of ChEAT scores year 3 in this model were Self-Esteem years 1 ($\beta=-0.04$, $p<0.05$) and 2 ($\beta=-0.04$, $p<0.05$), and Avoidance year 3 ($\beta=-0.26$, $p<0.05$). Thus, when Distraction, Acting Out and Take Light were included in the models, Self-Esteem failed to predict ChEAT scores year 3.

DISCUSSION

The main purpose of this paper was to explore to what extent yearly assessment of a variety of dimensions of eating patterns and attitudes, self-esteem and coping strategies over a 3-year-period would predict the degree

TABLE 3
Prediction* of disturbed eating attitudes (ChEAT score) Year 3.

Predictor variable	assessment year	β	Semi-partial correlation
ChEAT Total	2	0.49***	0.40 (16%)
DEBQ			
RE	1	-0.11***	-0.12 (1.4%)
RE	3	0.34***	0.36 (12.2%)
Emotional eating	1	0.003	0.004
Emotional eating	2	-0.06*	-0.08 (0.6%)
Emotional eating	3	0.06*	0.07 (0.6%)
A-Cope-S			
Social support	1	-0.03	-0.02
Avoidance	1	0.12	0.04
Avoidance	3	-0.03	-0.01
Distractions	3	0.06	0.04
Acting out	3	0.09	0.04
Take Light	3	-0.17*	-0.07 (0.4%)
"I think I am"			
Self-esteem	1	-0.02*	-0.05 (0.3%)
Self-esteem	2	0.01	0.03

*Standard multiple regression analyses (simultaneous entry).

* $p<0.05$, ** $p<0.01$, *** $p<0.0001$.

of disturbed eating attitudes the third year among teenage girls.

The results of the correlational analysis showed substantial associations mainly with the eating-related variables (ChEAT scores years 1 and 2; DEBQ: Restrained and to some extent Emotional Eating (years 1-3), but also with overall Self-Esteem (years 1-3). Among the A-Cope-S subscales, the pattern of significant associations was not as clear-cut, and the correlations were lower. Coping by using Social Support and Avoidance year 1 was negatively correlated with ChEAT scores year 3, and so was Acting Out, Avoidance and Take Light year 3. Distractions year 3 was positively correlated with concurrent ChEAT scores. More specifically, more use of problem behaviours (e.g., staying away from home, smoke, get angry and yell at people) and distractions (eat food, go shopping, take prescribed drugs as a way of avoidance) were related to higher ChEAT scores year 3. Further, less use of social support (e.g., do things with the family, talk with mother or father), and lower self-esteem were also associated with more disturbed eating attitudes year 3. These results agree with previous research suggesting earlier eating patterns and attitudes such as more disturbed eating attitudes and restrained eating behavior, lower self-esteem and mainly avoidance-oriented coping to be related to eating problems (1, 8, 12-15).

In the major regression analysis, ChEAT scores year 2 contributed most to the prediction of disturbed eating attitudes year 3, followed by the DEBQ-Restrained Eating Scale years 1 (negative) and 3, as well as the DEBQ-Emotional Eating Scale years 2 (negative) and 3. These results are in line with Calam et al. (17), who suggested previous eating patterns to be the strongest predictor and risk factor for the development of eating disturbances. The negative associations between, on the one hand the DEBQ-Restrained Eating scale year 1, and the Emotional Eating scale year 2, and, on the other ChEAT scores year 3, suggest lower restrained and emotional eating to be associated with higher ChEAT scores year 3. However, these results are likely to be an effect of suppressor variables. The results also indicate that less use of coping by taking things light (joke, tell yourself the problem is not important) and lower self-esteem are related to more disturbed eating attitudes, but these relations are very weak. Although these psychological variables were significantly (bivariate correlations) related with ChEAT scores year 3 at either one (acting out) or three (self-esteem) assessments, they con-

tributed only weakly to the prediction of disturbed eating attitudes.

There are contrasting findings regarding coping and eating behaviours in the literature, some researchers suggesting avoidance-oriented coping to be related to eating disturbances (e.g., 15), and others that avoidance coping does not predict eating problems (33). It should be noted that the psychological variables explained only 14% of the variance in the year 3 ChEAT scores. Thus, a substantial role for coping responses remains to be demonstrated in this context.

Previous research (47) has shown self-esteem, risk behaviours (e.g., smoking cigarettes) and anxiety to be associated with eating disturbances among adolescent girls (age 16). In that study, self-esteem scores alone explained 17% of the variance in the disturbed eating attitude score in a multiple regression analysis. In the present study Self-esteem year 1 contributed, as expected, to the prediction of disturbed eating attitudes year 3. However, this contribution was weak indicating that despite the exclusion of the eating related variables, self-esteem was not a strong predictor of disturbed eating attitudes. This was rather surprising considering the significant, although moderate associations between self-esteem and disturbed eating attitudes in the bivariate correlational analysis. These results are in line with previous research by Button et al. (28), and Wood et al. (19) who demonstrated an association between self-esteem and unhealthy eating. Our overall conclusion is that eating patterns and attitudes are the strongest predictors of disturbed eating attitudes year 3 in this group of adolescents. Self-esteem seems to be of limited predictive value in this study, although it cannot be completely dismissed, since its effects appear to be mediated by coping. Previous research (29) has shown coping to be related to self-esteem, which in turn was related to disturbed eating attitudes among adolescents. This suggests that there may be a relation between self-esteem, coping and disturbed eating that needs to be explored further in order to enhance our knowledge of their interaction.

A limitation of the present study is the relatively high number of non-participants, which is probably due to the longitudinal design of the study requiring a long-time commitment. The possible influence of drop-outs had been discussed elsewhere (Halvarsson-Edlund, submitted), demonstrating that drop-outs had slightly more disturbed eating attitudes than participants. The strength of the study is the multiple observations and its longitudinal char-

acter making possible analysis of data from three consecutive years, rather from a single point of assessment.

It has been suggested that preventive efforts for girls with high levels of weight concern (2), low self-esteem (13) and maladaptive coping with stress (29, 31) may be appropriate. As Garner (1) pointed out, there is a need for early identification of disordered eating symptoms in order to prevent the sub-clinical picture to develop into clinical cases of anorexia nervosa. The knowledge obtained from longitudinal research among healthy children and adolescents may be one way of approaching the risk factors predisposing the onset of disturbed eating patterns (3, 5, 6, 8, 16). Also suggested by the McKnight project (34), it is important to identify specific risk and protective factors related to the development of eating disturbances in order to enable the tailoring of appropriate interventions among those groups that need them. Based on the present study, it seems like the early assessment of eating patterns and attitudes is a potentially important predictor for the development of more serious eating disturbances among adolescent girls.

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