

Original Article

Anorexic Behavior, Female Competition and Stress: Developing the Female Competition Stress Test

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Abstract: The FCST (Female-Female Competition Stress Test) was constructed to assess stress from adolescent female-female competition. Such stress is particularly relevant to the Reproductive Suppression Hypothesis that has been suggested as one possible explanation for the development of anorexic type behavior in young women. A series of items generated an initial test in the first phase of development. In the second phase, three studies were conducted to assess reliability and validity. Female undergraduates retrospectively rated the female-female competition stress they had experienced as adolescents, and their responses were factor-analyzed. In a second group of subjects, FCST scores were correlated with a measure of anxiety. In the third study, three samples provided prototypicality ratings of the test items to determine both the agreement among raters and which items were not sufficiently prototypical of female-female competition stress to be retained. In the final phase, the responses of adolescent girls to the FCST and several measures of body image were factor analyzed, showing the utility of the FCST.

Keywords: reproductive suppression, competition, stress

Introduction

An evolutionary explanation of anorexia based on Wasser and Barash's (1983) theory of "adaptive reproduction suppression" has been further developed by Surbey (1987), Voland and Voland (1989), Crawford (1989), Juda, Campbell, and Crawford

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(2004) and Salmon, Crawford, Dane, and Zuberbier (in press). The reproductive suppression hypothesis (RSH) states that weight control evolved as an adaptation for adjusting reproductive effort in response to environmental conditions faced by ancestral females. Weight control in this context refers not to dieting per se but to either the loss of a minimal amount of weight (approximately five to ten pounds) or to altering the rate of weight gain during the adolescent growth spurt. Because ancestral females are likely to have lived in environments where food was often in relatively short supply, the amount of weight change needed to suppress reproduction is likely to have been minimal. The excessive prolonged dieting observed in contemporary females suffering from anorexia nervosa may be seen as the outcome of the activation of the reproductive suppression mechanism, triggered by contemporary environmental cues that, in relation to the ancestral environment, are grossly exaggerated.

Reproductive Suppression

The RSH is based on two concepts: (1) the reproductive suppression model, which states that because reproduction is costly to female mammals, a female facing conditions temporarily unfavorable to reproduction can increase her lifetime reproductive success by delaying reproduction until conditions improve (Wasser and Barash, 1983; Williams, 1966), and (2) the critical fat hypothesis, which states that because a minimum amount of body fat (17%) is needed before menstruation begins and that additional fat accumulation (22%) is needed to maintain regular ovulation (Frisch, 1985; Frisch and Barbieri, 2002) altering the trajectory of adolescent weight gain or the loss of five pounds could have been an effective mechanism for controlling sexual maturation and fertility in ancestral females. Based on our knowledge of modern hunter-gatherers (Betzig, 1986; Betzig, Borgerhoff-Mulder and Turke, 1988; Cronk, 2000; Hrdy, 1981; Kaplan, Hill, Hurtado, and Lancaster, 2001; Lancaster and Kaplan, 2000) and the mammalian literature on reproductive suppression (Creel, 2001; Jasienska, 2003; O'Riain, Bennett, Brotherton, McIlrath and Clutton-Brock, 2000; Wasser and Barash, 1983; Wasser and Isenberg, 1986), we suggest that at least two environmental pressures could have favored the evolution of mechanisms for reproductive suppression: excessive levels of female-female competition and attention from males who, in an ancestral population, would have been undesirable mating partners. Because girls reaching sexual maturity at an early age often lack the psychological maturity required for successful reproduction (for a discussion of the timing of pubertal maturation in girls in relation to their environment see Ellis, 2004), their vulnerability to such reproductive stresses is exacerbated, and the putative ancestral mechanisms for suppressing reproduction through dieting are more likely to be activated. As adolescence and young adulthood are prime years in terms of reproduction and also a time in which same-sex competition is high (lots of time spent with same-sex individuals, many individuals looking for mates), we would expect high this to be a time frame in which females would be particularly susceptible to developing anorexic type behavior. In this paper, we focus on levels of stress developing from female-female competition.

Female-female competition

Female-female competition is evolutionarily important for several reasons. The

animal literature contains many examples of female-female competition, such as competition for status and reproductive dominance in elephants (Dublin, 1983), competition in yellow baboons involving reproductive suppression of others, monopolization of males when other females are likely to conceive, and interference with a mother's attempt to nurse a newborn (Wasser and Barash, 1983), and competition for access to males in lions (Barash, 1982). Research suggests that in primate species, females compete with each other to maximize their own reproductive success at the expense of other females (Campbell, 2004; Hrdy, 1981). For instance, the presence of dominant female talapoin monkeys is associated with an alteration in hormone levels in subordinate monkeys that results in suppression of ovulation (Bowman, Dilley, and Keverne, 1978). Hrdy (1981) has characterized female-female competition as often subtle and covert, lacking the loud and overtly aggressive displays found frequently in competing males. Research on female-female competition in humans (e.g., Campbell, 2004; Walters, 1990) suggests that competitiveness is a naturally selected disposition in women and that ancestral women who were good competitors had increased reproductive success compared to women who competed poorly.

Such competitiveness plays an important role in the lives of women and girls. Adolescents must acquire the resources, status, power, and self-respect needed for functioning in the adult world. Peer relationships during adolescence, while extremely important sources of support, intimacy, and acceptance (Frankel, 1990; Merten, 2004) are also potential sources of great stress because commodities such as status are highly valued but not available equally to all peer group members (Adler and Adler, 1996; Byrne, Davenport, and Mazanov, 2007). Competition may be overt or subtle, encompassing both physical fighting and subtle verbal put-downs. There can be competition between boys and girls as well as competition between members of the same sex (Weisfeld, 1999). We are interested in the latter, in particular how female-competition stress may increase anorexic type behavior, and this paper focuses on the development of a test of competition stress for adolescent girls.

Little research has closely examined the precise nature of competition for status among adolescent girls. Much of the literature has focused on adolescent stress in general and its negative impact (Byrne, Davenport, and Mazanov, 2007; Finkelstein, Kubzansky, Capitman, and Goodman, 2007; Hankin, Mermelstein, and Roesch, 2007). One area that has received some attention is the importance young girls place on having an attractive and fashionable appearance (Toro, Gomez-Peresmitre, Sasentis, et al., 2006). Weisfeld, Bloch, and Ivers (1984) reported that fashionable, attractive, well-groomed mid-adolescent girls were seen as dominant by their peers. Lott (1981) contends that adolescent girls are well aware of the importance of their appearance and that they spend an inordinate amount of time achieving it. A major source of competition among undergraduate women involves the optimization of physical appearance (Buss, 1988; Walters and Crawford, 1994). Thus, physical attractiveness and a fashionable appearance appear to be key indicators of status among adolescent girls (De Bruyn and van den Boom, 2005).

Because physical assertiveness may confer fewer advantages on girls than boys, popularity can be viewed as a sign of dominance in girls (Cronin, 1980; Savin-Williams, 1987). It indicates general success in gaining resources in social contexts (ancestrally

essential to child-raising) and attracting the attention of others. The best single predictor of popularity among U.S. girls is attractiveness (Adams, 1977; Kennedy, 1990; Luthar and Latendresse, 2005; Rankin, Lane, Gibbons, and Gerrard, 2004; Weisfeld and Weisfeld, 1984). Popular, leading, dominant U.S. adolescent girls and boys are perceived by their peers as exhibiting dominance displays, such as erect posture, direct gaze, and relaxation (Weisfeld and Weisfeld, 1984). The same has been noted in U.K. adolescents (Boardway and Weisfeld, 1994).

As children turn into adolescents, their concern with social standing increases (Weisfeld, 1999) and will continue to do so into adulthood. There are biological resources at stake and, as a result, within sex competition intensifies at reproductive maturity (Trivers, 1985). In primates, much female competition is focused on rearing young successfully and one way in which they compete that has an impact on this is in being attractive to males. Those females able to attract high quality willing to invest males will experience greater reproductive success. In addition, support from other females has also played a role in successful child rearing (Geary, 2000).

Thus, social relationships at school and relationships with boys seem to be logical sources of competition. A certain amount of dominance among the female peer group is likely to be valuable to most girls; this might involve learning to use assertiveness, tact, and humor both to achieve one's goals and to remain liked and respected by other girls. Frankel (1990) found that both the most popular and the most neglected girls reported the least amount of stress. Girls who were average in popularity reported the most stress, at least some of which is likely due to having to compete for status. Adolescent girls must also become skilled in starting and maintaining relationships with boys, as well as in terminating relationships with undesirable boys. Thus, competition for status is envisioned to include methods for maintaining relationships with desirable peers of both sexes.

There were three phases to the construction of the Female-Female Competition Stress Test (FCST). In the first phase, a series of items were generated and studied in an informal manner to produce an initial form of the test. In the second phase, the preliminary test was refined through several studies on undergraduate subjects to obtain estimates of reliability and validity. The final phase of the development of the test involved studying the responses of high school students to the tests and their relation to other measures.

Three graduate students, three undergraduate students, and one faculty member participated in the development of the items. The goal was to construct items to assess competition stress that impinges on adolescent girls at approximately 14 years of age. This age represents mid-adolescence, a time when adolescent girls are gaining the social skills necessary for negotiating potentially stressful peer relationships. The items were constructed to include both the source of stress and a component of worry or anxiety.

As the frequency of experiencing competition as stressful could be confounded by the frequency with which a girl experienced the kind of competition stated in the item, we included only those items we felt were likely to be experienced by most adolescent girls. A large number of items were developed and pre-tested on small groups of mixed-sex undergraduates to assess their content and face validity. The results of these efforts resulted in a 20 item test.

Study 1

Methods

In Study 1, 39 undergraduate women (mean age 23.5 years, $SD = 3.2$) completed written questionnaires in which they were asked to report retrospectively how frequently they had experienced the situation described in each item of the test when they were between the ages of 14-15 using a 4-point scale (*never, rarely, sometimes, often*).

Results and Discussion

Intercorrelations were obtained between all items and between each item and the total test score. Many of these correlations were significant. Items that were not significantly correlated with the total score were noted and considered for elimination when the preliminary factor analysis was done. For the factor analysis, principle axes factors, using squared multiple correlations as initial communality estimates and the eigenvalue one rule for determining the number of factors, were rotated by the Varimax procedure. The following factors were identified: (1) appearance anxiety, (2) female subordination, (3) desire to be a typical adolescent, and (4) timidity. Caution was used in interpreting the factors since, in some cases, factor loadings were relatively small, some factors explained relatively small amounts of variance, some factors had a low number of significant loadings, and the sample size was not large. Items having low communalities were eliminated. The factors were used to construct additional items as suggested by the factor names. This procedure resulted in a revised test that contained 29 items.

Study 2: Retrospective Study of the Relation of the Measures to Anxiety

A second retrospective study was conducted to determine if the FCST relates to a measure of anxiety. Subjects completed the FCST and the trait anxiety portion of the State-Trait Anxiety Inventory (Spielberger, 1977). This step was necessary to confirm that the FCST items adequately encapsulated stress and anxiety associated with competitive behavior.

Methods

A new sample of 57 undergraduate women (mean age 19.7 years, $SD = 2.1$) was obtained from an introductory psychology course. The subjects were asked to imagine themselves at age 14 and to answer the test questions according to how they imagined they would have responded at age 14. They were told that this was important because the test would eventually be administered to high school students and that their responses would help us construct better questions. The STAI-T was administered according to standard procedures. The response scales were identical to those used in Study 1.

Results and Discussion

The correlation between total scores on the FCST and STAI-T was 0.63 ($p < .01$), indicating that the FCST adequately assesses worry, but measures a construct that is also somewhat independent of anxiety.

Study 3: Prototypicality

We used Buss and Craik's (1980, 1981, 1983) method of obtaining prototypicality ratings to determine how representative the items are of female-female competition stress. Buss and Craik demonstrated that subjects' prototypicality ratings of acts are useful in determining which acts are more or less representative of dispositional categories, such as dominance and submissiveness. The intent of the prototypicality study was to gather information from a variety of sources, including adolescent girls, concerning the face validity of the test items with respect to competition stress.

Methods

The instructions for rating prototypicality of items were adapted from those used by Buss and Craik (1983). The instructions for the FCST items were:

In this study you are being asked to judge how well each item reflects stress associated with female-female competition in adolescent girls. These items reflect stress in Grade 8 girls associated with their feelings about competing with other girls. Female-female competition is the desire or behavior of one woman or girl to possess more of some commodity than other women or girls. Research indicates that the kinds of commodities females compete for are: an attractive appearance, social status, group leadership, etc.

For an example, think of the work red. Imagine the truest red you can. Now think of other examples of red, such as purple-red and red-orange. Although you might still name the purple-red and red-orange "red," they are not as good examples of red as the true, clear red. In short, some reds are "redder" than others.

Instead of red, the category is stress due to competition with other adolescent girls. Please rate each act on the 7-point scale according to how good it is as an example of stress in Grade 8 girls due to competition with other girls. Please rate each item on the following scale:

1	2	3	4	5	6	7
extremely poor	very poor	poor	average	good	very good	extremely good

Three separate samples of subjects participated in Study 3. The Undergraduate 1

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sample included 85 subjects (25 men and 61 women, mean age 23.4 years, $SD = 2.3$) who received experimental credit in an introductory psychology course for their participation. The Undergraduate 2 sample included 10 men and 29 women (mean age 24.1 years, $SD = 2.8$) who were recruited from an upper level summer course in psychology. And the High School sample consisted of a group of 17 students entering Grade 12 (5 boys and 12 girls, mean age 16.4 years, $SD = 0.7$), who were taking a summer undergraduate course in psychology.

Results and Discussion

Table 1 contains a summary of FCST item prototypicality means for the three samples. The mean prototypicalities (measured on a 7-point scale with 7 corresponding to extremely prototypical) for Undergraduate 1, Undergraduate 2, and High School samples are, respectively, 5.03, 5.02, and 5.22. There is good agreement on the prototypicality of ratings from the three samples. Interestingly, the high school sample gave higher prototypicality ratings than did either of the undergraduate groups, suggesting that competition stress as assessed by the FCST is either more salient or more keenly felt by school students.

Table 1. Comparisons of FCST Item Prototypicality Means for Two Undergraduate Samples and One High School Sample

FCST Item	Group (<i>n</i>)		
	U1 (86)	U2 (36)	HS (17)
1. I am anxious about my appearance as compared to other girls. ^b	6.1	6.2	6.0
2. I worry that my girlfriends speak up more in class than I do. ^c	3.6	3.9	3.2
3. I am proud of my ability to handle myself with other girls. ^d	5.0 ^a	5.1	5.2
4. I worry about making myself more popular.	6.0	5.8	6.2
5. I am happy about how stylish my clothes are. ^d	5.9	5.8	5.8
6. I make suggestions to other girls that go unnoticed.	4.3	4.6	4.2
7. I feel ignored by the other girls.	5.8	5.5	5.6
8. I feel other girls have better figures than I do.	5.8	5.9	6.1
9. I worry about my ability to apply make-up.	4.3	4.8	4.6
10. I feel intimidated by girls who seem to have it “all.”	5.9	5.6 ^a	6.1
11. I have trouble keeping a guy interested in me.	5.7	5.3	5.4
12. I feel nervous about whether I am wearing the “right” clothes.	5.6	5.5	5.4
13. I am afraid of going on dates with guys.	5.0	5.1	5.6

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14. The loudness of the other girls intimidates me. ^c	3.9 ^a	3.8	3.8
15. I feel intimidated by girls who dress better than I do.	5.5	5.5 ^a	5.5
16. I avoid situations where I have to compete with other girls.	5.0	4.9	5.1
17. I feel weak or timid in relation to the other girls.	4.8	4.9	4.7
18. I am afraid of being thought of as a nerd by the other girls.	5.6	5.2	5.8 ^b
19. The other girls look better than I do.	5.8	5.8	6.1
20. I am afraid to talk to the older girls.	4.4 ^a	4.3	4.6
21. I find it stressful maintaining the right teenage image.	5.1	5.0	5.4
22. I hang around mostly with a group of girls. ^c	3.7	4.1	5.1
23. I am less assertive than most girls my age.	4.3	4.5	4.7
24. I feel less attractive than most of the other girls.	5.7	5.7	6.1
25. I tend to avoid boys.	4.0	4.3	5.0
26. I feel somewhat afraid of the other girls.	4.4	4.4	4.6
27. I find P.E. class to be stressful.	4.9	4.4	4.6
28. I find it difficult trying to look like the other girls.	5.0	5.1	5.2
29. I compete with other girls for such things as looks, clothes, money, status, etc.	5.6	5.7	5.6
Cronbach's alpha	.91	.93	.94

^a Females rated item to be significantly more prototypical than males did.

^b Males rated item to be significantly more prototypical than females did.

^c Items eliminated in final version.

^d Items scored using a reversed scale.

Using the Bonferroni correction for family-wise error, *t*-tests indicated only one item with a significant sex difference in prototypicality ratings. The item, “The loudness of the other girls intimidates me,” received higher prototypicality ratings by female raters when all 3 samples were combined ($t [138] = 3.52 p < .001$). Overall, we concluded that agreement was high between male and female raters concerning which items indicated female competition stress.

The correlation of the item prototypicality ratings among the three samples are 0.84 (Undergraduate 1 with High School), 0.85 (Undergraduate 2 with High School), and 0.96 (Undergraduate 1 with Undergraduate 2). Because these correlations are correlated across items rather than “randomly” drawn subjects, they cannot be tested for significance. The high positive correlations of prototypicality ratings for pairs of samples indicates a high degree of agreement regarding the prototypicality of the items and provides further evidence for the validity of the FCST.

Finally, alpha coefficients (Cronbach, 1951) were calculated for the prototypicality ratings. They ranged from 0.88 to 0.98. These results indicate high internal consistency of the prototypicality ratings in all three samples. Thus, the data indicate that the FCST has

reasonable reliability and validity.

Buss and Craik (1980, 1981, 1983) do not indicate how large an item prototypicality must be before it is significant. We decided a priori that any items having a mean prototypicality rating of less than 4.0 (i.e. less than “average”) across the three samples would be eliminated from further use. Using this criterion, we eliminated three items from the FCST. The final version of the FCST is shown in Table 1.

Study 4

Having established in a preliminary manner the reliability and validity of the FCST, we administered it to a sample of junior high-school girls. The purpose of this phase of the test development was to investigate the construct validity of the test using factor analysis. A number of other tests were administered to the subjects as part of a larger research project. Only the factor analysis of the following variables: FSCT items; Dissatisfaction with Back, Breasts, Calves, Feet, Hands, Head, Hips, Shoulders, Stomach, Thighs, and Waist; Body Mass Index (BMI), and Drive for Thinness from the Eating Disorders Inventory (Garner, Olmstead and Polivy, 1983) will be discussed. The body image variables were included because evidence suggests that much of female competition concerns physical appearance and we were interested in whether dissatisfaction with various body parts and drive for thinness would emerge as a separate factor.

Methods

The subjects in Phase 3 were 316 girls attending three junior high schools in Richmond, British Columbia. The mean age of the subjects was 15.1 years with a range of 12 to 17 ($SD = 1.7$). Consent was obtained from the school district, principals, parents, and subjects.

A female research assistant tested groups of ten to thirty subjects during school hours. Subjects were seated at desks and were encouraged not to talk while completing the questionnaires so as to ensure a maximum amount of privacy. The subjects completed a battery of pencil-and-paper tests, including the FCST. The data from four subjects was incomplete and, therefore, not included in any analyses.

Results and Discussion

A principal component analysis of the intercorrelations produced factors with six eigenvalues greater than 1.0. A scree test of the eigenvalues also indicated six principal component factors. We then computed the image covariance matrix for the test items (Guttman, 1953) and factor analyzed it using the principal factor method. Factor analyzing the image covariance matrix is particularly useful for studying the construct validity of a test because it contains the covariances between each item and the other ($n-1$) items on the test. Hence, it provides information on the factor structure of the true variance of the tests. We used the direct quartimin rotation method to rotate the factors because it gives a cleaner description of factors than orthogonal rotation and because it enabled us to see the

relationships between the factors underlying the test.

Summing the diagonal elements of the image covariance matrix for the FCST items and dividing by the number of items indicated that the image covariances accounted for 39% of the total variance of the test items. Thus, the image variance (common variance) accounts for a respectable amount of the variance of the test.

We rotated through six factors using the image method of factor extraction. Although the scree test and eigenvalue one rule indicated that six principal component factors might be significant, a careful inspection of the factors indicated that only the first two were meaningful and that the last four were factors primarily specific to particular items. The correlation between factors was 0.51. We decided to interpret any loading equal or greater than 0.25 as significant. The majority of the test items had loadings exceeding this value on the first factor. Table 2 contains this structure matrix for the 2-factor solution. The variables Dissatisfaction with Breasts, Calves, and Head had loadings exceeding 0.25 on this factor. However, neither BMI nor Drive for Thinness had significant loadings on this factor. We interpreted the first factor as a female competition stress factor. The second factor appears to relate generally to body image dissatisfaction. Of the variables related to body image, only Dissatisfaction with Breasts and Dissatisfaction with Head do not load significantly on this factor. The four FCST items that load significantly on this factor relate directly to dissatisfaction with physical appearance, e.g., “I feel other girls have better figures than I do.” We interpreted the second factor as concern about physical appearance. Structurally, female-female competition stress is distinct from concerns about appearance. While the FCST encompasses stress related to physical appearance, it goes beyond assessing competition for looks.

We computed the internal consistency of the FCST. Coefficient alpha (Cronbach, 1951) equals 0.8866, suggesting that the FCST items represent a single variable. The absence of any other test in the literature assessing stress of this kind makes it impossible to assess the reliability of the FCST using an alternate form of the test. Further research is necessary for assessing the temporal reliability of the test.

It is possible that one item, “I make suggestions to other girls that go unnoticed,” could be eliminated. It did not have a loading above 0.10 on either of the interpreted factors or a loading above 0.25 on a factor in any of the three through six factor solutions. Moreover, its item total correlation was 0.094. However, it had a reasonable mean prototypicality of 5.7 and its removal only changed the coefficient alpha for the test from 0.886 to 0.890. We decided not to delete it because it may be measuring some aspect of female-female competition stress not measured by the other items.

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Table 2. Structure Matrix of 2-Factor Solution

Item	Factor 1 Loadings	Factor 2 Loadings
I am anxious about my appearance as compared to other girls.	.44	.20
I am proud of my ability to handle myself with other girls. ^a	.19	.12
I am worried about making myself more popular.	.56	.06
I am happy about how stylish my clothes are. ^a	.21	.24
I make suggestions to other girls that go unnoticed.	.06	-.09
I feel ignored by the other girls.	.57	.14
I feel other girls have better figures than I do.	.42	.49
I worry about my ability to apply make-up.	.36	.15
I feel intimidated by girls who seem to have it “all.”	.70	.21
I have trouble keeping a guy interested in me.	.53	.10
I feel nervous about whether I am wearing the “right” clothes.	.58	.16
I am afraid of going on dates with guys.	.29	.06
I feel intimidated by girls who dress better than I do.	.65	.24
I avoid situations where I have to compete with other girls.	.33	.13
I feel weak or timid in relation to the other girls.	.59	.15
I am afraid of being thought of as a nerd by the other girls.	.54	.14
The other girls look better than I do.	.60	.34
I am afraid to talk to the older girls.	.47	.08
I find it stressful maintaining the “right” teenage image.	.49	.22
I am less assertive than most girls my age.	.35	.07
I feel less attractive than most of the other girls.	.64	.30
I tend to avoid boys.	.33	-.04
I feel somewhat afraid of the other girls.	.57	.24
I find P.E. class to be stressful.	.18	.24
I find it difficult trying to look like the other girls.	.64	.30
I compete with other girls for such things as looks, clothes, money, status, etc.	.45	.14
Dissatisfaction with back	.20	.39
Dissatisfaction with breasts	.28	-.01
Dissatisfaction with calves	.25	.49
Dissatisfaction with feet	.22	.27
Dissatisfaction with hands	.23	.25
Dissatisfaction with head	.29	.24
Dissatisfaction with shoulders	.18	.33
Dissatisfaction with stomach	.29	.73
Dissatisfaction with thighs	.23	.67
Dissatisfaction with waist	.14	.71
BMI	.01	.50
Drive for Thinness	.21	.53

^a Item scored in reverse.

General Discussion

In this series of studies, we generated a number of items to measure stress associated with female-female competition. We then gave the test to female subjects, and based on analyses of their scores, revised the items. We conducted a retrospective study in which a second sample of female subjects completed the FCST and a measure of trait anxiety. The results from this study provided support for the validity of our stress measures. We then asked three independent samples of subjects of various ages to rate the prototypicality of the test items as examples of female-female competition stress. The test was then administered to a sample of 316 adolescent girls along with several measures of body image. The results were factor analyzed and two factors were interpreted. They were Female-Female Competition Stress and Concern with Physical Appearance. We are reasonably confident that the FCST holds up to initial psychometric scrutiny and have provided evidence of both reliability and validity.

These results are particularly interesting in light of Faer, Hendricks, Abed, and Figueredo's (2005) study of the relevance of types of female competition on eating disorders. Their work suggests that competition for mates may be a strong predictor of bulimia while competition for status is a strong predictor of anorexia nervosa. They found that competition for mates was a driving factor behind female competition for status as well as perfectionism, body dissatisfaction, and the drive for thinness. Stress from female competition (and susceptibility to this particular type of competition) may be a major risk factor for developing anorexic behavior. Future studies should attempt to more strongly explore not only this idea of different types of competition leading to different eating disorders but also to the connection between life history strategies and eating disorders.

Much of the work on adolescence and stress has focused on the relationship between life changing events, such as parents' divorce, and adolescent coping (see Compas, 1987 for a review). We suggest that the present measures have identified "everyday" sources of stress for adolescent girls that are particularly problematic for some individuals. Further investigation might focus, for example, on the following refinements: identifying how girls throughout early, mid, and late adolescence cope with competition, obtaining standardized scores from larger samples of girls, administering the FCST in conjunction with other anxiety or stress measures or other yet-to-be-developed indices of female-female competition in order to further establish construct validity. We also believe that a further step should be to demonstrate that male-male competition and stress is not associated with anorexic-type behavior in males. As well, the RSH focuses on suppression of reproduction which speaks most directly to anorexic-type behavior. While we would predict from the FCST that high levels of female-female competition might lead to anorexic-type behavior, we would suggest that bulimia-type symptoms would not necessarily show such a clear link (as bulimia does not typically lead to the suppression of reproduction).

Researchers interested in younger adolescence (e.g., 12-14 years) may find some of the items on our test irrelevant for many girls that age. An example would be the items concerned with dating. The majority of young adolescent girls may have little or no experience with dating and therefore may be unable to respond to those items. Similarly,

other items may be reworded to be more appropriate for older girls.

Stress arising from female competition may have adverse health, behavioral, and psychological consequences for adolescent girls. While no studies have examined the outcomes of female competition stress in particular, stress during adolescence is associated with a number of negative outcomes such as substance abuse (Brooks, et al., 2002; Bruns and Geist, 1984; Budd, Eiser, Morgan and Gammage, 1985; Duncan, 1977; Rhodes and Jason, 1990), poor physical health (Siegel and Brown, 1988), and depression (Hankin et al., 2007; Kanner, Feldman, Weinberger and Ford, 1987; Tolor and Murphy, 1985). We have been particularly concerned with the implications female competition stress had for the RSH. The RSH suggests that natural selection shaped a mechanism for adjusting female reproduction to socioecological conditions by altering the amount of body fat. In a modern Western environment in particular, social and ecological cues which would have signaled the need for temporary postponement of reproduction in ancestral environments may now be experienced to an unprecedented intensity and duration, leading in many cases to a concern with body image and weight and in some cases to anorexic-type behavior. We hope that this test might provide a measure of insight into adolescents at risk for developing anorexic-type behavior. We have not attempted to determine pathological or harmful levels of stress associated with female competition, rather, we see this as a beginning step in a largely untapped research area that has practical relevance not only for those interested in eating disorders but also those who may be interested in other effects of female competition on young girls.

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