Rorie, Michele Taylor, <u>A Path Analysis Of Body Mass Index, Body Image, And Unhealthy Dietary Behavior As Contributors To Suicidal Behavior In Female Adolescents</u>. Doctor of Public Health (Social and Behavioral Sciences), May 2004, 120pp., 17 tables, 6 illustrations, references, 106 titles.

Objectives- This study examined the pattern and magnitude of relationships between body mass index, body image, unhealthy dietary behaviors, and suicidal behavior among a sample of White, African American, and Hispanic adolescent females.

Methods- This study employed secondary analysis of the 2001 Youth Risk Behavior Survey public-use dataset to provide quantitative estimates of the causal connections between body mass index, body image, dietary behaviors, and suicidal behavior. A sample (n= 5,218) of White, African American, and Hispanic adolescent females aged 14-17 were selected for analysis. This cross-sectional study involved public high school students in grades 9-12. The variables/constructs BMI, Body Image, and Dietary Behavior were examined using a path analysis to determine the magnitude of effects on Suicidal Behavior in adolescent females.

Results- The path coefficients were obtained for the path model using multiple regression equations, which took direct and indirect effects into account. The Female Adolescent Model (n= 5,218) yielded an R^2 = .27. This meant that 27% of the variance in Suicidal Behavior was explained by BMI,
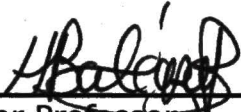
Body Image, and Dietary Behavior. When race/ethnicity was analyzed separately, different values were observed. The White Adolescent Female Model (n= 2,768) had an R^2= .32. The Black or African American Model (n= 1,206) had an R^2 = .23, and the Hispanic or Latino Model (n= 1,224) had an R^2 = .27.

Conclusion- The basic state of what is an actual fact about a person (i.e. weight) does not cause an increase of harmful or destructive behavior. The person's beliefs drive intention as it was demonstrated through the immergence of significant indirect pathways from BMI through Body Image and Dietary Behavior to Suicidal Behavior. The path analyses for the three racial groups suggest that there are varying degrees of influence among BMI, Body Image, Dietary Behaviors, and Suicidal Behaviors.
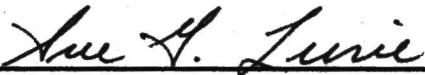
A PATH ANALYSIS OF BODY MASS INDEX, BODY IMAGE,

AND UNHEALTHY DIETARY BEHAVIOR AS

CONTRIBUTORS TO SUICIDAL BEHAVIOR

IN FEMALE ADOLESCENTS

Michele Taylor Rorie, B.S., M.P.A., CHES

APPROVED:

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Major Professor

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Committee Member

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Committee Member

_____

Department Chair

_____

Dean, School of Public Health

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DISSERTATION

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By

Michele Taylor Rorie, B.S., M.P.A., CHES

Fort Worth, Texas

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CHAPTER I

INTRODUCTION

Summary

The primary goal of the investigation was to examine: 1) the pattern and magnitude of relationships between body mass index, body image, unhealthy dietary behaviors, and suicidal behaviors in a female adolescent sample; and 2) whether there are racial differences in the pattern of relationships between White, Black or African American, and Hispanic or Latino adolescent females. The study employed secondary analysis of the 2001 Youth Risk Behavior Survey (YRBS) public-use dataset to provide quantitative estimates of the causal connections between these variables.

Statement of the Problem

Suicide is the third leading cause of death among youth aged 15-24 and the second leading cause of death among white youth aged 15-24 (Centers for Disease Control, 2003). The suicide rate for persons aged 15-24 has tripled since 1950 and in 1997 was 11.1 per 100,000. The Healthy People 2000 Initiative had an objective to reduce suicide attempts among female adolescents aged 14-17. The goal was to bring the baseline of 2.5% in 1991 to 2.0% in 2000. The objective was not met and had actually increased to 3.1% by 1999.

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Differences in body mass index (BMI), or weight status, have been associated with the probability of past-year major depression, suicide attempts, and suicide ideation. Studies have shown high rates of body dissatisfaction and dieting among adolescent females, with many engaging in unhealthy weight control behaviors, such as fasting and self-induced vomiting. Purging and low BMI are risk factors for suicide and attempted suicide. Body image and eating-related risk factors that emerge with adolescence could contribute to higher rates of depression and suicide/suicide ideation among girls (Stice, et al., 2000).

Purpose of the Study

The prevalence of overweight among adolescents more than doubled from 5% in the late 1970s to 11% between 1988 and 1994. In adolescence, obesity is associated with adverse psychological and social consequences. One of the national health objectives for the year 2010 is to reduce the rate of suicide attempts by adolescents to a 12-month average of 1% (Centers for Disease Control, 2003). The 2001 YRBS was the first national survey that collected data on the behaviors of adolescents after the final report from the Healthy People 2000 was published.

This project explored the magnitude of the relationship between BMI, body image, dietary behavior, and suicidal behavior among female adolescents to identify areas for prevention strategies. This will be useful

when adapting health education and prevention programs. Increased effort can be used to find female adolescents who are at risk, refer them for services and make sure they get appropriate care. The CDC has recommended developing and supporting a national network devoted to research about suicide and suicide prevention; improving national monitoring of suicide and suicidal tendencies; developing and disseminating tools to help primary care providers screen for and recognize suicidal behavior; and developing, testing, expanding and implementing programs for suicide prevention.

Hypotheses

The path analysis identified the magnitude of influence of the antecedent variable (BMI) and mediator variables (Body Image and Dietary Behavior) on one another and on the consequent variable (Suicidal Behavior) for female adolescents. The hypotheses are based on different expected mediated, unmediated, and total pathways of effects.

- Question 1- Is there a relationship between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents?
- Question 2- Are there different relationships between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents according to race?

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The following null hypotheses were tested at the 0.05 level of significance.

- $H_0 1$- BMI does not have a direct effect on suicidal behavior in adolescent girls.

- $H_0 2$- BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on body image.

- $H_0 3$- BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on dietary behavior.

- $H_0 4$- Body image does not have a direct effect on suicidal behavior in adolescent girls.

- $H_0 5$- Body image does not have an indirect effect on suicidal behaviors in adolescent girls through its influence on dietary behavior.

- $H_0 6$- Dietary behavior does not have a direct effect on suicidal behavior in adolescent girls.

- H_07- There will not be a different total effect between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents when examined by race.

Justification

Since one of the national health objectives for the year 2010 is to reduce the rate of suicide attempts by adolescents to a 12-month average of 1%, this study will identify the magnitude of the influence that BMI, body image, and unhealthy dietary behaviors have on suicidal behavior among female adolescents. This will allow public health professionals to concentrate on significant factors and to be able to administer culturally specific prevention techniques.

Limitations

The national YRBS provides descriptive data on the what, who, where and when of the self reported behaviors in the six major categories including: behaviors that contribute to violence and unintentional injuries; tobacco use; alcohol and other drug use; sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection; unhealthy dietary behaviors; and inadequate physical activity. The questions of why and how cannot be answered by this survey. The national data are not the aggregate of individual state and local surveys. The national sample

was not designed to be representative of each state. The data can only be generalized to the population that is defined in the sample: public school students in grades 9-12. Students who were enrolled in English as a second language classes, special education classes, correspondence schools, private schools, group home schools and correctional schools are not represented. Also, youth that dropped out of school were not included.

CHAPTER II

REVIEW OF THE LITERATURE

This review of the literature reports on investigations that are related to reasons why adolescent females exhibit suicidal behaviors. Focus areas within this review are body mass index and self-dissatisfaction. Two areas specific to this research design that are reviewed include body image and unhealthy dietary behaviors (eating disorders).

Suicide And Suicide Ideation

Incidence and Prevalence

Suicide is a serious and increasing health problem in the United States. Every seventeen minutes in the U.S. someone commits the ultimate act of suicide. Every day, 86 Americans take their own lives and over 1,500 attempt suicide, which translates to more than 30,000 suicides and 650,000 attempts annually in the U.S. Suicide is the eighth leading cause of death for all Americans and the third leading cause of death for those aged 15–24. For every teen that commits suicide, 400 report attempting suicide, 100 report requiring medical attention for a suicide attempt, and 30 are hospitalized for a suicide attempt (CDC, 1998).

Suicide rates are highest among white males and the elderly (aged 65 and over), but from 1952-1995, the incidence of suicide among adolescents and young adults nearly tripled. From 1980-1997, the rate of suicide among persons aged 15-19 years increased by 11% and among persons aged 10-14 years by 109%. From 1980-1996, the rate increased 105% for African-American males aged 15-19. (CDC, 1998) More teenagers and young adults die from suicide than from cancer, heart disease, AIDS, birth defects, pneumonia and influenza combined.

Mental disorders also have a strong association with suicide. Research has shown that more than 90 percent of people who kill themselves have depression or another diagnosable mental or substance abuse disorder, often in combination with other mental disorders.

Harris and Barraclough (1994) believed that virtually all mental disorders have an increased risk of suicide except mental retardation and dementia. The researchers conducted a study by searching the medical literature to find reports on the mortality of mental disorders. Reports were located on MEDLINE (1966-1993) with the search terms mental disorders, brain injury, eating disorders, epilepsy, suicide attempt, psychosurgery, with mortality and follow-up studies, and from the reference lists of these reports. 249 reports with two years or more follow-ups and less than 10% loss of

subjects were extracted. A standardized mortality ratio was calculated for each disorder.

The researchers concluded that there is increased risk for suicide in 36 of 44 disorders, with functional disorders collectively having the highest risks. However, within the functional disorders group, wide variability existed, ranging from a high of 20 times greater than that expected for major depression to a low of 4 in neurosis. Other functional disorders, such as bipolar disorder, brief reactive psychosis, schizophrenia, adjustment disorders, dysthymia, and anxiety disorders, also carried substantial risk for suicide. The suicide risk was highest for functional and lowest for organic disorders with substance misuse disorders lying between.

Typical stressors associated with suicidal acts include acute use of alcohol or sedatives that appear to disinhibit patients and an acute medical illness, especially if it affects the brain; and adverse life events. Mann (1998) proposes that suicide attempters tend to make multiple attempts with increasing lethality over the same period of risk as individuals with the same level of severity of major depression who never make a suicide attempt. This suggests some patients have a vulnerability or predisposition to suicidal behavior and that it is not simply a logical response to extreme stress.

Suicide in Minorities

European-Americans have a higher prevalence of suicide than African-American, Latino, and Asian-American/Pacific Islanders, however, American Indian/Alaska Native youth have the highest prevalence of suicide across all age groups. Research suggests that Latino youth are not overrepresented among completed suicides; they are overrepresented among attempted suicides (Centers for Disease Control, 1998). Among female high-school students in 1997, for example, the rate of attempted suicide among Hispanic girls (14.9%) was greater than African American (9.0%) and White (10.3%) females (Centers for Disease Control, 1997). This trend has continues year after year.

Hispanic cultural and family traditions may influence how the adolescent female and her parents respond to psychosocial stresses. Zayas (1987) proposed that the interaction of socioeconomic disadvantage, traditional gender-role socialization, acculturation, cultural identity, generational status, and intergenerational conflict converge to influence the suicidal behavior of Hispanic adolescent females. Seventy-five percent of Hispanic respondents in a study by Berne (1983) attributed the suicide attempt to conflicts with mothers or boyfriends. The struggle between mother and daughter often represents a rift between original culture and new culture. The suicide attempt is sometimes an act of despair and an attempt to connect (Zimmerman, 1991).

Parental education and occupation are also major influences. Fewer incidents of suicide attempts are reported among middle-class adolescent Hispanic females than among girls of lower socioeconomic status (Ng, 1996; Razin et al., 1991; Zimmerman, 1991).

African-American suicide rates have traditionally been lower than White rates despite racial discrimination, persistent poverty, social isolation, and lack of community resources. Gibbs (1997) explored four issues: (1) patterns and trends of Black suicide across the lifespan; (2) risk and protective factors in subgroups of Blacks; (3) the influence of cultural factors on suicide patterns of Blacks; and (4) implications of these patterns for prevention and early intervention of suicidal behavior among African Americans. He found that the exposure of black youths to poverty, poor educational opportunities, and discrimination may have negatively influenced their expectations about the future and, consequently, enhanced their resiliency to suicide. Protective factors that mitigated the risks of suicide included religiosity, older age, southern residence, and social support. Risk factors for Black suicide included: male sex, early adulthood, substance abuse, psychiatric disorders, family or interpersonal conflict, antisocial behavior, and homosexuality.

Suicide in Homosexuals

Debates exist as to whether gay, lesbian, or bisexual (GLB) young people are at increased risk of suicide and suicidal behaviors. It has been argued that because of a series of social processes that center on homophobic attitudes, GLB youth are exposed to serious personal stresses that increase their likelihood of suicidal behavior.

In 1995, Moscicki noted that no studies had compared suicidality in representative samples of heterosexual and homosexual youths. As a consequence, there was no population-based evidence that sexual orientation and suicidality are linked in some direct or indirect manner. These claims showed them not to be well founded in evidence, and reviews of this issue concluded that problems in existing research were such that no clear conclusions about the role of sexual orientation in suicidal behavior could be drawn.

In 2001, several years after Moscicki's claims, McDaniel documented several state and national studies that supported otherwise. He found studies that concluded that high school students who report same-sex sexual behavior or self-identify as gay, lesbian, or bisexual have higher rates of suicidal thoughts and attempts in the past year compared to youth who report exclusively heterosexual sexual behavior or self-identify as heterosexual in orientation.

Suicide in Women

Both pregnancy and the postpartum period may trigger the onset of clinical depression. However, the association between suicidal behavior and postpartum depression is less firmly established. An article by Brockington (2001) reviewed research into suicide in women over a 25-year span. The researchers concluded that worldwide rates for women are much lower than males, with exceptions from India and China, which report higher rates in young married women. Their study also found that while menstruation, hormonal treatment, and pregnancy were shown to have no major effect, unwanted pregnancy may still lead to suicide under certain circumstances, and severe labor can occasionally do so. Having children was shown to protect and certain social factors also had a limited effect. There were also higher rates of suicide in divorced women, but the evidence on widowhood was vague. Sexual abuse, rape and domestic violence contributed to suicide attempts.

Adolescent Period And Adolescent Development

Adolescence is characterized by dramatic physical changes moving the individual from childhood into physical maturity. Both boys and girls experience the following changes: a growth spurt; rapid development of sexual organs; more active sweat glands accompanied by acne; easier fatigue; and a greater calories requirement (Crosiar, 1996).

Physical Development

During the teen years, adolescents experience changes in their physical development. They rapidly gain height and weight. This growth spurt typically occurs two years earlier for girls than for boys and occurs between the ages of about 10.5 to 11 and 16 to 18, peaking somewhere around 14 years. During a one-year growth spurt, girls can gain an average of 3.5 inches in height (Steinberg, 1999).

Weight gain results from increased muscle development in boys but from body fat in girls. Teenage girls may become overly sensitive about their weight. Forty-six percent of adolescent girls report that they are trying to lose weight (CDC, 1998). A small percentage of adolescent girls (1-3%) become so obsessed with their weight that they develop severe eating disorders such as anorexia nervosa or bulimia.

Behavioral Development

With all the sudden and rapid physical changes that adolescents experience, this period of development tends to be one of self-consciousness, sensitivity and concern over one's own body changes, and comparisons between oneself and peers. Many adolescents are at increased risk for depression and potential suicide due to pressures and conflicts that may arise within families of origin, school or social organizations, and intimate relationships (Steinberg, 1999).

Self-image can be challenged by body changes during puberty and social comparisons. Youth begin long-term process of establishing own identity separate from family. Both boys and girls might be concerned with skin problems, height, weight, and overall appearance. Among girls, there is an increased ability to empathize with others, greater vulnerability to worrying, depression, and concern for others (Cole and Cole, 1996).

Suicide In Adolescents

The rise in teen suicide caught the attention of former U.S. Surgeon General David Satcher, who launched a national campaign to combat suicide by encouraging the creation of suicide prevention programs in schools (U.S. Department of Health and Human Services 2001). There is extensive research literature on youth suicide that has emerged during the past two decades. Lewinsohn (1996) attempted to summarize findings as they pertained to the suicidal behavior of older (14-18) adolescents. The researchers presented information regarding the epidemiology of suicidal ideation and suicide attempts (prevalence, incidence, onset age, methods, severity); described the psychosocial characteristics associated with past and future suicide attempts, in comparison to depression; and discussed issues relevant to assessment and screening, including the development of a new assessment instrument, the Life Attitudes Schedule. Recommendations were shared from the experience to help provide treatment for depressed

adolescents, approximately 40% of who had made a suicide attempt. Gaps in current knowledge for which more research is needed were identified.

While great advances in knowledge have led to increased understanding of the risk factors for child and adolescent suicides, Gould (2001) believes that the application of this knowledge for designing prevention strategies remains undeveloped.

Family dysfunction has been examined as a risk factor for completed suicide or suicidal symptoms in childhood or adolescence. Wagner (1997) reviewed relevant literature and evaluated the empirical support for this assumption. Completed suicides, attempted suicides and suicidal ideation were all considered in the assessment. Studies included children from early childhood through age 21, and only those studies that used a control group or within-group comparisons. The authors concluded that consistent evidence suggests a history of physical or sexual abuse puts children or adolescence at risk for suicidal symptoms or behavior. In addition, they concluded that modest evidence exists that poor family communication or problem solving, loss of a caregiver and psychopathology in first-degree relatives are risk factors for suicide or suicidal symptoms. Wagner concluded that few studies actually demonstrated that risk variables truly precede suicidal symptoms, but most indicated that family variables are strongly correlated with suicidal symptoms.

Moscicki (2001) also believes that adverse life events in combination with other risk factors such as depression may lead to suicide but that suicide and suicidal behavior are not normal responses to stress. Risk factors included: prior suicide attempt; family history of mental disorder or substance abuse; family history of suicide; family violence, including physical or sexual abuse; firearms in the home; incarceration; and exposure to the suicidal behavior of others, including family members, peers, or even in the media. Some risk factors vary with age, gender and ethnic group and may even change over time. The risk factors for suicide frequently occur in combination.

Body Mass Index

For years, the Body Mass Index or BMI has been used to assess weight status. The BMI is one of the best ways to indirectly measure total body fat. Unlike for adults, the BMI values vary with the age and sex of the adolescent and is called: BMI-for-age. The BMI value itself, is plotted on a specific BMI chart that contains a series of lines, which indicate specific percentiles. BMI Percentiles indicate the following (CDC, 2003):

- BMI-for-age less than the 5th percentile means Underweight.
- BMI-for-age 85th to 95th percentile means the child is at risk for Overweight.

- BMI-for-age greater than 95th percentile means the child is Overweight.

Female adolescents are more preoccupied with physique and appearance than are those in other age groups (Bruch, 1981). Research has indicated that female adolescents tend to be dissatisfied with their body weight, size, and shape. The path between BMI and Body Image was drawn based on several investigative ventures. With puberty, normal increases in girls' body fat can impact body image and self-concept negatively for many (Cole and Cole, 1996). It has also been reported that perceived obesity is associated with depression and unstable self-perceptions (Wichstrom, 1995). Moore (1988) reported that dissatisfaction with body weight and shape was highest among females aged 12 through 23 years. Women who perceived themselves as overweight scored lowest on emotional and social adjustment scales compared to women who perceived themselves as being normal or slightly overweight (DelRosario, Brines & Coleman, 1984).

Adolescents who overate tended to have a higher body mass index, a measure of weight in relation to height, and to believe that a person's weight and shape are the most important factors shaping self-esteem (Ackard, 2003). Some studies have found a relationship between body mass index (BMI), and self-concept among adolescents, with greater body weight or BMI being associated with significantly lower self-concept (Sallade, 1973;

Mendelson & White, 1985; Drake, 1988; O'Dea & Clampett, 1995). Berscheid, Walster, and Bohrnstedt (1973) found that dissatisfaction with weight-related aspects of one's body was a predictor of dissatisfaction with the body as a whole. The further a female deviates from this ideal, in the direction of becoming heavier, the more dissatisfied she becomes. This research influenced the hypothesized pathway from BMI to Body Image. The null hypothesis, "BMI does not have an indirect effect on Suicidal Behavior in adolescent girls through its influence on Body Image." was tested at the .05 alpha level.

Carpenter, Hasin, Allison, and Faith (2000) tested the relationships between relative body weight and clinical depression, suicide ideation, and suicide attempts in an adult US general population sample. Differences in BMI, or weight status, were associated with the probability of past-year major depression, suicide attempts, and suicide ideation. This study led to a direct pathway being drawn from BMI to Suicidal Behavior. The null hypothesis, "BMI does not have a direct effect on Suicidal Behavior in adolescent girls." was tested at the .05 alpha level.

Body Image

Body image is a multidimensional concept that includes the thoughts, feelings, and attitudes related to one's own body. Slade (1994) viewed body image as "a loose mental representation of body shape, size, and form which

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is influenced by a variety of historical, cultural and social, individual, and biological factors, which operate over varying time spans".

Freedman (1990) found that negative feelings of body image were more likely to occur in women with negative self-concepts and positive feelings of body image were more likely to occur in women with a positive self-concept. Low self-control and a desire to obtain social approval has been associated with body dissatisfaction, preoccupation with dieting and weight, and lowered self-esteem (Shisslak, Prada & Crago, 1990).

Gleaves et al. (1995) proposed a model that consisted of four dimensions: fear of fatness, body distortion, preference for thinness, and body dissatisfaction. Body Image and Eating Disturbances (BIED) occur when those perceptions and attitudes become distorted or agitated and include eating-disordered behaviors. Disturbed body image feelings include being dissatisfied with one's body. Disturbed body image perceptions include overestimating one's body size. Disturbed body image thoughts include chronic thoughts about weight loss and weight gain, and disturbed body image and eating actions include exercising excessively, binging and purging, and fasting to lose weight (Thompson, Heinberg, Altabe & Tantleff-Dunn, 1999). These philosophies led to the pathways being drawn from BMI to Dietary Behavior and from Body Image to Dietary Behavior. The null hypotheses, "Body image does not have an indirect effect on Suicidal

Behavior in adolescent girls through its influence on Dietary Behavior" and "BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on dietary behavior." were tested at the .05 level.

Eating Disorders

An eating disorder is defined as chronic binging or starvation of oneself and is usually the result of an altered body perception. Eating Disorders are a growing problem and concern among many adolescents today. (Abraham, 1983). Somewhere between 2 and 10 in every 1,000 adolescents ages 12-18 could have eating disorders in any point in their lives (Steinberg, 1999).

Many adolescents today are concerned about their physical appearance. Most girls want to have tall and thin bodies like models. Harrison and Cantor (1997) found that magazine reading was related to college students' Body Image and Eating Disturbances. Harrison (2000) found that increased exposure to thin ideal bodies in magazines was related to increased eating disorder symptoms for adolescent girls. The frequency of dieting behaviors was linked to the prevalence of images of thinness, dieting, and exercise seen on television. Similarly, exposure to thinness-depicting and thinness-promotion media have been associated with subsequent eating disorder symptoms among young women (Stice & Shaw, 1994).

A study by Stice, Hayward, Cameron, Killen, and Taylor (2000) explored the link between body image, eating disturbances, and major depression in girls, and examined the extent to which body image and eating-related risk factors can predict the onset of major depression among females. The authors concluded that body image and eating-related risk factors that emerge with adolescence could contribute to higher rates of depression among girls.

If some adolescents think they are the least bit fat, they may decrease their food intake. If this doesn't work they sometimes turn to starvation and/or binging to keep the weight off. It is estimated that one third of teenage girls go on diets in the United States today. In a 1986 study of almost five hundred schoolgirls by Mellin, Scully and Irwin, 81% of the ten-year-olds reported that they had dieted at least once. Unsuccessful dieting is often followed by an eating disorder. The two most common eating disorders are Anorexia Nervosa and Bulimia.

Anorexia Nervosa

One of the most prevalent disorders is anorexia nervosa. Anorexics tend to lose weight by not eating and have a disturbed body self image. Fewer than one-half of one percent of adolescents are anorexic. (Steinberg,1999) It affects females fifteen times more than it affects males. It usually begins during adolescence or in early adulthood, but hardly ever

occurs in women past the age of twenty-five. The disorder affects one teenager in every two hundred among adolescents aged between sixteen and eighteen (Field and Domangue, 1987).

People with anorexia nervosa starve themselves by dramatically restricting their food/caloric intake. Approximately 0.5% to 1.0% of late adolescent or adult women meet criteria for the diagnosis of anorexia nervosa (American Psychiatric Association, 2000). Symptoms include significant weight loss, refusing to maintain minimum normal body weight, loss of menstruation, dry skin, sallow complexion, disturbances in the perception of body shape, and an intense fear of gaining weight, even when underweight. Sufferers may develop a dangerously low body temperature or white blood cell count, severe heart problems, or brittle, weak bones. Individuals with anorexia nervosa are unable or unwilling to maintain a body weight that is normal or expected for their age and height.

There is no precise boundary dividing "normal" from "too low", but most clinicians use 85% of normal weight as a reasonable guide (American Psychiatric Association, 2000). Concerns about their weight and about how they believe they look have a powerful influence on the individual's self-evaluation. The seriousness of the weight loss and its health implications is usually minimized, if not denied, by the individual.

Women with the diagnosis of anorexia nervosa have missed at least three consecutive menstrual cycles (Field and Domangue, 1987). The identification of anorexia nervosa includes two subtypes of the disorder that describe two behavioral patterns. Individuals with the restricting type maintain their low body weight purely by restricting food intake and, possibly, by exercise. Individuals with the binge-eating/purging type usually restrict their food intake as well, but also regularly engage in binge eating and/or purging behaviors such as self-induced vomiting or the misuse of laxatives, diuretics or enemas (American Psychiatric Association, 2000).

Bulimia Nervosa

Bulimia nervosa is characterized by recurrent periods of binge-eating in which the sufferer eats until overly full, often while feeling out of control. Individuals with bulimia nervosa regularly engage in discrete periods of overeating that are followed by attempts to compensate for overeating and to avoid weight gain. Approximately 1.0% to 2.0% of late adolescent and adult women meet criteria for the diagnosis of bulimia nervosa. (American Psychiatric Association, 2000). The individual's subjective experience is dominated by a sense of a lack of control over the eating. There can be considerable variation in the nature of the overeating but the typical episode of overeating involves the consumption of an amount of food that would be considered excessive in normal circumstances.

There are two subtypes of bulimia nervosa. The Purging Type describes individuals who regularly compensate for the binge eating by attempts to "undo" the consequences of over consumption though inappropriate compensatory behaviors such as self-induced vomiting, misuse of laxatives, enemas, or diuretics. The Non-Purging Type is used to describe individuals who compensate through excessive exercising or dietary fasting (American Psychiatric Association, 2000).

This disorder may go undetected because the victim's weight can be at times normal or even somewhat overweight (First, 1995). There are five basic criteria in the diagnosis of bulimia (American Psychiatric Association, 2000):

1. Recurrent episodes of binge eating. This is characterized by eating within a two-hour period an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.

2. A sense of lack of control over the eating during the episode, or a feeling that one cannot stop eating.

3. In addition to the binge eating, there is an inappropriate compensatory behavior in order to prevent weight gain. These behaviors can include self-induced vomiting, misuse of laxatives, diuretics, enemas or other medications, fasting, or excessive exercise.

4. Both the binge eating and the compensatory behaviors must occur at least two times per week for three months and must not occur exclusively during episodes of anorexia.

5. Finally, the behavior above is unduly influenced by body image.

Medical complications that result from bulimia are generally due to continual bingeing and purging. Bulimics often develop swelling of the feet, hands and cheeks, and serious dental, throat and intestinal problems. Self-induced vomiting can result in oral complications. Repeated exposure to acidic gastric contents can erode tooth enamel, increase dental cavities, and create a sensitivity to hot or cold food. Swelling and soreness in the salivary glands from repeated vomiting can also be a concern.

The esophagus and the colon are the areas most affected by bulimic behaviors. Repeated vomiting can result in ulcers, ruptures, or strictures of the esophagus. Acid that backs up from the stomach can also become a problem.

The misuse of diuretics can create an abnormal buildup of fluid or edema. Continual use of laxatives can result in dependency on them and can cause the normal elimination process to become dysfunctional. The misuse of diuretics and laxatives combined can place the bulimic at great risk for

electrolyte imbalance, which can have life-threatening consequences (American Psychiatric Association, 2000).

It is clear from the literature reviewed that suicide ideation/suicide attempts in female adolescents are associated with a complex array of causal factors. The answer to this study's research question, "Is there a relationship between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents?" was achieved by running a path analysis for the entire female adolescent sample (n= 5,218).

Racial Differences

The null hypothesis, "There will not be a different total effect between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents when examined by race" was postulated based on an abundance of literature. Body image varies according to cultural norms, contextual norms, such as body structure of friends and family, and social perceptions (Chodorow, 1978).

Acculturation is defined as "the process of shifting values to the host culture from the culture of origin (Kempa & Thomas, 2000)." As this occurs, the dominant standards of beauty are internalized and women from minority groups adhere to standards similar to those of white women. The researchers also proposed that the effect of acculturation is dependent upon which stage

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of the ethnic identity process the individual is in. Those in the conformity stage may internalize dominant values of beauty which could lead to eating disorders, while those in the dissonance stage may be highly sensitive to oppressive circumstances and subsequently develop eating problems to cope with these experiences.

African American women are more satisfied with their bodies than their Caucasian women when it comes to body size perceptions. African American women do experience discrepancies between their ideal and current figure perceptions, but these discrepancies are not as large as those for Caucasian women, which suggests that they are less dissatisfied with their bodies (Abood & Chandler, 1997; Rucker & Cash, 1992). Girls with negative feelings about their bodies were found to have lower self-esteem although this was mostly associated with whites (Siegel, et al., 1999).

Very few studies have been done which report results on the Hispanic population and body size preferences. Smith and Krejci (1991) found that Hispanics were significantly more satisfied with their body shape than whites. (Story, French, Resnick, & Blum, 1995). Hispanic adolescents also tend to report stricter parenting than white adolescents do. Although they can usually be more obedient, Hispanics females tend to have poorer concepts of self or body image (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987).

Body dissatisfaction increased with increasing BMI in White or Hispanic girls, but to a lesser degree in African Americans (Seigel, et al., 1999). Research has also shown that African American women also display less concern about dieting, fatness, and weight fluctuations (Akan & Greilo, 1995; Powell & Kahn, 1995; Steven, Sumanyika, & Keil, 1994). In a survey of 6,504 adolescents African-American, Hispanic and Caucasian youth all reported attempting to lose weight at similar rates, 31.9%, 36.1% and 34.9% respectively (Kilpatrick et al., 1999).

There appears to be a discrepancy about the prevalence of minorities with eating disorders. Kilpatrick et al., (1999) stated that although African-American women are heavier than white women with 49% of them being overweight as opposed to 33% of White, they are less likely to have disordered eating than white women are. African-American women are generally more satisfied with their bodies, basing their definition of attractiveness on more than simply body size. Instead, they tend to include other factors such as how a woman dresses, carries and grooms herself. Some researchers have considered this broader definition of beauty and greater body satisfaction at heavier weights a potential protection against eating disorders. Studies conducted in the early 1990's indicate that African-American women exhibit less restrictive eating patterns, and that, at least among those who are college students, are less likely than white women to engage in bulimic behaviors (Fitzgibbon and Stolley, 2000).

In contrast, other studies report that eating disorders among women of color are on the rise. Hall (1995) stated that, "People furthest from the dominant ideal of beauty, specifically women of color, may suffer the psychological effects of low self-esteem, poor body image, and subsequently eating disorders." The Minnesota Adolescent Health Study found that dieting was associated with weight dissatisfaction, perceived overweight, and low body pride in all ethnic groups (Story et al., 1997).

Some of this gain may simply reflect an increase in the reporting of these problems rather than actual increases. Three factors affect the rate of reporting among minority women: underreporting of problems by the individual, under and misdiagnosing on the part of the treatment provider, and cultural bias of Diagnostic and Statistical Manual-IV criteria for eating disorders (Kilpatrick et al., 1999).

The answer to the second research question in this study, "Are there different relationships between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents according to race?" was achieved by running separate path analyses for White, Black or African American, and Hispanic or Latino females.

Theoretical Framework

Self-Discrepancy Theory

The theoretical framework for this study rests on Self-Discrepancy Theory (Higgins, 1987). According to the theory, when one's view of self is lower than an ideal of self, negative emotions result. Specifically, the theory posits that we carry three selves around: an actual self, an "ought" self, and an ideal self.

According to the theory, discrepancies between actual self and what one thinks one could be, leads to emotions like sadness, depression, and disappointment, whereas when the discrepancy is between actual self and what one thinks others expect her to be, more agitated negative emotions like guilt, anxiety, and anger are the outcome. The greater the discrepancy between our ideal and actual selves, the more likely we are to experience these feelings. It is quite possible that negative emotions such as those resulting from self-discrepancies would increase an individual's tendency toward suicide.

Figure 2.1
Self Discrepancy Theory


```
                    ┌──────────────┐         ┌──────────────┐
                 ┌─▶│ Self not equal to│──────▶│ Sadness        │
                 │  │     ideal        │       │ Depression     │
┌──────────────┐ │  └──────────────┘         │ Disappointment │
│Self-Discrepancies│                          └──────────────┘
└──────────────┘ │  ┌──────────────┐         ┌──────────────┐
                 └─▶│ Self not equal to│──────▶│ Anxiety        │
                    │     ought        │       │ Shame          │
                    └──────────────┘         │ Guilt          │
                                              └──────────────┘
```
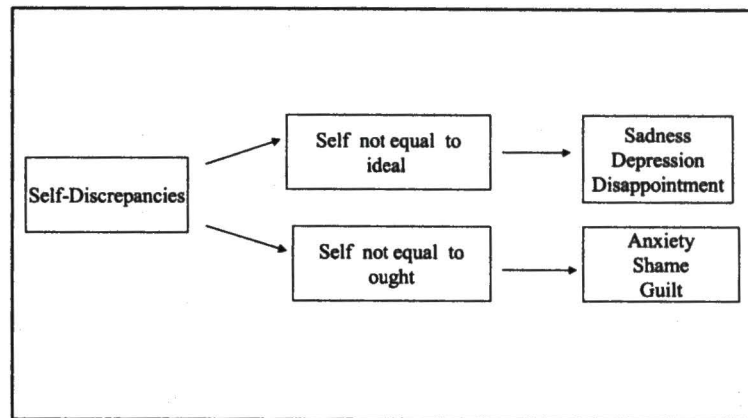
Society plays a role in setting expectations on girls and women,
particularly, on the way they should look. In western societies over the last
few decades, the ideal female body shape has been getting thinner and
thinner. Television, magazines, and many other media vehicles promote this
model body type. Many adolescents are internalizing these messages and
taking drastic methods to achieve this image and sometimes become
discourage or depressed if they cannot.

A Reuters Health study by Ackard (2003) found that adolescents who
go on eating binges and feel out of control and distressed by their behavior
might be more likely to attempt suicide than other teens. The American
Association of University Women (1990) studied 36,000 students in

Minnesota and found that girls with negative body image were three times more likely than boys of the same age, to say that they feel badly about themselves and were more likely to believe that others see them in a negative light. The study also found that negative body image is associated with suicide risk for girls. Thus, in this study, the pathways from Dietary Behavior to Suicidal Behavior and from Body Image to Suicidal Behavior were drawn. The null hypotheses, "Body image does not have a direct effect on suicidal behavior in adolescent girls." and "Dietary behavior does not have a direct effect on suicidal behavior in adolescent girls." were tested at the .05 alpha level.

Summary

These finding provide justification and support the plausibility that BMI, Body Image, and Dietary Behavior have a relationship with Suicidal Behavior in adolescent females. The model proposed that BMI has a direct effect on Suicidal Behaviors (p_1). There are also indirect effects of BMI of Suicidal Behaviors. BMI affects Dietary Behavior (p_5), which in turn affects Suicidal Behavior (p_6). BMI affects Body Image (p_2), which in turn affects Suicidal Behavior (p_3), and BMI affects Body Image (p_2) again but also affects Dietary Image (p_4), which in turn affects Suicidal Behavior (p_6). Body Image has a direct effect on Suicidal Behavior (p_3) and an indirect effect whereby it affects Dietary Behavior (p_4), which in turn affects Suicidal Behaviors (p_6). Dietary Behavior has a direct effect on Suicidal Behavior (p_6)

but no indirect effects. Figure 2.2 describes the different pathways of these relationships.

Figure 2.2
A Priori Path Model
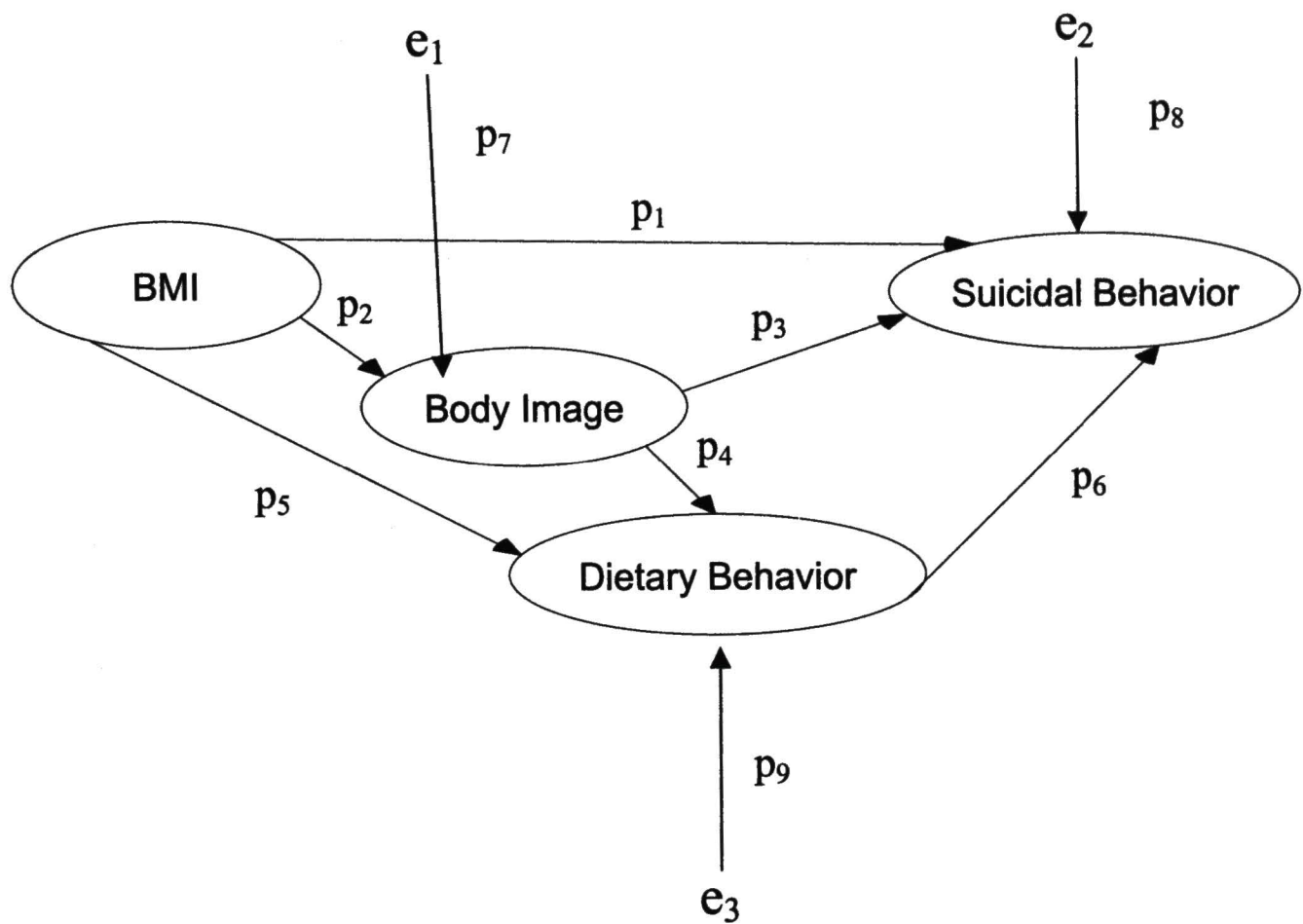
Self-discrepancy theory poses that a person does not only contain actual aspects of the self or the way a person is (p_1), but also an ideal and ought self. When applied to the proposed model, discrepancies between ideal and the female adolescent's actual state (p_2) can lead to emotions such as disappointment and suicidal behaviors (p_3). Those discrepancies are also strong influences for behavior because people often try to reduce the discrepancy (p_5). Adolescent females may be motivated to reach a state where self-concept matches what she thinks she should or could be (actual-ought), thus sometimes developing unhealthy dietary behaviors (p_4) to achieve the ideal body type. When this fails, actual-ought discrepancies represent the presence of negative outcomes, and are associated with suicidality, or other agitation-related emotions (p_6).

MATERIALS AND METHODS

2001 National School-Based Youth Risk Behavior Survey

The following information was obtained from the 2001 National School-based Youth Risk Behavior Survey (YRBS) Public-use Data Documentation. This year was chosen because it was the first YRBS conducted after the Healthy People 2000 objective 6.2a (reducing the rate of attempted suicide among females aged 14-17 to 2.0%) failed. This national survey provided the information that was used to track this objective. The assessment included information about suicidal ideation, plans, and attempts, but only the attempts that required medical attention were included in tracking the objective. The dataset used for analysis was downloaded from the Centers for Disease Control and Prevention website, located at http://www.cdc.gov/nccdphp/dash/yrbs/data/index.htm.

Development of the Youth Risk Behavior Surveillance System

The Youth Risk Behavior Surveillance System (YRBSS) was developed by the Division of Adolescent and School Health, United States Centers for Disease Control and Prevention, in collaboration with representatives from 71 state and local departments of education and 19 other federal agencies. Its main purpose is to monitor six priority health-risk behaviors that contribute

to the leading causes of morbidity, mortality and social problems among youth and adults in the United States. These behaviors include:

- Behaviors that may result in intentional injuries;
- Behaviors that may result in unintentional injuries;
- Tobacco, alcohol and other drug use;
- Sexual behaviors that may result in unintended pregnancies, HIV or other sexually transmitted diseases;
- Unhealthy dietary behaviors; and
- Inadequate physical activity.

Development of the YRBS Questionnaire

The YRBS high school survey was first implemented at the national level in 1990. Whenever possible, questions were selected for the YRBS that had been used successfully in other school-based surveys of secondary school students. The questions were developed by health and education experts in their respective fields with the National Health Objectives and National Education Goals in mind. Extensive focus group and field test work was conducted during the development of the questionnaire.

A review of student responses led to recommendations for improving the wording of some questions, setting recall periods i.e. in the past 30 days and identifying response categories. The field-testing also sought to identify

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survey conditions that would encourage honest responses. This testing found that the best method for collecting data was the classroom where students are accustomed to being tested using a paper and pencil format. This and other research indicates that risk behavior data may be gathered from adolescents as reliably as from adults. To obtain truthful answers, it was discovered that students must perceive the survey as important and believe procedures are implemented to protect their privacy and allow for anonymous and voluntary participation.

YRBS Sample Design

The 2001 national school-based survey employed a three-stage cluster sample design to produce a nationally representative sample of students in grades 9-12. The first stage sampling frame contained primary sampling units (PSUs) consisting of large counties, sub-areas of very large counties, or groups of small, adjacent counties. From the 1,256 PSUs, 57 were selected from 16 strata formed on the basis of the degree of urbanization and the relative percentage of black and Hispanic students in the PSU. The PSUs were selected with probability proportional to school enrollment size.

At the second sampling stage, 199 schools were selected with probability proportional to school enrollment size. To enable separate analysis of data for black and Hispanic students, schools with substantial numbers of black and Hispanic students were sampled at higher rates than

all other schools. The third stage of sampling consisted of randomly selecting one or two intact classes of a required subject (e.g., English or social studies) from grades 9-12 at each chosen school. All students in the selected classes were eligible to participate in the survey.

YRBS Survey Procedures

The survey is administered every other year to a random sample of classes at the high school and middle school. The average sample size across the years is approximately 1,600 students per survey at the high school level (grades 9-12) and 2,000 at the middle school level (grades 6- 8). In 2001, the national survey was conducted by the CDC and 34 state surveys and 18 local surveys were conducted by state and local education and health agencies. The survey was administered by staff that had been trained in proper methods of survey administration, including protecting students' anonymity. Student participation was voluntary. Parent consent forms and surveys were translated into six languages. Only students with positive parent/guardian permission were allowed to complete the survey.

Reliability of the YRBS Questionnaire

One hundred and fifty of 199 sampled schools participated in the national survey. There were 13,601 usable questionnaires received from the 16,398 students sampled. The school response rate was 75%, and the student response rate was 83%, resulting in an overall response rate of

63%. A weighting factor was applied to each student record to adjust for non-response and for the varying probabilities of selection, including those resulting from the over-sampling of black and Hispanic students. The weights were scaled so that a) the weighted count of students was equal to the total sample size and b) the weighted proportions of students in each grade matched national population proportions. The data are representative of students in grades 9-12 in public and private schools in the United States.

Strengths of the YRBS Questionnaire

The results from the YRBS are used by CDC to (1) monitor how priority health-risk behaviors among high school students (grades 9-12) increase, decrease, or remain the same over time; (2) evaluate the impact of broad national, state, and local efforts to prevent priority health-risk behaviors; and (3) monitor progress in achieving three leading health indicators and 15 *Healthy People 2010* national health objectives. Results also will be used to help focus programs and policies for comprehensive school health education on the behaviors that contribute most to the leading causes of mortality and morbidity.

Limitations of the YRBS Questionnaire

The national data are not the aggregate of the individual state and local surveys. The national sample was not designed to be representative of each state. The YRBS provides descriptive data on the what, who, where and

when of the self reported behaviors in the six major categories intentional and unintentional injuries; tobacco, alcohol and other drug use; sexual behaviors that may result in unintended pregnancies, HIV or other sexually transmitted diseases; unhealthy dietary behaviors; and inadequate physical activity. The questions of why and how cannot be answered by this survey. The data can only be generalized to the population that is defined in the sample: public school students in grades 7-8 and 9-12. Students who were enrolled in English as a second language classes, special education classes, correspondence schools, group home schools and correctional schools are not represented. Also, youth who dropped out of school are not included.

Path Analysis Key Concepts And Terms

The following is a general overview of path analytic key concepts and terms that were explained by Davis (1985), Kline (1998), Loehlin (1991), Pedhazur (1982), and Wright (1934).

Theoretical Assumptions of Path Analysis

Causation is investigated with experimental designs in which the independent variable is manipulated, the subsequent effects of this are measured, and variables that could confound or influence the effect of the independent variable are controlled. Path Analysis usually involves testing causal or path model with data that do not result from an experimental design. Three conditions of causation must be met: First, there must be an

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observed and measurable relationship between X_1 and Y; they must be correlated. Second, X_1 should precede Y in time. Third, X_1 and Y should have a non-spurious relationship, meaning that the observed, measurable, and temporarily ordered relationship between X_1 and Y will not disappear when the effects of other variables on this relationship are controlled. Regression can be used to test whether the data meet this assumption but only if the right confounding variable is measured.

Statistical Assumptions of Path Analysis

When performing a path analysis there are basic statistical assumptions. These assumptions include normal distributions, homoscedasticity, and linear relationships because path analysis consists of a series of regression equations. When calculating the direct and indirect effects of variables in the path model, four assumptions are necessitated:

- When two independent variables are correlated with one another and diagrammed as having no other variables influencing them, their relationship cannot be analyzed, and the magnitude of this relationship is represented by the correlation coefficient.

- It is assumed that the flow of causation in the model is unidirectional. The model is recursive, meaning that if any independent variable in the model is traced along the straight lines in the direction of the

arrows from one variable to the next, the path will not come back to the original independent variable.

- It is assumed that the variables in the model are measured on an interval scale. This assumption can be somewhat relaxed with ordinal variables especially when the number of categories increases.

- The measurement error is assumed to be zero for all variables in the model.

Recursive and Nonrecursive Models

The assumption for path analysis is that the model is recursive, meaning there is one-way flow of causation in the model. All paths between the variables flow in one direction. The only exception is when theory and previous research is insufficient to support a direction being assigned to the path. When this happens, a correlation rather than a directional relationship is assumed and a curved line indicates this with an arrow in each end. When a model is nonrecursive, at least one of the paths between two variables goes in two directions or a set of paths within the model is circular. Such models do not meet the assumptions necessary for path analysis.

Direct and Indirect Effects

Depending on its relationships with other variables in the model, an independent variable can be diagrammed as having one of three kinds of

effects on the dependent variable. This includes only direct, only indirect, or both direct and indirect.

The direct effect is the partial coefficient (beta) for y on x controlling for all prior variables and all intervening variables in the model. The indirect effect is the total causal effect minus the direct effect, and measures the effect of the intervening variables. Where effects analysis may use a variety of coefficients such as partial correlation or regression, effect decomposition in path analysis is restricted to use of regression.

Exogenous and Endogenous Variables

All variables in a path model are either endogenous or exogenous. A regression analysis needs to be performed for every endogenous variable in the model. These variables are diagrammed as being influenced by other variables in the model. Dependent variables are always endogenous but some independent variables can be also if they are influenced by other independent variables in the model. Exogenous variables in a path model are those with no explicit causes. Exogenous variables are diagrammed as independent of any influence from the other variables. They have no arrows going to them, other than the measurement error term. If exogenous variables are correlated, a double-headed arrow connecting them indicates this. Endogenous variables, then, are those that do have incoming arrows. Endogenous variables include intervening causal variables and dependents.

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Intervening endogenous variables have both incoming and outgoing causal arrows in the path diagram. The dependent variable has only incoming arrows.

Path Coefficient

A path coefficient is a standardized regression coefficient (beta) showing the direct effect of an independent variable on a dependent variable in the path model. When the model has two or more causal variables, path coefficients are partial regression coefficients that measure the extent of effect of one variable on another in the path model controlling for other prior variables, using standardized data or a correlation matrix as input. When using a path model with a variable as a dependent of a single exogenous variable and an error residual term, the path coefficient in this special case is a zero-order correlation coefficient.

Decomposition of Effects

Path coefficients may be used to decompose correlations in the model into direct and indirect effects, corresponding, of course, to direct and indirect paths reflected in the arrows in the model. This is based on the rule that in a linear system, the total causal effect of variable i on variable j is the sum of the values of all the paths from i to j.

Effect decomposition is equivalent to effects analysis in regression. In general, any bivariate correlation may be decomposed into spurious and total causal effects, and the total causal effect can be decomposed into a direct and an indirect effect. The total effect is reflected in the bivariate coefficient, which for standardized data is the correlation coefficient and for raw data is the regression coefficient, b_{yx}. The total causal effect is the coefficient in a regression with all of the model's prior but not intervening variables for x and y controlled (the beta coefficient for the standardized solution, the partial b coefficient for the unstandardized or raw solution).

Study Design

From the public use version of the 2001 Youth Risk Behavior Survey, a sample (n= 5,218) of White, Black or African American, and Hispanic or Latino adolescent females aged 14-17 were selected for analysis. This cross-sectional study involved public high school students in grades 9-12. Variables indicative of suicidal behavior were identified using Self Discrepancy Theory (Higgins, 1982) as a framework. Higgins' theory posits that when a person's actual state is different from what she or society views as acceptable, an internal conflict arises. This conflict motivates behaviors that are aimed at achieving this ideal state.

The Female Adolescent Model (n= 5,218) was drawn to reflect the assumption that when an adolescent female had a low body image of herself,

she would strive to attain the perfect image. These behaviors included using laxatives, vomiting, taking diet pills, or fasting for more than 24 hours to achieve the "perfect body image". When these actions failed or did not correct the adolescent's self view, depressive emotions would arise and sometimes lead to suicidal behavior. The variables/constructs BMI, Body Image, and Dietary Behavior were hypothesized to contribute to Suicidal Behavior in adolescent females and were examined using a path analysis.

Path Model

A path model is a diagram relating independent, intermediary, and dependent variables. Single arrows indicate causation between exogenous or intermediary variables and the dependent(s). Arrows also connect the error terms with their respective endogenous variables. Double arrows indicate correlation between pairs of exogenous variables. Sometimes the widths of the arrows in the path model are drawn in a width that is proportional to the absolute magnitude of the corresponding path coefficients.

This project studied the effects of BMI (antecedent), Body Image (mediator), and Dietary Behavior (mediator) on Suicidal Behavior (consequent). A recursive model was drawn (see Figure 2.2) with a single-arrowed path from the exogenous variable, BMI, to each endogenous variable in the model, Body Image, Dietary Behavior, and Suicidal Behavior. A single-arrowed path from the endogenous variable Body Image was then

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drawn to the remaining two endogenous variables, Dietary Behavior and Suicidal Behavior. Finally, the last single-arrowed path was drawn from the endogenous variable, Dietary Behavior, to Suicidal Behavior. This signified that only a direct effect existed between these two variables.

The arrow from e_1 to Body Image (p_7) was drawn to signify the amount of variance in Body Image that is not accounted for by BMI. The arrow from e_2 to Suicidal Behavior (p_8) was drawn to signify the amount of error arising from the variance in Suicidal Behavior that is not explained BMI, Body Image and Dietary Behavior. The arrow from e_3 to Dietary Behavior (p_9) denotes the amount of variance in Dietary Behavior that is unexplained by BMI and Body Image. These error terms point to the fact that there are other variables that have an impact on Body Image, Dietary Behavior, and Suicidal Behavior but which were not included in the path diagram.

Definition of Terms

Adolescent Females/Teenage Girls- Includes girls ages 14 through 17. The categories, "12 years old or younger", "13" and "18 years old or older" were excluded to accurately replicate the ages the ages of interest from the Healthy People 2000 objective 6.2a.

Race/Ethnicity- How respondents identified themselves when asked "How do you describe yourself? ". Choices included White, Black or African

American, Hispanic or Latino, American Indian/ Alaska Native, Asian, Native Hawaiian/other Pacific Islander, Multiple-Hispanic, or Multiple-Non-Hispanic. Those girls who identified themselves as American Indian/ Alaska Native, Asian, or Native Hawaiian/ other Pacific Islander were deleted from the data set due to low numbers and them belonging to a race/ethnicity not included in this research design. Other females were excluded because they answered the question as Multiple-Hispanic, Multiple-Non-Hispanic, or skipped the question.

Independent Variables

Body Mass Index (BMI)

This variable was determined from a calculated measure derived from the respondents when asked to provide weight and height. Previous research has established that self-reported weight and height are reliable (Brooks-Gunn, Warren, Rosso, & Gargiulo, 1986). Data were recorded in meters and kilograms. The following formula was used to convert the responses to BMI:

$$BMI = \frac{\text{Weight in Kilograms}}{(\text{Height in Meters})^2}$$

The nationally accepted standard separates individuals into three groups according to their BMI: less than 18.5 (underweight), 18.5-24.9 (normal), and 25 or above (overweight). BMI was kept as a continuous variable and the final construct was named BMI.

Body Image

This variable was determined from the questions:

1. How do you describe your weight? Responses were coded (0) when answered average, slightly underweight, or slightly overweight to reflect satisfactory body image; and (1) when answered very underweight, or very overweight to reflect poor body image.

2. Which of the following are you trying to do about your weight? Responses were coded (0) when answered stay the same weight or not trying to do anything reflect satisfactory body image; and (1) when answered lose weight or gain weight to reflect poor body image.

A sum score for each participant was then constructed based on the answers to both items in the construct. A high score was reflective of poor body image; whereas a low score was reflective of positive body image. The final construct was renamed (i.e., SumBody).

Dietary Behavior

This variable was included to showcase unhealthy eating habits and determined from the following questions:

1. During the past 30 days, did you go without eating for 24 hours or more (also called fasting) to lose weight or to keep from gaining weight? Responses were coded (0) when answered no, and (1) when answered yes.

2. During the past 30 days, did you take any diet pills, powders, or liquids without a doctor's advice to lose weight or to keep from gaining weight? Responses were coded (0) when answered no, and (1) when answered yes.

3. During the past 30 days, did you vomit or take laxatives to lose weight or to keep from gaining weight? Responses were coded (0) when answered no, and (1) when answered yes.

The YRBS 2001 did not include specific questions about excessive eating. A sum score for each participant was then tabulated based on the answers to all three items in the construct and was renamed SumDiet. A high score was reflective of unhealthy dietary behavior; whereas a low score was reflective of better dietary behavior. The categories were labeled as follows:

"0"   No Involvement

"1"   Low Involvement (practices 1 behavior)

"2"   Moderate Involvement (practices 2 behaviors)

"3"   High Involvement (practices 3 behaviors)

<u>Dependent Variable</u>

Suicidal Behavior

This variable was determined when respondents gave a positive response to at least one of the following questions. Responses were coded (0) if the question was answered no, and (1) when the question was answered yes.

1. During the past 12 months, did you ever seriously consider attempting suicide?

2. During the past 12 months, did you make a plan about how you would attempt suicide?

3. During the past 12 months, how many times did you actually attempt suicide?

For the final question in the construct, responses were coded (0) if the question was answered zero times, and (1) when the question was answered one or more times. A sum score for each participant was then tabulated based on the answers to all three items in the construct. The final construct was renamed (i.e., SumSuic).

Research Questions

- Question 1- Is there a relationship between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents?

- Question 2- Are there different relationships between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents according to race?

Null Hypotheses

The following null hypotheses were tested at the 0.05 level of significance.

- $H_0 1$- BMI does not have a direct effect on suicidal behavior in adolescent girls.

- $H_0 2$- BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on body image.

- $H_0 3$- BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on body image and dietary behavior.

- $H_0$4- Body image does not have a direct effect on suicidal behavior in adolescent girls.

- $H_0$5- Body image does not have an indirect effect on suicidal behaviors in adolescent girls through its influence on dietary behavior.

- $H_0$6- Dietary behavior does not have a direct effect on suicidal behavior in adolescent girls.

- $H_0$7- There will not be a different total effect between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents when examined by race.

Procedure

<u>Conducting the Path Analysis</u>

The YRBS data was reduced so that there were no missing values for any subset included in the path. A secondary analysis of survey data from the 2001 YRBS was performed. An input path model (See Figure 2.2) was drawn using AMOS 5© software to explicitly state the statistical hypotheses. Pearson correlations (See Table 4.12) were obtained to determine if the variables were significantly related. BMI was then controlled for to check for

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possible confounding. There was very little change in the values, signifying that BMI was not a confounding variable, and the path analysis was qualified to continue. Multiple regression was performed to ascertain the direct and indirect effects of independent variables of Body Image, BMI, and Dietary Behavior and to calculate their quantifiable relationship to the dependent variable, Suicidal Behavior.

Multiple Regression Analysis

Multiple correlation analysis was performed to establish relationships between the independent variables body mass index (BMI), dietary habits, and self-perception of body weight status and satisfaction (body image) and the dependent variable, suicidal behavior.

Equations

1. Body Image= $x_1$bmi + e_1 (yielded p_2)

2. Suicidal Behavior= $x_1$bmi + $x_2$body + $x_3$diet + e_2 (yielded p_1, p_3, p_6)

3. Dietary Behavior= $x_1$bmi + $x_2$body + e_3 (yielded p_5 and p_4)

An analysis for each set of causal relationships was performed. The standardized regression coefficients (Beta) from these regressions were calculated as path coefficients. The coefficients and t-values (see table 4.25) identified which variables from the theoretical framework were significantly related to the dependent variable at the $a = 0.05$ level.

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The coefficient of determination from the multiple regressions (R^2)
was reported to represent the variance in the dependent variable defined by
the regression. The total variance is 1, and then the difference is the
unexplained variance. The linear correlation between variables and the
residual (unexplained) variance was calculated using the following equation:

$$U = \sqrt{1-R^2}$$

The overall path model fit to the data was tested by computing the
generalized squared multiple correlation as follows (Pedhazur, 1982):

$$R^2_m = 1- (1-R^2_1)\ (1-R^2_2)\ (1-R^2_3)$$

The R^2 values were the squared multiple correlation coefficients from
each of the separate regression analysis. Each term in the parentheses was
the squared residual path coefficient.

The coefficient of determination (R^2) was obtained from the original
multiple regression analysis of the Total Adolescent Female Model. When the
paths were reproduced and the indirect and direct effects were decomposed,
the path model R^2_m was calculated. This measured how well the model fit the

data. If there was a noticeable improvement over the original multiple regression value of R^2, the reproduced model was a better fit.

The path model was then run separately for Whites (n = 2,768), Black or African Americans (n = 1,206), and Hispanic or Latinos (n = 1,244) to determine if adolescent girls from different racial groups have different correlation relationships with the independent variables as well as the dependent variable.

CHAPTER IV

ANALYSIS OF THE DATA AND RESULTS

Descriptive Statistics

There were 6,952 adolescent females who participated in the 2001 YRBS. From this population, 3,193 (46%) identified themselves as being White, 1407 (20%) identified themselves as being black or African American, and 1489 (21%) identified themselves as being Hispanic or Latino. Those girls who identified themselves as American Indian/ Alaska Native (101, 2%), Asian (199, 3%), or Native Hawaiian/ other Pacific Islander (58, 1%) were deleted from the sample due to low numbers and them belonging to a race/ethnicity not included in this research design. In addition, 505 other females were excluded because they answered the question as Multiple-Hispanic, Multiple-Non-Hispanic, or skipped the question.

The response categories"12 years old or younger", "13", and "18 years old or older" from the variable which asked, "How old are you?" were also excluded from the sample to replicate the ages of interest (14-17) from the Healthy People 2000 objective. After these deletions, the sample size was 5,218, with 2,768 (53%) White, 1,244 (24%) Hispanic or Latino, and 1,206 (23%) Black or African American (Table 4.1).

Table 4.1
Racial/Ethnic Distribution Within Adolescent Female Sample

	Frequency	Percent
Black or African American	1206	23.1
Hispanic or Latino	1244	23.8
White	2768	53.0
Total	5218	100.0

The YRBS code was removed for Question1 (How old are you?) and the variable was renamed Age to calculate the mean. The mean age for the sample was 15.78 and the distribution is found in Table 4.2.

Table 4.2
Age Distribution Within Adolescent Female Sample

age

	Frequency	Percent
14	611	11.7
15	1436	27.5
16	1628	31.2
17	1543	29.6
Total	5218	100.0

The mean BMI from the sample was 22.5. African American adolescent females had the largest percentage of overweight (29%) followed by Hispanics (24%) and Whites (15%). The results were the opposite for underweight adolescent females, with Whites having the highest percentage (15%) followed by Hispanics and African Americans with 10% and 9%, respectively (Table 4.3).

Table 4.3
Body Mass Index Within Adolescent Female Sample

	Normal	Underweight	Overweight	Total
Black or African American	679	100	316	1095
	62.0%	9.1%	28.9%	100.0%
Hispanic or Latino	754	109	264	1127
	66.9%	9.7%	23.4%	100.0%
White	1820	396	391	2607
	69.8%	15.2%	15.0%	100.0%
Total	3253	605	971	4829
	67.4%	12.5%	20.1%	100.0%

Chi-square =120.89 with df =4 (p=.000)

African American adolescent females had the greatest percentage (36%) of low scores within the construct Body Image, where a score of zero denoted a positive body image, a score of one was moderate, and a score of two was a negative perception (Table 4.4). Hispanics had the highest

percentage (8%) of high scores within the construct, which indicated negative body image.

Table 4.4
Body Image Within Adolescent Female Sample

	Body Image			
	Positive	Moderate	Negative	Total
Black or African American	427	701	66	1194
	35.8%	58.7%	5.5%	100.0%
Hispanic or Latino	351	781	96	1228
	28.6%	63.6%	7.8%	100.0%
White	838	1771	147	2756
	30.4%	64.3%	5.3%	100.0%
Total	1616	3253	309	5178
	31.2%	62.8%	6.0%	100.0%

Chi-square = 24.37, with df =4 (p=.000)

Hispanic adolescent females had the highest occurrence (28%) of engaging in one or more unhealthy dietary behaviors (Table 4.5); such as vomiting or taking laxatives to lose weight or to keep from gaining weight, taking diet pills, powders, or liquids without a doctor's advice to lose weight or to keep from gaining weight, or going without eating for 24 hours or more (also called fasting) to lose weight or to keep from gaining weight. White females were second with 27% practicing these at least one behavior and African Americans were third with 18%.

Table 4.5
Unhealthy Dietary Behavior Within Adolescent Female Sample

	Dietary Behavior				
	No Involvement	Low Involvement	Moderate Involvement	High Involvement	Total
Black or African American	950	171	27	10	1158
	82.0%	14.8%	2.3%	.9%	100.0%
Hispanic or Latino	874	217	91	34	1216
	71.9%	17.8%	7.5%	2.8%	100.0%
White	1992	458	192	94	2736
	72.8%	16.7%	7.0%	3.4%	100.0%
Total	3816	846	310	138	5110
	74.7%	16.6%	6.1%	2.7%	100.0%

Chi-square =69.08 with df =6 (p=.000)

White adolescent females in this sample cohort were most likely to display suicidal behavior (27.4%), as shown in Table 4.6. This percentage included suicide ideation, described as seriously thinking about suicide or making a suicide plan (10.2%), and actually attempting suicide (17.2%). Hispanic/ Latino adolescent females were more likely to exhibit suicidal behavior (26.6%) than Black/African American adolescent females (20.5%). However, when the actions were examined as suicide ideation versus suicidal attempts, Hispanic/ Latino adolescent females had the highest attempt rate (16.1%) compared to 10.2% and 9.5% for White and Black/African American adolescent females, respectively.

Table 4.6
Suicidal Behavior Within Adolescent Female Sample

		Suicidal Behavior			
		Non Suicidal	Suicide Ideation	Suicide Attempt	Total
	Black or African American	782	108	93	983
		79.6%	11.0%	9.5%	100.0%
	Hispanic or Latino	794	114	174	1082
		73.4%	10.5%	16.1%	100.0%
	White	1894	447	265	2606
		72.7%	17.2%	10.2%	100.0%
Total		3470	669	532	4671
		74.3%	14.3%	11.4%	100.0%

Chi-square = 65.27, with df =4 (p=.000)

Involvement in Suicidal Behavior such as seriously thinking about suicide and making a plan to commit suicide was greatest (26.8%) in 14 year olds and least (25.1%) in 15 year olds. An actual suicide attempt was lowest in older female adolescents (17 year olds) with 9.4% attempting but the most (15.8%) in suicide ideation (Table 4.7).

Table 4.7
Suicidal Behavior Within Adolescent Female Sample by Age

		Suicidal Behavior			
		Non Suicidal	Suicide Ideation	Suicide Attempt	Total
age	14	398	78	68	544
		73.2%	14.3%	12.5%	100.0%
	15	965	174	149	1288
		74.9%	13.5%	11.6%	100.0%
	16	1071	199	184	1454
		73.7%	13.7%	12.7%	100.0%
	17	1031	218	129	1378
		74.8%	15.8%	9.4%	100.0%
Total		3465	669	530	4664
		74.3%	14.3%	11.4%	100.0%

Chi-square= 11.10 with df =6 (p=.085)

The percentage of suicidal behavior decreased as the female adolescent progressed in school. The rate of involvement was highest (27.2%) for 9th graders, 26.9% for 10th graders, 24.4% for 11th graders, and lowest (22.8%) for 12th graders (Table 4.8).

Table 4.8
Suicidal Behavior Within Adolescent Female Sample by Grade

		Suicidal Behavior			
		Non Suicidal	Suicide Ideation	Suicide Attempt	Total
9th grade		1005	190	185	1380
		72.8%	13.8%	13.4%	100.0%
10th grade		1006	200	171	1377
		73.1%	14.5%	12.4%	100.0%
11th grade		991	182	138	1311
		75.6%	13.9%	10.5%	100.0%
12th grade		455	94	34	583
		78.0%	16.1%	5.8%	100.0%
Total		3457	666	528	4651
		74.3%	14.3%	11.4%	100.0%

Chi-square = 26.85 with df =6 (p=.000)

Suicidal behavior in White female adolescents mimicked the trend that was apparent in the female adolescent model by gradually decreasing from 30.3% in the 9th grade to 21.8% in the 12th grade. African American females were just the opposite. Their rate for suicidal behavior increased as grade level progressed, moving from 17.3% in 9th grade to 22.0% in the 12th grade. Hispanic females were most likely to display suicidal behavior in the 10th grade (29.5%), which reduced to 22.3% by the 12th grade (Table 4.9).

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Table 4.9
Suicidal Behavior Within Adolescent Female Sample by Race/Ethnicity and Grade

		Suicidal Behavior			
		Non Suicidal	Suicide Ideation	Suicide Attempt	Total
Black or African American	9th grade	239	23	27	289
		82.7%	8.0%	9.3%	100.0%
	10th grade	206	21	35	262
		78.6%	8.0%	13.4%	100.0%
	11th grade	242	46	22	310
		78.1%	14.8%	7.1%	100.0%
	12th grade	92	17	9	118
		78.0%	14.4%	7.6%	100.0%
	Total	779	107	93	979
		79.6%	10.9%	9.5%	100.0%
Hispanic or Latino	9th grade	253	35	67	355
		71.3%	9.9%	18.9%	100.0%
	10th grade	210	36	52	298
		70.5%	12.1%	17.4%	100.0%
	11th grade	221	25	41	287
		77.0%	8.7%	14.3%	100.0%
	12th grade	108	18	13	139
		77.7%	12.9%	9.4%	100.0%
	Total	792	114	173	1079
		73.4%	10.6%	16.0%	100.0%
White	9th grade	513	132	91	736
		69.7%	17.9%	12.4%	100.0%
	10th grade	590	143	84	817
		72.2%	17.5%	10.3%	100.0%
	11th grade	528	111	75	714
		73.9%	15.5%	10.5%	100.0%
	12th grade	255	59	12	326
		78.2%	18.1%	3.7%	100.0%
	Total	1886	445	262	2593
		72.7%	17.2%	10.1%	100.0%

Chi-square (Black) =16.95, with df =6 (p=.009)
Chi-square (Hispanic) =10.49, with df =6 (p=.105)
Chi-square (White) =21.18 with df =6 (p=.002)

White female adolescents had the highest percentage of suicidal

behavior (19.5%) when body image was considered positive (Table 4.10).

African Americans had the lowest percentage (40.4%) of suicidal behavior

when body image was most negative, with Hispanics having the highest

(47.0%).

Table 4.10
Suicidal Behavior Within Adolescent Female Sample by
Race/Ethnicity and Body Image

			Suicidal Behavior			
			Non Suicidal	Suicide Ideation	Suicide Attempt	Total
Black or African American	Body Image	Positive	283	33	25	341
			83.0%	9.7%	7.3%	100.0%
		Moderate	459	65	53	577
			79.5%	11.3%	9.2%	100.0%
		Negative	34	10	13	57
			59.6%	17.5%	22.8%	100.0%
	Total		776	108	91	975
			79.6%	11.1%	9.3%	100.0%
Hispanic or Latino	Body Image	Positive	249	30	23	302
			82.5%	9.9%	7.6%	100.0%
		Moderate	491	67	122	680
			72.2%	9.9%	17.9%	100.0%
		Negative	44	15	24	83
			53.0%	18.1%	28.9%	100.0%
	Total		784	112	169	1065
			73.6%	10.5%	15.9%	100.0%
White	Body Image	Positive	641	109	46	796
			80.5%	13.7%	5.8%	100.0%
		Moderate	1164	309	182	1655
			70.3%	18.7%	11.0%	100.0%
		Negative	75	29	34	138
			54.3%	21.0%	24.6%	100.0%
	Total		1880	447	262	2589
			72.6%	17.3%	10.1%	100.0%

Chi-square (Black) =18.68, with df =4 (p=.001)Chi-square (Hispanic) =36.76,
with df =4 (p=.000), Chi-square (White) =68.11, with df =4 (p=.000)

African American adolescent females had the lowest percentage (17.0%) of suicidal behavior when there was no involvement in unhealthy dietary behavior and the highest percentage (66.7%) when there was the high involvement of practicing three behaviors (Table 4.11).

Table 4.11
Suicidal Behavior Within Adolescent Female Sample by Race/Ethnicity and Dietary Behavior

			Suicidal Behavior			
			Non Suicidal	Suicide Ideation	Suicide Attempt	Total
Black or African American	Dietary Behavior	No Involvement	659	75	60	794
			83.0%	9.4%	7.6%	100.0%
		Low Involvement	100	22	21	143
			69.9%	15.4%	14.7%	100.0%
		Moderate Involvement	9	7	5	21
			42.9%	33.3%	23.8%	100.0%
		High Involvement	3	1	5	9
			33.3%	11.1%	55.6%	100.0%
	Total		771	105	91	967
			79.7%	10.9%	9.4%	100.0%
Hispanic or Latino	Dietary Behavior	No Involvement	627	67	83	777
			80.7%	8.6%	10.7%	100.0%
		Low Involvement	102	34	44	180
			56.7%	18.9%	24.4%	100.0%
		Moderate Involvement	37	8	29	74
			50.0%	10.8%	39.2%	100.0%
		High Involvement	15	3	13	31
			48.4%	9.7%	41.9%	100.0%
	Total		781	112	169	1062
			73.5%	10.5%	15.9%	100.0%
White	Dietary Behavior	No Involvement	1498	257	121	1876
			79.9%	13.7%	6.4%	100.0%
		Low Involvement	263	110	63	436
			60.3%	25.2%	14.4%	100.0%
		Moderate Involvement	85	58	38	181
			47.0%	32.0%	21.0%	100.0%
		High Involvement	31	18	42	91
			34.1%	19.8%	46.2%	100.0%
	Total		1877	443	264	2584
			72.6%	17.1%	10.2%	100.0%

Chi-square (Black) =54.84, with df =6 (p=.000), Chi-square (Hispanic) =95.23, with df =6 (p=.000), Chi-square (White) =280.33, with df =6 (p=.000)

Results Of Multiple Regression/Path Analysis

Internal reliability testing was done for the construct, Body Image. Body image is a latent variable and internal reliability testing is important to determine if the items that make up the scale are internally consistent. It answers the question of whether the scale is measuring a single idea. The items used for the scale to define body image resulted in a reliability coefficient or Cronbach's alpha of 0.78. Cronbach's Alpha calculates the average of possible split-half reliability coefficients. Generally, the result should be 0.8 or above so the calculated value was regarded as internally reliable for this study.

Pearson correlations (Table 4.12) for the variables BMI, Body Image, Dietary Behavior, and Suicidal Behavior from the Female Adolescent Model were obtained. All the correlations between the variables were significant ($p < .05$), meaning that they have an influence on one another. BMI was also tested for confounding, which causes the enhancement or lessening of effects of other variables. This would have been demonstrated if the values for the partial correlations were greatly different from the zero order correlations when BMI was controlled for. Next, three multiple regressions were performed to obtain standardized coefficients (Betas) to complete the path analysis.

Table 4.12
Pearson Correlations Within Adolescent Female Model

Variable	Suicidal Behavior	Dietary Behavior	BMI	Body Image
Mean	.5005	.3687	22.436	.7397
Standard Dev.	.9479	.7209	4.4821	.5493
Cases	4288	4288	4288	4288

Zero Order Correlations

	SUICIDAL BEHAVIOR	BODY IMAGE	DIETARY BEHAVIOR	BMI
SUICIDAL BEHAVIOR	1.0000	.1651*	.3061*	.0883*
BODY IMAGE	.1651*	1.0000	.2836*	.3534*
DIETARY BEHAVIOR	.3061*	.2836*	1.0000	.1344*
BMI	.0883*	.3534*	.1344*	1.0000

4286 cases, * denotes significance

Controlling for BMI

	SUICIDAL BEHAVIOR	BODY IMAGE	DIETARY BEHAVIOR
SUICIDAL BEHAVIOR	1.0000	.1437*	.2981*
BODY IMAGE	.1437*	1.0000	.2547*
DIETARY BEHAVIOR	.2981*	.2547*	1.0000

4285 cases, * denotes significance

Path coefficients were obtained to represent the magnitude of influence of the antecedent (BMI) and mediators (Body Image, Dietary Behavior) on one another as well as the outcome variable (Suicidal Behavior). Multiple regression using the equation, *Suicidal Behavior = x_1bmi + x_2body + x_3diet + e_2,* only accounted for the direct effects of BMI, Body Image, and Dietary Behavior on Suicidal Behavior (p_1, p_3, p_6) in the Female Adolescent Model. Two additional regression equations, *Body Image = x_1bmi + e_1* and *Dietary Behavior = x_1bmi + x_2body + e_3,* were required to generate coefficients for the indirect effects of BMI and Body Image on Suicidal Behavior (p_2, p_5, p_4) to complete each path in the Female Adolescent Model.

The Stepwise regression procedure was not used because the SPSS program's default criteria for inclusion and exclusion would have possibly prevented certain variables from entering into the equations. Therefore, the SPSS program's Enter method was used for each of the three regressions to force all the variables (BMI, Body Image, Dietary Behavior, and Suicidal Behavior) into the equations. Failure to do this would have meant that if any variables were found to be statistically insignificant, SPSS would not have included them in the model and no standardized coefficients (Betas) would be computed for them. Listwise deletion of missing cases was performed during each procedure.

The standardized coefficient, Beta (β) was used to allow for the comparison of the magnitudes of each path in the Female Adolescent Model. These coefficients were needed to determine the direct, indirect, and total effect of each independent variable. They were also useful in determining which antecedent or mediator had the greatest direct effect on the outcome variable.

The coefficient of determination (R^2) was determined for each model. This measured how well the least square equation $y = b_0 + b_1 x$ performed as a predictor of y. A general formula is:

$$R^2 = \frac{SS_{reg}}{SS_{tot}} = 1 - \frac{SS_{res}}{SS_{tot}}$$

The smaller the sum of square residual, the better the model represented the real system, which means the better the model fit the data, the closer the coefficient of determination close to 1. The value of R^2, in general, is always between 0 and 1. "0" meaning the model did not fit the data, while "1" meaning the model fit the data perfectly.

Female Adolescent Model

Linear regression was performed with Body Image as the Dependent variable and BMI as the Independent variable, as stated in Equation 1 *(Body Image = $x_1 bmi$ + e_1)*. This was followed by the execution of Equation 2 *(Suicidal Behavior = $x_1 bmi$ + $x_2 body$ + $x_3 diet$ + e_2)*, which required Suicidal Behavior as the Dependent variable and BMI, Body Image, and Dietary Behavior as the Independent variables. Finally, Equation 3 *(Dietary Behavior = $x_1 bmi$ + $x_2 body$ + e_3)* was run with Dietary Behavior as the Dependent variable and BMI and Body Image as the Independent variables. The results are found in Table 4.13.

Table 4.13
Female Adolescent Model Results

Pathway	Std. Error	Beta	t	Sig.
BMI → Body Image (p_2)	.002	.350*	25.878	.000
BMI → Suicidal Behavior (p_1)	.003	.023	1.503	.133
Body Image → Suicidal Behavior (p_3)	.028	.077*	4.817	.000
Dietary Behavior → Suicidal Behavior (p_6)	.020	.281*	18.593	.000
BMI → Dietary Behavior (p_5)	.002	.048*	3.193	.001
Body Image → Dietary Behavior (p_4)	.019	.264*	17.705	.000

R^2 = .27, * denotes significance at 0.05

Decomposition of Effects

The overall impact of the variable BMI on Suicidal Behavior for the entire female adolescent sample was calculated by taking the direct effect of BMI (.02) and adding to it the indirect effects. Multiplying the coefficients for each path from BMI to Suicidal Behavior assembled the indirect effects. The paths from BMI to Dietary Behavior to Suicidal Behavior were calculated as (.05)(.28) = .01. The paths from BMI to Body Image to Suicidal Behavior were calculated as (.35)(.08) = .03. The paths from BMI to Body Image to Dietary Behavior to Suicidal Behavior were calculated as (.35)(.26)(.28) = .03. The total indirect effect of BMI on Suicidal Behavior is .01 + .03 + .03 = .07. The total effect of BMI on Suicidal Behavior is the direct effect (.02) plus the indirect effects (.07), which equaled .09.

The overall impact of the variable Body Image on Suicidal Behavior for the entire female adolescent sample was calculated by taking the direct effect of Body Image (.08) and adding to it the indirect effects. Multiplying the coefficients for each path from Body Image to Suicidal Behavior assembled the indirect effects. The paths from Body Image to Dietary Behavior to Suicidal Behavior were calculated as (.26)(.28) = .07. The total effect of Body Image on Suicidal Behavior is the direct effect (.08) plus the indirect effects (.07), which equaled .15. The overall impact of the variable Dietary Behavior on Suicidal Behavior was direct and equal to .28 with no indirect effects.

Model Summary

The results from the Female Adolescent Model found that BMI had a weak and insignificant (β = .02, p= .133) direct effect on Suicidal Behavior. The indirect effects of BMI on Suicidal Behaviors were stronger and all significant (p<. 05). BMI affected Dietary Behavior (β = .05), which in turn affected Suicidal Behavior (β = .01). BMI also affected Body Image (β = .35), which in turn affected Suicidal Behavior (β = .08). Finally, BMI affected Body Image again (β = .35) but also affected Dietary Behavior (β = .26), which in turn affected Suicidal Behavior (β = .28). Body Image had a weak, but statistically significant direct effect on Suicidal Behavior (β = .08, p=. 000) but a stronger significant indirect effect whereby it affected Dietary Behavior (β = .26), which in turn affected Suicidal Behavior (β = .28). Dietary Behavior had a moderate, statistically significant direct effect on Suicidal Behavior (β = .28), but no indirect effects (Figure 4.1).

The arrow e1 to Body Image ($\sqrt{1-R^2}$= .94) refers to the amount of variance in Body Image that was not accounted for by BMI. The arrow from e2 to Suicidal Behavior (.95) denotes the amount of error arising from the variance in Suicidal Behavior that was not explained by BMI, Body Image and Dietary Behavior. The arrow from e3 to Dietary Behavior (.96) denotes the amount of variance in Dietary Behavior that was not explained by BMI and Body Image. These error terms point to the fact that there were other variables that had an impact on Body Image and Suicidal Behavior but which

were not included in the path diagram. The calculated R^2 concluded that 27% of the variance in Suicidal Behavior is explained by BMI, Body Image, and Dietary Behavior in the model.

Model Fit

The overall path model fit to the data was tested by computing the generalized squared multiple correlation. The coefficient of determination obtained from the original multiple regression analysis of the Total Adolescent Female Model was $R^2 = .10$. When reproduced and accounting for direct and indirect effects, the path model R^2_m was calculated using the R^2 values from each multiple regression equation; Body Image= $x_1$bmi + e_1, Suicidal Behavior= $x_1$bmi + $x_2$body + $x_3$diet + e_2, and Dietary Behavior= $x_1$bmi + $x_2$body + e_3. This value was determined to be $R^2_m =. 27$.

This procedure measured how well the line fit the data. There was a noticeable improvement over the original multiple regression model value ($R^2 = .10$) that was previously obtained from the Female Adolescent multiple regression equation, *Suicidal Behavior = x$_1$bmi + x$_2$body + x$_3$diet + e$_2$*.

Figure 4.1
Path Model for Female Adolescents
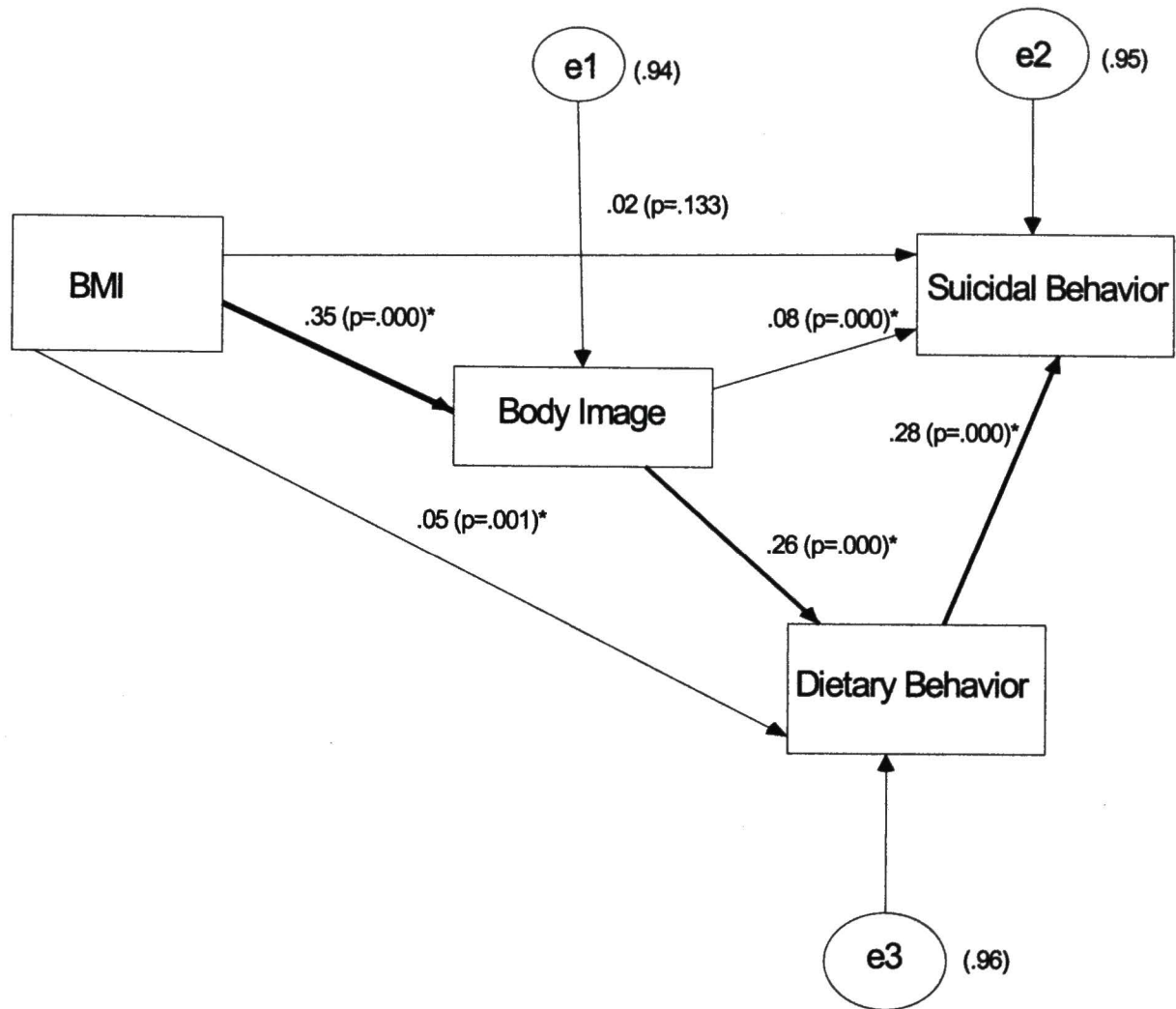
n= 5,218
Mean BMI-22.5
R^2 = .27
* denotes significance

White Female Adolescent Model

After calculating the total effect of BMI, Body Image, and Dietary Behavior on Suicidal Behavior for the entire female sample, the path model was analyzed by race. For the first racial analysis, only female adolescents identified as White (n= 2,768) were selected. The same procedure that was used to complete the Female Adolescent Model was employed. The results are found in Table 4.14

Table 4.14
White Female Adolescent Model Results

Pathway	Std. Error	Beta	t	Sig.
BMI → Body Image (p_2)	.002	.390*	21.557	.000
BMI → Suicidal Behavior (p_1)	.005	.022	1.050	.294
Body Image → Suicidal Behavior (p_3)	.038	.067*	3.102	.002
Dietary Behavior → Suicidal Behavior (p_6)	.025	.308*	15.394	.000
BMI → Dietary Behavior (p_5)	.004	.015	.749	.454
Body Image → Dietary Behavior (p_4)	.029	.287*	13.960	.000

R^2 = .32, * denotes significance at 0.05

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Decomposition of Effects

The overall impact of the variable BMI on Suicidal Behavior for White adolescent females was calculated by taking the direct effect of BMI (.02) and adding to it the indirect effects. The paths from BMI to Dietary Behavior to Suicidal Behavior were calculated as (.02)(.31) = .01. The paths from BMI to Body Image to Suicidal Behavior were calculated as (.39)(.07) = .03. The paths from BMI to Body Image to Dietary Behavior to Suicidal Behavior were calculated as (.39)(.29)(.31) = .04. The total indirect effect of BMI on Suicidal Behavior is .01 + .03 + .04 = .08. The total effect of BMI on Suicidal Behavior for White adolescent females was the direct effect (.02) plus the indirect effects (.08), which was .10.

The overall impact of the variable Body Image on Suicidal Behavior for White adolescent females was calculated by taking the direct effect of Body Image (.07) and adding it to the indirect effects. The paths from Body Image to Dietary Behavior to Suicidal Behavior were calculated as (.29)(.31) = .09. The total effect of Body Image on Suicidal Behavior was the direct effect (.07) plus the indirect effects (.09), which was .16.

The overall impact of the variable Dietary Behavior on Suicidal Behavior for White adolescent females was direct and equal to .31 and had no indirect effects (Figure 4.2).

Model Summary

The results from the White Female Adolescent Model were similar to the Female Adolescent Model. BMI was found to have a weak, insignificant (β = .02, p= .294) direct effect on Suicidal Behavior. BMI indirectly affected Dietary Behavior, but also insignificantly (β = .02, p= .454), which in turn affected Suicidal Behavior (β = .31). BMI also significantly affected Body Image (β = .39, p= .000), which in turn affected Suicidal Behavior (β = .07, p= .002). Finally, BMI affected Body Image again but also affected Dietary Behavior (β = .29, p= .000), which in turn affected Suicidal Behavior (β = .31, p= .000). Body Image had a weak direct effect on Suicidal Behavior (β = .07, p= .002) but a stronger significant indirect effect (p< .05) whereby it affects Dietary Behavior (β = .29), which in turn affected Suicidal Behavior (β = .31). Dietary Behavior had a moderate, significant, direct effect on Suicidal Behavior (β = .31, p= .000), but no indirect effects.

The amount of variance in Body Image that was not accounted for by BMI (e1) had a value of .92. The amount of error for (e2) was equal to .94. The arrow from e3 to Dietary Behavior (.96) denoted the amount of variance in Dietary Behavior that was not explained by BMI and Body Image. BMI was found to be insignificant in the direct pathway to Suicidal Behavior and also in an indirect pathway to Suicidal Behavior through Dietary Behavior. The calculated R^2 concluded that 32% of the variance in Suicidal Behavior is explained by BMI, Body Image, and Dietary Behavior in the model.

Figure 4.2
Path Model for White Adolescent Females
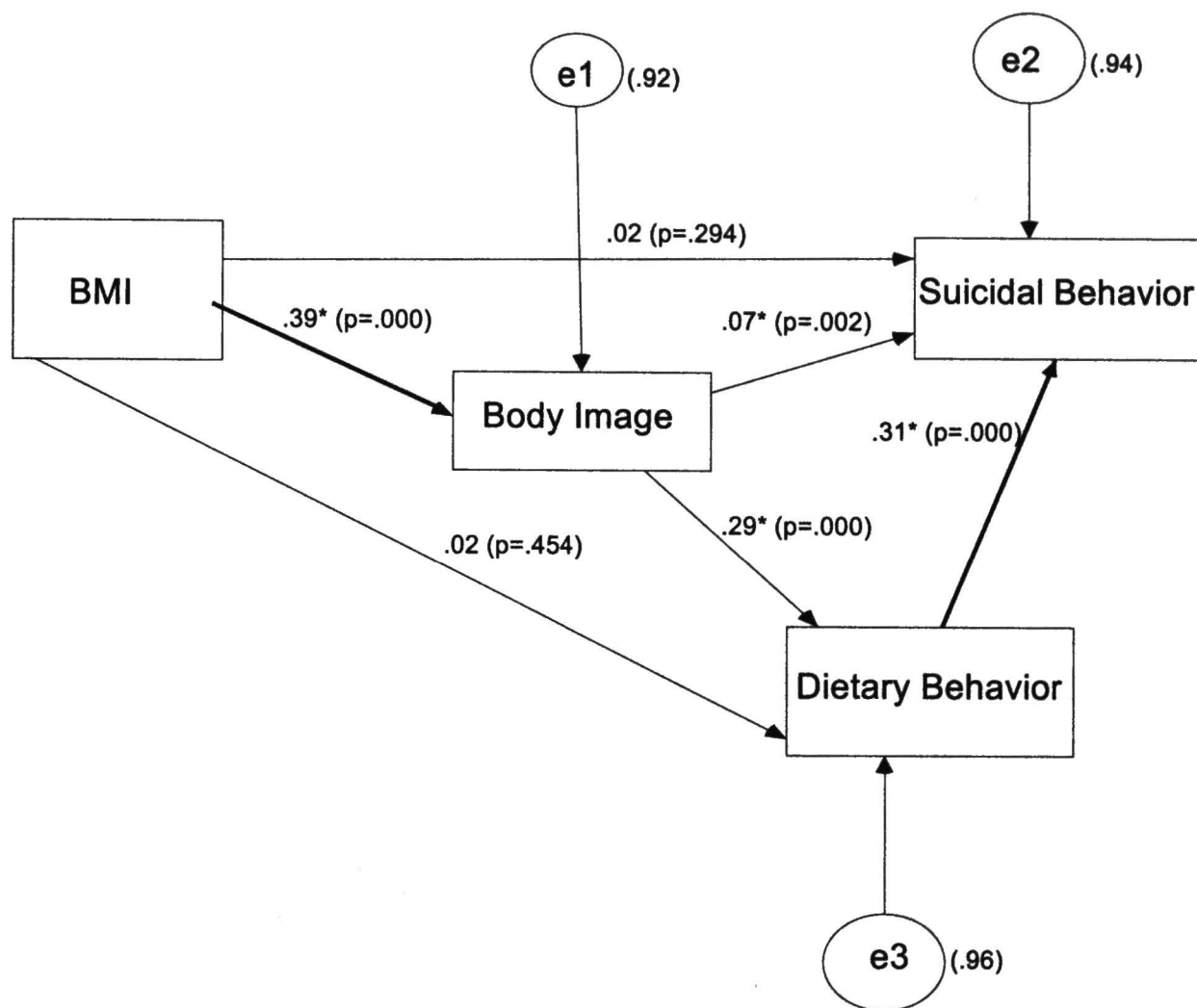
n= 2,768
Mean BMI-21.8
R^2 = .32
* denotes significance

African American Adolescent Females

For the second racial analysis, only female adolescents identified as black or African American (n=1,206) were selected. The procedure used to obtain path coefficients for the Female Adolescent Model was employed for the African American Female Adolescent Model. The results are summarized in Table 4.15

Table 4.15
African American Female Adolescent Model Results

Pathway	Std. Error	Beta	t	Sig.
BMI → Body Image (p_2)	.003	.326*	11.353	.000
BMI → Suicidal Behavior (p_1)	.005	.050	1.426	.154
Body Image → Suicidal Behavior (p_3)	.052	.058	1.633	.103
Dietary Behavior → Suicidal Behavior (p_6)	.055	.207*	6.049	.000
BMI → Dietary Behavior (p_5)	.003	.187*	5.953	.000
Body Image → Dietary Behavior (p_4)	.029	.171*	5.450	.000

$R^2 = .23$, * denotes significance at 0.05

Decomposition of Effects

The overall impact of the variable BMI on Suicidal Behavior for Black or African American adolescent females was calculated by taking the direct effect of BMI (.05) and adding the indirect effects. The paths from BMI to Dietary Behavior to Suicidal Behavior were calculated as (.19)(.21) = .04. The paths from BMI to Body Image to Suicidal Behavior were calculated as (.33)(.06) = .02. The paths from BMI to Body Image to Dietary Behavior to Suicidal Behavior were calculated as (.33)(.17)(.21) = .01. The total indirect effect of BMI on Suicidal Behavior is .04 + .02 + .01 = .07. The total effect of BMI on Suicidal Behavior for Black or African American adolescent females is the direct effect (.05) plus the indirect effects (.07), which equaled .12.

The overall impact of the variable Body Image on Suicidal Behavior for Black or African American adolescent females was calculated by taking the direct effect of Body Image (.06) and adding it to the indirect effects. The paths from Body Image to Dietary Behavior to Suicidal Behavior were calculated as (.17)(.21) = .04. The total effect of Body Image on Suicidal Behavior is the direct effect (.06) plus the indirect effects (.04), which equaled .10.

The overall impact of the variable Dietary Behavior on Suicidal Behavior for Black or African American adolescent females was direct and equal to .21 with no indirect effects.

Model Summary

The results from the Black or African American Female Adolescent Model were similar to the Female and White Adolescent Models. BMI was found to have a weak, non-significant (β = .05, p= .154) direct effect on Suicidal Behavior. BMI indirectly affected Dietary Behavior significantly (β = .19, p= .000), which in turn affected Suicidal Behavior (β = .21). BMI also significantly affected Body Image (β = .33, p= .000), but then became non-significant on its path to Suicidal Behavior (β = .06, p= .103). Finally, BMI affected Body Image again but also affected Dietary Behavior (β = .17, p= .000), which in turn affected Suicidal Behavior (β = .21, p= .000). Body Image had a non-significant, direct effect on Suicidal Behavior (β = .06, p= .103) but a stronger significant indirect effect (p< .05) whereby it affects Dietary Behavior (β = .17), which in turn affected Suicidal Behavior (β = .21). Dietary Behavior had a direct effect on Suicidal Behavior (β = .31, p= .000), but no indirect effects (Figure 4.3).

The amount of variance in Body Image that was not accounted for by BMI (e1) was .94. The amount of error (e2) was equal to .97. The arrow from e3 to Dietary Behavior (.96) denoted the unexplained variance in Dietary Behavior. BMI was found to be non-significant in the direct pathway to Suicidal Behavior and in an indirect pathway to Suicidal Behavior through Body Image. The calculated R^2 concluded that 23% of the variance in Suicidal Behavior is explained by BMI, Body Image and Dietary Behavior.

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Figure 4.3
Path Model for African American Adolescent Females
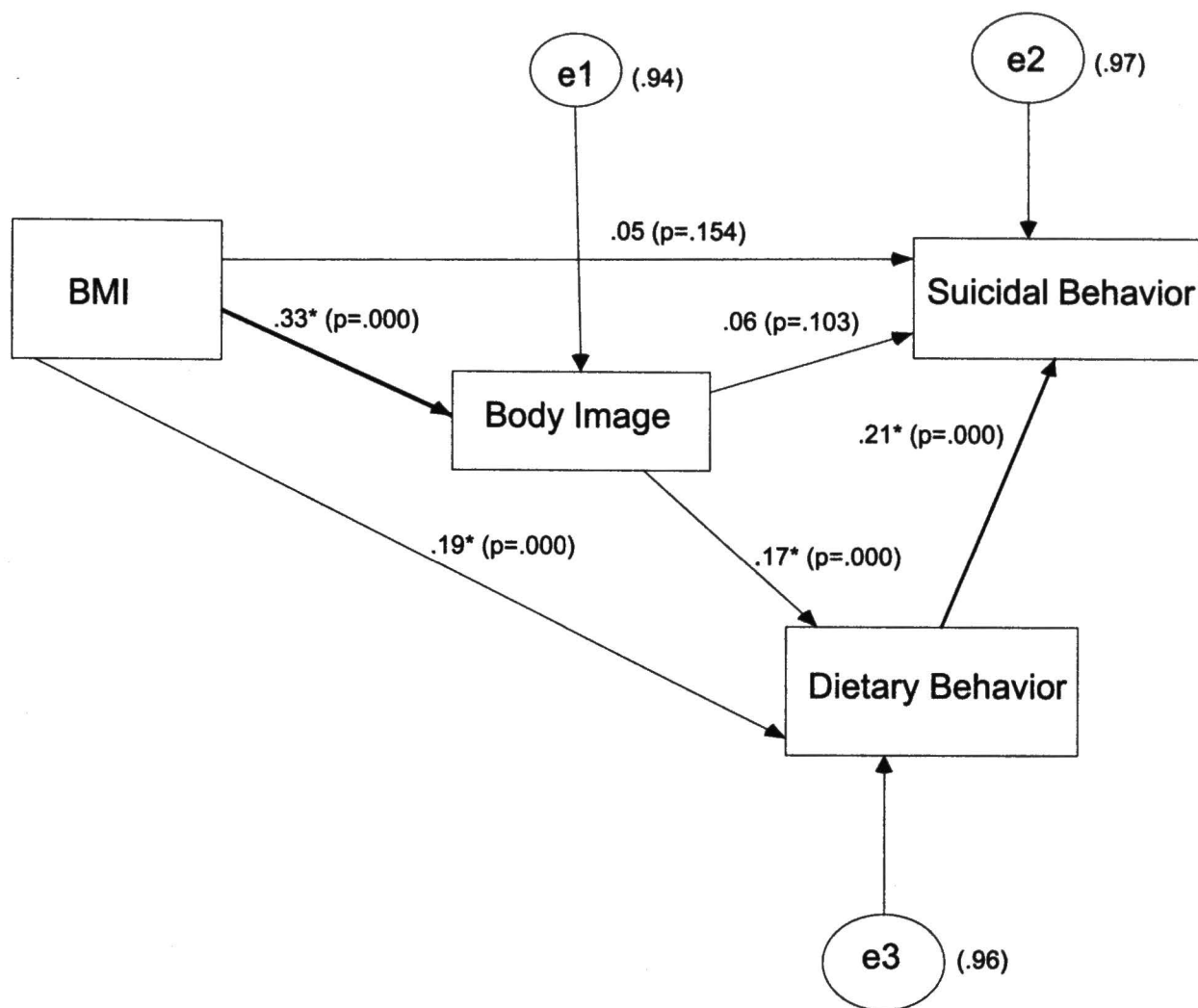
n= 1,206
Mean BMI-23.7
R^2 = .23
* denotes significance

Hispanic Adolescent Females

For the final racial analysis, only female adolescents identified as Hispanic or Latino (n= 1,244) were selected*. The procedure used to obtain path coefficients for the Female Adolescent Model was employed for the Hispanic Female Adolescent Model. The results are found in Table 4.16

Table 4.16
Hispanic Adolescent Female Model Results

Pathway	Std. Error	Beta	t	Sig.
BMI → Body Image (p_2)	.004	.351*	12.519	.000
BMI → Suicidal Behavior (p_1)	.008	.037	1.144	.253
Body Image → Suicidal Behavior (p_3)	.060	.102*	3.040	.002
Dietary Behavior → Suicidal Behavior (p_6)	.045	.235*	7.294	.000
BMI → Dietary Behavior (p_5)	.005	.097*	3.150	.002
Body Image → Dietary Behavior (p_4)	.040	.253*	8.224	.000

R^2 = .27, * denotes significance at 0.05

*Hispanics are considered an ethnic group in the official census classification. For the purpose of this study, the classification of Hispanic as a race was considered only for practical purposes of the data analysis and presentation.

Decomposition of Effects

The overall impact of the variable BMI on Suicidal Behavior for Hispanic or Latino adolescent females was calculated by taking the direct effect of BMI (.04) and adding it to the indirect effects. The paths from BMI to Dietary Behavior to Suicidal Behavior were calculated as $(.10)(.24) = .02$. The paths from BMI to Body Image to Suicidal Behavior were calculated as $(.35)(.10) = .04$. The paths from BMI to Body Image to Dietary Behavior to Suicidal Behavior were calculated as $(.35)(.25)(.24) = .02$. The total indirect effect of BMI on Suicidal Behavior is $.02 + .04 + .02 = .08$. The total effect of BMI on Suicidal Behavior for Hispanic or Latino adolescent females was the direct effect (.04) plus the indirect effects (.08), which equaled .12.

The overall impact of the variable Body Image on Suicidal Behavior for Hispanic or Latino adolescent females was calculated by taking the direct effect of Body Image (.10) and adding to it the indirect effects. The paths from Body Image to Dietary Behavior to Suicidal Behavior was calculated as $(.25)(.24) = .06$. The total effect of Body Image on Suicidal Behavior was .16.

The overall impact of the variable Dietary Behavior on Suicidal Behavior for Hispanic or Latino adolescent females adolescent females was direct and equal to .24 and had no indirect effects.

Model Summary

BMI was found to have a similar insignificant (β = .04, p= .253) direct effect on Suicidal Behavior, as did the previous models. BMI indirectly affected Dietary Behavior significantly (β = .10, p= .002), which in turn affected Suicidal Behavior (β = .24). BMI also significantly affected Body Image (β = .35, p= .000), and then Suicidal Behavior (β = .10, p= .002). Finally, BMI affected Body Image again but also affected Dietary Behavior (β = .25, p= .000), which in turn affected Suicidal Behavior (β = .24, p= .000). Body Image had a weak direct effect on Suicidal Behavior (β = .10, p= .002) but a stronger significant indirect effect (p< .05) whereby it affects Dietary Behavior (β = .25), which in turn affected Suicidal Behavior (β = .24). Dietary Behavior had a direct effect on Suicidal Behavior (β = .24, p= .000), but no indirect effects.

The amount of variance in Body Image that was not accounted for by BMI (e1) had a value of .94. The amount of error (e2) was equal to .96. The arrow from e3 to Dietary Behavior (.95) denotes the amount of variance in Dietary Behavior that was not explained by BMI and Body Image. In the Hispanic adolescent female model, BMI had a significant indirect effect on Suicidal Behavior through Body Image and Dietary Behavior, but an insignificant direct effect on Suicidal Behavior. The calculated R^2 concluded that 27% of the variance in Suicidal Behavior is explained by BMI, Body Image, and Dietary Behavior in the model.

Figure 4.4
Path Model for Hispanic Adolescent Females
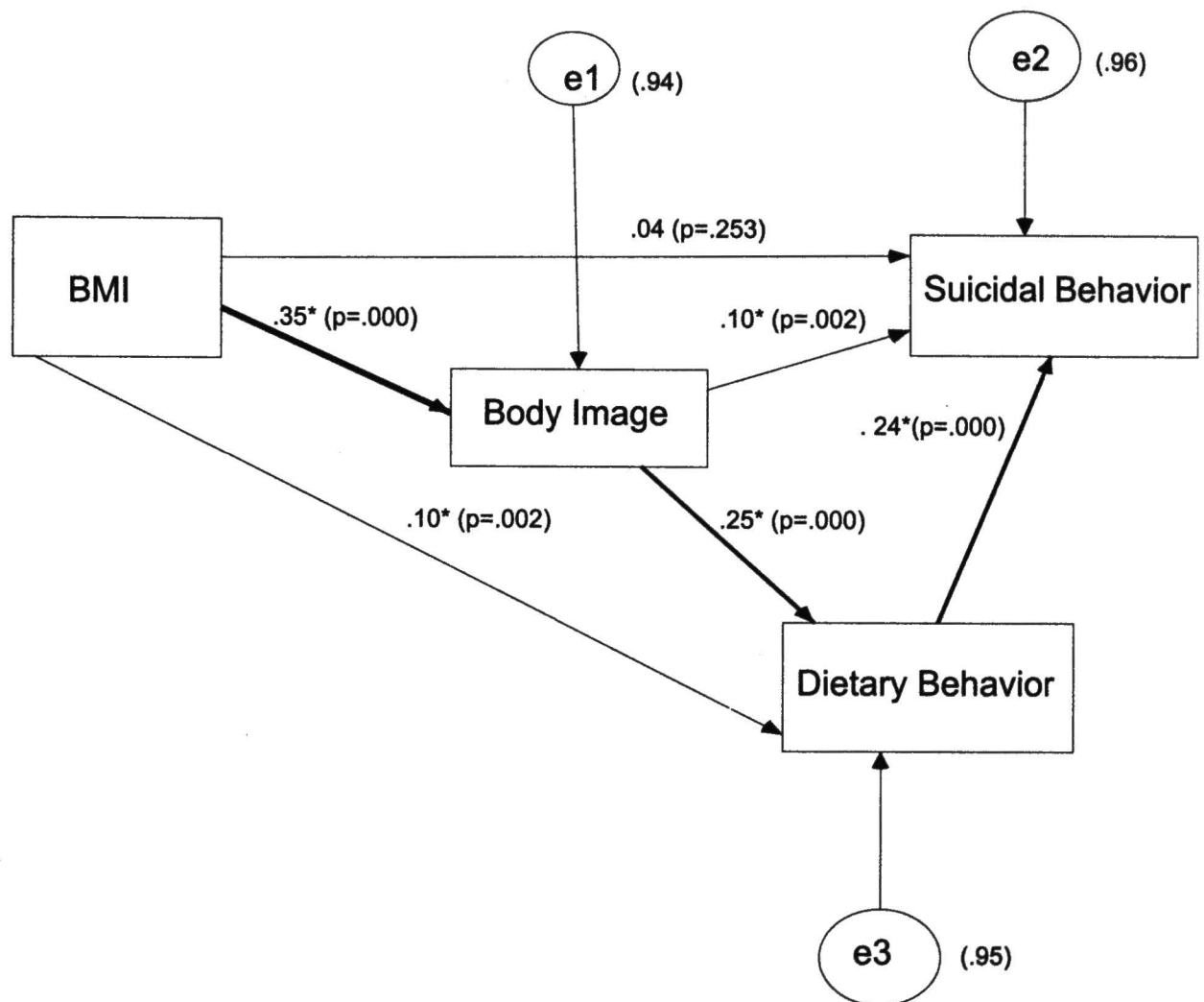
n= 1,244
Mean BMI-22.8
$R^2 = .27$
* denotes significance

A summary of the Betas for each for the Female, White, African

American, and Hispanic models can be found in Table 4.17.

Table 4.17
Summary of Standardized Coefficients (β) for Female, White, Black, and Hispanic Models

Pathway	Female	White	Black	Hispanic
BMI → Body Image (p_2)	.350*	.390*	.326*	.351*
BMI → Suicidal Behavior (p_1)	.023	.022	.050	.037
Body Image → Suicidal Behavior (p_3)	.077*	.067*	.058	.102*
Dietary Behavior → Suicidal Behavior (p_6)	.281*	.308*	.207*	.235*
BMI → Dietary Behavior (p_5)	.048*	.015	.187*	.097*
Body Image → Dietary Behavior (p_4)	.264*	.287*	.171*	.253*

* denotes significance at 0.05

CHAPTER V

DISCUSSION AND CONCLUSIONS

Summation of Project

The purpose of this investigation was to identify relations between female adolescent body dissatisfaction, unhealthy dietary behaviors and suicidal tendencies. The primary goals of the investigation were to examine: 1) the pattern of relationships between body mass index (BMI), body image, unhealthy dietary behaviors, and suicidal behaviors in a female adolescent sample; and 2) whether there are racial differences between White, Black or African American, and Hispanic or Latino adolescent females.

One of the Healthy People 2000 goals was to reduce suicide attempts among female adolescents (ages 14-17) to 2.0%. The results from this current study found a greater percentage, 2.6% (137) of the females aged 14-17 had actually attempted suicide and required medical attention. Body image and unhealthy dietary behavior have been identified as individual predictors for suicidal behavior. This path analysis provided new information on how the three variables/constructs (BMI, Body Image, Dietary Behavior) influence each other and their collective and individual effects on Suicidal

Behavior. These variables were found to have varying magnitudes for each of the race/ethnicity models, suggesting that individualized and culturally specific interventions are warranted. Body Image was the greatest influence on the White Female Model, while Body Image and Dietary Behavior impacted the Hispanic Female Model. The African American Model was greatly affected by the variable Dietary Behavior.

From the public use version of the 2001 Youth Risk Behavior Survey, a sample (n= 5,218) of White, Black or African American, and Hispanic or Latino adolescent females aged 13-17 were selected for analysis. This cross-sectional study involved public high school students in grades 9-12. Variables indicative of suicidal behavior were identified using Self Discrepancy Theory (Higgins, 1982) as a framework. Higgins' theory posits that when a person's actual state is different from what she or society views as acceptable, an internal conflict arises. This conflict motivates behaviors that are aimed at achieving this ideal state.

The Female Adolescent Model (n= 5,218) was drawn to reflect the assumption that when an adolescent female had a low body image of herself she would strive to attain the perfect image. These behaviors included using laxatives, vomiting, taking diet pills, or fasting for more than 24 hours to achieve the "perfect body image". When these actions failed or did not correct the adolescent's self view, depressive emotions would arise and

sometimes lead to suicidal behavior. The variables/constructs BMI, Body Image and Dietary Behavior were hypothesized to contribute to Suicidal Behavior in adolescent females and were examined using a path analysis.

Coefficients were computed to complete each path in the Female, White, African American, and Hispanic Models to represent the magnitude of the influence of the independent variables (BMI, Body Image, and Dietary Behavior) on themselves and the dependent variable Suicidal Behavior. The standardized coefficients (β) were used to compare the magnitude of the paths in the models. These coefficients measured the direct, indirect, and total effects of each independent variable and determined which one had the greatest direct effect on Suicidal Behavior.

Discussion of Findings

Results discussed here were based on the 5,218 White, Black or African American, and Hispanic or Latino adolescent females who completed the 2001 National Youth Risk Behavior Survey (YRBS). This survey was the first national attempt to gather information after the Healthy People 2000 Initiative's objective to reduce adolescent suicide attempts among females aged 14-17 failed. The independent variables/ constructs in this study BMI, Body Image, and Dietary Behavior were all found to be statistically significant when Pearson Correlations were analyzed. The Coefficient of Determination (R^2) of the initial model was .10 (data not shown), meaning that 10% of the

variance was explained by these variables. However, when the path coefficients were reproduced for the path model using multiple regression equations, which took direct and indirect effects into account, the R^2 rose to .27. This meant that 27% of the variance was now being explained by BMI, Body Image, and Dietary Behavior in the Female Adolescent Model.

When race/ethnicity was analyzed separately, different values were observed. The White Adolescent Female Model (n= 2,768) had an R^2= .32. The Black or African American Model (n= 1,206) had an R^2 = .23, and the Hispanic or Latino Model (n= 1,224) had an R^2 = .27.

White adolescent females in this cohort were most likely to display suicidal behavior (27.4%). This included suicide ideation (seriously thinking about suicide or making a suicide plan) and actually attempting suicide. Hispanic or Latino adolescent females were more likely to exhibit suicidal behavior (26.6%) than Black or African American adolescent females (20.5%). However, when the actions were examined as suicide ideation versus suicidal attempts, Hispanic or Latino adolescent females had the highest attempt rate (16.1%) compared to 10.2% and 9.5% for White and Black or African American adolescent females, respectively.

Conclusions Related to Current Research Questions

<u>Hypothesis One</u>

The null hypothesis stated that, "BMI does not have a direct effect on suicidal behavior in adolescent girls." The null hypothesis was not rejected. After viewing the entire sample, the regression weight (β) for BMI in the prediction of Suicidal Behavior was not significantly different from zero ($p=.133$) at the .05 level (two-tailed). It was noted that BMI became insignificant in the racial models as well. In White adolescent females, the standardized β for BMI in the prediction of Suicidal Behavior was not significantly different from zero ($p= .294$) at the .05 level. In African American adolescent females, the β was also not significant ($p= .154$) at the .05 level and neither was it in Hispanic adolescent females ($p= .253$).

<u>Hypothesis Two</u>

The null hypothesis stated that, "BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on body image." The null hypothesis was rejected. While BMI does not have a significant direct effect on Suicidal Behavior, the paths from BMI to Body Image ($p= .000$) to Suicidal Behavior ($p= .000$) were significant and calculated as $(.35)(.08) = .03$. This indirect pathway indicates that Body Image mediates the relationship between BMI and Suicidal Behavior.

Hypothesis Three

The null hypothesis stated that, "BMI does not have an indirect effect on suicidal behavior in adolescent girls through its influence on body image and dietary behavior." The null hypothesis was rejected. BMI significantly affected Body Image (β = .35, p= .000) and also significantly affected Dietary Behavior (β = .26, p= .000), which in turn significantly affected Suicidal Behavior (β = .28, p= .000). The total indirect pathway from BMI to suicidal behavior in adolescent girls through its influence on body image and dietary behavior had a regression weight of β = .03 (p< .05) and indicates a mediated relationship between BMI and Suicidal Behavior.

Hypothesis Four

The null hypothesis stated that, "Body image does not have a direct effect on suicidal behavior in adolescent girls." The null hypothesis was rejected. The regression weight for Body Image in the prediction of Suicidal Behavior is significantly different from zero (p= .000) at the .05 level (two-tailed). The standardized direct (unmediated) effect of Body Image on Suicidal Behavior is β = .08. That is, due to the direct effect of Body Image on Suicidal Behavior, when Body Image values go up (indicating negative body image) by 1 standard deviation, Suicidal Behavior goes up by .08 standard deviations. The reverse is also true, when Body Image values go down (indicating positive body image) by 1 standard deviation; Suicidal

Behavior goes down by .08 standard deviations. This is in addition to the indirect or mediated effect that Body Image had on Suicidal Behavior.

Hypothesis Five

The null hypothesis stated that, "Body image does not have an indirect effect on suicidal behaviors in adolescent girls through its influence on dietary behavior." The null hypothesis was rejected. The indirect path was significant ($p < .05$) from Body Image to Dietary Behavior to Suicidal Behavior and was calculated as $(.264)(.281)$ or $\beta = .07$. This indirect pathway indicates that Dietary Behavior mediates the relationship between Body Image and Suicidal Behavior. This is in addition to the direct effect that Body Image had on Suicidal Behavior.

Hypothesis Six

The null hypothesis stated that, "Dietary behavior does not have a direct effect on suicidal behavior in adolescent girls." The null hypothesis is rejected. The standardized direct or unmediated effect of Dietary Behavior on Suicidal Behavior is $\beta = .28$. The path was statistically significant ($p=.000$). Due to the direct effect of Dietary Behavior on Suicidal Behavior, when Dietary Behavior goes up by 1 standard deviation (indicating higher involvement in using laxatives, vomiting, taking diet pills, or fasting for more than 24 hours), Suicidal Behavior goes up by 0.28 standard deviations. The reverse is also true, when Dietary Behavior values go down (indicating lower

involvement in using laxatives, vomiting, taking diet pills, or fasting for more than 24 hours) by 1 standard deviation; Suicidal Behavior goes down by .28 standard deviations. Dietary Behavior had no indirect (mediated) effects on Suicidal Behavior.

Hypothesis Seven

The null hypothesis stated that, "There will not be a different total effect between relative body weight, perceived body image, dietary behaviors, and suicide ideation/suicide attempts in female adolescents when examined by race." The null hypothesis is rejected. The White Female Adolescent Model (n= 2768) indicated that 32% (R^2 = .32) of the variance in suicidal behavior is explained by BMI, Body Image, and Dietary Behavior. This explained variance (R^2) differed for the Black or African American (23%) and Hispanic or Latino (27%) female adolescent models (n = 1206 and 1244, respectively). The total effect of BMI, Body Image, and Dietary Behavior on Suicidal Behavior for Whites was β = .53. The total effect of these variables for Blacks or African Americans was β = .41 and β = .52 for Hispanics or Latinos.

Implication of Findings

The direct influence (β) of BMI on Suicidal Behavior was not significant in any of the models. This was consistent with Self Discrepancy Theory. The basic state of what is an actual fact about a person (i.e. weight)

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does not cause an increase of harmful or destructive behavior. The person's beliefs drive intention as it was demonstrated through the immergence of significant indirect pathways from BMI through Body Image and Dietary Behavior to Suicidal Behavior.

Self-discrepancy theory assumes that people are motivated to reach a condition in which their self-concept matches their personally relevant self-guides. Strauman and Higgins (1987) have also researched self-discrepancies as predictors of chronic emotional distress. They found that people characterized by an actual-ideal discrepancy reported considerable depressive moods. Higgins (1982) also found that discrepancies between actual and ideal aspects lead to sad and disappointing emotions.

The path analyses for the three racial groups suggested that there are varying degrees of influence among BMI, Body Image, Dietary Behaviors, and Suicidal Behaviors.

White Adolescent Female Model

For the White Adolescent Female Model, the direct path from BMI to Dietary Behavior was insignificant, thus BMI did not affect the decision for the White female to engage in laxative use, vomiting, taking diet pills, or fasting for more than 24 hours. This means that no matter what the BMI of the White adolescent, whether overweight, normal, or overweight, Body

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Image was required to mediate her choice to engage in unhealthy dietary behavior or suicidal behavior. This attitude may be driven by society's rigid definition of beauty as ultra-thin.

Researchers like Fallon and Rozin (1985) have shown that Caucasian women incorrectly estimated the level of thinness preferred by men, believing that Caucasian men find ultra thin women most attractive, and they prescribe to this preference by wanting to be that thin. This caused Caucasian women to be extremely dissatisfied with their bodies because they feel the pressure to lose weight in order to be more attractive. This belief is supported by this study in that the beta weights along the paths from BMI to Body Image to Dietary Behavior to Suicidal Behavior were greatest for this model, signifying a higher magnitude of influence among the variables.

African American Adolescent Female Model

For the Black or African American Model, the direct path from Body Image to Suicidal Behavior was insignificant, meaning that Body Image does not contribute to Suicidal Behavior in adolescent females of this race. This supports the literature concerning more relaxed attitudes towards increased BMI and that some African Americans view a bigger body as more appealing. While some body dissatisfaction does exist, there is family and social pressure to be self-accepting, helping to protect against Suicidal Behavior. However, the path from BMI to Dietary Behavior was statistically significant

and more than triple the beta weight for the Female Adolescent Model which included all the races. Pumariega, Gustavson, Gustavson, Motes, and Ayers (1994) conducted a study using *Essence* (an African-American magazine) readers. The results from over 2,000 respondents indicated that African American women are at risk for eating disorders in at least equal proportions to their White counterparts.

The results from this current study show that the problem is even greater among adolescents. This may mean that instead of adopting a healthier lifestyle by modifying their eating habits and exercising, African American adolescents perceive using laxatives, pills, and vomiting as a "quick fix" to their weight problems.

Hispanic Adolescent Female Model

The Hispanic or Latino Model revealed that only the direct path from BMI to Suicidal Behavior was insignificant, as with the other models. Only the path from BMI to Dietary Behavior, like the African American, was greatly elevated when compared to the Female Adolescent model. They may also see these behaviors as a solution to their weight problems.

Acculturation itself is tied to increased rates of depression and suicide among Hispanic youth and young adults. A study examining California death certificates from 1970 through 1992 revealed that Hispanic immigrants were

less likely to die by suicide than their Hispanic counterparts born in the United States (Sorenson, Upchurch & Shen, 1996). Acculturated Hispanics are also at greater risk for suicidal thoughts and behavior than are less acculturated Hispanics, a difference that has been attributed to the gap between rising expectations and limited socioeconomic opportunities (Sorenson & Golding, 1988). A Hispanic female may be taught by her more traditional parents to suppress her anger. Having limited abilities to cope with anger and lacking appropriate problem-solving skills may interact to trigger the suicide attempt.

Socioeconomic status may affect a Hispanic females' risk for developing eating disorders. For example, females from low-income families may face a greater risk for higher BMI, while those from higher income families may be at a higher risk for dieting to try to fit in with their middle or upper class peers. This would be an excellent topic for future research pertaining to what other factors are influencing suicidal behaviors among this race/ethnicity because their rate for suicidal attempts was the highest among this study.

Other Path Analytic Studies

This study revealed that 27% of the variance in Suicidal Behavior was explained by BMI, Body Image, and Dietary Behavior in the Female Adolescent Model. Other studies have identified alternate predictors with

varying magnitudes of variable influence on Suicidal Behavior. An investigation by Cisler, Lemerond, and Morano (1993) examined loss as an event that preceded adolescent suicide attempts. The researchers found that experience with loss and lower family support accounted for 42% of the variance in determining whether subjects attempted suicide.

Another study, (Huff, 1999) used path analysis to examine the extent, direction, and strength of the relationship between the independent variables, recency and degree of stressors, and the dependent variable, degree of suicidal ideation in adolescents. The results revealed that recency and degree of stress accounted for 68% of the variance.

Since the aforementioned studies did not incorporate the same variables as in the present path analysis, it would be difficult to compare the results.

Prevention

Health Educators and Program Planners must have defined demographic and culturally specific background information before developing a prevention program for each race/ethnicity found in this study. They must address the cultural norms that influence body image and eating-related risk factors, since Dietary Behavior contributed the largest influence on Suicidal Behavior among the models. Teachers as well as parents should

be made aware of these unique indicators so that they may recognize adolescents at risk for engaging in suicidal behaviors. Practitioners working with adolescents could help reduce major depression and related problems by designing ways to reduce body dissatisfaction and dieting. They are also more likely to make a greater impact by focusing on the how female adolescents think or feel about how their bodies look (body image) than on actual body dimensions.

Limitations and Future Research Suggestions

The cross-sectional design of the YRBS was very useful for this study because it was relatively uncomplicated to obtain data on risk factors for practices or behaviors. The previous hypotheses were then generated based on this data. The large sample size (n= 5,218) was also an advantage. The YRBS used a population-based sample instead of convenient samples, so its generalizability is more widespread than results based on clinical populations. However, this study can only be generalized to female adolescents who are in public high schools.

One limitation was that the self reported suicidal behaviors could not be externally validated because of the anonymity of the survey. Students who were absent the day of the data collection, those who did not respond truthfully, and those who were not granted parental permission to participate may have caused a bias in the estimation of suicidal behavior.

Model specification error could also exist since the model was drawn after the data were collected. Studies that use path analysis with existing data are constrained by the omission of possibly pertinent variables and perhaps imprecise measures; thus they must be considered exploratory and as a precursor to future research. More research is needed to understand why BMI, Body Image, and Dietary Behavior influenced Suicidal behavior in the manner that they did.

Also, since the data was cross-sectional and only represented behaviors and attitudes during a specific point in time, the directional associations between variables and pathway magnitudes cannot be definitively specified. Future longitudinal studies are needed to observe individuals over time so that more conclusive evidence can be obtained about BMI, Body Image, and Dietary Behavior's influence on Suicidal Behavior in adolescent females.

Conclusion

In conclusion, the relationship between BMI, Body Image, Dietary Behavior, and Suicidal Behavior as demonstrated by the Adolescent Female Model indicates:

1. BMI alone (unmediated), no matter what the value, does not influence Suicidal Behavior in adolescent females. This is in contrast to the study

by Carpenter, Hasin, Allison, and Faith (2000) that tested the relationships between relative body weight and clinical depression, suicide ideation, and suicide attempts. Differences in BMI, or weight status, were associated with the probability of past-year major depression, suicide attempts, and suicide ideation in adults. A 10-unit increase in body mass index increased the risks of both suicidal ideation and suicide attempts in the past year by 22% in women. The current research project shows that these results are not applicable to adolescent females aged 14-17.

2. With an exception among Black or African Americans, low Body Image is positively correlated with and significantly contributes to Suicidal Behavior in adolescent females. This is in partial agreement with Stice, Hayward, Cameron, Killen, and Taylor (2000) who explored the link between body image, eating disturbances, and major depression in girls. The authors concluded that body image risk factors that emerge with adolescence could contribute to higher rates of depression and suicide among girls.

3. High Body Image serves as a protector for Suicidal Behavior in adolescent females. This is in agreement with a study by The American Association of University Women (1990) which studied 36,000 college students in Minnesota and found that negative body image is

associated with suicide risk for girls and positive body image serves as a protector.

4. Engaging in multiple unhealthy dietary behaviors (i.e. fasting for more than 24 hours, diet pill usage, laxative abuse, and vomiting after eating) contributes to Suicidal Behavior in adolescent females. This supports previous studies, such as Ackard (2003) which found that adolescents who go on eating binges might be more likely to attempt suicide than other teens.

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