IDENTIFYING COMPONENTS FOR A DRUG AND EATING DISORDER PREVENTION CURRICULUM

by
Esther L. Moe

A THESIS

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CERTIFICATE OF APPROVAL

This is certify that the MPH thesis of

Esther L. Moe

has been approved

[redacted]

Professor in charge of thesis

[redacted]

Member

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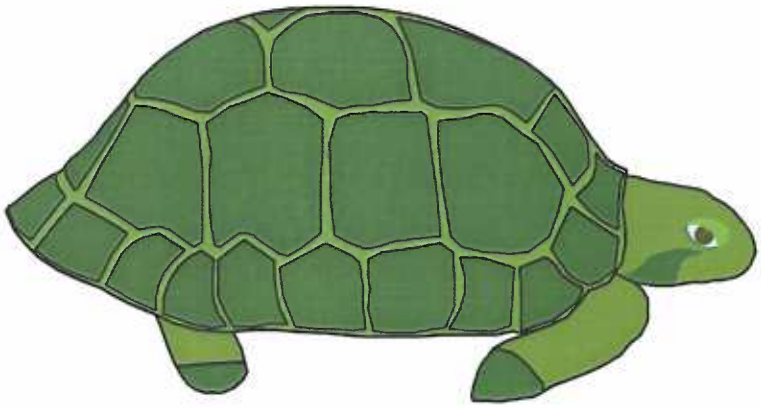

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ABSTRACT

Background: Adolescents have a high prevalence of drug abuse. The recent increase in illicit drug use by adolescents is paralleled by a rise in disordered eating behaviors (fasting, purging and self-induced vomiting) among young women. Women's substance abuse has gender-specific influences and consequences, including links to concerns about body weight, body dissatisfaction and disordered eating behaviors.

Objective: The goal of this study is to identify curriculum components to create a drug and eating disorder prevention intervention.

Methods: We surveyed 2090 middle and high school aged female adolescents, using a 118-item questionnaire. The survey questions combined established correlates of disordered eating behaviors and drug use with risk and protective factors in the domains of personal variables, peer effects, and non-peer influences. Several questions explored the use and use frequency of illicit substances, including alcohol, tobacco, marijuana, cocaine, and amphetamines. Five questions asked about intent toward future disordered eating and the use of laxatives, diet pills, and diuretics. Those at greatest risk for these unhealthy behaviors were identified, with 986 having higher intent toward future disordered eating behaviors. Self-reported use of alcohol, marijuana or tobacco in the past year was identified in 969 individuals.

Results: A factor analysis was conducted, from which 13 factors were derived. The factors were: Mood/Self-respect, Friends care about my eating disorder

behavior, Friends use of drugs, Food control issues, Perception of eating disorder norms, Pictorial body image, Perception of body size, Family influence, Friends with eating disorder behaviors, Meal frequency, Winning is important, Anxiety, and Societal gender/weight issues. These factor scores were saved as variables to be then used in a discriminant function analysis. Discriminant function analyses were run using the independent measures of high intent for disordered eating and self-reported drug use in the last year. Using the factor scores, those with disordered eating intent were correctly classified 69% of the time, while those with drug use were correctly classified 77.5% of the time. Examination of the discriminant function coefficients revealed that the factors which contributed the greatest to the classification of eating disorders and drug use were Mood/self-respect, Friends use of drugs, Eating and meal frequency, and Societal gender and weight issues.

Conclusion: Based upon these results, the following components were determined to be important to include in the ATHENA prevention curriculum: depression, nutritional needs, drug and eating disorder norms, body image and self-esteem, and media influences.

INTRODUCTION

Adolescent substance abuse is a major public health concern, and use remains widespread among American youth (Kandel, 1982; Center on Addiction and Substance Abuse [CASA], 1996; Kahn, 2001).

Middle and high school years represent a critical time for alcohol and other drug (AOD) use prevention. High school students rank drugs as the single most important problem facing them and their peers (CASA, 1997). Once use begins, adolescents are a particularly vulnerable group in regards to dependency and the harmful effects of alcohol and illicit drugs (Blum, 1987). The advantage of keeping middle and high school students from using drugs is considerable, as youth who remain drug-free during adolescence have decreased lifetime alcohol and drug use as adults (US Department of Health and Human Services, 2001).

Extensive resources are committed annually toward adolescent drug prevention programs. Despite an improved understanding of effective drug prevention intervention, there has been little progress in actually reducing adolescent drug use. Numerous school-based substance use prevention programs have been tested for effectiveness with outcomes showing only limited success (Flay, 2000). The lack of effective high school programs creates a gap in adolescent drug prevention.

ATLAS

Since the early 1990's, our research group has studied drug prevention and health promotion programs (Boyea, et al., 1990; Folker, et al., 1991; Jarrett, et al., 1992; Elliot, Wolf, Goldberg, & Moe, 1995; Clarke, et al., 1996; Elliot, et al.,

1996; Elliot, Goldberg, Moe, Clarke, Poole, & Witherrite, 1997; Goldberg, Elliot, Clarke, MacKinnon, Zoref, et al., 1996; Goldberg, Elliot, Clarke, MacKinnon, Moe, et al., 1996; Clarke, Elliot, Goldberg, Moe, Poole, & Witherrite, 1997; Moe, Elliot, Goldberg, Clarke, Poole, & Witherrite, 1997; Goldberg, MacKinnon, Elliot, Moe, Clarke, & Cheong, 2000; MacKinnon, et al., 2001). The initial prevention program created as a result of the research was entitled ATLAS (Adolescents Training & Learning to Avoid Steroids), a sport team-centered, gender-specific, peer-led drug prevention curriculum.

ATLAS was developed after several years of preliminary research and pilot work. Various interventions were tested, and the failures and successes led to the development of the comprehensive drug prevention curriculum. Initially, a fact-only presentation about risks and benefits was tested to try and change attitudes or intentions to use anabolic steroids (AS). Despite improvements in knowledge, neither behaviors nor attitudes about AS changed (Goldberg, Bosworth, Bents, & Trevisan, 1990). The next modification was to compare a cognitive-based program presenting information about risks and benefits to an approach that stressed only the negative side effects of anabolic steroid use (Goldberg, Bents, Bosworth, Trevisan, & Elliot, 1991). This "scare tactics" approach was not effective, with no significant impact in knowledge, attitudes, or intentions. A concerning outcome in this intervention trial was a trend for athletes who received the scare tactic approach to have an increased desire to try AS. Next, a balanced approach (presenting both the pros and cons of AS use) using peer leaders was tested. The prevention curriculum included sports nutrition and

strength training information as alternatives to AS use (Bents, Young, Bosworth, Boyea, Elliot & Goldberg, 1990; Jarrett, et al., 1992). This educational intervention found success in changing attitudes. This preliminary work helped determine that ATLAS program features would (1) be peer-led, (2) provide a balanced approach to discuss both the pros and cons of AS use, (3) provide the positive alternatives of sports nutrition and strength training to AS use, and (4) avoid the use of scare tactics.

With support from the National Institute of Drug Abuse, a randomized control study of ATLAS followed football teams at 31 schools in 12 cities and included more than 3,200 high school students in Oregon and Washington. ATLAS was designed to achieve male athletes' performance goals while reducing use of and intent toward use of athletic-enhancing substances (e.g., AS, amphetamines, growth hormone and ergogenic supplements), in addition to lowering AOD use (Goldberg, Elliot, Clarke, MacKinnon, Moe, et al., 1996). The ATLAS program was gender-specific, and addressed risk and protective factors related to AS and AOD use of young men.

Results from the ATLAS program included a reduction of new AS use, lower intent to use AS, a reduction in use of other drugs, and less occurrences of drinking and driving. The intervention improved self-efficacy and team cohesion, resulting in a healthier, more drug-resistant adolescent male athlete (Goldberg, Elliot, Clarke, MacKinnon, Moe, et al., 1996). ATLAS athletes successfully learned how to use sports nutrition and strength training as healthy alternatives to ergogenic substance use (Goldberg, et al.). Other findings showed improved

resistance skills to deal with social pressure to use AS and AOD, the perception of increased personal vulnerability to the use of AS, and an altered awareness of media influences (MacKinnon, et al., 2001). Along with changes in these AS and AOD attitudes and behaviors, there was an improvement in nutrition and exercise. Because of the positive outcomes, ATLAS was selected by the U.S. Department of Education as one of nine Exemplary programs (U.S. Department of Education, 2001), and one of twenty-nine Model programs by the Center for Substance Abuse Prevention (U.S. Department of Health and Human Services, 2001).

What About the Girls?

The team-based, peer-led, gender-specific model for drug prevention was successful for boys, but what about the girls? Boys playing sports typically want to get physically bigger and stronger, which is generally not the case for girls. What would be a parallel gender-specific focus of a drug prevention curriculum for girls?

Risk factor models suggest that early dieting, poor body esteem, and fear of fat may set the stage for the development of eating disorders (Shisslak, et al.,1998). Killen et al., (1987) found comorbidity between depression symptoms and eating disorders. Childhood obesity, negative attitudes about weight and shape, and social pressure to control one's weight have all been identified as specific risk factors for eating disorders (Fairburn, et al., 1997).

Gender-related research for females show behaviors correlated with AOD abuse include disordered eating practices, weight control issues, poor self-

perception of physical appearance, and body dissatisfaction (Griffin, Weiss, Mirin, & Lange, 1989; Graber, Brooks-Gunn, Paikoff, & Warren, 1994; Holderness, Brooks-Gunn, & Warren, 1994; Dansky, Saladin, Brady, Kilpatrick, & Resnik, 1995; Shene & Deirdre, 1997; Koval, Pederson, Mills, McGrady, & Carvajal, 2000; Silverman, Raj, Mucci, & Hathaway, 2001). Given this information, we hypothesized that a unique gender-specific drug prevention program for females should focus on the prevention of AOD, eating disorders, and the associated use of body-shaping drug (amphetamines, AS, cocaine, diet pills, diuretics, laxatives and tobacco) use.

Conceiving ATHENA

In 1995, we began background and pilot work for development of the ATHENA program. The long-term goal was to prevent the onset of disordered eating behavior, reduce the intent for disordered eating behavior, and prevent use of AOD and body-shaping drugs (Elliot, et al., 1995; Clarke, et al., 1996; Elliot, et al., 1996; Elliot, et al., 1997; Moe, et al., 1997; Clarke, et al., 1997; Elliot, Goldberg, Wolf & Moe, 1998; Elliot, Moe, Duncan, & Goldberg, 1999).

Is there a problem?

Disordered eating behaviors in young women are a great concern. Evidence suggests eating disorder prevalence gradually increases throughout adolescence with the age of onset decreasing over time (Jones, Bennett, Olmsted, Lawson, & Rodin, 2001). Eating disorders are the third most common chronic illness among adolescent females (Kreipe, et al., 1995). Several studies have shown lifetime prevalence of anorexia nervosa and bulimia nervosa as high

as 3.7% and 4.2%, respectively (Deering, 2001).

There is a cultural bias toward thinness and beauty, which affects women's weight loss behaviors and perception of their body (Rodin, 1993). A range of behaviors relative to eating disorders, from poor food choices and inconsistent nutrition (Bull, 1992) to clinically diagnosed eating disorders is evident in young women. Body dissatisfaction and distorted body image are common in this population. Research shows that 80% of adolescent girls feel bad about their bodies, 75% feel fat, and up to 70% are on diets at any given time (Herbold & Frates, 2000). Data collected by Grigg, Bowman, & Redman (1996), found a high prevalence of disordered eating (33%), unhealthy dieting (57%), and distorted body image (12%).

The use of a variety of physique-altering drugs to control body weight (diet pills, diuretics, laxatives, tobacco, AS, cocaine, and amphetamines), is another aspect of disordered eating behavior (Ghaderi & Scott, 1999). Grigg, et al., (1996) found that over thirty-percent of a population surveyed had used at least one or more extreme dieting methods to lose weight in the past month, including fasting, diet pills, diuretics, laxatives, and/or cigarettes. The combination of AOD use, eating disorders, and the use of body-shaping drugs is a serious issue for adolescent females.

What has been tried for eating disorder prevention?

The seriousness of eating disorders is recognized by most professional organizations. Many symposia and workshops have addressed the pertinent issues and have proposed numerous directives. This concern has not carried

over to research leading to effective interventions for the prevention of eating disorders. Despite the increased attention to the prevention of eating disorders, less than two dozen prevention intervention studies have been conducted to date (Austin, 2000), and those have been with small sample sizes and largely ineffective.

In testing a prevention program for fifth grade girls, Smolak, Levine and Schermer (1999) increased knowledge about eating disorders and nutrition, but found no behavioral change in weight reduction attempts, eating or exercise patterns. Killen and colleagues (1993) had similar findings when they studied the outcome of a prevention program for sixth and seventh grade girls. Paxton (1993) chose ninth grade girls to test a prevention program to reduce moderate and extreme weight loss behaviors, disordered eating, and low body image. Measures of disordered eating and frequency of extreme weight loss behaviors were constant across time and showed no resulting change in behavior. Neumark-Sztainer, Sherwood, Coller and Hannan (2000) implemented a community-based eating disorder prevention program for pre-adolescent girls, focusing on media literacy and advocacy skills. While this program had a positive influence on media-related attitudes and behaviors, including internalization of socio-cultural ideals, significant changes were not found in dieting behaviors.

Some school-based prevention programs have done more harm than good. In a study conducted by Mann, et al. (1997), the eating disorder prevention program consisted of having classmates who had "recovered" from eating disorders describe their experiences and provide information about eating

disorders to the others in the class. At follow-up, intervention participants had slightly more symptoms of eating disorders than did controls. By talking about eating disorders, or having a recovered role model discuss their past issues with eating, the stigma of these disorders may have been reduced and the program may have inadvertently normalized them (Mann, et al.). Huon, Braganza, Brown, Ritchie, and Roncolato (1998) cautioned against prevention programs that might teach students the behavior targeted for change. Most prevention programs that have been tested are educational in framework and were directed at increasing knowledge to change attitudes such as body image and dissatisfaction, and to affect behaviors such as unhealthy dieting. Unfortunately, these programs have been ineffective in preventing eating disorders.

Development of a Solution

When to intervene?

It is important to consider the optimal time and age at which to intervene with girls to prevent disordered eating behaviors and AOD use. Information about age of onset is difficult to demarcate in eating disorders. For example, Kendler, et al. (1991) and Garfinkel, et al. (1995) define age of onset as the age when the person first met criteria for full syndrome anorexia nervosa or bulimia nervosa. In contrast, Fairburn, et al. (1997) define onset as the age at which the first clinically significant symptom (e.g. severely restrictive dieting, or recurrent binge eating, or recurrent purging) emerges. Age of onset of symptoms is significantly earlier than age of onset of full syndromes.

The theory behind an eating disorder prevention intervention would be to

prevent girls from moving along a continuum of eating problems, from preoccupation with weight, intent for eating disorders, experimentation with eating disorders, to eating disorders. Ideally, intervention would occur before intent toward disordered eating and prior to the onset of disordered eating behaviors.

Research from another field, pregnancy prevention, suggests that a program encouraging contraceptive use has its greatest effect among teenagers who had not initiated sexual intercourse at the time of the program (Frost & Forrest, 1995). Because they had not yet had unprotected sex, a preexisting behavior did not need to be changed. For a prevention program, it is important to intervene at a time when there is a low rate of the target behavior. Substance abuse rates significantly increase from middle to high school, with the lifetime use of any illicit drugs more than doubling between the 8th and 12th grade, thus initiation of a prevention program in middle school is advisable.

Prior to development and implementation of an eating disorder prevention curriculum, we needed to determine the prevalence of AOD and intent for disordered eating behaviors. This information was used to confirm the presence of the disordered eating behaviors and AOD use, and to establish the sample size needed to study the prevention of these behaviors.

Defining the curriculum

While ATLAS relied upon the series of preliminary studies to define a curriculum, we did not have that background research for girls. Two types of information were available: correlates of disordered eating, and findings from

programs to prevent other harmful behaviors, particularly tobacco use.

Girls with eating disorders have behaviors, perceptions, and emotional differences which distinguish them from their peers. Neumark-Sztainer, Story, French, and Resnick (1997) found that dieting frequency in girls was associated with weight dissatisfaction, high emotional stress, binge eating, alcohol use, tobacco use, suicidal ideation and attempts, delinquent behaviors, and physical and sexual abuse. Other correlates of eating disorders include overweight status, low self-esteem, and depression (Neumark-Sztainer & Hannan, 2000). Higher levels of AOD use and sexual risk-taking are common in females with disordered eating behaviors (Lock, Reisel, & Steiner, 2001). Parental and family issues may play a role for some girls with eating disordered behaviors. Poor family communication, low levels of parental caring, and parents with low expectations (Neumark-Sztainer, Story, Hannan, Beuhring, & Resnick, 2000) have been identified as being associated with eating disorders in young women.

The science of smoking prevention is more advanced than disordered eating prevention. There is compelling evidence that prevention programs featuring certain components can retard the initiation of smoking by some students, and prevent smoking completely for others (Pentz, et al., 1989). These components include (1) providing information about the immediate consequences of smoking, (2) practicing resistance of the media and other social encouragement to smoke, (3) training in life-skills which improve self-esteem and coping with stress, (4) modification of prevalence estimates so as to reduce the belief that smoking is normative which also gives the perception of peer approval,

and (5) creation of a school and community climate which does not support smoking. Adapting this information to disordered eating prevention, and including questions about these components in a needs assessment questionnaire will provide additional information about topics to include in the curriculum.

Identification of the common attitudes in girls with higher intent toward eating disorders is important in the development of an eating disorder prevention program. In this study, FA was used to examine the underlying factor structure of self-report attitudes and behaviors surrounding drug use and eating disorder behaviors in a questionnaire administered to middle and high school female adolescents. Factor analysis finds questions that have a similar focus, such as, "I am pretty happy with myself these days", "I feel that many things about me are good", and "I'm able to do things as well as most people."

FA is a multivariate technique to examine the commonalities of variables, and those relationships are used to reduce the variables into summary indices (Floyd & Wideman, 1995). The original set of variables is reduced to a smaller set that still accounts for most of the reliable variance of the initial item pool. This is achieved by including as much information from the original variables in as few derived factors as possible. The smaller set of factors can then be used as operational representations of the constructs that underlie the original set of variables. This creates a more workable number of variables for further analyses.

The next step in the development of an AOD and eating disorder prevention program is to group common attitudes and behaviors together to find a cohesive pattern. This pattern of variables can then be used to generate

activities and can be converted into a curriculum for a prevention intervention addressing AOD reduction, along with a prevention of disordered eating and intent toward disordered eating. FA combines items and describes these factors, but it does not relate them to the outcomes of interest. To show the relationship of the factors created by the FA to those girls with a higher intent for disordered eating and higher use of AOD, discriminant function analysis (DFA) was used.

The purpose of DFA is to classify or predict nominal or categorical outcome groups using variables that will provide additional information about those groups, based upon the variables and in which direction the differences in the groups are evidenced (Tabachnick & Fidell, 1989). Discriminant function analysis is a rather robust technique not particularly sensitive to minor violations of the mathematical assumptions of multivariate normality of the discriminating variables, and equal group covariance matrices. If the joint distribution of the variables can be considered multivariate normal, and the covariance matrices are not too dissimilar, the linear DFA performs quite well, resulting in efficient classifications based on the probability of group membership.

In this analysis, the DFA was used to determine additional information about those at risk for use of AOD and who have a higher intent for disordered eating behavior. The factors identified with the factor analysis were used as dependent variables, and the information contained in the variables that made up the factors gave us additional information about how the factors related to the independent outcome behaviors.

The hypothesis was that the predictors for girls with high intent for eating

disorders and higher use of AOD would identify the topic areas needed for a disordered eating and AOD use prevention curriculum. The research question to be answered by DFA is whether these factors can differentiate drug users and individuals with intent for eating disorders, and if they can, which factors contribute the most to the grouping prediction. By examining the variables which successfully discriminate girls with higher eating disorder intent and girls with drug use, those variables were then used to determine which components should be included into an eating disorder, drug use prevention curriculum.

MATERIALS and METHODS

Subjects and Data Collection

An anonymous questionnaire was administered to 2090 girls from middle and high schools in the suburban area of Portland, Oregon. Questionnaires were administered at seven high schools (n=1220) and six middle/junior high schools (n=870) located in the Portland metro area. Schools within their district were suggested by school administrators for participation, and were a convenience sample. Because the resulting prevention program was going to be used with female athletes in both middle and high schools, we targeted districts in which middle schools have school-sponsored sports programs.

Data collection occurred over a one-month period in the early spring of 1996. The survey was administered during health or physical education classes at each of the participating schools. Research staff traveled to each school for questionnaire administration and school teachers or staff members were not

involved in questionnaire collection to preserve respondent anonymity.

Questionnaires were anonymous and participation was voluntary. The survey and administration methods were approved by the Oregon Health & Science University Institutional Review Board and reviewed by administration at each school. Parents were provided information about the survey prior to administration, and were informed of actions to take if they preferred their daughter not complete the questionnaire. Questionnaires were distributed and collected using individual manila envelopes for privacy. Research staff members were available to answer any questions raised by students or teachers.

Instrument

A 118-item questionnaire was used, with most responses being on a 7-point Likert scale. Responses ranged from "strongly agree" and "strongly disagree." The questionnaire was developed to assess eating disorders and correlates of disordered eating behaviors, including self-reported drug use, attitudes and behaviors regarding eating behaviors, eating disorders, risk behaviors, family dynamics, and emotional issues. The assessment instrument includes both previously established, reliable measures, and additional items devised and assessed in our previous studies. It was comprised largely of existing measures of eating disorders (Garner & Garfinkel, 1979), intent for disordered eating (Rosen & Silberg, 1988), drug and supplement use (Oregon Health Division, 1996), depression (Radloff, 1977), perception of body size (Furnham & Baguma, 1994), impact of media (Warner & Goldenhar, 1992), and body and self-image (Rosenberg, 1965, 1979), with the addition of questions

asking about activity level, dietary behaviors, participation in school-based sports, and general demographic questions.

Missing Data

As with most data collection, there was missing data. Students who completed the questionnaire occasionally left an item or two blank. Questionnaire items used in the analyses had between 4 and 90 missing data points, with an average of 32 per item. If students who had skipped any question were eliminated from the analysis, the sample size would have been reduced by almost one-fourth. To include data from all participants, and not exclude those with missing data, we decided to impute values for the incomplete data.

Standard analyses of incomplete data assume that the data are missing completely at random, although in many studies, this assumption is highly questionable. These analyses, generally involving the use of listwise deletion, take advantage of the balanced nature of the resulting data set to simplify computations. One general and flexible method for handling missing data is imputation (Little & Rubin, 1987). In the present study, we employed NORM (Schafer, 1999) to impute values for the incomplete data. The use of imputation procedures such as NORM assumes missing values are missing at random and that the variables are jointly normally distributed. NORM utilizes an expectation maximization algorithm for efficient estimation of means variances, and covariances (or correlations); and a data augmentation procedure for generating multiple imputations of missing values. The expectation maximization algorithm is a general method for obtaining maximum-likelihood estimates of parameters from

incomplete data. This process ends with the creation of a matrix of data which can be analyzed as a complete data set.

Data Analysis

Prevalence by age

Data were analyzed to examine differences by age, and between middle and high school girls, for both AOD use and eating disorder intent. The purpose of this examination of age by AOD and eating disorder intent is to consider optimal age for prevention intervention. Frequencies and crosstabs were assessed using SPSS version 10.1.

Factor Analysis

Factor analysis (FA) was used to analyze the survey data using SPSS version 10.1. A FA was initiated with all of the questions on the ATHENA questionnaire, with the exception of demographic and outcome variables. Extraction method for the FA was principal component analysis, and rotation method used varimax rotation with Kaiser Normalization. After determining all the possible variables to include in the analysis, inspection of the factor loading is used to make a determination whether to include or eliminate each variable.

To get the cleanest analysis, FA was run repeated times, eliminating questions that did not contribute to the analysis on each run. For these purposes, the criterion of retaining variables was if the variable exceeded 0.3 on only one factor. Questions that loaded minimally (<0.3), or loaded at a level higher than 0.3 on more than one factor, were eliminated by a backward stepwise elimination, removing the variable with the smallest loading from the next

analysis until all included variables had at least 0.3 on only one factor. The factor loadings were examined to determine the variables that had the strongest correlations with the given factor and which would provide the strongest interpretation of that factor. As a final step in FA, factor scores were saved as variables for use in the discriminant function analysis (DFA).

Discriminant Function Analysis

DFA was used to discriminate between girls with higher intent for eating disorders and girls with low intent for eating disorders and to determine which factors contribute the most to the discrimination between those two groups. DFA was also used to classify girls with higher drug use from girls with no drug use and identify the associated factors used for discrimination.

Subjects were dichotomized into groups of 'High' or 'Low' intent for eating disorders and 'Higher' or 'None' groups of drug use. To measure intent for eating disorders questions, we included questions about intent such as: "In the future, I might use drugs to control my weight if more of my friends would start using them;" or "In the future, I would vomit to control my weight if more of my friends did." We defined girls with higher intent if they agreed with any of these questions, with agreement defined as a 1, 2, or 3 (Strongly Agree, Slightly Agree, or Agree) on the Likert Scale response. Using this criterion, 47% of the girls had higher intent for disordered eating behaviors.

To identify self-reported drug use, if an individual reported any use of alcohol, cigarettes, or marijuana in the past year, they were grouped into the 'Higher' drug use group. Using this criterion, 46% were grouped as drug users,

using a combined alcohol, tobacco, or marijuana drug use index.

RESULTS

The mean age of the subject sample was 14.6 years (SD = 1.44), with the majority being white (78%). The racial breakdown of the study population matches the population of the suburbs where the schools were located. Subjects were distributed from 7th to 12th grade, with most being in the 8th, 9th, and 10th grades. These demographic variables of the study population are presented in Table 1.

Table 1. Descriptive statistics of the sample (N = 2090)

Age	N	%
12	99	5%
13	379	18%
14	515	25%
15	545	26%
16	326	15%
17	144	7%
18	81	4%
Grade		
7	265	13%
8	497	24%
9	584	28%
10	437	21%
11	178	8%
12	123	6%
Race/Ethnicity		
Caucasian	1631	78%
Asian/Pacific Islander	122	6%
Hispanic/Mexican-American	77	4%
African American	18	1%
American Indian/Native Alaskan	14	1%
Other	211	10%

Age of AOD and Intent for Disordered Eating

Percentages of participants reporting use of AOD show a continual increase from ages 12 through 18. There is an increase from year to year, with 12-year-old girls having 23.2% AOD use to 18-year-olds reporting 70.4% AOD use.

The percentages of girls with high intent for disordered eating, however, reveal a different pattern. The youngest and oldest ages have the lowest (18.2% for 12-year-old girls) and highest (33.3% for 18-year-old girls) levels of intent for disordered eating, but levels vary for each age level with no set pattern. Table 2 shows the percentage of users of AOD and individuals with higher intent for disordered eating behaviors by age.

Table 2. Percentage of AOD use and high intent for disordered eating behaviors by age

AGE	Sample Size	Percentage of high intent for eating disorders	Percentage of users of tobacco, alcohol, or marijuana
12	99	18.2	23.2
13	379	21.4	35.4
14	515	25.4	46.2
15	545	23.1	53.6
16	326	27.0	63.8
17	144	23.6	68.1
18	81	33.3	70.4
TOTAL	**2089**	**24.2**	**50.3**

When looking at the mean results for each school level, the percentage of individuals reporting AOD use in the past year was 40% for middle school girls, and 60% for high school girls. There is a comparable level of high intent for disordered eating between middle and high school girls, however; 23% and 25%, respectively.

A graph showing the percentage of AOD use and disordered eating intent by age is displayed in Figure 1. With both behaviors displayed on the graph, the different levels of behaviors at each age are evident.

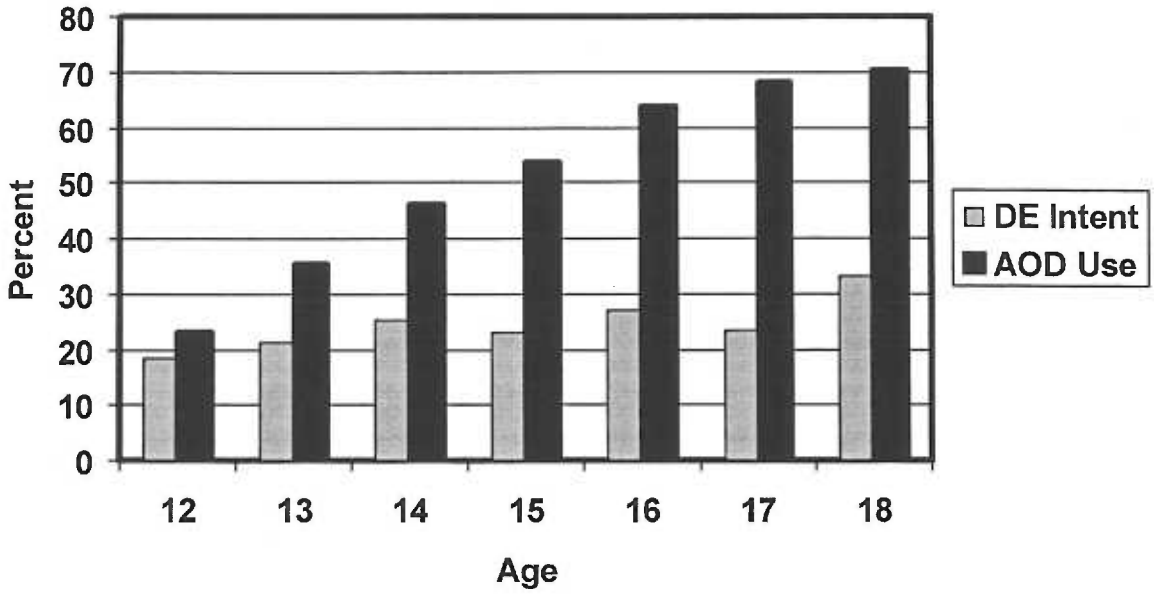

Figure 1. AOD use and high intent for disordered eating behaviors by age

Factor Analysis

Factor analysis extracts components that account for the maximum possible variance in the observed variables. After eliminating questions from the analysis that did not load cleanly (using 0.3 as the benchmark), there were 47

variables retained for the final FA analysis. From these 47 variables, the FA revealed thirteen robust and meaningful factors, each with an eigen value over 1.0. The thirteen factors which emerged from the analysis each appeared highly interpretable, and had minimal overlap. The FA had no variables loading less than .5, and none loaded on more than one factor at a level greater than 0.3. The factors accounted for 67% of the variance.

The labels attached to the13 factors are identified in Table 3, along with the questions, eigen value, variance explained, communalities, and loadings for each of the factors. Questions with a higher loading are considered more important in the identification of the label for each factor.

Table 3. Factor analysis coefficients and variance explained by factors

Commun-alities	Loading	Questions included in Factor	% Variance Explained	Eigen Value
		Factor 1 (Mood/self-respect)		
0.79	0.85	I'm pretty happy with myself these days		
0.74	0.82	I feel that many things about me are good		
0.66	0.77	I'm able to do things as well as most people	8.56	8.06
0.63	0.72	All in all, I feel that I am a failure		
0.51	0.59	In the past week, I felt depressed		
0.41	0.53	In the past week, I had crying spells		
0.43	0.51	I wish I had more respect for myself		
		Factor 2 (Friends care about my ED behavior)		
0.90	0.94	Closest friends would care if I used diuretics		
0.89	0.93	Closest friends would care if I vomited	7.33	3.45

Commun-alities	Loading	Questions included in Factor	% Variance Explained	Eigen Value
0.88	0.93	Closest friends would care if I used AS		
0.76	0.85	Closest friends would care if I took diet pills		
		Factor 3 (Friends use drugs)		
0.88	0.89	Of 5 closest friends, # use cigarettes		
0.83	0.86	Of 5 closest friends, # use alcohol	5.64	3.09
0.81	0.84	Of 5 closest friends, # use pot		
		Factor 4 (Food control issues)		
0.72	0.79	I feel that food controls my life		
0.63	0.73	Sometimes I eat a lot and feel I can't stop myself	5.28	2.55
0.59	0.72	I think about food all the time		
0.51	0.65	I buy fattening food and eat it in secret		
		Factor 5 (ED norms)		
0.80	0.87	ED Norms for 100 at your school		
0.79	0.87	ED Norms for 100 HS seniors	5.21	2.41
0.78	0.86	ED Norms for 100 athletes at your school		
		Factor 6 (Pictorial body image)		
0.75	0.83	Picture - you think looks best		
0.74	0.81	Picture - you most want to look like		
0.56	0.72	Picture - you think boys think look best	5.06	2.19
0.38	0.59	Picture - you think looks healthiest		
		Factor 7 (Actual body size)		
0.79	0.85	I believe my weight is under, normal, over wt		
0.72	0.84	People think I'm too thin	4.88	1.88
0.77	0.80	Picture - you think you look like		
		Factor 8 (Family)		
0.84	0.85	There is a feeling of togetherness in my family		

Commun-alities	Loading	Questions included in Factor	% Variance Explained	Eigen Value
0.76	0.81	My family members help & support each other	4.68	1.72
0.66	0.77	There is very little group spirit in family		
		Factor 9 (Friends with ED)		
0.75	0.85	Of 5 closest friends, # use lax		
0.71	0.76	Of 5 closest friends, # made themselves vomit	4.60	1.64
0.72	0.75	Of 5 closest friends, # use diet pills		
		Factor 10 (Meal frequency)		
0.61	0.73	How many days per week do you eat lunch		
0.54	0.69	How many days per week do you eat dinner	4.29	1.51
0.48	0.60	How many days per week do you eat breakfast		
0.51	0.55	I try not to eat when I'm hungry		
		Factor 11 (Winning is important)		
0.81	0.89	I will do whatever it takes to win		
0.81	0.89	When on a team, I want to win no matter what it takes	4.24	1.41
0.37	0.55	Playing team sports is all about winning		
		Factor 12 (Anxiety)		
0.72	0.83	Large groups make me nervous		
0.65	0.77	I get embarrassed very easily	4.22	1.32
0.68	0.71	I am jittery		
		Factor 13 (Societal gender/wt issues)		
0.53	0.67	Life is a lot easier for boys than girls		
0.53	0.65	Thin women are more physically attractive to men	3.22	1.09
0.36	0.51	My friends are trying to lose weight		

Discriminant Function Analysis

Discriminant function analysis uses a categorical outcome variable for the observed grouping, and independent variables to predict the grouping. The purpose of the DFA was to examine whether group differentiation was possible between individuals with and without intent for disordered eating, and if group differentiation was possible between individuals who used and did not use drugs in the past year. The 13 factors from the FA comprised the independent variables used to predict the groupings. Table 4 shows the DFA classification tables of the analyses, and Table 5 shows the Standardized Discriminant Function Coefficients.

The stepwise DFA procedure for the Eating Disorder Intent analysis resulted in a significant discriminant function, Wilks' Lambda=.700, $p < .001$, with 12 of the 13 factors entering the equation. For Eating Disorder Intent DFA, all 12 factors together correctly classified 75.5% of the cases. In this analysis, 69% of the girls observed with higher eating disorder intent were correctly identified as being in the higher eating disorder intent group, with 81% correctly classified in the lower eating disorder intent group.

For the drug use DFA, all 10 factors together were able to classify 80% of the grouped cases correctly, and of the observed drug users, 77.5% were correctly classified while 82.2% of the non-drug users were correctly classified.

Table 4. Discriminant Function Classification Tables

Drug Use

		% Correctly Classified	
		No	Yes
Observed	Low (1121)	82.2%	17.8%
	High (969)	22.5%	77.5%

Eating Disorder Intent

		% Correctly Classified	
		Low	High
Observed	Low (1104)	81.3%	18.8%
	High (986)	31.0%	69.0%

Table 5. Standardized Discriminant Function Coefficients

Factor	ED Intent	Drug Use
Mood & self-respect	.47	.29
Friends care about ED behaviors	.21	.15
Friends use drugs	.29	.94
Food control issues	.50	- -
Eating disorder norms	-.25	-.22
Pictures – body image	.20	- -
Body size	-.36	- -
Family	.16	.25
Friends w/ED behaviors	.31	.21
Eating and meal frequency	.52	.31
Winning is important	.26	.17
Anxiety	- -	-.15
Societal gender/wt issues	.36	.11

Standardized discriminant function coefficients (DFC) from these factors indicated that discrimination was possible between those with high and low eating disorder intent, with Eating & meal frequency (DFC=.52), Food control issues (DFC=.50), Mood/self-respect (DFC=.47), Body size (DFC= -.36), Societal gender/weight issues (DFC=.36), Friends with ED behaviors (DFC=.31), and Friends use drugs (DFC=.29), contributing most to maximizing group differences. Two factors had negative DFC scores, Eating disorder norms and Body size. The discriminant function evaluated at the group means revealed that negative scores on the function were associated with a difference in girls with higher intent for eating disorders. Thus, girls with a higher intent for eating disorders believe there is a higher incidence of eating disorders than girls with low intent for eating disorders. Similarly, girls with higher intent for eating disorders perceive their body size as being larger than girls with a low intent for eating disorders.

Looking at the discriminant function coefficients from the factors indicated that discrimination was also possible between those who reported drug use and those who did not. The factor which contributes the most to the correct classification is Friends use of drugs. Peer drug use is the primary factor included to discriminate between the high and low drug users. Individuals who had reported drug use were more likely to report that their Friends use drugs (DFC=.94). The other factors that were included as a component in the analyses were Eating and meal frequency (DFC=.31), and Mood & self-respect (DFC=.29). DFA showed that the power of the identified factors to discriminate between the

dichotomous variables is good, and will provide useful information about individuals with high intent for eating disorder and individuals who are drug users.

Considering factors with DFC values which contributed at least .29 to either of the DFA reveals seven factors, which are listed in Table 6. Two of the factors are peer-related (Friends use drugs and Friends w/ED behaviors), two are food and nutritional issues (Eating and meal frequency and Food control issues), and three are various personal issues (Mood & self-respect, Societal gender/wt issues, and Body size).

Table 6. Highest Discriminant Function Coefficient Factors

Factor	ED Intent	Drug Use	Sum
Friends use drugs	.29	.94	1.23
Eating and meal frequency	.52	.31	.83
Mood & self-respect	.47	.29	.76
Friends w/ED behaviors	.31	.21	.52
Food control issues	.50	- -	.50
Societal gender/wt issues	.36	.11	.47
Body size	-.36	- -	-.36

How can these identified factors be developed into a curriculum and curriculum activities? To impact peer-related factors, the curriculum needs to be peers-teaching-peers, which will provide role modeling and positive peer pressure. Small groups will have a peer leader presenting the information and lead discussions, allowing for peer bonding and opportunities for discussion of pertinent issues. Curricular activities addressing the most prominent factor of Friends use drugs could include role plays for improvement of refusal skills, and interactive activities for the correction of normative beliefs regarding adolescent

drug use. Regarding the factors related to food and nutritional issues, activities could include information about the role carbohydrates, proteins and fats play in a balanced diet and optimizing physical performance. Discussions about the importance of eating breakfast, and providing some quick and easy breakfast ideas could be utilized to convey the nutritional importance of eating meals. The personal issues of mood and self-respect, societal and gender weight issues, and body size are, perhaps, the most challenging factors to impact. Tracking daily mood and the number of daily fun activities and observation of the correlation between the two might help individuals recognize that the addition of fun activities to a day when one feels down can improve one's mood. This presents an opportunity for adolescents to learn new skills to help them gain control over their moods and deal with situations that contribute to their depression. Addressing issues surrounding societal pressures for weight and body size could be deconstructing advertisements to look deeper than the superficial glance to see what is being promoted by the companies. Fashion magazines, television and advertisements have long been criticized for their promotion of the thin body and of dieting. Recognizing media manipulation and improving media resistance are important to be most accepting of one's body size and shape. Self-esteem may be increased through strength training. High-level physical activity is an important component in the development of self-esteem in children (Strauss, Rodzilsky, Burack, & Colin, 2001).

There is are three factors which overlap between the intent for disordered eating factors and the AOD use factors, with both DFC scores equal to or greater

than .29. Those overlapped factors include Mood and self-respect; Friends use drugs, Eating and meal frequency. It is imperative to include activities that address each of these to impact both AOD use and disordered eating intent.

DISCUSSION

The results of this research project answered questions regarding the development of an AOD and disordered eating curriculum. First, the prevalence data concur with other reports, and indicated that AOD use and disordered eating behaviors are a problem. The age on onset of AOD use is similar to the Monitoring the Future data (Johnson, et al., 2002), with the use rate doubling between 8^{th} and 12^{th} graders in our sample. A majority of high school girls and close to 70% of 17- and 18-year-olds had used tobacco, alcohol, or marijuana, which is similar to nationwide use. As students move into the middle and high school years, they are exposed to older students who are more likely to experiment and use AOD.

Much of the previous research on eating disorders has been conducted with individuals who have eating disorders as a preexisting condition. A unique aspect of the analysis conducted here was grouping a general population of girls by their self-reported intent for disordered eating behaviors. Intent for disordered eating has not been previously examined, although reports of behaviors consistent with patterns of disordered eating experimentation show numbers comparable with our data (Grigg, Bowman, & Redman, 1996; Herbold & Frates, 2000).

Why don't we see the increase in intent for eating disorders in an analysis of those intentions by age? The answer is impossible to know for sure, and it is likely a combination of factors, but there are a few possibilities. There may be hormonal effects. Males trying to get bigger are able to use their naturally increasing level of testosterone, while girls may be impacted by their increase in fat tissue associated with puberty, and go against their hormone levels. There is some evidence that girls who mature early may be at higher risk for disordered eating as they develop and try to maintain their pre-pubescent body shape (Graber et al., 1994; Killen, et al., 1993). If the onset of intent for eating disorders begins in early adolescence, with girls struggling against their normal growth and development as they progress through middle and high school, this might explain relatively steady prevalence of intent for eating disorders. Another consideration is that eating disorders are personal and private, and girls may not discuss these behaviors with others except perhaps their closest friends. These behaviors, being less public, may not have the age-related increase seen in AOD use as a result of exposure to older girls, if there is less communication about the behaviors. There are likely to be different influences impacting girls' behaviors between the ages of 12 to 18, both from a positive and negative perspective. Perceived norms for disordered eating and the amount of pressure from various sources may change at different ages. Perhaps there is a natural ceiling of prevalence of disordered eating behaviors, with many girls staying at the level of poor food choices or skipping meals and not progressing toward clinical eating disorders. To answer the question of why intent for disordered eating didn't show

an increase with age was not within the scope of this research. However, our analysis of intent for disordered eating provides information indicating that the onset of the behaviors is at or even before middle school years, thus prevention needs to be initiated at an early age.

The components which emerged from the FA, and the importance of those factors, were demonstrated in the DFA classifications for both AOD and intent for disordered eating. Our research confirmed the correlation of body image dissatisfaction, low self-esteem, and depression with disordered eating as found by other researchers (Neumark-Sztainer & Hannan, 2000; Story & Neumark-Sztainer, 1998). Drug and alcohol use correlate with significant levels of change in mood (Jaffe, 1990), which our data also showed. Peer influences are very important, and these factors were present in the FA. Risk factors for adolescent drug use related to peers include friends' substance use, and friends' attitudes toward substance use.

For prevention of intent for disordered eating, Mood/self-respect, Food control issues, Body size, Eating & meal frequency, and Societal gender/weight issues contributed most to maximizing group differences. These risk factors concur with other research (Neumark-Sztainer, Story, French & Resnick, 1997), and validate the inclusion of the topics of mood, dietary behaviors, self-esteem, and modification of attitudes toward media and social weight pressures in a disordered eating prevention curriculum. For the DFA for classification of AOD users, peers, along with eating and meal frequency, mood and self-respect were important factors.

Results from the two DFA produced a listing of issues that would be considered important areas to include in the ATHENA eating disorder and drug prevention curriculum. Given these results, the curriculum components should include peer influences, nutritional needs, mood, and address societal pressures such as media.

One of the most important factors identified as correctly classifying girls more likely to have used AOD in the past year was peers. Peers can be influential, particularly as children reach adolescence. The perception of what one's friends are doing and what they value plays a pervasive role in this group (Shisslak, et al., 1998). Peer AOD use places adolescents at an increased risk of substance abuse, according to the Center on Addiction and Substance Abuse 1997 survey (CASA, 1997). Students who have friends who use marijuana, friends who drink regularly, can buy marijuana quickly and expect to use an illegal drug in the future are more likely to use illicit drugs and alcohol. When teens were asked why they smoke, drink and use marijuana, the response was to "fit in with the crowd" and to "have fun" (CASA). It is clear for these analyses that peer influence is an important consideration in AOD prevention. The ATHENA prevention will include peer discussion groups, led by peer leaders, using interactive methods, to convey much of the information. Another aspect of peer influence that will be included is a correction of normative beliefs about drug use.

Mood was identified as an important component in the correct classification of girls with high intent for disordered eating and AOD use.

Recently, it became evident that depression and low mood are amenable to intervention efforts. Research by Clarke, et al. (1999) has shown encouraging results with the utilization of cognitive-behavioral techniques in treatment of depressed adolescents. A modified mood improvement component based upon Dr. Clarke's work will be incorporated into the ATHENA program.

The ATLAS program is implemented only with males, and the ATHENA program will only be implemented with females. Gender-specific programs are a new focus of drug prevention, because of the known etiologies, consequences, and risk and protective factors of substance use, which differ for men and women (Michell & Fidler, 1993; Brady, et al., 1993; CASA, 1996; Swan, 1997; Rosenbaum, 1998; Kandel, 1997; Society for Women's Health Research, 1998; Leshner, 1998; Grunberg, 1998).

Despite recognized gender-related differences (Griffin, et al., 1989; Graber, et al., 1994; Holderness, Brooks-Gunn & Warren, 1994; Dansky, et al., 1995; Shene & Deirdre, 1997; Center for Disease Control and Prevention, 1997; Kandal, 1998; Califano & Booth, 1998; Leshner, 1999; Smolak, et al., 2000; Koval, et al., 2000; Silverman, et al., 2001), traditional substance use prevention programs for adolescents typically are 'gender-neutral' (Roberts, Fournet & Penland, 1995; Blake, Amaro, Schwartz & Flinchbaugh, 2001). With the many differences between male and female adolescents in relation to substance use and abuse, gender-specific prevention programs such as ATLAS and ATHENA are necessary and likely to produce more favorable outcomes.

Use of peers for the delivery of information in a small group setting will be

incorporated for ATHENA as it was for ATLAS. Peers are credible and effective teachers, and highly acceptable to other students (Bernard, 1990; Prince, 1995; Metropolitan Life Foundation, 1998), and use of them as leaders can provide positive results. A meta-analysis of school-based drug prevention programs concluded that interactive peer interventions for middle school students are statistically superior to programs led by teachers or researchers for middle school youth (Black, Tobler, & Sciacca, 1998).

There are some weaknesses to this research project. The factors that were created by the FA were limited to questions that were included in the questionnaire. There likely are areas that would be beneficial to include in a drug and eating disorder prevention program that were not included in these analyses. The sample population was fairly homogeneous, with 80% white, living in an urban and suburban area. The findings in this study may not be generalized to more diverse populations. Also, we may have viewed the relationship of the factors to the higher intent and higher AOD use group with an assumption of causality, which is not proven. Some of the younger participants may have been challenged to completing the survey instrument in the time provided and in understanding the questions. Although we provided definitions for some of the less common terminology related to drugs and eating disorders (i.e., diuretics, anabolic steroids, laxatives, diet pills, anorexia nervosa, bulimia), these may not have been well understood.

Despite these limitations, the findings provide a rational strategy to define the scope of a gender-specific sport team-centered curriculum. Analysis of the

program outcomes and effects on these factors will allow our research group to provide gender-specific drug prevention curriculum for both boys and girls which may favorably influence adolescent behavior.

SUMMARY and CONCLUSIONS

The purpose of the present study was to determine which components should be included in an eating disorder and AOD use prevention curriculum. FA and DFA may be a useful means to define curriculum components for a disordered eating and AOD prevention intervention. The analysis identified dimensions or factors related to disordered eating intent and AOD use, and those were able to classify girls with higher intent for disordered eating and girls with higher AOD use. The contributions of each factor to the classification and discrimination were prioritized for curriculum inclusion.

Recommendations for future research are to test a peer-led, gender-specific, disordered eating and AOD use prevention using the components identified through this research project. Reduction in AOD use and disordered eating intent would make a valuable contribution to the health of young women.

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