RELATIONSHIPS AMONG BODY MASS INDEX, NUTRITION, INTERNALIZING SYMPTOMS, AND ETHNIC IDENTITY OF CHEROKEE YOUTH ATTENDING A PRIVATE NATIVE AMERICAN SECONDARY SCHOOL

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CHAPTER I

INTRODUCTION

The increasing prevalence of overweight and obesity among American youth is associated with many aspects of physical and mental health. Compared with teens from other ethnic groups, American Indian youth are at particularly high risk of overweight, and they are also more likely to suffer from internalizing disorders such as anxiety and depression (Broussard, Johnson, Himes, Story, Fichtner, Hauck et al., 1991; Story, Stevens, Evans, Cornell, Juhaeri, Gittelsohn, et al., 2001). Both overweight and internalizing problems are linked with three types of health risk behaviors: poor dietary practices, low levels of physical activity, and an increase in sedentary habits such as television viewing (Masten, Coatsworth, Cicchetti, & Cohen, 1995; Mechanic & Hansell, 1987). Moreover, prior studies with other ethnic groups have indicated mixed findings regarding the possible protective function of having a strong ethnic identity with regard to youth health practices and mental health outcomes. Unfortunately, however, there has been a dearth of research on American Indians, and as a result, the relationships among these various factors are not well understood for American Indian youth.

This study investigated how ethnic identity, internalizing symptoms, and nutrition, are related to body mass index in a sample of American Indian youth. It addressed the following three research questions: (1) What is the combined influence of ethnic identity, internalizing symptoms, and nutrition on body mass index observed in this sample of youth? and (2) What are the separate contributions of ethnic identity,

internalizing symptoms, and nutrition to body mass index in this sample of youth? and (3) What is the correlation between the three domains of ethnic identity and nutrition?

The following predictions were made: (1) Together, ethnic identity, internalizing symptoms, and nutrition will predict a significant amount of variance in BMI observed in this sample of youth; (2) poorer nutrition will be associated with higher BMI; (3) youth with higher levels of ethnic identity resolution, exploration, and affirmation will have higher BMIs; (4) youth with higher levels of internalizing symptoms will have higher BMIs; and (5) higher levels of ethnic identity resolution, exploration, and affirmation will be correlated with poorer nutrition.

Originally, this study was designed to assess a broad array of health risk behaviors in this research sample. Subsequent reliability analyses of the Youth Risk Behavior Survey (YRBS) questions indicated low Cronbach alpha coefficients for the subscales, therefore, only the nutrition scale was used in further analyses.

CHAPTER II

REVIEW OF LITERATURE

American Indians in Social and Historical Context

Tremendous diversity of cultures exists among American Indian tribes in the United States. Approximately 560 federally recognized tribes reside in rural and urban areas of 35 U.S. states (Centers for Disease Control and Prevention [CDC], 2003). Despite long term struggles in the face of historical adversity, American Indians continue to display incredible adaptability across various domains. Unfortunately, American Indians experience a range of health disparities that impact their lives. Better understanding the factors that impact these disparities, and how they are related to each other, has the potential to lead to lasting and meaningful changes to occur in the lives of American Indians.

Health of American Indian Youth

American Indian youth face similar health-related issues and concerns as their non-Native peers. The majority of American Indian youth do not experience significant health risks; however, a considerable minority do, and do so more than other groups of teenagers in the U.S. (Blum, Harmon, Harris, Bergeisen, & Resnick, 1992). These youth experience a high prevalence of socioemotional problems as well. Silmere and Stiffman

(2006) found that less than one-quarter of American Indian youth showed successful positive psychosocial functioning (23.6%), good mental health (20.2%), and positive behavior and emotions (16.8%). These findings are consistent with the high prevalence of various problems in American Indian adolescents reported in previous studies, such as comparatively higher levels of anxiety, depression, and general internalizing symptoms, which predict a spectrum of emotional disorders and physical problems (Frank & Lester, 2002; Lewinsohn, Rohde, Klein, & Seeley, 1999; Masten et al., 1995; Hawkins, Cummins, & Marlatt, 2004; Spear, Longshore, McCaffrey, & Ellickson, 2005).

Overweight and Obesity Among American Indian Youth

Regardless of ethnic, cultural, or racial background, adolescents with overweight or obesity are at higher risk for physical and mental health problems such as lower-body disability, diabetes, hypertension, heart disease, as well as orthopedic, endocrine, and psychological disorders such as depression (Black, 2002; Wadden, Sarwer, Womble, Foster, McGuckin, & Schimmel, 2001). Adolescent overweight and obesity pose long-term health consequences through the accumulation of various health risk factors over the life course.

Many of the leading causes of morbidity and mortality in American Indian communities are associated with the rising rates of overweight and obesity (Broussard et al., 1991; Story, Evans, Fabsitz, Clay, Rock, & Broussard, 1999), it is estimated that between 25-45% of American Indian school-age children are obese, compared to 22% of children in the general population. Due to the higher prevalence of obesity, American Indian populations are burdened by an increased incidence of chronic diseases,

particularly Type 2 diabetes, which is commonly seen in American Indian children aged 10 and over (Acton, Burrows, Moore, Querec, Geiss, & Engelgau, 2002).

Body Mass Index

Body mass index (BMI) calculations are commonly used to assess for overweight and obesity (National Institutes of Health [NIH], 1998). Body mass index is a number derived from an individual's body weight divided by the square of his or her height (NIH, 1998). Body mass index provides a reliable indicator of adiposity for most people and is in widespread use for screening for weight categories (CDC, 2003). Although not a direct measure of adipose tissue, Lohman, Caballero, Himes, Hunsberger, Reid, Stewart, et al. (1999) found a high correlation (r = .84) between BMI and percentage of adipose tissue in a sample of third to fifth grade American Indian children.

For children and teens, BMI is age- and sex-specific and is plotted on the CDC BMI-for-age growth charts (for either girls or boys) to obtain a percentile ranking (CDC, 2008). Percentiles are the most commonly used indicator to assess the size and growth patterns of individual children in the United States (NIH, 1998). Interpretation of BMI plotted on a BMI-for-age chart is based on established cutoff values. The reference population used to construct the CDC Growth Charts is a nationally representative sample obtained from a series of national health examinations and surveys conducted by the National Center for Health Statistics from 1963-1994 and from supplemental data. The CDC promotes one set of growth charts for all racial and ethnic groups (CDC, 2000).

There are several advantages to using BMI-for-age as a screening tool for adolescent overweight and underweight. BMI-for-age is the only indicator that allows us to plot a measure of weight and height with age on the same chart, while taking into

account the normal changes associated with puberty (NIH, 1998). Another advantage of using BMI-for-age to screen for overweight or at risk of overweight in adolescents is that it correlates with clinical risk factors for cardiovascular disease, elevated insulin, and high blood pressure (NIH, 1998). The CDC growth-for-age charts for young people aged 2-20 reflect weight status categories defined as follows: underweight is less than the 5th percentile, healthy weight is from the 5th to less than the 85th percentile, overweight is from the 85th to less than the 95th percentile, and obese is equal to or greater than the 95th percentile (CDC, 2008). These percentiles indicate a child's BMI rank compared with a normative group of 100 children of the same gender and age (CDC, 2000). For example, in a group of 100 children, one would expect five children to have a BMI-for-age at or above the 95th percentile, 10 to have a BMI-for-age between the 85th and 95th percentiles, 5 to have a BMI-for-age less than the 5th percentile, and 80 children to have a BMI-for-age that is within the normal range.

Health Risk Factors: Dietary Habits and Physical Activity

Sallis and Saelens (2000) examined the reliability of nine self-report measures of physical activity in children aged 9-18. Reliability estimates ranged from r =.60 to .98, suggesting moderate to high reliability. Despite the moderate to high reliability, the relationship between self-reported physical activity and objective measures of physical activity (i.e. Actigraph accelerometer) were highly variable, ranging from r =.07 to .88. Pertaining to self report of dietary behaviors, studies have found Pearson product-moment reliability coefficients ranging from r =.39 to .57 (Rockett, Breitenbach, Frazier, Witschi, Wolf, Field et al., 1997) and from r =.33 to 1.0 (Frank, Nicklas, Webber, Major, Miller, & Berenson, 1992). Reviews of the validity of self-reported dietary habits found

that older children and adolescents are likely to under-report food intake, particularly fruit and vegetable consumption (Field et al, 1998; Frank et al, 1992).

Youth Risk Behavior Survey. The Youth Risk Behavior Survey (YRBS; CDC, 2004) is a health-related school-based survey developed by the CDC Division of Adolescent and School Health. It is administered every two years in select public schools to students in grades 9-12 to monitor priority health-risk behaviors that contribute to the leading causes of premature death and disability in this age group. The YRBS has also been administered to special populations. Since 1994, the Bureau of Indian Affairs has periodically conducted surveys of American Indian youth attending middle and high schools they fund (Brener, Kann, Kinchen, Grunbaum, Whalen, Eaton, et al., 2004).

The YRBS monitors six categories of health-risk behaviors that contribute to unintentional injuries and violence; tobacco use; alcohol and other drug use; sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including human immunodeficiency virus infection; unhealthy dietary behaviors; and physical inactivity. In addition, the YRBS monitors the prevalence of obesity and asthma (CDC, 2008).

There is a high school version and a middle school version of the YRBS. The high school survey, designed for students in grades 9-12, asks students to recall their behaviors over the past 30 days. The high school questionnaire has a total of 87 items including seven demographic items. Four items ask about safety, ten about violence, one about bullying, five about sad feelings and attempted suicide, eleven related to tobacco usage, six about drinking alcohol, four about marijuana use, nine about other drugs, seven

related to sexual behavior, seven about body weight, eight about food and drink intake, five about physical activity, and three address health related topics.

The middle school survey, designed for students in grades 7 and 8, asks participants to report behaviors that they engaged in at any point in their lives ("have you ever"). Its 50 items include five demographic items, four safety items, three questions asking about violence, one about bullying, three about sad feelings and attempted suicide, eight related to tobacco usage, two about drinking alcohol, two about marijuana usage, three about other drugs, four related to sexual behavior, seven about body weight, seven food and drink intake items, five about physical activity, and three items on health related topics.

No studies to date have assessed the reliability or validity of all self-reported behaviors included on the YRBS (CDC, 2004). However, test-retest reliability studies conducted by Brener, Collins, Kann, Warren, and Williams (1995) and by Brener, Billy, and Grady (2003) reported kappa coefficients ranging from 14.5 -91.1%, with 71.7% of the items rated as highly reliable (κ = 61-80%).

Prochaska, Sallis, and Long (2001) examined the test-retest reliability of the two YRBS items measuring moderate and vigorous physical activity among middle school and high school students and reported inter-rater reliability ratings (intraclass correlation coefficients) ranging from .55 to .79. Furthermore, Prochaska et al. examined the validity of the YRBS physical activity items by comparing data obtained from accelerometers and found correlations ranging from r =.20 to .46.

Troped, Wiecha, and Fragala (2007) followed up on Prochaska et al. (2001) by assessing the test-retest reliability of the two YRBS items measuring moderate and

vigorous physical activity in middle school students over a period of one to 40 days. They reported moderate intraclass correlation coefficients of 0.51 and 0.46, respectively. Reliability of high school students' estimates was objectively measured by comparing data obtained from accelerometers. Twenty-one percent of students reported that they engaged in moderate activity on the YRBS item, whereas actually, 90.4% of these youth engaged in moderate physical activity, as measured by the accelerometer (Troped et al., 2007). The findings indicated that these two YRBS questions underestimated the proportion of students attaining recommended levels of moderate physical activity and overestimate the proportion meeting vigorous recommendations.

Empirical research reports ethnic differences in the prevalence of health-risk behaviors for adolescents in the U.S. Neumark-Sztainer, Story, & French (1996), for instance, compared prevalence rates of health-compromising behaviors among boys and girls (n = 123,132) from different ethnic backgrounds in early, middle, and late adolescence (grades 6, 9, and 12). These researchers compared co-occurrences of such behaviors across gender and ethnic groups. The classroom-administered statewide survey focusing on high risk behaviors included items taken from the YRBS. Prevalence rates of most health-compromising behaviors differed by gender and ethnicity and increased with age, and they were highest among American Indian youth.

Several studies utilizing YRBS data sets indicated associations between self-reported health risk behaviors and several health-related factors. Lowry, Galuska, Fulton, Burgeson, and Kann (2005) found an increased interest in weight control among male adolescents, and increased use of exercise for weight control among female and male adolescents. Another study used the national 1999 YRBS dataset (n = 15,349) to examine

associations of physical activity, fruit and vegetable consumption, and cigarette smoking with weight management goals and practices of U.S. high school students (Lowry, Galuska, Fulton, Wechsler, and Kann, 2002). Based on self-reported height and weight, 25% of students were either overweight (11%) or at risk for becoming overweight (14%). However, 43% of students were trying to lose weight and 19% of students were trying to maintain their current weight. Female students were less likely than male students to be overweight, but more likely to be trying to lose weight. Trying to lose weight was associated with vigorous physical activity, strengthening exercises, and cigarette smoking among female students; and vigorous physical activity, strengthening exercises, and eating five or more servings per day of fruits and vegetables among male students. Among students trying to lose weight or maintain the same weight, only 62% of females and 41% of males combined exercise with a reduced fat and calorie diet, while 32% of females and 17% of males used unhealthy weight control methods (fasting, diet pills, vomiting, or laxatives).

Research is limited on the incidence of health-risk behaviors among American Indian adolescents. However, existing research documents a strong link between American Indian adolescents' health and their health-related behaviors (Mechanic & Hansell, 1987). In their analysis of 10,251 high school adolescents' responses (n = 10,251) from the National School-Based Risk Survey, Frank and Lester (2002) found that American Indian and Alaska Native youths engaged more often in risky health-related behaviors than White or Black youths. Together with males and older youth, American Indian adolescents were at the highest risk of carrying out health-compromising behaviors. Young people who use drugs and alcohol, carry weapons, and engage in early

sexual activity are less likely to carry out health-promoting behaviors, including healthy eating and physical exercise (Murphey, Lamonda, Carney, & Duncan, 2004; Neumark-Sztainer et al., 1996). The sample was chosen from public and private schools in all 50 states, in both urban and rural settings.

Ethnic differences in BMI, weight concerns, and eating behaviors among American Indian, White, and Hispanic adolescents suggests that substantial proportions of adolescents, regardless of ethnicity or gender, are engaged in excessive weight control behaviors (Lynch, Heil, Wagner, & Havens, 2007). BMI scores were significantly higher for boys and girls in the American Indian group, and boys in this group were significantly more engaged in weight control behaviors, including purging (Lynch et al., 2007). The sample was chosen from 13 urban public schools in Montana, all consisting of high enrollment of American Indian students.

Limited data suggest that psychological factors, including binge eating, dieting, and depressive symptoms, may predispose children to excessive weight gain. Tanofsky-Kraff et al. (2006) investigated the relationship between baseline psychological measures and changes in body adiposity over time among 146 children thought to be at high risk for adult obesity, either because they were overweight when first examined or because their parents were overweight. Children completed questionnaires that assessed dieting, binge eating, disordered eating attitudes, and depressive symptoms and underwent measurements of adiposity at baseline and annually for an average of 4.2 years. Both binge eating and dieting predicted increases in body adiposity. Neither depressive symptoms nor disturbed eating attitudes served as significant predictors. Children who

reported binge eating gained, on average, 15% more adipose tissue, compared with children who did not report binge eating.

Blum et al. (1992), Story, Hauck, Broussard, White, Resnick, and Blum (1994), and Story, French, Neumark-Sztainer, Downes, Resnick, and Blum (1997) utilized data from 13,454 American Indian youth in grades 7 through 12 living on or near reservations within eight Indian Health Service areas who completed the Indian Adolescent Health Survey in 1989. The Indian Adolescent Health Survey is a comprehensive, anonymous, self-report questionnaire with 162 items addressing 10 dimensions of health. Blum et al. (1992) indicated that 22% of American Indian students reported fair or poor health, a far higher percentage of youth compared with the 6.5% reported to have fair or poor health by Goodman (1999) using a nationally representative sample of U.S. high school students. Blum et al. (1992) also found that self-perceived health status showed a consistent inverse relationship with important health and social risk factors. Poor physical health was associated with physical/sexual abuse, suicide attempts, substance abuse, poor school performance, and nutritional inadequacy. These findings illustrate the extent to which poor health appraisals are associated with health-compromising behaviors and psychosocial problems, at least for a large percentage of the study sample. Parker (2004) also found results consistent with Blum et al. (1992). In Parker's (2004) study, 19.1% of American Indian teens rating their health as fair or poor. The sample consisted of 574 students in grades 7-12 at four reservation-based schools in New Mexico.

Story et al. (1994) analyzed the same data set (n =13,454) and found that frequent dieting was associated with a wide range of negative health risk factors. American Indian adolescents who were overweight were more likely to diet frequently and to engage in

unhealthy weight control practices than those adolescents who were of normal weight. Forty-one percent of the adolescent girls reported feeling overweight, 50% were dissatisfied with their weight, and 44% worried about being overweight. Almost half (48%) had been on a weight-loss diet in the past year, with 27% reporting that they had self-induced vomiting at some time to try to lose weight. Eleven percent reported using diet pills. A larger proportion of boys were satisfied with their weight (68%), with 22% worrying about being overweight. American Indian youth, particularly girls, are dissatisfied with their weight and are worried about being overweight, and unhealthy weight control practices are common.

Story et al. (1997) analyzed the Indian Adolescent Health Survey once again. Their findings converged with those of French, Story, Downes, Resnick, & Blum (1995): frequent dieting and purging methods were associated with negative psychosocial and health-risk behaviors. In French et al. (1995), almost half (48.3%) of the girls and one third (30.5%) of the boys had dieted in the past year. More than one fourth (28%) of the girls and 21% of the boys reported purging behavior of some type. Adolescents who did not diet consistently reported the most healthy pattern of psychosocial and health behaviors, whereas those who dieted more frequently had the most negative pattern. Dieting frequency and purging status were associated with negative outcomes. Dieting frequency in girls was associated with weight dissatisfaction, concerns about being overweight, high emotional stress, binge eating, alcohol use, tobacco use, suicide ideation and attempts, delinquent behaviors, and physical and sexual abuse. Dieting and other health risk behaviors also were mediated by emotional distress. In French et al. (1995), high emotional stress was associated with both dieting frequency (girls) and purging

(girls and boys). Findings from this study suggested that dieting and purging are associated with similar psychosocial factors and health-compromising behaviors in American Indian youth as in White adolescents.

Empirical evidence suggests that risk behaviors in adolescents tend to cluster, rather than occurring in isolation. Sanchez, Norman, Sallis, Calfas, Cella, and Patrick (2007) described the prevalence and clustering patterns of four adolescent health behaviors in a sample of youth that was 58% White—physical activity, television viewing time, fruit and vegetable consumption, and dietary fat intake. A majority of adolescents did not meet CDC physical activity or dietary guidelines. Thirty percent of these adolescents exceeded two hours daily of television viewing time, with boys more active and less sedentary than girls. Nearly 80% of the youth manifested multiple risk behaviors. Sanchez et al. (2007) reported that older adolescents and youth with BMIs over the 85th percentile were more likely to have a greater number of risk behaviors.

Internalizing Symptoms: Anxiety and Depression

Internalizing symptoms and health risk behaviors. An association between obesity and various psychological states has been reported in the scientific literature over the last several decades (Friedman & Brownell, 1995). Paxton, Valois, Watkins, Huebner, and Drane (2007), for instance, conducted a cross-sectional study of a large (n = 15,241) national sample of adolescents and found that adolescent health-risk behaviors are significantly associated with reported depressed mood.

In a longitudinal investigation conducted with adolescents in a rural southeastern American Indian community, BMI was related to weight control efforts, onset and frequency of smoking, dieting, and body dissatisfaction (Newman, Sontag, & Salvato,

2006). Body dissatisfaction, in turn, was linked with anxiety, depression, peer relations, self-esteem, and somatization. Over two years, psychological health, peer competence, and ethnic identity contributed to a more positive body image. In boys, early ethnic identification was associated with the development of more positive body image (Newman et al., 2006).

Internalizing symptoms and BMI. Erickson, Robinson, Haydel, and Killen (2000) reported an association between depression and BMI for primary school girls. Yet Tanofsky-Kraff, Cohen, Yanovski, Cox, Theim, Keil, M. et al. (2006) found that for children who had not yet reached puberty, depressive symptoms did not predict later changes in adiposity. The authors speculated that the lack of relationship might be a consequence of the age and psychological profile of the sample, since depression often manifests at or after puberty, and few of their participants met the criteria for clinical depression. It is possible that depressive symptoms, and perhaps other psychological variables, are more potent predictors of adiposity only after children become older.

Two longitudinal studies conducted with children and adolescents extended these findings, showing major depression or depressive symptoms to be predisposing factors for later weight gain (Goodman & Whitaker, 2002; Stice, Presnell, Shaw, & Rohde, 2005). Goodman and Whitaker (2002) found that depressed mood at baseline predicted the subsequent development of obesity in youth who were not initially obese. Depressed mood at baseline also was linked with an increase over time in age-adjusted BMI in individuals who were initially obese. This effect was observed even after controlling for low self-esteem, low levels of physical activity, parental obesity, and parent education (Goodman & Whitaker, 2002). Similarly, Stice et al. (2005) found that self-reported

dietary restraint, radical weight-control behaviors, depressive symptoms, and perceived parental obesity—but not high-fat food consumption, binge eating, or exercise frequency—predicted obesity onset in adolescent girls age 11–15 years over a 4-year period.

According to Pasch, Nelson, Lytle, Moe, and Perry (2008), several unhealthy physical and mental health factors (including fighting, drug use, and depression) increase in the transition from childhood to adolescence. As children grow older, these factors become increasingly linked with unhealthy increases in weight. Pasch et al. (2008) found that only depression was associated with BMI at the beginning of grade 7, but that by the end of grade 8 binge drinking, alcohol, tobacco, drug use, fighting, and depression all were related to BMI. Moreover, depression in grade 7, together with drug use and fighting, predicted BMI in grade 8. This work yielded important insights into the causal mechanisms underlying adolescent behaviors.

Mustillo, Worthman, Erkanli, Keeler, Angold, and Costello (2003) utilized an all-White sample to examine the development of psychiatric disorders among four groups of 9–16-year old children. The children were divided based on their obesity trajectories – obese in childhood only, obese in adolescence only, never obese and chronically obese. Childhood-obese and chronically obese children were significantly more likely than nonobese children to have depression and oppositional defiant disorder. Psychopathology was most common in the chronically obese group and the childhood-limited group. However, no significant differences were found among the trajectories of participants with anxiety disorders, conduct disorder, ADHD, or substance abuse disorders. If psychopathology increases the risk of obesity, one would expect an association in the

chronic and adolescent-onset groups. Conversely, if obesity increases the risk of psychopathology, one would expect an association in the chronic and childhood-limited groups (Mustillo et al., 2003). Datar and Sturm's (2006) results also showed that being always-overweight was associated with more internalizing behavior problems in girls; however, in contrast to Mustillo et al. (2003), fewer externalizing problem behaviors were observed among boys. Similarly, Young-Hyman, Tanofsky-Kraff, Yanovski, Keil, Cohen, Peyrot et al. (2006) examined weight status and psychological difficulties in childhood for overweight or at-risk-for-overweight children. Regardless of race or sex, increasing weight was associated with emotional and weight-related distress.

In a study by ter Bogt, van Dorsselaer, Monshouwer, Verdurmen, Engels, and Vollebergh (2006) of Dutch youth, both BMI and body weight perception were related to the incidence of internalizing and externalizing problem behaviors and to social, attention and thought problems. However the perception of being 'too thin' and particularly the perception of being 'too heavy' best predicted problem behavior. Among youth with a positive perception of their body weight, there were no differences in psychological functioning between underweight, normal weight, and overweight individuals, suggesting that young people's perceptions with regard to their body shape mediate any effects of overweight on psychological functioning.

In summary, some studies have found no relationship between BMI and internalizing problems (Tanofsky-Kraff et al., 2006). Yet there are questions about whether or not this is a causal relationship (Mustillo et al., 2003), and the degree to which this relationship is attributable to individuals' perceptions about their body weight, rather than to their physical weight per se (ter Bogt et al., 2006).

Ethnicity and Ethnic Identity

Ethnic identity is a multidimensional and dynamic construct that focuses on individuals' knowledge and beliefs about belonging to a particular ethnic group (Phinney, 1990). Tajfel (1981) defined it as a "that part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value or emotional significance attached to that membership" (p. 255). A challenge found in the literature, however, is the lack of one prominent definition of ethnic identity (Moran, Fleming, Somervell, & Manson, 1999; Phinney, 1990). Ethnic identity and enculturation are often used interchangeably, with enculturation referring to the process by which knowledge, behavioral expectations, attitudes, and values are acquired and shared by members of a cultural group. Adolescents are said to be enculturated if they have a strong cultural identity, sense of pride in their culture, and participate in traditional activities (Zimmerman, Ramirez-Valles, Washienko, Walter, & Dyer, 1994).

Much of the developmental work that has examined ethnic identity among in adolescents has been grounded in both Tajfel's (1981) social identity theory and Erikson's (1968) theory of identity formation (Phinney, 1990; Umaña-Taylor & Fine, 2002). Social identity theory focuses more on the affective components of identity and how they are related to outcomes, whereas the theory of identity formation places greater emphasis on the process of identity development over the life span. Based on these theories, Umaña-Taylor and colleagues (2004) posited three distinct but related components for ethnic identity: (a) the degree to which individuals have explored the customs, beliefs, and practices associated with their ethnicity; (b) the degree to which

they have resolved what their ethnic identity means to them; and (c) the affect (positive or negative) that they associate with membership in their ethnic group. Umaña-Taylor et al. (2004) set out to develop and validate a scale to assess these components, which they termed *Exploration, Resolution,* and *Affirmation*, to allow for more a more fine-tuned understanding of an individual's status within the ethnic identity formation process.

Research indicates that a more mature ethnic identity is linked with higher academic achievement (Arrellano & Padilla, 1996). In Arrellano and Padilla's (1996) study, Mexican American college students reported that their ethnic pride, social connections with other individuals from the same ethnic group, and commitment to serving "their people" made them more determined to succeed academically (p. 498).

Evidence also points to strong ethnic identity (stronger affiliation, attachment, and pride) as a protective factor with regard to the risk of substance use and violence. In such a diverse society, ethnic identities and cultural factors may play significant roles in minority individuals' choices of health behaviors (Choi, Harachi, Gillmore, & Catalano, 2005). In one study, Love, Yin, Codina, and Zapata (2006) examined the relationship between ethnic identity and risky health behaviors in Mexican-American youth (n = 1,892). They employed the Ethnic Identity Scale (EIS) to assess ethnic identity and they included questions from the YRBS measured health risk behaviors to measure self-reported engagement in health risk behaviors. Love et al. (2006) found that even when controlling for SES, gender, age, and academic performance, stronger ties to Mexican-American culture were significantly associated with less engagement in health risk behaviors in the form of drug, alcohol, and tobacco use. Similarly, Marsiglia, Kulis, and Hecht (2001) found that students, of African American, Mexican American, and mixed-

ethnicity, with a strong sense of ethnic pride reported less drug use and exposure, while White students reported less drug use and exposure when they viewed their behavior, speech, and looks to be consistent with their ethnic group. In Mexican rural communities, when there was more social cohesion and cultural identity, little or no drug use was found (Wagner, Diaz, Lopez, Collado, & Aldaz, 2002).

Studies of individuals of American Indian heritage have reported that high levels of identification with American Indian culture are positively related to healthy behaviors. Consequently, higher ethnic identity may serve as a protective mechanism to enhance the psychological well-being of American Indian youth. Weaver (1999) found that children and youth who identified more strongly with traditional American Indian culture also engaged in healthier dietary practices. The sample consisted of 75 youth from two reservation-based and three non-reservation-based agencies service American Indian Youth. Similarly, Boyce and Boyce (1983) found that Navajo children and adolescents were healthier if they came from families and communities with the same cultural background as theirs. Sixty Navajo children, aged 6-15 in their first year at a reservation boarding school in New Mexico comprised the sample. They concluded that strong cultural identity protected them against tobacco use and alcohol use. Ingram (1989) pointed out that health and balanced eating practices are closely related to harmony, balance, and spiritual beliefs among American Indians. Accepting personal responsibility is highly valued in traditional American Indian culture. Zimmerman et al. (1994) found enculturation to increase self-esteem in American Indian youth, which served as a protective barrier for alcohol and substance use. The sample involved 120 American Indian youth from urban areas in a Midwestern state.

Whereas some research has found that having a strong ethnic identity was associated with positive psychosocial outcomes for ethnic minority youth, there are some contrary findings with American Indian adolescents. In their examination of 400 American Indian youth aged 12-19 , Silmere and Stiffman (2006) found that contrary to prior research, youth engagement in traditional American Indian activities was associated with less successful functioning, even for youths who did not have many misbehaving peers. Successful functioning in this study included seven indicators: good mental health, being alcohol- and drug-free, absence of serious misbehavior, clean police record, good grades, positive psychosocial functioning, and positive behavior and emotions. The sample consisted of 401 Southwestern urban and reservation-based youth.

Cultural identity and participation in traditions are sometimes associated with increased rates of alcohol or substance use. In a sample of American Indian youth, Hawkins et al. (2004) indicated that increased report of alcohol-related problems was associated with identification with American Indian culture. Similarly, Petoskey, Van Stelle, and De Jong (1998) found being an American Indian male, as well as increased frequency of attendance at American Indian cultural events, was associated with increased use of substances. Taken together, the mixed findings regarding the relationship between ethnic identity and health risk behaviors call for further examination of the relationship between ethnic identity and behavioral and psychological functioning. These studies utilized large national databases consisting of American Indian youth living on reservations, as well as urban and rural non-reservation areas.

This Study

The present study investigated how ethnic identity, internalizing symptoms, and nutrition are related to overweight in a sample of American Indian youth. It addressed the following three research questions: (1) What is the combined influence of ethnic identity, internalizing symptoms, and nutrition on body mass index observed in this sample of youth? (2) What are the separate contributions of ethnic identity, internalizing symptoms, and nutrition to body mass index in this sample of youth? and (3) What is the correlation relationship between the three domains of ethnic identity and nutrition?

The following predictions are made: (1) Together, ethnic identity, internalizing symptoms, and nutrition will predict a significant amount of variance in BMI observed in this sample of youth; (2) poorer nutrition will be associated with higher BMI; (3) youth with higher levels of ethnic identity resolution, exploration, and affirmation will have higher BMIs; (4) youth with higher levels of internalizing symptoms will have higher BMIs; and (5) higher levels of ethnic identity resolution, exploration, and affirmation will be correlated with poorer nutrition.

Originally, this study was designed to assess a broad array of health risk behaviors in this research sample. Subsequent reliability analyses of the Youth Risk Behavior Survey (YRBS) questions indicated low Cronbach alpha coefficients for the subscales, therefore, only the nutrition scale was used in further analyses.

CHAPTER III

METHODOLOGY

Participants

Participants were current students in a selective private tribal school in a Midwestern state serving American Indian youth in grades 7-12. Current enrollment is 360 students, which represent 42 tribes and 14 different states. Approximately 130 students reside in on-campus dormitories. Students are eligible to attend if they are members of a federally recognized Indian tribe or one-fourth blood descendants of such members and have a grade point average (GPA) of 2.25. Students must maintain a GPA of 2.25 or higher to continue enrollment. Courses of cultural significance required of all students include American Indian Language I and II, American Indian History, and American Indian Arts and Crafts.

All students were asked to participate in the study. To be eligible to participate, parents of students who were under the age of 18 provided parental consent and students provided individual assent. Students who were 18 or older provided individual consent. The tribal affiliation of the participating students is presented in Table 7. This investigation was part of a larger research study involving administration of several self-report questionnaires.

Measures

The questionnaire employed for the present study included measures of health risk behaviors, internalizing mental health symptoms, and ethnic identity, and nine demographic questions (e.g., age, school year, ethnicity). The questions pertaining to health risk behaviors, internalizing symptoms, and ethnic identity were administered in counterbalanced order.

Body mass index. A licensed practical nurse accompanied the research team to the school to measure students' height and weight in order to calculate body mass index (BMI). The students' BMI scores were plotted on the CDC's (2000) clinical growth charts to obtain a percentile ranking that compared each participant with others of the same age and gender.

Health risk behaviors. The Youth Health Risk Behavior Survey (YRBS; CDC, 2004) was used to measure health risk behaviors engaged in by the participants. Two forms of the YRBS were created by the CDC, a high school and middle school questionnaire, to monitor a wide range of health risk behaviors. The CDC administers this survey at schools across the U.S. at 2-year intervals and compiles the data for epidemiological purposes. The YRBS assesses a wide range of health risk behaviors—behaviors that result in unintentional injuries, tobacco, alcohol and other drug use, sexual behaviors, dietary intake, and physical activity. The middle school questionnaire contains 50 questions; the high school questionnaire has 87 questions. Both include *body weight* and *physical activity* subscales. The *food intake* subscale is included only in the high school questionnaire. For the purposes of this study, however, all students in grades 7-12

were asked to complete the *food intake* questions. These YRBS items are located both in Table 1 and also in Appendix B.

Internalizing symptoms. Internalizing symptoms were measured using the Anxiety and Depression Scales of the Behavior Assessment Scale for Children Self-Report of Personality, Adolescent version (BASC-2; Reynolds & Kamphaus, 2004). The BASC-2 is a multi-method, multidimensional system used to evaluate the behavior and self perceptions of children and young adults aged 2 through 25 years. The Self-Report of Personality is an omnibus personality inventory consisting of statements that respondents answer in one of two ways. Some of the items presented first on the record form require a True or False response, while others call for rating on a 4-point scale of frequency, ranging from Never to Almost Always. Internal consistency coefficients for the Anxiety and Depression scales were reported of α = .86 and .88, respectively, for the 12-14 year age range and α = .86 and .86 respectively for ages 15-18 (Reynolds & Kamphaus, 2004). In the present analyses, T-scores were entered for the Anxiety and Depression scales. These BASC-2 items are reproduced in Appendix C.

Ethnic identity. Ethnic identity was measured using the Ethnic Identity Scale (EIS; Umaña-Taylor, Yazedjian, & Bamaca-Gomez, 2004). The EIS consists of 17 items measuring three distinct components of ethnic identity: Exploration (seven items), Resolution (four items), and Affirmation (six items). The researchers defined Exploration as the degree to which individuals have explored aspects related to their ethnicity, Resolution as the extent to which individuals have resolved any issues related to their ethnicity, and Affirmation as the degree to which individuals feel positively about their ethnicity. Items are rated on a 1 to 4 Likert scale anchored by 1 *(Does not describe me at*

all) and 4 *(Describes me very well)*. Ten items are positively worded and seven are negatively worded. Negatively worded items are reversed scored so that higher scores indicate higher levels of Affirmation, Exploration, and Resolution. The items in each scale are averaged to produce scale scores. Cronbach's coefficient alphas were reported of α = .89, .84, .89 for Exploration, Resolution, and Affirmation, respectively, with a high school sample and with alphas of .91, .86, and .92, respectively, for a college sample (Umaña-Taylor et al., 2004). A recent study that examined the factor structure of the EIS with the present sample of American Indian youth found that items 6 and 11, which originally were part of the Exploration subscale, did not fit the model (Yetter, Foutch, & Bui, in preparation). Consequently, these two items were omitted and only the remaining 15 EIS items were used in the present analyses. For the present sample, the coefficient alphas were α = .84, .86, .82 for Exploration, Resolution, and Affirmation, respectively. For the present sample of youth the Pearson correlations among the scales are r = .27 (p < .001) between Resolution and Affirmation, r = .33 (p < .001) between Affirmation and Exploration, and r = .60 (p < .001) between Resolution and Exploration (Yetter, Foutch, & Bui, in preparation). The EIS questions are located in Appendix D.

Procedures

The data were drawn from a larger research project examining factors potentially related to overweight and obesity in American Indian youth. The study was approved by the Oklahoma State University Institutional Review Board. Prior to the day when surveys were distributed to the students, the school mailed letters to the parents of all students under age 18 describing the study and requesting parental consent for their children to participate in the study. A total of 133 parents agreed to allow their children to

participate. The surveys were administered at the school in a single day. All students age 18 or over, and all students under age 18 whose parents had consented for them to participate were called from their classrooms to the survey area one grade at a time (in groups of approximately 40 students) by the school secretary using the school announcement system. Once students were seated in the survey area, the researchers read aloud the assent form (consent form for students over age 18) and students were asked to sign if they agreed to participate. The signed assent (consent) forms were collected and the survey packets, which included the Ethnic Identity Scale and several demographic questions, were distributed to the students as a group. The participants were instructed not to write their names on the surveys. Participants were allowed as much as time as they needed to complete the survey and were allowed to ask questions to clarify meaning of survey items if needed.

Half of the participants had their height and weight measures collected by a licensed practical nurse after the questionnaire was administered, and half had their height and weighted measured before completing the questionnaire. Students were randomly directed to one of two assessment areas. The nurse recorded each student's height and weight information. on the back of the student's questionnaire to retain anonymity of information. After completing the questionnaire and having their height and weight measured, the students were given a 2-page information sheet describing healthy eating and exercise habits created by the National Diabetes Education Program for American Indians and Alaska Natives (2009), reproduced in Appendix E. The students then returned to their classrooms.

Analyses

All data analyses were performed using SPSS software version 17.0 (SPSS, 2008). A hierarchical multiple regression analysis was carried out to address the research questions, with the three ethnic identity scales, internalizing symptoms, and nutrition as the predictor variables and degree of youth overweight as the dependent variable. Ethnic identity exploration, resolution, and affirmation were entered in Step 1, internalizing symptoms in Step 2, and nutrition in Step 3. A hierarchical multiple regression analysis was chosen based upon the conceptualization of acculturation as a relatively stable characteristic. In contrast, internalizing problems likely reflect life circumstances and within-person dispositional factors and nutritional practices are behaviors that can be altered by an individual. Entering these variables as three separate blocks allowed measurement of the variance in BMI accounted for by each of the three factors, controlling for those factors that were already in the model.

CHAPTER IV

RESULTS

Reliability of YRBS Scales

Although the Youth Risk Behavior Survey (YRBS) questions were intended to assess a broad array of health risk behaviors in this research sample, subsequent reliability analyses indicated low Cronbach alpha coefficients for the subscales. The Cronbach's alpha was α =.44 for the dieting practice questions (items 3-7), α =.45 for physical activity (items 16-19), and α = .55 for nutrition (items 8-15). Further examination indicated that removal of nutrition item 14 would result in an increased alpha of α =.66, approaching Nunnally's (1978) recommendation that instruments used in social science research have alpha reliability coefficients of about .70 or higher. Item 14 therefore was removed, leaving a nutrition scale consisting of items 8-13 and 15. Only the nutrition scale was used in further analyses; these items were summed. See Appendix B for the complete set of YRBS items that were administered.

Table 1
YRBS Nutrition Scale Items Included in the Study

8. During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)

A. I did not drink 100% fruit juice during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

9. During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)

A. I did not eat fruit during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

10. During the past 7 days, how many times did you eat **green salad**?

A. I did not eat green salad during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

11. During the past 7 days, how many times did you eat **potatoes**? (Do **not** count French fries, fried potatoes, or potato chips.)

A. I did not eat potatoes during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

12. During the past 7 days, how many times did you eat **carrots**?

A. I did not eat carrots during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

13. During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)

A. I did not eat other vegetables during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

15. During the past 7 days, how many **glasses of milk** did you drink? (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)

A. I did not drink milk during the past 7 days
B. 1 to 3 glasses during the past 7 days
C. 4 to 6 glasses during the past 7 days
D. 1 glass per day
E. 2 glasses per day
F. 3 glasses per day
G. 4 or more glasses per day

Descriptive Statistics

Tables 2, 3, and 4 summarize the descriptive statistics for the variables in this study. Table 2 shows the distribution of participants among the CDC's (2000) weight categories. The mean age- and gender-adjusted BMI percentile rank for the participants was 80.9 (*SD* = 20.79), which falls in the *At Risk of Overweight* category according to the CDC (2000) growth charts.

As Table 3 indicates, the means of the Ethnic Identity Scale (EIS) subscales were 2.9 (*SD* =.76) for Exploration, 3.8 (*SD* =.51) for Affirmation, and 3.2 (*SD* =.79) for Resolution

on the 1 to 4 range of possible answers. The mean T-scores on the BASC Anxiety and Depression symptom scales were 45.8 (*SD* = 10.54) and 48.8 (*SD* = 10.14), respectively, both within the *Average* range (Reynolds & Kamphaus, 2004). Lastly, the mean YRBS Nutrition score was 17.2 (*SD* = 5.80) on a possible range of scores of 7 to 49, where lower scores indicated less consumption of nutritious foods. Table 4 shows the breakdown of participants among the BASC-2 classifications of *Average, At-Risk* and *Clinically Significant* for Depression and Anxiety symptoms.

Table 2
BMI Weight Categorization of Participants (N = 143)

Category	BMI Percentile Range	N	%
Underweight	< 5th percentile	0	0.0
Healthy weight	5th to < 25th percentile	3	2.1
	25th percentile to < 45th percentile	11	7.7
	45th percentile to < 65th percentile	12	8.4
	65th percentile to < 85th percentile	31	21.7
Risk of Overweight	85th to 95th percentile	29	20.3
Overweight	≥ 95th percentile	57	39.9

Note. Two participants declined to have their height and weight measured.

Table 3
Descriptive Statistics for Outcome Variables in the Study

	Mean	SD	Minimum	Maximum
BMI[1]	80.86	20.79	12	100
EIS[2]				
Exploration[3]	2.92	.76	1	4
Affirmation[4]	3.79	.51	1	4
Resolution[5]	3.16	.79	1	4
Anxiety[6]	45.76	10.54	32	78
Depression[7]	48.80	10.14	40	93
Nutrition[8]	17.23	5.80	7	39

Note. [1]BMI percentiles. [2]EIS mean raw scale scores. [3]Possible range of Exploration scores 1-4. [4]Possible Likert range of Affirmation scores 1-4. [5]Possible range of Resolution scores 1-4. [6]T-scores on BASC Anxiety symptoms scale. [7]T-scores on BASC Depressive symptoms scale. [8]Possible range of YRBS nutrition scale raw scores was 7-49.

Table 4
BASC Anxiety and Depression Symptoms Categorization (N = 145)

Clinical Scales	T-Score Range	Anxiety[1]	Depression[1]
Average	41-59	126	120
At-Risk	60-69	15	17
Clinically Significant	70 or above	4	8

Note. [1]Number of participants who met criteria in each category.

Research Question 1: What is the combined influence of ethnic identity, internalizing symptoms, and nutrition on body mass index observed in this sample of youth?

A hierarchical linear regression analysis examined the combined influence of ethnic identity, internalizing symptoms, and nutrition on body mass index. Ethnic identity exploration, resolution, and affirmation were entered in the first step, F (3, 129) = 1.536, p = .208. The BASC Anxiety symptoms and Depressive symptoms T-scores were entered in the second step, F (2, 127) = .705, p = .496. The YRBS nutrition total score was entered in the final step, F (1, 126) = .904, p = .344. As Table 5 shows, the percent of variance in BMI accounted for by all the predictors together was 5.2%. None of the predictors accounted for a significant amount of variance in BMI. Hypothesis 1 was not upheld.

Research Question 2: What are the separate contributions of ethnic identity, internalizing symptoms, and nutrition to body mass index in this sample of youth?

The results of the hierarchical linear regression analysis were further examined to determine the separate contributions of ethnic identity, internalizing symptoms, and nutrition on body mass index. Table 5 summarizes the percent of variance in BMI accounted for by the predictors. As Table 5 shows, all the predictors together explained 5.2% of the variance in BMI. Ethnic identity, internalizing symptoms, and nutrition accounted for 3.4%, 1.1%, and 0.7% of variance, respectively. None of the predictors accounted for a significant amount of variance in BMI. Hypotheses 2, 3, and 4 were not supported.

Table 5
BMI Variance Accounted for by the Predictors

Model	*R*	*R-Square*	*F Change*	*Sig. F Change*	*SE*
1	.19[a]	.034	1.54	.208	20.664
2	.21[b]	.045	.705	.496	20.711
3	.23[c]	.052	.904	.344	20.719

Note.

a. Predictors: Exploration, Affirmation, Resolution

b. Predictors: Exploration, Affirmation, Resolution, Anxiety, Depression

c. Predictors: Exploration, Affirmation, Resolution, Anxiety, Depression, Nutrition

Research Question 3: What is the correlation between the three domains of ethnic identity and nutrition?

Table 6 shows the simple correlations among the variables in the study. Participants with healthier nutrition practices reported higher levels of ethnic identity in the Exploration and Resolution domains (r = .27, p = .001; and r =.25, p = .002

respectively), contrary to Hypothesis 5. Participants with healthier nutrition practices reported neither higher nor lower levels of ethnic identity in the Affirmation domain (r = .03, p = .36). This result is also contrary to Hypothesis 5.

Table 6
Simple Correlations Among Major Variables

		Ethnic Identity				
	BMI	Explore	Affirm	Resolve	Anxiety	Depression
BMI[1]	1.00					
Explore	.142*	1.00				
Affirm	-.088	.197**	1.00			
Resolve	.088	.616***	.252**	1.00		
Anxiety	.069	-.060	.180**	.092	1.00	
Depression	.072	-.051	.007	.051	.629***	1.00
Nutrition	-.049	.270***	-.031	.248**	-.258***	-.127

Note. [1]BMI percentile.

*p < .05; **p < .01; ***p < .001

Table 7. *Tribal distribution of participating youth*

Tribe	N	%	Tribe	N	%
Cherokee	82	56.6	Cherokee/Seminole	1	.7
Cherokee/Creek	8	5.5	Cheyenne	1	.7
United Keetoowah Band	8	5.5	Cheyenne/Arapaho	1	.7
Creek	6	4.1	Chickasaw	1	.7
Cherokee/Delaware	2	1.4	Choctaw	1	.7
Cheyenne/Cherokee	2	1.4	Choctaw/Seminole/Creek	1	.7
Choctaw/Cherokee	2	1.4	Creek/Sioux	1	.7
Creek/Seminole	2	1.4	Eastern Cherokee	1	.7
Eastern Shawnee	2	1.4	Kickapoo/Cheyenne/Arapaho	1	.7
Keetoowah	2	1.4	Kiowa	1	.7
Osage	2	1.4	Kiowa/Cherokee	1	.7
Ponca	2	1.4	Laguna Pueblo	1	.7
Seminole	2	1.4	Meskwaki	1	.7
Shawnee	2	1.4	Pawnee	1	.7
Cherokee/Creek/Sioux/Florida	1	.7	Shoshone	1	.7
Cherokee/Pawnee	1	.7	Did not report	4	2.8

CHAPTER V

DISCUSSION

In this study, ethnic identity, internalizing symptoms, and nutrition together did not predict a significant amount of variance in BMI. Surprisingly, and contrary to our hypothesis, youth who felt curious about their traditional culture and wished to investigate it further (high in ethnic identity Exploration) were more likely to eat nutritious foods. Likewise, youth who felt comfortable with being American Indian and who had integrated American Indian cultural beliefs, practices, and understandings into their identity (high in ethnic identity Resolution) also ate nutritious foods more frequently than their lower-resolved peers.

We found that ethnic identity Affirmation, the degree to which individuals felt positively about their ethnicity, was not related to nutritional practices. Table 3 shows that the mean Affirmation score was 3.79 (*SD* =.51) on the 1-4 scale, indicating overall high ratings with little variation for this sample. Considering the strong emphasis on cultural pride at this private tribal school, high Affirmation ratings are not surprising. The homogeneity of the sample and controlled setting, however, likely limit the extent to which these findings would generalize to other American Indian youth.

Prior investigations of individuals of American Indian heritage have reported mixed findings with regard to the relationship between identification with traditional

culture and healthy eating. Some studies reported that high levels of identification with American Indian culture were positively related to healthy behaviors (Weaver, 1999; Zimmerman et al. 1994), whereas other studies have reported that participation in traditional American Indian activities predicted poorer psychosocial functioning (Hawkins et al., 2004; Petoskey et al., 1998). In this study, no significant relationships were found between ethnic identity and nutrition.

The majority of participants in this study reported average levels of anxiety and depression symptoms (87% and 83% respectively). These rates are considerably lower than the high prevalence of anxiety, depression, and general internalizing symptoms reported among youth in general (Lewinsohn et al., 1999; Masten et al., 1995) and more specifically in American Indian adolescents (Frank & Lester, 2002; Hawkins et al., 2004; Spear et al., 2005). Silmere and Stiffman (2006) found that less than one-quarter of American Indian youth showed successful positive psychosocial functioning (23.6%), good mental health (20.2%), and positive behavior and emotions (16.8%). It is possible that the low levels of mental health problems evident in this sample are attributable to students' enrollment in this selective private school and that youth with significant mental health problems might not be retained at the school. Alternatively, it may be that anxiety and depression are less prevalent among the students at this school due to the school's highly personal and supportive atmosphere and intensive efforts to instill ethnic pride in its students.

Regardless of ethnic, cultural, or racial background, adolescents with overweight or obesity have been found to be at higher risk for mental health problems such as depression (Black, 2002; Wadden et al., 2001; Young-Hyman et al., 2006). Our data did

not indicate a higher occurrence of anxiety or depression in high-BMI adolescents. However, it is important to note, over time overweight and obesity may lead to problems in physical and mental health. In contrast to studies that reported that depression in adolescence predicted weight gain (Goodman & Whitaker, 2002; Pasch et al., 2008; Stice et al., 2005), Tanofsky-Kraff et al. (2006) did not find childhood depressive symptoms to be a significant independent predictor of changes in adiposity. Additionally, Neumark-Sztainer et al. (1996), found that the emotional well-being of adolescents did not differ greatly between nonoverweight, moderately overweight, and severely overweight adolescents.

Prior research has reported BMI scores that are significantly higher for American Indian boys and girls, as compared to other ethnic groups (Lynch et al., 2007). It has been estimated that between 25 and 45% of American Indian school-age children are obese, compared to 22% of children in the general population (Broussard et al., 1991; Story et al., 1999). Caballero, Johnson, Himes, Lohman, Davis, Stevens, Evans, et al. (2003) found that over 30% of American Indian children were overweight and 21% were at risk for becoming overweight. The weight distribution of this sample was similar to estimates found in national samples. As indicated in Table 2, among our participants the distribution of weight classifications was 40% overweight, 20% at risk of overweight, 38% healthy weight, and 2% underweight.

Strengths. The ecological validity of this study is a prominent strength. The participants were all documented American Indian adolescents attending a traditional American Indian school in a largely American Indian community setting. With a response rate of 40%, the sample was fairly representative of the student body as a whole.

A second strength is the moderately high degree of tribal homogeneity of our sample. As Table 7 shows, more than half of the participants were of Cherokee or mixed Cherokee and other tribal heritage. Given the substantial cultural differences among the various American Indian tribes, tribal homogeneity in our sample enhances the internal validity of our findings. A third strength of this study relates to the overall soundness of the measures we employed. Computation of BMIs was based on physical measurements conducted by a trained medical professional using a medical-grade scale, and the BMI percentiles we used in these analyses were computed using CDC (2000) charts that adjusted for age and gender. The validity of the BASC-2 Self-Report of Personality as an indicator of anxiety and depression symptomology is well established (Reynolds & Kamphaus, 2004), and the EIS also is supported by empirical evidence.

Weaknesses. Unfortunately, the internal consistency of the YRBS dieting and physical activity scales of α = .44 and .45, respectively, were unacceptably low according to commonly accepted psychometric standards (Nunnally, 1978), and consequently we did not include measures of these variables in our analyses. Even after we deleted one item, the internal consistency of the YRBS nutrition scale was lower than desired (α = .66). It is possible that the low internal reliability of the nutrition items contributed to our lack of findings, and that had we used a stronger measure of healthy eating behaviors our results would have been different.

Our sample was drawn from a highly selective private school that provided ample instruction to instill knowledge and pride in American Indian culture and language. Students actively sought entry into this culturally enriched community. As a consequence, these students' EIS scores may well have been higher than those of typical

American Indian adolescents. Although it is not possible to tell for certain, the unique learning environment from which these participants were drawn may also have restricted the range of their EIS responses. Similarly, the fact that these participants were drawn from a selective private school with a wait list of applicants raises the possibility that their unique setting restricted the range in their BASC-2 internalizing scores. In sum, the unusually selective and enriched setting from which our sample was drawn threatens the external validity of this study. Moreover, it also may have led to restrictions of range in the responses to several of the measures. This, in turn, might explain our lack of findings.

By examining a sample that was majority Cherokee, the conclusions do not necessarily generalize to Native American youth of other tribal affiliations, especially given the differences among the tribes. The reader is cautioned that these results may not generalize to Native American youth from non-private-school populations or Native American youth from reservation communities.

Future research. Additional research is warranted with American Indian youth from other tribal backgrounds and from more typical community settings to gain a better understanding of the relationships among the variables in this study. Improved assessments instruments with a comprehensive focus on health risk behaviors, including nutrition, are necessary for reliable measurement. Follow-up using a longitudinal approach would provide more information as to how relationships among these variables may change during the course of development.

Nevertheless, the present study provided a window into the relationships among overweight, internalizing symptoms, ethnic identity and healthy eating practices for one sample of American Indian youth living in a American Indian community. Especially

given the dearth of research on American Indians, these findings are potentially valuable for increasing our understanding of these issues.

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APPENDICES

APPENDIX A

Demographic Questions

Thank you for participating. Please answer the following demographic questions. Circle the best answer.

1. How old are you?
   A. 13 years old or younger
   B. 14 years old
   C. 15 years old
   D. 16 years old
   E. 17 years old
   F. 18 years old
   G. 19 years old or older

2. What is your sex?
   A. Female
   B. Male

3. In what grade are you?
   A. 7^{th} grade
   B. 8^{th} grade
   C. 9^{th} grade
   D. 10^{th} grade
   E. 11^{th} grade
   F. 12^{th} grade

4. On a scale where 2.0 = C, 3.0 = B, and 4.0 = A, what is your grade point average? (fill in the blank to give your best estimate) _____

5. Do you live on campus or off campus?
   A. On campus
   B. Off campus

6. Are you American Indian?
   A. Yes
   B. No

7. If you are, what is your tribal affiliation? _____ (for example, Chickasaw or Cherokee)

8. What is your height? (give your best estimate) ____ft ____in

9. What is your weight? (give your best estimate) _____lbs

APPENDIX B

Youth Risk Behavior Survey:

Body Weight, Food Intake, and Physical Activity Questions

The next 7 questions ask about body weight.

65. How do **you** describe your weight?
    A. Very underweight
    B. Slightly underweight
    C. About the right weight
    D. Slightly overweight
    E. Very overweight

66. Which of the following are you trying to do about your weight?
    A. **Lose** weight
    B. **Gain** weight
    C. **Stay** the same weight
    D. I am **not trying to do anything** about my weight

67. During the past 30 days, did you **exercise** to lose weight or to keep from gaining weight?
    A. Yes
    B. No

68. During the past 30 days, did you **eat less food, fewer calories, or foods low in fat** to lose weight or to keep from gaining weight?
    A. Yes
    B. No

69. 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?
    A. Yes
    B. No

70. 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? (Do **not** include meal replacement products such as Slim Fast.)
    A. Yes
    B. No

71. During the past 30 days, did you **vomit or take laxatives** to lose weight or to keep from gaining weight?
    A. Yes
    B. No

The next 8 questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at school, at restaurants, or anywhere else.

72. During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)
    A. I did not drink 100% fruit juice during the past 7 days
    B. 1 to 3 times during the past 7 days
    C. 4 to 6 times during the past 7 days
    D. 1 time per day
    E. 2 times per day
    F. 3 times per day
    G. 4 or more times per day

73. During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)
    A. I did not eat fruit during the past 7 days
    B. 1 to 3 times during the past 7 days
    C. 4 to 6 times during the past 7 days
    D. 1 time per day
    E. 2 times per day
    F. 3 times per day
    G. 4 or more times per day

74. During the past 7 days, how many times did you eat **green salad**?
    A. I did not eat green salad during the past 7 days
    B. 1 to 3 times during the past 7 days
    C. 4 to 6 times during the past 7 days
    D. 1 time per day
    E. 2 times per day
    F. 3 times per day
    G. 4 or more times per day

75. During the past 7 days, how many times did you eat **potatoes**? (Do **not** count french fries, fried potatoes, or potato chips.)
    A. I did not eat potatoes during the past 7 days
    B. 1 to 3 times during the past 7 days
    C. 4 to 6 times during the past 7 days
    D. 1 time per day
    E. 2 times per day
    F. 3 times per day
    G. 4 or more times per day

76. During the past 7 days, how many times did you eat **carrots**?

A. I did not eat carrots during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

77. During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)

A. I did not eat other vegetables during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

78. During the past 7 days, how many times did you drink a **can, bottle, or glass of soda or pop**, such as Coke, Pepsi, or Sprite? (Do **not** include diet soda or diet pop.)

A. I did not drink soda or pop during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

79. During the past 7 days, how many **glasses of milk** did you drink? (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)

A. I did not drink milk during the past 7 days
B. 1 to 3 glasses during the past 7 days
C. 4 to 6 glasses during the past 7 days
D. 1 glass per day
E. 2 glasses per day
F. 3 glasses per day
G. 4 or more glasses per day

The next 4 questions ask about physical activity.

80. During the past 7 days, on how many days were you physically active for a total of **at least 60 minutes per day**? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days

81. On an average school day, how many hours do you watch TV?

A. I do not watch TV on an average school day
B. Less than 1 hour per day
C. 1 hour per day
D. 2 hours per day
E. 3 hours per day
F. 4 hours per day
G. 5 or more hours per day

82. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet.)

A. I do not play video or computer games or use a computer for something that is not school work
B. Less than 1 hour per day
C. 1 hour per day
D. 2 hours per day
E. 3 hours per day
F. 4 hours per day
G. 5 or more hours per day

83. During the past 12 months, on how many sports teams did you play? (Include any teams run by your school or community groups.)

A. 0 teams
B. 1 team
C. 2 teams
D. 3 or more teams

APPENDIX C

BASC-2-SRP-A Internalizing Questions[1]

1. Nothing goes my way. (D)
2. I used to be happier. (D)
3. I can never seem to relax. (A)
4. I worry about little things. (A)
5. Nothing is fun anymore. (D)
6. Nobody ever listens to me. (D)
7. I just don't care anymore. (D)
8. I worry a lot of the time. (A)
9. I often worry about something bad happening to me. (A)
10. I don't seem to do anything right. (D)
11. Nothing ever goes right for me. (D)
12. Nothing about me is right. (D)
13. I get so nervous I can't breathe. (A)
14. I worry when I go to bed at night. (A)
15. I feel like my life is getting worse and worse. (D)
16. I feel depressed. (D)
17. No one understands me. (D)
18. I feel guilty about things. (A)
19. I get nervous. (A)
20. I worry but I don't know why. (A)
21. I feel sad. (D)
22. I get nervous when things do not go the right way for me. (A)
23. Little things bother me. (A)
24. I worry about what is going to happen. (A)

[1] Behavior Assessment System for Children Self-Report of Personality (SRP), Adolescent version (Reynolds & Kamphaus, 2004). The notation after each item indicates the relevant subscale: A= Anxiety, D = Depression.

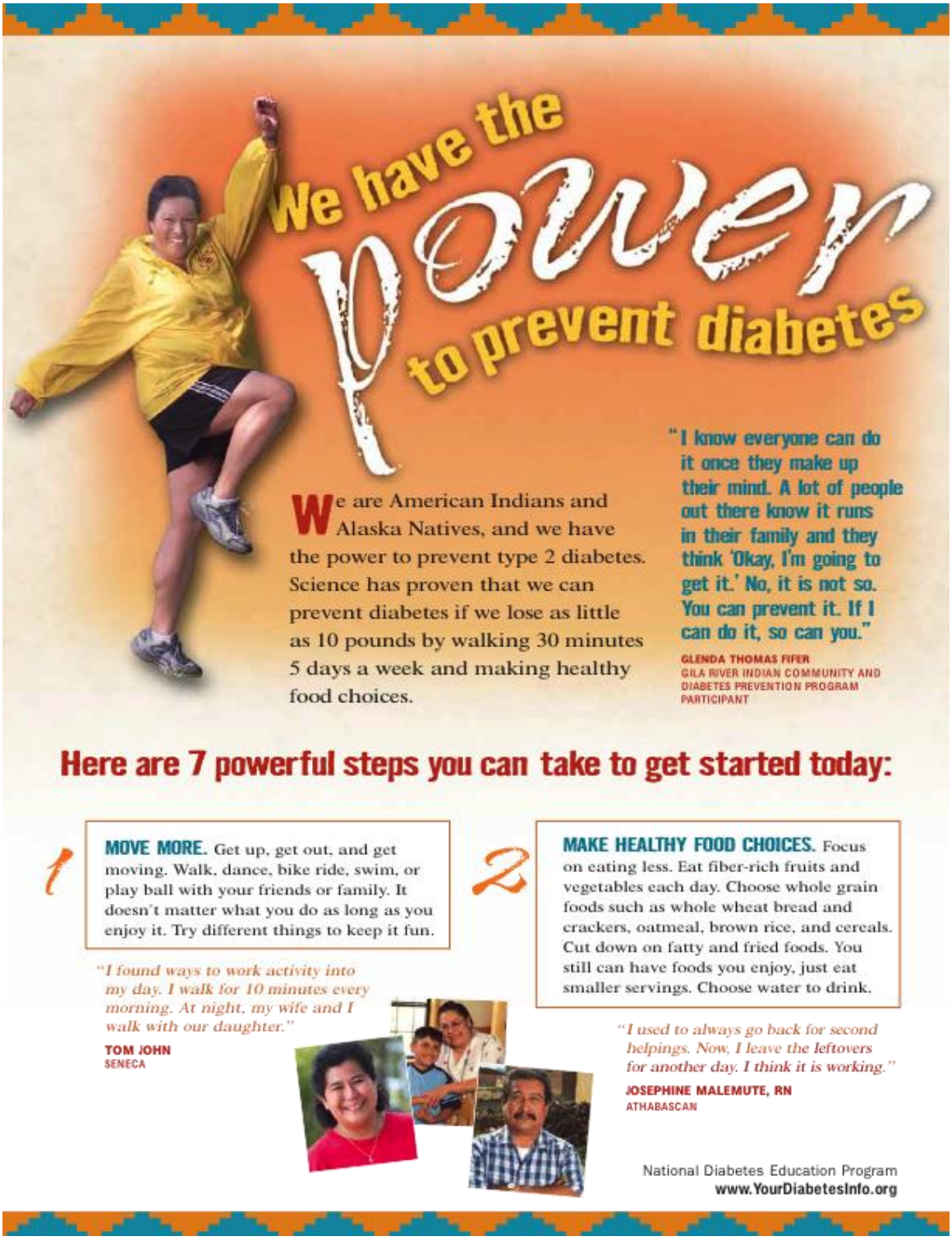
APPENDIX D

Ethnic Identity Scale[1]

1. My feelings about my ethnicity are mostly negative (–A).
2. I have not participated in any activities that would teach me about my ethnicity (–E).
3. I am clear about what my ethnicity means to me (+R).
4. I have experienced things that reflect my ethnicity, such as eating food, listening to music, and watching movies (+E).
5. I have attended events that have helped me learn more about my ethnicity (+E).
6. I have read books/magazines/newspapers or other materials that have taught me about my ethnicity (+E). [This item was omitted from the present study.]
7. I feel negatively about my ethnicity (-A).
8. I have participated in activities that have exposed me to my ethnicity (+E).
9. I wish I were of a different ethnicity (–A).
10. I am not happy with my ethnicity (–A).
11. I have learned about my ethnicity by doing things such as reading (books, magazines, newspapers), searching the internet, or keeping up with current events (+E). [This item was omitted from the present study.]
12. I understand how I feel about my ethnicity (+R).
13. If I could choose, I would prefer to be of a different ethnicity (–A).
14. I know what my ethnicity means to me (+R).
15. I have participated in activities that have taught me about my ethnicity (+E).
16. I dislike my ethnicity (–A).
17. I have a clear sense of what my ethnicity means to me (+R).

[1]Umaña-Taylor, Yazedjian, & Bamaca-Gomez (2004). Response options were: (1) Does not describe me at all, (2) Describes me a little , (3) Describes me well, and (4) Describes me very well. The notation after each item indicates the relevant subscale: A= Affirmation, E = Exploration, and R= Resolution); + indicates a positively worded item; – indicates a negatively worded item. Negatively worded items were reverse scored so that higher scores indicate higher levels of Affirmation, Exploration, and Resolution.

APPENDIX E


We have the Power to prevent diabetes
We are American Indians and Alaska Natives, and we have the power to prevent type 2 diabetes. Science has proven that we can prevent diabetes if we lose as little as 10 pounds by walking 30 minutes 5 days a week and making healthy food choices.
"I know everyone can do it once they make up their mind. A lot of people out there know it runs in their family and they think 'Okay, I'm going to get it.' No, it is not so. You can prevent it. If I can do it, so can you."
GLENDA THOMAS FIFER
GILA RIVER INDIAN COMMUNITY AND DIABETES PREVENTION PROGRAM PARTICIPANT
Here are 7 powerful steps you can take to get started today:
1
MOVE MORE. Get up, get out, and get moving. Walk, dance, bike ride, swim, or play ball with your friends or family. It doesn't matter what you do as long as you enjoy it. Try different things to keep it fun.
"I found ways to work activity into my day. I walk for 10 minutes every morning. At night, my wife and I walk with our daughter."
TOM JOHN
SENECA
2
MAKE HEALTHY FOOD CHOICES. Focus on eating less. Eat fiber-rich fruits and vegetables each day. Choose whole grain foods such as whole wheat bread and crackers, oatmeal, brown rice, and cereals. Cut down on fatty and fried foods. You still can have foods you enjoy, just eat smaller servings. Choose water to drink.
"I used to always go back for second helpings. Now, I leave the leftovers for another day. I think it is working."
JOSEPHINE MALEMUTE, RN
ATHABASCAN
National Diabetes Education Program
www.YourDiabetesInfo.org

3 **TAKE OFF SOME WEIGHT.** Once you start eating less and moving more, you will lose weight. By losing just 10 pounds, you can cut your chances of getting diabetes.

"Since losing a few pounds, I feel better and have more energy to do the things I enjoy."
LORELI DECORA
WINNEBAGO TRIBE OF NEBRASKA

4 **SET GOALS YOU CAN MEET.** Start by making small changes. Try being active for 15 minutes a day this week. Then each week add 5 minutes until you build up to at least 30 minutes 5 days a week. Try to cut 100 calories out of your diet each day (that's one can of soda!). Slowly reduce your calories over time. Talk to your health care team about your goals.

"When I first started walking, I could only go for about 10 minutes. Now I feel stronger and am able to walk 45 minutes every day."
JONATHAN FEATHER
EASTERN BAND OF CHEROKEE INDIANS

6 **SEEK HELP.** You don't have to prevent diabetes alone. Ask your family and friends to help you out. Involve them in your activities. You can help each other move more, eat less, and live a healthy life. Go for a walk together or play a pick-up game of basketball. Join a support group in your area to help you stay on track.

"After dinner I often take a walk with my family instead of watching TV."
KELLY MOORE, MD
CREEK NATION OF OKLAHOMA

5 **RECORD YOUR PROGRESS.** Write down all the things you eat and drink and the number of minutes you are active. Keeping a diary is one of the best ways to stay focused and reach your goals.

"Keeping track of my activity allows me to see how I'm doing. By walking for 10 minutes at least 3 times a day, I'm able to get my 30 minutes in."
LORRAINE VALDEZ, RN
ISLETA/LAGUNA PUEBLOS

7 **KEEP AT IT.** Making even small changes is hard in the beginning. Try to add one new change a week. If you get off track, start again and keep at it.

"When I don't think I have time to exercise, I just remember how important it is to be around for my family."
RALPH FORQUERA
JUANEÑO BAND OF CALIFORNIA INDIANS

"We have the power to help our people and the generations to come. We have the Power to Prevent Diabetes."

YVETTE ROUBIDEAUX, MD
ROSEBUD SIOUX

Take your first step today. Talk to your health care team about your risk for type 2 diabetes and the small steps you can take to prevent it. To find out more, call **1-888-693-NDEP (6337)** or visit **www.YourDiabetesInfo.org** to get a free copy of Your GAME PLAN to Prevent type 2 Diabetes.

NDEP National Diabetes Education Program
small steps big rewards Prevent type 2 Diabetes

Kelly Moore, M.D., contracted consultant with the Indian Health Service Division of Diabetes, Albuquerque, NM has reviewed this tip sheet for accuracy.
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VITA

Stacy Brett Lee

Candidate for the Degree of

Doctor of Philosophy

Dissertation: RELATIONSHIPS AMONG BODY MASS INDEX, NUTRITION, INTERNALIZING SYMPTOMS, AND ETHNIC IDENTITY OF CHEROKEE YOUTH ATTENDING A PRIVATE NATIVE AMERICAN SECONDARY SCHOOL

Major Field: Educational Psychology with option in School Psychology

Education:

Completed the requirements for the Master of Science in School Psychometrics at Oklahoma State University, Stillwater, Oklahoma in December, 2007.

Completed the requirements for the Bachelor of Science in Social Science at Rogers State University, Claremore, Oklahoma in May, 2002.

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Name: Stacy B. Lee Date of Degree: July, 2011

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: RELATIONSHIPS AMONG BODY MASS INDEX, NUTRITION, INTERNALIZING SYMPTOMS, AND ETHNIC IDENTITY OF CHEROKEE YOUTH ATTENDING A PRIVATE NATIVE AMERICAN SECONDARY SCHOOL

Pages in Study: 65 Candidate for the Degree of Doctor of Philosophy

Major Field: Educational Psychology with option in School Psychology

Scope and Method of Study: The present study provided a window into the relationships among overweight, internalizing symptoms, ethnic identity and healthy eating practices for one sample of American Indian youth living in a American Indian community.

Findings and Conclusions: In this study, ethnic identity, internalizing symptoms, and nutrition together did not predict a significant amount of variance in BMI. Youth who felt curious about their traditional culture and wished to investigate it further (high in ethnic identity Exploration) were more likely to eat nutritious foods. Likewise, youth who felt comfortable with being American Indian and who had integrated American Indian cultural beliefs, practices, and understandings into their identity (high in ethnic identity Resolution) also ate nutritious foods more frequently than their lower-resolved peers. Ethnic identity Affirmation, the degree to which individuals felt positively about their ethnicity, was not related to nutritional practices. The majority of participants in this study reported average levels of anxiety and depression symptoms. Our data did not indicate a higher occurrence of anxiety or depression in high-BMI adolescents. Lastly, the weight distribution of this sample was similar to estimates found in national samples.

ADVISER'S APPROVAL: Dr. Georgette Yetter