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The Tip of the Blade: Self-Injury Among Early Adolescents

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The Tip of the Blade:
Self-Injury Among Early Adolescents

by

Moya L. Alfonso

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
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Dedication

This work is dedicated to my true family, those folks who have stood by me during these surreal years. To my girls, my loves, my life, what would I do for material without you? You have my heart. Therefore, when you hurt, I am broken; when you smile, I melt. To my serious, kind-hearted Lauren, who has hated mommy's "job" all these years for the time it took away from her. I'm sorry darling. I will try to make it up to you and hope that I at least made you proud. To my wild, purple-haired, piercing-loving daughter, Jackie, thank you for all of the silliness you bring to our lives—well, maybe not all of it! You are worshipped, my love. To my husband, Peter, what can I say? You have known me as a student since we met over 16 years ago. Never has your support wavered. You believed I could finish when I did not. To my friend, Tracie, who I lost last year, I miss you every day. Finishing this without you here was hard, but your belief in me was in my heart. To my friends, Terri, Tina, Julie, Leah, Jeanine, and Jen, you have been called upon a great deal this past year, and you have risen to the occasion. I could not have finished this process without your support.

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The Tip of the Blade:
Self-injury During Early Adolescence

Moya L. Alfonso

ABSTRACT

This study described self-injury within a general adolescent population. This study involved secondary analysis of data gathered using the middle school Youth Risk Behavior Survey (YRBS) from 1,748 sixth- and eighth-grade students in eight middle schools in a large, southeastern county in Florida. A substantial percentage of students surveyed (28.4%) had tried self-injury. The prevalence of having ever tried self-injury did not vary by race or ethnicity, grade, school attended, or age but did differ by gender. When controlling for all other variables in the multivariate model including suicide, having ever tried self-injury was associated with peer self-injury, inhalant use, belief in possibilities, abnormal eating behaviors, and suicide scale scores. Youth who knew a friend who had self-injured, had used inhalants, had higher levels of abnormal eating behaviors, and higher levels of suicidal tendencies were at increased risk for having tried self-injury. Youth who had high belief in their possibilities were at decreased risk for having tried self-injury. During the past month, most youth had never harmed themselves on purpose. Approximately 15% had harmed themselves one time. Smaller proportions of youth had harmed themselves more frequently, including two or three different times (5%), four or five different times (2%), and six or more different times

(3%). The frequency of self-injury did not vary by gender, race or ethnicity, grade, or school attended. Almost half of students surveyed (46.8%) knew a friend who had harmed themselves on purpose. Peer self-injury demonstrated multivariate relationships with gender, having ever been cyberbullied, having ever tried self-injury, grade level, and substance use. Being female, having been cyberbullied, having tried self-injury, being in eighth grade, and higher levels of substance use placed youth at increased risk of knowing a peer who had self-injured. Chi-squared Automatic Interaction Detection (CHAID) was used to identify segments of youth at greatest and least risk of self-injury, frequent self-injury, and knowing a friend who had harmed themselves on purpose (i.e., peer self-injury).

Chapter One: Introduction

Self-injury, also known as self-mutilation, self-harm, and cutting, among other terms, has been referred to as the “fastest-growing adolescent behavioral problem” (Purington & Whitlock, 2004, p. 2). Already established as a risk behavior within clinical and educational settings, self-injury is rapidly becoming defined as a problem behavior by society at large. Within school settings, self-injury has been described as a “silent school crisis,” reflecting insufficient knowledge, confusion, lack of effective interventions, and the tendency for adults and youth to shy away from dealing directly with the issue (Carlson, DeGeer, Deur, & Fenton, 2005; Galley, 2003). Whether self-injury is on the rise or is being reported more frequently because of recent media attention is unknown (Favazza, 1998; Purington & Whitlock, 2004). However, schools, hospitals, mental health institutes, and clinical reports suggest self-injury among adolescents is on the rise (Conterio & Lader, 1998; Galley, 2003; Hawton, Harriss, Hall, Simkin, Bale, & Bond, 2003; Olfson, Gameroff, Marcus, Greenberg, & Shaffer, 2005; Pipher, 1994; Purington & Whitlock, 2004). The emergence and increasing prevalence of this behavior during adolescence suggest that self-injury—in clinical or nonclinical settings—is, in part, a developmental phenomenon: aspects of the behavior (e.g., offers immediate reduction in stress), the individual (e.g., difficulties regulating emotion and coping with stress), and the environment (e.g., social reinforcement) during this period of development have resulted in its spread (Conterio & Lader, 1998; Rosen & Walsh, 1989;

Ross & Heath, 2002; Whitlock, Powers, & Eckenrode, 2006). In addition to feelings of release, self-injury offers adolescents benefits at a time when they are most receptive to influence, most impulsive, and most at risk for the negative effects of stress. Self-injury offers vulnerable adolescents, in particular, a way to deal with overwhelming affect and a sense of identity, enables self-expression, and fits with characteristics of adolescents, including experimentation, imitation, and rebellion (Gladwell, 2000/2002). Although *not* undertaken for attention, self-injury also enables youth to shock adults, certainly a perk for some.

Although much is known about other adolescent risk behaviors such as alcohol and tobacco use, little is known about self-injury among the general adolescent population (Purington & Whitlock, 2004). There are three types of direct self-injury: major (e.g., amputation), stereotypic (e.g., rhythmic head banging), and superficial/moderate (e.g., skin cutting) (Favazza, 1998). Favazza (1998) further broke superficial/moderate self-injury, which is the most common type of self-injury, into three types, episodic, repetitive, and compulsive. [For a comprehensive review of classifications of self-injury see Claes and Vandereycken (2007).] All three types share similar underlying reasons (e.g., tension relief); however, they are differentiated by frequency and level of perceived importance to the individual (Strong, 1998). Self-injury has been studied in clinical settings for decades; however, few empirical studies have been conducted to identify the factors that contribute to the practice of self-injury among adolescents in a general population (Carlson et al., 2005; Purington & Whitlock, 2004). Increased attention will bring with it a demand for efforts to control self-injury, especially within school settings (Jessor & Jessor, 1977). Before effective preventive interventions

can be developed, however, more needs to be learned about the scope of self-injury among adolescents in community settings and factors related to self-injury, especially those amenable to change and useful in identifying vulnerable youth.

Research Problem

For the most part, self-injury has been approached from a psychiatric or clinical framework (Johnstone, 1997). Most research has located self-injury within individuals and, thus, has offered clinical explanations and individual-level solutions (Johnstone, 1997). Self-injury is a mental health issue, but it is not known whether all youth who self-injure have a diagnosable mental illness, whether self-injury is a sign of distress among vulnerable youth in clinical and nonclinical settings, and/or whether self-injury is a “new” expression of adolescent risk behavior that is being “labeled as risqué by adults in a particular historical and sociocultural setting” and becoming “normative” (Rew, 2005, p. 167). Preliminary evidence suggests that increasing prevalence rates of self-injury represent a cultural effect, with more recent cohorts demonstrating higher prevalence rates than did earlier cohorts (e.g., Whitlock, Eckenrode, & Silverman, 2006). One clinician has associated the rise in self-injury (and other expressions of distress) with the rise in mental and emotional disorders among children of privilege (Levine, 2006). Parenting behaviors associated with privilege (e.g., overinvolvement, intrusion, criticism, permissiveness) combined with growing up in a culture of affluence has resulted in many privileged children reaching adolescence with a sense of emptiness, an impaired sense of self, which translates, for some, to mental, emotional, and behavioral disorders (Levine, 2006).

There have been many attempts to explain self-injury (Conterio & Lader, 1998; Ross & Heath, 2003). Most explanations suggest self-injury is a maladaptive coping mechanism that provides relief from distress (i.e., emotional regulation) and communicates what cannot be or is not verbalized; some youth who lack healthier ways of coping with, or adapting to, stress or have difficulty expressing negative or overwhelming emotions (e.g., hostility, anxiety) use self-injury, a maladaptive coping behavior, as a form of emotional release and survival (Conterio & Lader, 1998; Ross & Heath, 2003; Yates, 2004). Within community samples of adolescents, Yip (2005) suggested self-injury may be used, among other things, by adolescents to release tension, gain attention, and/or express their anger at institutions (e.g., schools, families) that seek to control them. This suggestion is similar to Wocjik's (1995) description of self-injury as rebellion, which has roots in the punk movement. Some researchers suggest self-injury among adolescents is contagious, similar to what has been known about suicide for years (Crouch & Wright, 2004; Fennig, Gabrielle, & Fennig, 1995; Gladwell, 2000/2002; Rosen & Walsh, 1989; Taiminen, Kallio-Soukainen, Nokso-Koivisto, Kalionen, & Helenius, 1998; Walsh & Rosen, 1985). Once tried, self-injury may 'stick' with vulnerable youth (Gladwell, 2000/2002; White, Trepal-Wollenzier, & Nolan, 2002). The act of self-injury causes the body to release endorphins, which result in feelings of relief or release. This chemical reaction and associated release reinforces the behavior (i.e., automatic reinforcement). This process of use—reinforcement—compulsion over time is similar to that seen with other behaviors such as disordered eating and substance abuse. Others caution against viewing self-injury as an addiction because most studies have

demonstrated self-injury is emotionally-based and stopping necessitates perceptions of personal control (Conterio & Lader, 1998).

Prior to the 1990s, it was assumed that most individuals who tried self-injury discovered the behavior on their own (Adler & Adler, 2005; Hodgson, 2004; Purington & Whitlock, 2004). Among more recent cohorts, however, it is assumed that adolescents have been exposed to self-injury via some social venue (e.g., media, school) (Adler & Adler, 2005; Hodgson, 2004). However, there is a lack of empirical investigations into social influences on self-injury, including family and school experiences and exposure to self-injury models in the media and among peers (i.e., peer contagion). Existing evidence suggests social contagion, or, as Marsden (2005) explained, “imitative behavior based on the power of suggestion and word of mouth influence,” has played a key role in the dramatic increase of self-injury among youth (Crouch & Wright, 2004; Derouin & Bravender, 2004; Fennig et al., 1995; Lieberman, 2004; Rosen & Walsh, 1989; Taiminen et al., 1998; Yates, 2004; Young, Sweeting, & West, 2006). Increasing media attention, especially since the late 1980s, more than likely played a central role in tipping the behavior from aberration to social epidemic. Much of the media that has included references to self-injury targets younger audiences (e.g., *7th Heaven*, *Family Guy*, *Girl, Interrupted*). Although media attention has the potential to reach out to youth in need of support with informal social support and resources for recovery, Carlson et al. (2005, p. 22) and others (e.g., Yates, 2004) have argued that increased attention without research or scientific information has resulted in a “climate of confusion”—self-injury has been normalized and vulnerable youth have been exposed to maladaptive coping behaviors (i.e., social contagion), yet adults and institutions are confused as to how best to respond.

Rates of self-injury have increased exponentially among adolescents; self-injury has ‘tipped’ (see Gladwell, 2000/2002 for a discussion of social epidemics).

Jensen (2003) suggested that future research in the area of psychopathology and comorbidity, among other aspects, should focus on identifying subgroups, interactions associated with comorbidity, environments in which psychopathology is expressed, and the varying pathways to psychopathology. Specific to comorbidity, the theory of problem behavior in adolescence suggests alcohol use, tobacco use, and other risk behaviors are comorbid among some youth, possibly due to similar underlying explanatory factors (Jessor & Jessor, 1977; Rew, 2005). Prior research has demonstrated relationships among health-risk behaviors (“co-occurrence,” clusters of risk behaviors); however, to date, this author has been unable to locate empirical studies conducted within community settings of early adolescents to examine relationships between self-injury and other risk behaviors.

Jensen’s (2003) call for the identification of subgroups of individuals is consistent with the use of segmentation in public health and prevention research. Segmentation refers to the division of an apparently heterogeneous population (i.e., dataset) into smaller “homogeneous segments” (John & Miaoulis, 1992, p. 131). The logic behind segmentation within public health is to identify homogenous groups of individuals that will respond to “specific and efficient marketing strategies designed to elicit particular responses” (John & Miaoulis, 1992, p. 131). Segmentation is a hallmark of effective public health interventions: combined with audience research (e.g., qualitative research), it enables the identification of target audiences and effective strategies for reaching each with health prevention programming. Within the realm of self-injury, segmentation could

be used to identify groups at risk of adopting self-injury as a maladaptive coping strategy and inform school-based prevention efforts.

Conceptual Framework

Overall, this study focused on moderate/superficial self-injury as a distinct behavioral phenomenon with assumed multiple causes and functions. A broad definition of self-harm, which includes multiple behaviors noted among early adolescents, guided this study. For the purposes of this study, self-injury was defined as the performance of a harmful behavior such as cutting, scratching, burning, not allowing wounds to heal, or pinching, by a person who feels upset as a way to feel better (less upset). A distinction was not made between episodic and repetitive self-injury given the lack of available measures of psychological symptoms (i.e., indicators of diagnosable mental illness) and impulsivity.

To gain a comprehensive understanding of self-injury among early adolescents, literature from multiple fields was consulted, including psychology, sociology, education, medicine, and public health. Further, multiple explanatory theories and concepts were considered such as problem behavior theory (Jessor & Jessor, 1977), social contagion (see Gladwell, 2000/2002; Marsden, 2005), behavioral precipitants of self-injury (see Boyce, Oakley-Browne, & Hatcher, 2001; Crouch & Wright, 2004; Strong, 1998; Walsh & Rosen, 1988), developmental theory (i.e., developmental psychology), and behavioral frameworks such as automatic and social reinforcement (see Nock & Prinstein, 2004, 2005). Each of these is discussed in more detail in Chapter 2. The conceptual framework and theories presented in Chapter 2 guided the variable selection process. Because this study involved a secondary analysis of data obtained from the Youth Risk Behavior

Survey (YRBS), the ability to measure key theories was limited. Ultimately, indicators of the following theories or concepts were identified: problem behavior theory (e.g., “Have you ever tried cigarette smoking, even one or two puffs?”), social contagion (“Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching?)”), precipitants of self-injury (“During your lifetime, have you ever been cyberbullied?”), and developmental theory (Parent Communication).

Research Purpose and Questions

The purpose of this study was to provide a description of self-injury within a general adolescent population. This research identified subgroups of self-injurers, identified behaviors associated with self-injury, explored relationships between the environment (e.g., peer, media) and self-injury, and suggested risk and protective factors associated with self-injury. Three broad questions guided this dissertation research: (a) What is the status of self-injury within a public middle school setting in terms of prevalence, frequency, exposure, and correlates, including demographic (e.g., gender), attitudinal (e.g., attitudes toward school), and behavioral variables (e.g., having ever been bullied)? (b) How does self-injury relate to other risk behaviors, such as tobacco use, alcohol use, suicide, and deviance among youth? and (c) What factors are useful in identifying meaningful subgroups (segments) of youth who are more likely to self-injure?

Research Approach

This study is a secondary analysis of cross-sectional, self-report data gathered from sixth-and eighth-grade students in eight middle schools in a large, southeast county in Florida using the middle school Youth Risk Behavior Survey (YRBS). The middle school version of the YRBS is an anonymous survey used by the county school board to

monitor risk health and risk behaviors among middle school youth and for prevention programming and evaluation purposes. The middle school survey is used to monitor six categories of priority health-risk behaviors among youth and young adults: (a) unintentional and intentional injuries, (b) tobacco use, (c) alcohol and other drug use, (d) sexual behaviors that contribute to unintended pregnancies and sexually transmitted diseases, (e) unhealthy dietary behaviors, and (f) physical inactivity (Kann et al., 1998). The 2005 middle school YRBS also included questions about demographics, delinquent behaviors, communication/relationship with parents/guardians, exposure to prevention interventions, self-reported grades, and truthfulness of responses. Three items were developed to measure three aspects of self-injury: lifetime prevalence, past-30 day prevalence, and awareness of peer self-injury behavior.

Given the early state of the literature, this dissertation research focused on mining data for patterns and structure. The concept of principled statistical discovery, an iterative analysis approach that involves exploring datasets, identifying potential patterns or structure, and using further statistical tests and/or information to confirm or disconfirm potential findings, guided the analysis (Mark, 2006). Descriptive and inferential statistics, including multilevel logistic regression analysis, were used to answer each of the three broad research questions. Particular attention was paid to exploring gender, sociocultural, grade and school-level variation with respect to the three dependent variables: having ever tried self-injury, frequency of self-injury, and knowledge of friends who self-injure.

There are numerous multivariate statistical approaches for looking for structure in social and behavioral data, including, for example, multiple regression, cluster analysis,

discriminant analysis, logistic regression, log-linear modeling, and Chi-Square Automatic Interaction Detection (CHAID), an exploratory, criterion-based response modeling technique (Dillon & Kumar, 1994). Although CHAID (Kass, 1980) has not received substantial attention within the realm of educational research and measurement or other fields (Hoare, 2004), it has been used by prevention researchers to identify unique target audience segments (i.e., mutually exclusive and exhaustive subgroups) and has much to offer investigators interested in searching for patterns and structure in large datasets (Hoare, 2004; Magidson, 1994). CHAID is a predictive cluster analysis approach in that a set of independent variables (i.e., predictors) are used to group participants based on their response to a categorical or polytomous dependent variable. CHAID produces mutually exclusive and exhaustive segments that result from an iterative, chi-square test of independence based analysis of the interactions among predictor variables, such as demographics, psychographics (e.g., attitudinal variables), and behavioral variables (Magidson, 1994). CHAID was selected for the dissertation study described herein based on its use in the fields of marketing research and public health, its appropriateness or match to the guiding research questions, and the ease in which potentially meaningful patterns in a dataset are identified in a dataset with a large number of variables.

Once segmentation results were obtained, validity evidence was gathered through the use of theory and applied knowledge in interpreting the segmentation results (i.e., determining the number and nature of segments/classes) and replicating CHAID analysis within a holdout sample (Aldenderfer & Blashfield, 1984; Magidson, 1994).

Significance

The overall prevalence of mental health disorders among youth is estimated to be 20% (Spear, 2000). Approximately 16% of boys and 19% of girls meet the criteria for one or more of the following mental illnesses: posttraumatic stress disorder (PTSD), major depression, and substance abuse or dependence (Kilpatrick et al., 2003). Further, approximately one third to one half of adolescents may report depressed mood or affective disturbance at any point in time (Spear, 2000). These estimates suggest that, at any one point in time, a substantial proportion of youth lacking in support or adaptive coping skills may be at risk for trying self-injury. A smaller subset of youth, for whom the behavior becomes repetitive, may develop a chronic behavioral condition that places them at increased risk for suicide and other long-term, negative outcomes (Hawton, Harriss, & Zahl, 2006; Hawton, Zahl, & Weatherall, 2003; McElroy & Sheppard, 1999; Patton et al., 1997; Shaw, 2002).

Whereas much is known about certain risk behaviors such as tobacco and alcohol use, less is known about self-injury, a risk behavior that has taken hold among adolescents in today's world (Purington & Whitlock, 2004). Currently, schools, mental health institutions, and clinicians suggest it is on the rise and many are at a loss for dealing with it—much less preventing it (Carlson et al., 2005; Galley, 2003; Purington & Whitlock, 2004). In a recent study of hospitalizations, Olfson et al. (2005) found a significant increase in the proportion of hospitalizations that involved cutting, hanging, and suffocating. More interestingly, Olfson et al. (2005) found that total estimated inpatient costs for cutting, the most prevalent form of self-injury, almost tripled in the

past decade from 6.7 million in 1990 to 18.5 million in 2000, along with the proportion of hospitalizations for self-injury from 4.3% in 1990 to 12.2% in 2000.

Effective primary, secondary, and tertiary prevention programming that addresses self-injury among adolescents could reduce these costs and others not yet estimated. Much needs to be learned, however, about the individual, cultural, social, and environmental risk and protective factors associated with self-injury among youth in non-clinical settings (Purington & Whitlock, 2004) before effective prevention programs or strategies can be developed.

Several aspects of this study distinguish it from prior research conducted on self-injury among adolescents within general populations. First, this study used a clear definition of self-injury that was not conflated with attempted suicide. Second, self-injury was studied using a larger, more diverse accessible population. Third, theories such as social contagion and problem behavior theory guided the development of research questions, analysis, and interpretation of results, thereby, moving beyond a primary focus on psychological theories and variables in understanding self-injury. Fourth, this study captured the prevalence of self-injury during a time period, early adolescence, when the behavior has been found to emerge (Adler & Adler, 2005; Favazza, 1998). Finally, this study did not assume youth who self-injure (“cutters”) are a homogeneous group, but rather attempted to identify subgroups within the population who are at risk for self-injury. In addition to contributing to the literature, this study was designed to inform the development of more effective prevention programming and practice. Study results tested the validity of using multivariate marketing approaches to identify segments of youth at risk for self-injury, and the literature review combined with

study results were used to develop recommendations for the county where the data were gathered.

Organization of Remaining Chapters

The remainder of this document is divided into four chapters. Chapter 2 provides a comprehensive review of the literature. Chapter 3 presents the methods used in this dissertation research. Chapter 4 includes quantitative and qualitative results. Finally, Chapter 5 provides an overview and discussion of key study findings, implications for prevention, and suggestions for future research. .

Definitions of Terms

General Adolescent Population: This phrase refers to adolescents who are not in some form of clinical, residential, or juvenile institutional setting. For the purposes of this dissertation, adolescents who attend one of the eight middle schools are considered members of the general adolescent population. Individual members of the general adolescent population may have a clinical diagnosis and/or receive services within the school setting.

Prevalence: Prevalence refers to the total number or proportion of cases of a disease, condition, or behavior in a specific population at a specific point in time.

Primary prevention: Primary prevention refers to any type of intervention designed to prevent a behavior or negative outcome before it occurs. Primary prevention efforts are geared to general populations.

Protective factors: Community, school, family, and peer/individual level factors that protect against health or behavioral problems during adolescence.

Risk factors: Community, school, family, and peer/individual level factors that place youth at risk for developing a health or behavioral problem during adolescence.

Secondary prevention: Secondary prevention refers to prevention that occurs among those at risk for performing a behavior or developing a disease.

Tertiary prevention: Tertiary prevention refers to efforts targeted at those who have already adopted a behavior or have developed a disease with the intent of ending the behavior and preventing relapse, where appropriate, and reducing the negative impact of the behavior or disease on individual health and wellbeing.

Chapter Two: Literature Review

Introduction

This chapter begins with an overview of early adolescence and theories used to explain adolescent risk behavior. This overview is designed to provide a developmental context for this study and justify the consideration of relationships between self-injury and other risk behaviors. Self-injury then is defined and an overview of the complex etiology of self-injury is provided. The prevalence and trends of self-injury during adolescence, including sociocultural and gender variation, also are reviewed. Relationships between self-injury and adolescent development are discussed, with emphasis on the ways in which self-injury fits with the characteristics and goals of adolescence. The role of popular culture and social contagion in spreading self-injury is discussed. A literature-based discussion of intervention approaches and guiding principles is provided. Segmentation as an approach to identifying homogenous groups of individuals that will respond to public health interventions is discussed within the context of self-injury, and statistical approaches to segmentation are presented. This chapter concludes with a synthesis and application of the literature to the present study protocol.

Early Adolescence

Middle school-aged youth are in the developmental period referred to as early adolescence. Early adolescence, the period between 10 and 14 years of age, is

characterized by a multitude of somewhat simultaneous biological, social, and psychological changes (Brooks-Gunn, 1988; Elliott & Feldman, 1990; Simmons & Blyth, 1987; Smetana, 1988). Early adolescents assume a new role; they are no longer children, but they are not yet adults (Simmons & Blyth, 1987). Decreased time spent with parents, increased emotional distance from parents, increased conflict over “mundane issues” (e.g., chores), and the desire to hold certain issues private and the related increase in “strategic disclosure” (i.e., carefully selecting what to discuss with parents) characterize early adolescence (Dowdy & Kliever, 1998; Paikoff & Brooks-Gunn, 1991).

Developmental tasks that begin during this period include establishing identity or self-image, forming and negotiating peer relationships, individuation (i.e., establishing autonomy or individuality while remaining connected to parents), planning for the future, dealing with emerging sexuality, learning to interact with same and opposite sex peers, and dealing with conformity issues (Cooper & Cooper, 1992; Elliott & Feldman, 1990; Simmons & Blyth, 1987; Wakschlag, Pittman, Chase-Lansdale, & Brooks-Gunn, 1996; West, Rose, Spreng, Sheldon-Keller, & Adam, 1998). Adolescents grow psychologically and socially during this period, with those who establish caring relationships, find acceptance and belonging, and experience age-appropriate intimacy experiencing healthier psychological and social development than do adolescents who do not (Baumeister & Leary, 1995; Reis & Shaver, 1988; Sullivan, 1953). Early adolescents must cope with numerous issues related to their developmental status, including physical and hormonal changes, sexual or romantic desires or feelings, changes in parent-child relationships, increased expectations associated with their move into adolescence, school

changes, and changes in social networks (Papini & Micka, 1991; Simmons, Burgeson, & Reef, 1988).

Recent work in developmental neurology and related advances in neuroimaging suggest adolescent behavior is heavily influenced by brain development that occurs during this period (see Spear, 2000 for an excellent review of this literature). As is the early adolescent, the adolescent brain is in a state of transition, or as Spear (2000, p. 428) described, a “chronic state of threatened homeostasis.” Adolescents use the skills they have gained thus far in life to navigate a time of intense emotion, changes, and expectations. At this time, they have to learn new skills that will serve them in adulthood (Spear, 2000). As part of this transitional period from child to adulthood, there are, on average, increases in social behavior or affiliation, risk taking, and/or novelty seeking, with boredom being a common complaint among early adolescents (Spear, 2000). A certain level of risk taking, although not always desirable from an adult’s (i.e., parent) perspective, is common and may aid youth in making the transition from youth to adulthood (Spear, 2000). For example, risk taking, for some, is associated with increased self-esteem and other positive outcomes such as increased knowledge of self and environment; however, it may serve as a means for affect regulation (i.e., self-medication) or maladaptive coping (Spear, 2000). Ultimately, the issue involves determining when a behavior becomes something to prevent (Spear, 2000).

The forebrain regions undergo substantial alterations during adolescence (National Institute of Mental Health, 2001; Spear, 2000). These regions are sensitive to stress, placing youth, especially those with underdeveloped coping skills or who lack the resources to deal with stress, at risk for affective disturbances (e.g., depressed mood) and

impaired decision making (Spear, 2000). When faced with stress or overwhelming emotion, early adolescents are less able than are older adolescents to react with reason or problem solving, tending more to react with fear and other ‘primitive’ responses (National Institute of Mental Health, 2001). The more life changes that happen during adolescence and the greater the *perceived* level of stress, the more likely some youth may feel overwhelmed (i.e., unable to cope) and experience distress or inner turmoil. Some youth, especially those lacking more adaptive ways to cope with perceived stress, may turn to risk behavior/s (e.g., drinking alcohol) and fail to perform healthy behaviors in response to distress (Spear, 2000).

The biological, social, and psychological changes that occur during early adolescence are related to the individuation process, the primary developmental task associated with early adolescence. Cognitive changes, such as being able to think abstractly and consider multiple perspectives, enable adolescents to reason more effectively, and view their parents and their relationships in a new light. These changes are hypothesized to contribute to the transformation in the parent-child relationship (Papini & Micka, 1991; Smetana, 1988, 1991). Biological changes that become readily apparent during early adolescence have demonstrated effects on parent-child interactions, particularly when mothers and/or fathers are uncomfortable with these changes (Hauser, 1991; Paikoff & Brooks-Gunn, 1991; Papini & Micka, 1991). Effects of the individuation process seem to be most disruptive during early adolescence, as evidenced by increased conflict, especially within mother-daughter dyads, increased self-reports of parenting stress, and reports of diminished marital dissatisfaction (Carlson, Cooper, & Spradling, 1991; Dowdy & Kliewer, 1998; Paikoff & Brooks-Gunn, 1991; Smetana,

1988; Steinberg, 1990; West et al., 1998). Adolescence requires a shift in parenting: parents must grow with their children (some more rapidly than others), understand and accept the goals of adolescence, and change their parenting behaviors to fit the needs of their transitioning child (e.g., rely more on explanation, curiosity, and problem solving) (Powers, Hauser, & Kilner, 1989).

Theoretical Approaches to Adolescent Risk Behavior

Individual adolescent problem (risk) behavior can be considered in isolation or in association with other known problem behaviors (Rew, 2005). Much research has focused on identifying risk and protective factors associated with individual problem behaviors such as tobacco use. Information from this research has been used to devise interventions targeted at preventing the initiation of individual risk behaviors. However, some researchers have adopted a more inclusive approach, one that views problem behaviors as related to one another (i.e., comorbid) (Jensen, 2003; Jessor & Jessor, 1977; Rew, 2005; Spear, 2000). Problem-behavior theory suggests that problem behaviors such as alcohol use, tobacco use, and others performed during adolescence are expressions of similar underlying explanatory factors (Jessor & Jessor, 1977). Key assumptions of problem-behavior theory include: the relationship between academic achievement and individual orientation to conventionality; the tension among independence and conventionality, regulation, and adult control; the purposive and instrumental nature of problem behavior; and the need to consider aspects of the individual adolescent, the multiple contexts in which the adolescent operates, and the larger society in which the adolescent performs the behavior (see Rew, 2005, pp. 169-170 for a review).

Jessor (1991) reviewed empirical evidence suggesting risk behaviors covary within individuals, which has been dubbed problem (risk) behavior syndrome. Jessor (1991) argued that youth who demonstrate such a syndrome may be in need of interventions that focus at the lifestyle level rather than at the level of individual problem or risk behaviors. In terms of antecedents, youth who demonstrate risk behavior syndrome tend to be less conventional and function within unconventional environments (Donovan & Jessor, 1985). Tests of problem-behavior theory have identified numerous other risk and protective factor domains associated with problem behavior syndrome in adolescence, including psychosocial adjustment, school connectedness, family connectedness, and depression (see Rew, 2005).

Self-injury

Definitions of Self-injury

There are many terms used to refer to self-injury, including the following: deliberate self-harm, cutting, self-abuse, self-injurious behavior (SIB), self-mutilation, auto-aggression, and parasuicide (see Claes & Vandereycken, 2007; Klonsky, Oltmanns, & Turkheimer, 2003; Strong, 1998). For the purposes of the present research, the terms self-harm and self-injury will be used synonymously. Self-mutilation, although some qualify with “superficial,” carries with it a negative connotation or seriousness not generally demonstrated by youth who self-injure, and may be best used only when acts of major injury such as amputation are carried out (see Herpertz, 1995). Self-harm can be classified into two broad categories—direct or indirect (Laye-Gindhu & Schonert-Reichl, 2005; Suyemoto, 1998; Yates, 2004). Direct self-harm, which includes cutting, biting, severing, burning, and hitting, is of primary interest in this study (Yates, 2004).

Examples of indirect self-harm include overeating and substance abuse (Yates, 2004). Menninger (1935) argued all individuals perform some type of non-fatal self-destruction; self-injurious behavior of both forms is not uncommon.

There are three types of direct self-injury, including: major (e.g., amputation), stereotypic (e.g., rhythmic head banging), and superficial/moderate (e.g., skin cutting) (Favazza, 1998). Favazza (1998) further divided superficial/moderate self-injury, which is the most common type of self-injury, into three types, episodic, repetitive, and compulsive. Episodic self-injury tends to be associated with mental and personality disorders such as mood disorders, borderline personality disorder, eating disorders, and posttraumatic stress disorder associated with early adverse experiences (e.g., sexual abuse). Repetitive self-injury, evidence suggests, is an impulse control disorder or, as some argue, a stand alone behavioral phenomenon (e.g., Klonsky et al., 2003; Muehlenkamp, 2005). Repetitive self-injury is of concern to school administrators and teachers, because it is associated with a chronic condition that functions, in part, to provide a sense of identity (Carlson et al., 2005; Lieberman, 2004; Strong, 1998). Compulsive self-injury refers to behaviors that are more subconscious, such as skin picking and hair pulling. All three types share similar underlying motivations (e.g., tension relief); however, they are differentiated by frequency and level of perceived importance to the individual (Strong, 1998). Within the present study, a distinction was not made between episodic or repetitive self-injury given the lack of available measures of psychological symptoms (i.e., indicators of diagnosable mental illness) and impulsivity.

Within the literature, several definitions of self-injury have been offered.

Suyemoto (1998) defined self-injury as:

...a direct, socially unacceptable, repetitive behavior that causes minor to moderate physical injury; when self-mutilating, the individual is in a psychologically disturbed state but is not attempting suicide or responding to a need for self-stimulation or a stereotypic behavior characteristic of mental retardation or autism. (p. 532)

Woldorf (2005) defined self-injury as, “Deliberate damage to one’s body that is not culturally sanctioned, is not motivated by suicidal intent, and is meant to relieve intense negative emotions” (pp. 196-197). Muehlenkamp (2005) defined superficial/moderate self-injury as:

...repetitive, low-lethality actions that alter or damage body tissue (e.g., cutting, burning) without suicidal intent. Superficial/moderate SIBs [self-injurious behaviors] have a unique set of symptoms, are viewed as a type of morbid self-help, and are exhibited by individuals with and without various mental disorders. (p. 324)

Most definitions emphasize that self-injury is deliberate, distinct from suicide, and is not culturally sanctioned. Others, such as Muehlenkamp’s (2005) definition, specify forms (e.g., cutting), functions (e.g., affect regulation), and relationships with mental disorders.

Suyemoto (1998) provides a simple definition that may apply to many individuals who self-injure within community settings: self-injury, she argued, is a *temporary* maladaptive coping mechanism. Support for this argument is found in the average developmental trajectories associated with depression, self-esteem, and anger, all of

which are associated with self-injury (see Brown, 2001 for a review of emotions and self-injury). Depression, low self-esteem, and anger peak during early adolescence when the gender gap between males and females is the largest; however, on average, depression and anger decrease, self-esteem increases, and the gender gap narrows during the transition to early adulthood, which corresponds to, on average, increased independence and greater emotional regulation abilities (Galambos, Barker, & Krahn, 2006). Overall, although there is some disagreement over what self-injury is (and is not); most researchers suggest self-injury is a form of “morbid self-help” used during times of overwhelming distress or in connection with mental illness or early trauma (Conterio & Lader, 1998; Favazza, 1988; Yates, 2004) and, in some cases, is a separate impulse control disorder (e.g., Favazza, DeRosear, & Conterio, 1989). However defined, self-injury is poorly understood, impacts youth, families, schools, and society, and, evidence suggests, has taken hold within youth culture (Nock & Prinstein, 2005).

Historically, self-injury often has been mistaken for attempts at suicide (Favazza, 1998; Muehlenkamp & Gutierrez, 2004). Froeschle and Moyer (2004) argued this view is one of the several myths associated with the behavior (e.g., self-injury is used to manipulate others, self-injury is used to gain attention, and individuals who self-injure are dangerous to others). Self-injury and suicide are distinct, yet related phenomena: self-injury is the strongest risk factor for suicide (Hawton et al., 2003). Self-injury differs from suicide, according to Muehlenkamp (2005), in terms of intent, lethality, chronicity, and preferred methods (e.g., cutting vs. poisoning). Individuals who self-injure distinguish between self-injury and suicide; some have described self-injury as a way to be in control, and suicide as being out of control (Solomon & Farrand, 1996). The

distinction between self-injury and suicide also may be associated with attitudes toward life: adolescents who self-injure report less repulsion toward life than do those who attempt suicide (Muehlenkamp & Gutierrez, 2004). Shaw (2002) expanded on key differences between self-injury and suicide: “In self-injury, I see confusion, pain, violation, protest and desperation, but also perseverance, a yearning for connection, a struggle to hold on to what is real and a moment primed for intervention” (p. 210). In an empirical investigation of differences between individuals who had attempted suicide with and without a history of self-injury, Stanley, Gameroff, Michalsen, and Mann, (2001) discovered that those with a history of self-injury may underestimate the potential lethality of their suicide attempts. Among individuals who had attempted suicide, those with a history of self-injury reported higher levels of depression, hopelessness, aggression, anxiety, impulsivity, and suicide ideation than did those who did not have a history of self-injury (Stanley et al., 2001).

It is important to note distinctions between self-injury as studied in this dissertation and self-harm as defined by the Child and Adolescent Self-harm in Europe (CASE). In this study, self-injury was defined as the performance of a harmful behavior such as cutting, scratching, burning, not allowing wounds to heal, or pinching, by a person who feels upset as a way to feel better (less upset). The CASE study’s definition of self-harm is as follows:

“An act with a non-fatal outcome in which an individual deliberately did one or more of the following:

- ◆ Initiated behaviour (for example, self cutting, jumping from a height), which they intended to cause self harm

- ◆ Ingested a substance in excess of the prescribed or generally recognised therapeutic dose
- ◆ Ingested a recreational or illicit drug that was an act that the person regarded as self harm
- ◆ Ingested a non-ingestible substance or object.” (Hawton, Rodham, Evans, & Weatherall, 2002)

The latter definition is more inclusive than the latter—self-injury with and without suicidal intent are included, as is the ingestion of substances (ingestible and non-ingestible).

Etiology and Functions of Self-injury

Multiple pathways lead to self-injury (Tiefenbacher, Novak, Lutz, & Meyer, 2005).¹ The etiology of self-injury may differ according to the population of interest—clinical or nonclinical. For example, within clinical settings, sexual abuse has been identified as the single best predictor of self-injury (Strong, 1998). Whether this holds in nonclinical populations is unclear. Within community samples of adolescents, Yip (2005) suggested self-injury may be used, among other things, by adolescents to release tension, gain attention, and/or express their anger at institutions that seek to control them (e.g., parents, schools). This suggestion is similar to Wocjik’s (1995) description of self-injury as rebellion, which has roots in the punk movement (e.g., Sex Pistols).

Tiefenbacher et al. (2005) suggest two developmental pathways to self-injury: one that begins with genetic or biological risk and the other that begins with adverse early

¹ Self-injury associated with suicide attempts, need for self-stimulation, or conditions such as mental retardation or autism is excluded from this discussion of etiology in order to be consistent with Suyemoto’s (1998) guiding definition.

experiences. Whether these two pathways are mutually exclusive is arguable given the complex interrelationships between genetic or biological vulnerability, certain mental illnesses (e.g., depression, bipolar disorder), and increased susceptibility to the negative impact of early adverse experiences. In some cases, self-injury may be a symptom of mood or personality disorders that when treated abates (Woldorf, 2005), whereas in others it may be a risk behavior experimented with by a curious, exposed adolescent either during times of stress or in response to some developmental need or drive (Derouin & Bravender, 2004). Shaw (2002) summarized the complex etiology and trajectory of self-injury among women:

Self-injury is not only protest or resistance. It is a product of culture as well as physiology, unconscious processes, traumatic experiences, life events and environmental triggers. Paradoxically, self-injury may at once be a symbol of protest, a marker of violations, a catharsis and a behavior through which women unwittingly engineer their own incarceration as they become entrapped in an isolating cycle of self-abuse. (p. 209)

The concept of “biological fragility” (vulnerability) is important to consider when discussing self-injury (Conterio & Lader, 1998). Although approximately one-half (or more) of individuals who self-injure report a history of abuse or maltreatment, many have no such history (Conterio & Lader, 1998; Strong, 1998). Thus, some practitioners have recognized that self-injury, even within clinical settings, has multiple causes, one of which may be the tendency for some individuals to be emotionally “hypersensitive” (Conterio & Lader, 1998). This hypersensitivity is described by some as an innate temperamental influence on development (Conterio & Lader, 1998). Although

environment plays an important role in development, perhaps even greater than that played by individual-level factors, especially during adolescence, biological fragility may play a key role in clinical and nonclinical settings—one that would explain why self-injury ‘sticks’ with some but not with others (Conterio & Lader, 1998; Gladwell, 2000/2002).

Based on Suyemoto’s (1998) review of the functions of self-injury, Klonsky (2004) identified the following seven models of self-injury: (a) the interpersonal-influence model, (b) the self-punishment model, (c) the antisuicide and sexual models (i.e., drive models – self-injury reduces these drives), (d) the affect regulation model, (e) the dissociation model (i.e., self-injury stops dissociation), and (f) the interpersonal boundaries model (i.e., self-injury serves to create or delineate boundaries between self and other). In reality, more than one of these models may explain the initiation and/or maintenance of self-injury within any one individual. Klonsky (2004) did not address directly the environmental model, which posits self-injury is modeled and reinforced within the child’s immediate environment. Children learn that behavior is rewarded (e.g., tension relief, attention, sympathy), imitate the behavior, and experience reinforcement (Suyemoto, 1998). Klonsky (2004) provided one of the first tests of the functions of deliberate self-harm. Using a semi-structured interview assessing the functions and consequences of self-injury and feelings associated with self-injury episodes of self-injury, Klonsky (2004) interviewed 39 college students who had repetitively self-injured. Results supported the affect regulation model as the primary functional motivation for self-injury. Secondary functions of self-injury such as self-punishment, interpersonal influence, and sensation-seeking also were identified (Klonsky, 2004).

In many cases, the act of self-injury represents a cry for help (i.e., self-injury as communication) and a quick means of emotional regulation (i.e., self-injury as self-help). Self-injury serves as a language of sorts (i.e., words, history, and experiences written on the body) that allows individuals who self-injure to communicate psychological distress (Abrams, 2003; Austin & Kortum, 2004; Conterio & Lader, 1998; Derouin & Bravender, 2004; Harrison, 1997). Whereas some individuals externalize distress (i.e., ‘act out’) through some form of defiance such as fighting, substance use or sexual behavior, others internalize distress through behaviors such as self-injury (Abrams, 2003). Individuals who self-injure report that it offers quick relief from overwhelming affect, racing or chaotic thoughts, depersonalization, anxiety, and emotional distress (Adler & Adler, 2005; Favazza, 1998; Favazza & Conterio, 1989; Solomon & Farrand, 1996; Woldorf, 2005). Self-injury also has been associated with relief from guilt, rejection, boredom, hallucinations, and sexual preoccupation, which is a symptom of bipolar disorder among adolescents (Favazza, 1998). Self-injury converts emotional distress into physical pain that is within the control of the self-injurer (Liebling, Chipchase, & Velangi, 1997; Solomon & Farrand, 1996). In addition to providing a means of self-soothing, self-injury leaves behind marks, scars, or wounds that tell a story of pain that either cannot be verbalized or has been ignored or trivialized by others (Shaw, 2002; Solomon & Farrand, 1996; Woldorf, 2005).

All of these models (except the ‘self-injury as rebellion’ model) share a foundation in the clinical literature. Klonsky’s (2004) study supported the validity of the affect regulation model within a community setting. However, the sample was small and limited to repetitive self-injurers. Whether clinical models that link self-injury to

diagnosable mental illness and/or trauma will remain valid within nonclinical populations remains uncertain. The emergence and increasing prevalence of this behavior during adolescence, however, suggests self-injury—in clinical or nonclinical settings—is, in part, a developmental phenomenon: aspects of the behavior (e.g., offers immediate reduction in stress), the individual (e.g., difficulties regulating emotion and coping with stress), and the environment (e.g., social reinforcement) during this period of development have resulted in its spread (Conterio & Lader, 1998; Rosen & Walsh, 1989; Ross & Heath, 2002; Whitlock, Powers, & Eckenrode, 2006). Young et al. (2006) used a longitudinal cohort design to study the factors that predict self-injury among Scottish youth, serving as one of the first—if not the first—longitudinal examination of self-injury within a general population. Unfortunately, participants were not recruited into the study until they were 11 years of age, thereby precluding the ability to examine factors that occurred earlier in the developmental trajectory. Results suggested that self-reported identification with the Goth subculture was the strongest predictor of self-injury and suicide attempts, even after controlling for other factors examined (Young et al., 2006). Additional significant predictors of self-injury included gender (i.e., being female), parental divorce or separation, smoking, and other substance use (excluding alcohol), and a history of depression (Young et al., 2006). In a retrospective, cross-sectional study involving undergraduate and graduate students in the general population, Whitlock et al. (2006) found that, when controlling for demographic characteristics, self-reported emotional or sexual abuse, having ever considered or attempted suicide, elevated psychological distress, and characteristics of eating disorders were associated with repetitive self-injury. In addition to reporting greater distress and poorer psychological

functioning than did their non-self-harming peers, youth who self-injured reported, on average, greater repulsion with life, greater attraction to death, and less attraction to life (Muehlenkamp & Gutierrez, 2004). For more information on the etiology of self-injury consult Conterio and Lader (1998), Favazza (1998), Lloyd-Richardson, Perrine, Dierker, and Kelley (2007), Suyemoto (1998), Walsh and Rosen (1988), and Yip (2005).

Prevalence and Trends of Self-injury during Adolescence

For the most part, estimates of the prevalence of self-injury during adolescence and early adulthood have been calculated within clinical settings or using small, convenience samples. Among clinical populations, approximately 20% of patients or clients self-injure, with higher rates among specific groups (e.g., 32% of individuals with eating disorders) (Dieter, Nicholls, & Pearlman, 2000; Solano, Fernandez-Aranda, Aitken, López, & Vallejo, 2005). Even though the behavior is said to emerge during early adolescence (13 to 14 years of age), few studies have focused on self-injury during early adolescence within community settings (Muehlenkamp, 2005). Estimates of the general prevalence (including adults) varies from a low of 750 per 100,000 persons per year (0.75%) (Yates, 2004) to a high of 1.7% (Patton et al., 1997). The prevalence of self-injury among adults may be similar to the estimated prevalence rates (~1%) of other disorders such as eating disorders and bipolar disorder (American Psychiatric Association Work Group on Eating Disorders, 2000; Narrow, 1998; Regier et al., 1993). However, Briere and Gil (1998) suggested 4% of the general population in the United States may self-injure. Three studies conducted within community settings documented similar rates of having engaged in self-injury among adolescents: 15% (Laye-Gindhu & Schonert-Reichl, 2005), 16% (Muehlenkamp & Gutierrez, 2004), and 14% (Ross & Heath, 2002)

(see Table 1). Lloyd-Richardson et al. (2007) found that 46.5% of adolescents reported some form of non-suicidal self-injury (NSSI), 60% of whom (28% of the entire sample) reported moderate/severe forms of NSSI (e.g., cutting/carving skin). Rates of hospitalizations for self-injury have increased, as has the behavior, with a rate of 4.3% among youth hospitalized in 1990 to 12.2% of youth hospitalized in 2000 (Olfson et al., 2005). Cutting (wrist or arm) is the most common form of self-injury (Favazza & Conterio, 1989; Hawton et al., 2003; Ross & Heath, 2002).

Table 1

Sample of Self-Injury Measures Used with Adolescents and Associated Prevalence Rates

Study*	Measure	Prevalence
Laye-Gindhu & Schonert-Reichl (2005)	Have you ever done anything on purpose to injure, hurt, or harm yourself or your body (but you weren't trying to kill yourself)? Followed by open-ended questions about specific behaviors	15%
Lloyd-Richardson et al. (2007)	FASM – A checklist of non-suicidal self-injury asking whether participants had practiced each of 11 self-harm behaviors.	46.5%
Muehlenkamp & Gutierrez (2004)	Self-harm Behavior Scale – open-ended, free response scale 5 items on methods of self-harm (i.e., cutting, scratching, burning, self-hitting, punch/kicking, banging, and other)	15.9%
Ross & Heath (2002)	Screening: hurt themselves on purpose (Likert scale) Semi-structured, follow-up interview: elaborate on hurting themselves on purpose	Urban School Screening: 21.2% Follow-up: 13% Suburban School Screening: 19.6% Follow-up: 14.8%

*All studies were conducted with high school students.

The duration of self-injury varies anywhere from a single experimentation to chronic, repetitive self-injury lasting a decade or more (Favazza, 1998; Suyemoto, 1998). According to Suyemoto (1998), for most adolescents, self-injury may be a temporary coping mechanism. Most adolescent females who self-injure eventually stop, with most stopping the behavior at around 18 to 19 years of age (Suyemoto, 1998). One-half of those who had self-injured had done so on a minimum of 50 different occasions (Favazza & Conterio, 1989). Muehlenkamp (2005) suggested self-injury becomes repetitive at around five or more times. Favazza (1998) suggested switching between occasional and repetitive self-injury occurs at different times for different individuals. In addition to increased lifetime prevalence rates of self-injury, some have reported an increase in the frequency of repetitive self-injury (Hawton, Fagg, Simkin, Bale, & Bond, 1997).

Sociocultural and Gender Variation

There is a lack of information on sociocultural and gender variation in self-injury prevalence and frequency within community samples. Traditionally, self-injury has been reported to be a White, female, middle-to-upper middle class issue (Abrams, 2003; Conterio & Lader, 1998; Ross & Heath, 2002). However, this may represent a sampling artifact: White, female inpatients have been over-represented in clinical studies (Suyemoto, 1998). However, self-injury may represent a symptom of the disproportionate rates of depression, anxiety, and substance use disorders among children of privilege in the United States (see Levine, 2006 for a review). Parental pressure combined with growing up in a culture of affluence has resulted in many privileged children reaching adolescence with a sense of emptiness and a lack of core self, which translates, for some, to mental, emotional, and behavioral disorders (Levine, 2006). On

the other hand, sociocultural variations in vulnerability to suicide, depression, and eating disorders suggest ethnic groups, particularly low-income, Hispanic females, may be at increased risk for self-injury (Abrams, 2003). However, studies (e.g., Muehlenkamp & Gutierrez, 2004) have been limited by insufficient numbers of participants within ethnic groups to study variation.

As with gender differences in other expressions of emotional distress (e.g., depression), there may be gender differences in self-injurious behaviors and underlying motivations (Laye-Gindhu & Schonert-Reichl, 2005). The performance of self-injury may vary across genders. For example, whereas girls may self-injure when alone, boys also may self-injure when in the company of others (Laye-Gindhu & Schonert-Reichl, 2005). There is a lack of information on self-injury among males due to their underrepresentation in clinical settings (Gratz, 2003; Laye-Gindhu & Schonert-Reichl, 2005). Ross and Heath (2002) hypothesized that differences in the prevalence of self-injury between males (36%) and females (64%) in their sample represented preferences for different coping behaviors that are not new (i.e., internalization versus externalization). However, research conducted among male inpatients (Winters, 2005) suggested that rates of self-injury among males is on the rise, indicating either an increase in distress and related depression among males and/or the influence of media exposure to self-injury on males' choices of coping behaviors. Interestingly, Muehlenkamp and Gutierrez (2004) found no statistically significant gender differences in self-injury rates among high school students in a community setting. Goodman (2005) suggested repetitive self-injury may be more common among females; however, this has not been established empirically within community settings.

Shaw (2002) suggested self-injury is gendered, representing women's internalization of cultural objectification and violence; through self-injury, females recreate and control the violence that is inflicted on them every day in the media, at school, and in their own homes (Shaw, 2002). Within a feminist framework (e.g., Shaw, 2002), girls use self-injury as a way to reflect back to society the violence that has been perpetuated on them (e.g., objectification, violence in the media and home). The body becomes their means of expression, with some youth carving words or symbols into their flesh (Derouin & Bravender, 2004; Suyemoto, 1998). Shaw (2002) argued self-injury may be "uniquely distressing because it reflects back to the culture what has been done to girls and women" (p. 208).

Self-injury and Adolescent Development

To understand why self-injury emerges and peaks during adolescence, one must understand the prevalence of emotional disturbances during adolescence, biological characteristics of early adolescents, the developmental characteristics and tasks of early adolescence, and the role that self-injury plays during adolescence (e.g., benefits, precipitants). Studies of psychopathology in community samples of adolescents suggest that the prevalence of severe emotional disturbance ranges from 10% to 20%, which represents the percentage found in the adult population (Kilpatrick et al., 2003; Powers et al., 1989; Suyemoto, 1998). However, Spear (2000) pointed out that approximately one-third to one-half of adolescents may report depressed mood or affective disturbance at any point in time. A substantial proportion of youth may be at risk for self-injury and other risk behaviors because of early experiences that do not equip them with the skills and resources necessary for navigating adolescence, such as affect regulation in the face

of overwhelming experiences, self-soothing behaviors, and dealing with sexuality (Suyemoto, 1998). Self-injury is bodily communication of trauma or emotional distress and a “sign that something has gone wrong in the development of self-regulatory functioning and the separation-individuation process” (Hemme, 2001, p. 647).

Impulsivity (i.e., urgency, lack of premeditation, lack of perseverance, and sensation seeking) and aggression peak during adolescence in association with developmental and neurological changes (d’Acremont & Van der Linden, 2005; Muehlenkamp, 2005; Spear, 2000). Neurological changes that occur during adolescence increase adolescents’ sensitivity to stress and result in poorer decision making when compared to adults (Spear, 2000). In addition to impulsivity, internalizing problems also increase during adolescence, with differences in girls and boys becoming pronounced beginning with the transition from childhood to early adolescence, and girls demonstrating higher levels thereafter (Bongers, Koot, van der Ende, & Verhulst, 2003). Increased distress among girls once they reach adolescence has been noted (Gilligan, 1991; Pipher, 1994). Differences in internalization (‘anger in’) versus externalization (‘anger out’) are associated with gender differences in preferred coping styles, which may help to explain greater rates of self-injury among females than males (Bongers et al., 2003). Whereas females tend to ‘act in’ and demonstrate self-destructive behaviors such as self-injury, males tend to act out, behave aggressively, and ‘accidentally’ hurt themselves (e.g., punching a hole through the wall) (Clarke & Whittaker, 1998).

Self-injury emerges during adolescence because it fits in well with the conflicts and developmental issues associated with this phase of life (Crouch & Wright, 2004; Suyemoto, 1998). These include the tension between needing and not wanting help, the

struggle for autonomy (i.e., individuation), self-definition (i.e., identity formation), the tension between disclosure and privacy, fear of rejection versus the need to be understood, and affect regulation during a time of marked physiological and social change. When shared within a group setting, whether a clinical setting (e.g., mental health ward) or community setting (e.g., Goth subculture), self-injury may offer group cohesion, acceptance, and understanding (Crouch & Wright, 2004; Machoian, 2001; Muehlenkamp, 2005; Young et al., 2006).

Most acts of self-injury are precipitated by a sense of loss, interpersonal conflict or perceived rejection, or isolation (Boyce et al., 2001; Crouch & Wright, 2004; Walsh & Rosen, 1988; Strong, 1998). Relationship and communication difficulties between parent and youth may place some youth at risk for self-injury (Derouin & Bravender, 2004). Discord between parent and youth peaks during early adolescence, with greater tension noted in mother-daughter relationships (Carlson et al., 1991; Dowdy & Kliewer, 1998; Paikoff & Brooks-Gunn, 1991; Smetana, 1988; Steinberg, 1990; West et al., 1998). Interestingly, in a community sample of adolescents, Lloyd-Richardson et al. (2007) found that getting “a reaction” from another person was one of the most common reasons cited for deliberate self-harm. Further, adolescents move away from parents and toward their peers as a part of the individuation process, thereby setting the scene for some youth to experiment with self-injury when exposed within their peer networks (Derouin & Bravender, 2004). In addition, youth exposure to media increases substantially during the teenage years, which may lead some youth to attempt the behavior on impulse when exposed to self-injuring models on the Internet or in the media (Teens Health, 2005; Whitlock et al., 2006).

Self-injury can be linked to adolescents' search for identity and truth, for a sense of self (see Erickson's and Gilligan's theories of adolescent development; Shaw, 2002). Self-injury offers one solution to the struggle for identity; some youth who try self-injury self-identify as "cutters," "burners," or "emo" (i.e., emotional). Adolescents may even distinguish between 'genuine' self-injurers and those 'faking' the behavior (for belonging) using criteria such as level of physical damage and secrecy (Crouch & Wright, 2004). Whereas self-injury offers some benefits and meets developmental needs, being labeled as a 'cutter' or 'burner' or being linked to groups known for high rates of self-injury (i.e., Goths; see Young et al., 2006) may further traumatize vulnerable youth and place them at risk for developing a chronic behavioral condition (Adler & Adler, 2005; Johnstone, 1997; Machoian, 2001). The youth may be labeled as manipulative, attention seeking, and severely emotionally disturbed (Machoian, 2001). The investigator's personal experience with self-injury among adolescents has uncovered disturbing youth backlash against other youth who self-injure ("cutters") on social networking sites such as www.vampirefreaks.com, a popular social networking site among Goths. One virtual 'cult' open to members of www.vampirefreaks.com, "fuck_emo," made available banners that read, "Next time cut deeper" against a background of superficial cuts indicative of self-injury. Youth easily could save and add these banners to their own site, thereby leading to the spread of images of self-injury and backlash against youth who self-injure. In addition to poems and other narratives romanticizing the benefits of self-injury (i.e., "problems flow away as the blood flows"), there is evidence that some adolescents have begun to create jokes about self-injury, which may serve to normalize the behavior:

Question: Why are ‘emo’ lawns the best?

Answer: They cut themselves.

Cutting is an effective yet maladaptive way for adolescents to release their frustration, gain relief from tension, gain attention (i.e., someone to listen to them), and express their anger towards people and institutions charged with controlling them—schools, parents, and society (Yip, 2005). Self-injury serves as a way to communicate distress and may result in improved relationships with parents, in a subset of cases (Hilt, Borelli, Nock, & Prinstein, 2004). Evidence suggests adolescents who self-harm differ from those who do not in help-seeking, communication and choice of coping (Evans, Hawton, & Rodham, 2005). Compared to those who did not self-harm, youth who self-harmed were more likely to need help but not seek it, were less “able” to talk with social network members (e.g., teachers, family), had fewer groups they could turn to for support, were more likely to choose avoidant coping over problem focused coping, and were more likely to turn to their friends for support (Evans et al., 2005, p. 585-586). Although a desire for control may precipitate many cases of self-injury among youth, ironically, self-injury often results in a loss of control (Liebling et al., 1997). Adolescents may discover the behavior becomes compulsive (i.e., difficult to control without intervention) over time, and, if discovered, youth who self-injure may be considered a danger to self and others by schools, families, and clinicians. This may result in their freedoms being limited by concerned and often uninformed/misinformed adults and institutions (Carlson et al., 2005; Conterio & Lader, 1998; Shaw, 2002).

Popular Culture and Self-injury

The increased prevalence of self-injury among youth, especially over the past several years, suggests a cultural trend. Thus, self-injury cannot be considered separate from the cultural and historical period in which it occurs (Clarke & Whittaker, 1998; Johnstone, 1997; Kleinman 1988; Oliver, Hall, & Murphy, 2005). Feminist researchers such as Harrison (1997) and Shaw (2002) suggested self-injury is a natural yet admittedly maladaptive reaction to living in “a harming society – a society that seeks to control and maintain us” (p. 438). Levine (2006) associated self-injury with the culture of affluence that leads to disconnection, emptiness, and depression among adolescents and adults. In addition to individual, familial, and community level influences on expressions of distress (i.e., internalization versus externalization), culture impacts an individual’s preferred method of expression. Culture creates the options and reinforces their expressions (Abrams, 2003; Gladwell, 2000/2002). Using the body as a “bulletin board for the frustrations and feelings that have gone ignored” is not a new phenomenon (Conterio & Lader, 1998, p. 11). Body modification involving breaking of the skin has occurred since the beginning of recorded history (Conterio & Lader, 1998). Self-injury as defined herein is not the same phenomenon as piercing or tattooing. Although these behaviors have in common piercing of the skin, the behaviors are differentially motivated—piercing and tattooing represent a desire to care for the body and may actually protect against self-injury (Claes, Vandereycken, & Vertommen, 2005).

There is a lack of empirical investigations into aspects of popular culture that have contributed to increased rates of self-injury. Derouin and Bravender (2004) suggest the high rate of separation and divorce (approximately 50% of marriages end in divorces;

Bramlett & Mosher, 2002) may place youth at increased risk for self-injury. Combined with high rates of separation and divorce, youth in recent cohorts have had to cope with increasing levels of stress and violence in their lives (e.g., media, community), placing vulnerable youth at increased risk for self-injury through internationalization of violence and social learning (exposure) (Derouin & Bravender, 2004). Conterio and Lader (1998) suggested several factors may be related to increasing rates of self-injury, including disconnection at the familial and community levels (e.g., extended families live apart, youth spend more time alone when not in school), reductions in talking with confidants and increases in acting on emotions, increased reliance on technology, the ‘quick fix’ nature of our culture, emphasis on addiction, less time with family and more time with peers, a focus on appearance, and gender bias. Gender bias or living within a ‘girl-harming’ culture may help to explain higher rates of self-injury among females than males; by adolescence, girls are angry, afraid, and frustrated (Conterio & Lader, 1998; Pipher, 1994).

Although self-injury has been studied for several decades, media attention has increased substantially since the late 1980s to early 1990s (Adler & Adler, 2005; Derouin & Bravender, 2004). An anthology of self-injury in the media can be found at <http://anthology.self-injury.net/>. A recent study of self-injury on the Internet discovered more than 400 self-injury message boards dedicated to self-injury, most of which were developed within the past five years (Whitlock et al., 2006). Much of the media that have included references to self-injury targets younger audiences (e.g., 7th Heaven, Family Guy, Girl, Interrupted). Princess Diana was one of the earliest (1996) famous individuals to talk of her personal struggle with self-injury (Derouin & Bravender, 2004). Since that

time other celebrities, many popular with youth, have discussed their experiences with self-injury, including but not limited to: Johnny Depp, Angelina Jolie, Fiona Apple, Marilyn Manson, and Christina Ricci. The Internet is riddled with web sites devoted to self-injury, and attention has increased in the news, advice columns, personal narratives, the research literature, and novels (e.g., *Cut*) (Shaw, 2002).

Today's adolescent cohort in the United States (i.e., GenTech, GenM) is wired (~80% use the Internet; 50% access the Internet daily); they are technologically savvy and use the Internet to express themselves and connect socially (Becker, 2000; Gross, 2004; Lenhart, Madden, & Hitlin, 2005; Roberts, Foehr, & Rideout, 2005). The average 8 to 18 year old is exposed to 8.5 hours of media a day, with an average of 6.5 hours of direct media use per day (Roberts et al., 2005). Although the average total media use among adolescents has not changed significantly from 1999–2004, time spent using computers has more than doubled during this time, from an average of 27 minutes per day to just over one hour per day (Roberts et al., 2005). Relative to media exposure during a typical day (i.e., 8.5 hours), youth reported spending just over two hours per day “hanging out with parents” and just over two hours per day “hanging out with friends” (Roberts et al., 2005). Exposure to media violence, which is present in high levels in a substantial portion of media to which youth are exposed, has been linked to increased verbal and physical aggression (O’Keefe, 2002). Whether self-injury, in particular, is associated with media exposure is unknown. Whereas studies have suggested that Internet use may decrease social isolation among youth and help them connect with like-minded others and assume different identities (Maczewski, 2002; Suzuki & Calzo, 2004), at least one investigator has suggested the increasing prevalence of self-injury

‘communities’ on Internet message boards and web sites devoted to self-injury, in full or in part, may serve to fuel the behavior among adolescents (Whitlock et al., 2006).

Although media attention has the potential to reach out to individuals in need of support with informal social support and resources for recovery, Carlson et al. (2005, p. 22) and others (e.g., Yates, 2004) have argued that increased attention without research or scientific information has resulted in a “climate of confusion”—self-injury is normalized and vulnerable individuals are exposed to maladaptive coping behavior (i.e., social contagion) yet adults and institutions are confused as to how best to respond. Whereas most adults exposed to self-injury during adulthood may react with horror or an inability to understand when exposed to self-injury, adolescents, who tend to be drawn to dramatic and romantic notions of death and dying, are more susceptible to behavioral contagion and may find self-injury attractive (Gould, 2001; Muehlenkamp & Gutierrez, 2004). For example, Whitlock et al. (2006) found that Internet message boards are most frequently populated with messages of informal support and discussions of self-injury triggers. However, the Internet also provides “access to a virtual subculture of like-minded others,” exposure to explicit content (ideas, suggestions), and connections to sources of pro-self-injury sites (e.g., sites that serve as self-injury technique information), and may serve to normalize and encourage the behavior (Hodgson, 2004; Whitlock et al., 2006).

Social Contagion & Self-injury

Existing evidence suggests self-injury has increased dramatically due, in part, to the dynamic of social contagion (Crouch & Wright, 2004; Derouin & Bravender, 2004; Fennig et al., 1995; Hodgson, 2004; Lieberman, 2004; Rosen & Walsh, 1989; Taiminen

et al., 1998; Yates, 2004; Young et al., 2006).² According to Marsden (2005), social contagion refers to “imitative behavior based on the power of suggestion and word of mouth influence.” Social contagion is “subtle,” working through imitation and “permission to act from someone else who is engaging in a deviant act” (Gladwell, 2000/2002, p. 223). Emotions, behaviors, and ideas all can spread via social contagion (Marsden, 2005). One branch of social contagion research has focused on identifying aspects of the person *and* the behavior that affect contagion (e.g., Marsden, 1998). Gladwell (2000/2002) built on the social contagion literature base in his national bestseller, *The Tipping Point*. According to Gladwell (2000/2002), three characteristics interact to explain the spread of emotions, behaviors, and ideas through a culture: contagiousness, the idea that little changes or causes can trigger big effects, and geometric rather than gradual change. The idea of geometric or dramatic shifts in cultural trends is referred to as the “tipping point” (Gladwell, 2000/2002, p. 9). Efforts to explain why some epidemics “tip” (i.e., take off) and others falter must address three factors, including: (a) characteristics of individuals who transmit the emotion, behavior, or idea; (b) aspects of the emotion, behavior, or idea that make it attractive or “sticky”; and (c) the environment in which the potential contagion is transmitted (Gladwell, 2000/2002).

The spread of an emotion, behavior, or idea through a culture serves as a form of communication, a form of advertisement of sorts. For example, within the realm of self-destructive behaviors, social contagion posits that messengers who perform the behavior serve to advertise one potential response to dealing with life’s challenges (Gladwell,

² For a case study of social contagion and adolescent risk behaviors see Gladwell (2000/2002, pp. 216-252).

2000/2002). Self-aggressive behaviors, in particular, serve as a shared language among a particular group of individuals at a particular point in time (Gladwell, 2000/2002).

Contagiousness is a function of the “messenger”; thus, efforts to stop the spread of a behavior must consider aspects of the messenger’s personality to which others are drawn.

Thus, in addressing self-injury, one would need to identify aspects of individuals transmitting the self-injury message that make them attractive sources of information.

These may include traits that are known to be attractive to youth: rebelliousness, impulsivity, risk-taking, precociousness, and indifference to others (Gladwell, 2000/2002, p. 232).

Whether a behavior sticks is a function of the message and the person exposed to the behavior (Gladwell, 2000/2002, p. 232). Self-injury may be particularly sticky for adolescents because it offers a way to deal with overwhelming affect and a sense of identity, horrifies parents and adults, enables self-expression, and fits with characteristics of adolescents, including experimentation, imitation, and rebellion (Gladwell, 2000/2002). In other words, self-injury is a simple yet powerful way to meet numerous psychological needs at once (Strong, 1998). Cutting may be especially effective in aiding the individuation process because wounds are visible and disturbing to adults who may not be familiar with the behavior and may react with horror and disbelief. Within Gladwell’s (2000/2002, p. 268) framework, self-injury may represent an “epidemic of isolation” in that it makes sense only to those within the group performing the behavior.

Whether a behavior becomes repetitive for a particular individual is dependent upon the individual’s initial reaction. This is the reason why highly addictive substances such as heroin or nicotine are “only addictive in some people, some of the time”

(Gladwell, 2000/2002, p. 235). Differences in the number of individuals who report trying self-injury and the smaller subgroup who continue on to repetitive or compulsive self-injury reflect this differential stickiness. This initial reaction to the behavior then becomes a key time point for intervention—some youth will cut once and move on, whereas others cut once and find it works. Individual level characteristics, such as genetics, biological frailty, attitudes and beliefs, and early adverse experiences, determine, in part, whether and to whom self-injury sticks.

Though evidence suggests that social contagion or social learning theory plays a role in initiation of self-injury, whether self-injury associated with social contagion (e.g., peer influence) differs in meaningful ways from self-injury studied within clinical settings (e.g., self-injury associated with abuse and/or psychopathology) is unknown (Yates, 2004).³ Rosen and Walsh (1989) discovered evidence of social contagion among adolescents (i.e., adolescents imitated the self-injury behavior of group leaders). Fennig et al. (1995) suggested self-injury in the school environment may differ from that found within clinical settings. This is similar to Austin and Kortum's (2004) discussion of the "traits" of adolescents who self-injure, including, for example perfectionism, intelligence, moodiness, body image issues, inability to tolerate intense feelings, and difficulties expressing feelings or needs. In their study, most youth who self-injured were high functioning socially and academically but exhibited internalizing traits (e.g., anxiety)—not severe emotional disturbance. A more recent study supported this finding among college students at Ivy League institutions: 17% of undergraduate and graduate

³ Exposure to self-injuring models is not necessary for experimentation with self-injury, as some individuals who self-injure report accidentally discovering the power of self-injury to alleviate distress (Hodgson, 2004; Strong, 1998).

students self-reported lifetime self-injurious behavior, with 36% reporting that no one knew of their behaviors (Whitlock et al., 2006).

Although the secret or private nature of self-injury has been emphasized, evidence of social contagion indicates self-injury during adolescence may not be as private as the literature would suggest (see Adler & Adler, 2005 for a discussion of the social transformation of self-injury). Adler and Adler (2005, pp. 348-349) used a sociological framework to explain differences between the secretive self-injurer (“loner deviant”) typically described in the literature and youth who self-injure in private but share their experiences with members of their social network (“individual deviant”). Adolescent developmental theory suggests adolescents may share evidence of self-injury with some people and not others using, perhaps, the same criteria used when selectively disclosing parts of their lives to parents, peers, and other members of their social network. Further, the infiltration of self-injury into popular culture over the past two decades suggests the social unacceptability of self-injury may be giving way to some level of tolerance (Adler & Adler, 2005). This is not to say that adolescents who self-injure do not attempt to manage their deviant identities (i.e., stigma management) by hiding their injuries (e.g., wearing long sleeves), creating stories to explain their injuries (e.g., a cat scratch), or accounting (i.e., justifying) for their self-injurious behaviors (Adler & Adler, 2005; Hodgson, 2004). Some adolescents who self-injure (“individual deviants”) may be surrounded by “fellow deviants” who share their views of self-injury (i.e., the benefits, motivations) (e.g., Goths; Young et al., 2006), which may make it difficult for them to cease the behavior (Adler & Adler, 2005, p. 372). Being surrounded by their “fellow

deviants” confirms the “deviant identity” and makes it difficult for some adolescents to stop self-injuring and adopt healthier coping behaviors (Adler & Adler, 2005, p. 372).

Traditionally, attention has been rejected as a primary motivator for self-injury within clinical settings, although attention is certainly a side-effect of the behavior. However, evidence suggests that whereas automatic reinforcement (e.g., the sense of relief) may drive repetition of the behavior for some, social reinforcement (e.g., attention, sympathy) may, in part, explain the shift between experimentation and repetition (Nock & Prinstein, 2004; Oliver et al., 2005). This tendency toward social reinforcement may be one factor that differentiates self-injury as discussed in the clinical literature (i.e., clinical psychology) from self-injury as discussed in non-clinical settings (i.e., middle school setting), which begs the question of isolation and privacy—a key assumption made in the literature. Are youth in non-clinical settings aware of self-injury among their peers? Are there some youth who try self-injury during middle school or beyond for attention (“fakes”; Taiminen et al., 1998) and some who self-injure ‘legitimately’ (Crouch & Wright, 2004)? What are youths’ reactions to other youth who self-injure (e.g., social reinforcement, isolation)? Should schools remain quiet (“reluctant”) about the issue and isolate those who self-injure to prevent contagion (e.g., Derouin & Bravender, 2004; Lieberman, 2004) if a sizable proportion of youth are already discussing the behavior and aware of its presence among their peers (Fennig et al., 1995)?

Youth spend more time with their peers than ever before; they are connected 24/7 via cell phone, Internet, telephone, and face-to-face contact at school and other locations (Roberts et al., 2005). Peer contagion refers to peer influence on the spread of behavior. Peer contagion works through competition and false consensus bias (i.e., thinking more

peers are performing a behavior than actually are) (Dishion & Dodge, 2005). Although scant research has examined empirically the relationship between peer contagion and self-injury, there is a body of literature that offers insight into how self-injury may spread among adolescents (e.g., Dishion & Dodge, 2005; Hartup, 2005; Prinstein & Wang, 2005). For example, the effects of peer contagion may be greatest among youth who are not at the extremes of deviancy; youth who are in the middle or sitting on the fence, so to speak, may be at increased risk for ‘catching’ risk behaviors from their peers (Dishion & Dodge, 2005; Hartup, 2005). Further, mixed groups of youth demonstrate higher levels of peer contagion than do ‘pure’ groups (i.e., deviant youth). Thus, public school settings where there is a mixture of deviance levels, with most youth being not at the extreme levels of deviance, represent potential breeding grounds for the spread of health risk behaviors such as self-injury (Hartup, 2005).

What makes some youth vulnerable or susceptible to peer contagion is not well understood; what is known with certainty is there are numerous individual level factors that may be related to vulnerability, which may or may not be specific to the behavior of interest (Hartup, 2005). The literature does highlight the importance of considering relationships within social networks and social norms (i.e., shared beliefs, attitudes) when studying peer contagion (Hartup, 2005). Developmentally, behaviors present before adolescence (e.g., tendency to be overwhelmed when faced with intense emotion) may be amplified within peer groups (Hartup, 2005). Peer contagion must be considered in association with the way in which relationships are formed; individuals select their peers based, in part, on the ways in which they have been socialized (Hartup, 2005). Basic social psychology suggests like individuals tend to gravitate toward one another and

develop relationships. During adolescence, this tendency is demonstrated in the formation of groups, such as Goths, Preps, and Skaters. Within the realm of aggression and deviance, aggressive or deviant youth who spend time with one another tend to be more aggressive or deviant than they would if left to their own devices (Hartup, 2005). The mechanisms underlying this tendency are not well understood; suggestions have included modeling, coaching, and deviancy talk (Dishion, Spracklen, Andrews, & Patterson, 1996). Joiner (2003) suggested that selection or assortive relating may be responsible for bringing individuals vulnerable to suicide into contact with one another (i.e., similar people cluster together before self-injury occurs). A recent longitudinal cohort study suggested identification with the Goth subculture was the best predictor of having self-injured or attempted suicide (Young et al., 2006). The authors suggested selection and modeling effects were at play in the initiation and spread of self-injury among youth; vulnerable youth are more attracted to the Goth subculture and, once ‘accepted’ into the culture, were at increased risk for adopting self-injury when exposed (Young et al., 2006). Once adopted, affiliation with a deviant identity—Goth or cutter—may make it difficult for youth to adopt a healthier identity (Adler & Adler, 2005).

In addition to competition (i.e., one-upmanship; Crouch & Wright, 2004), false consensus bias, or the tendency for some adolescents to overestimate the prevalence and/or frequency of health risk behavior among their peers, plays a role in behavioral contagion (Prinstein & Wang, 2005). Affiliation with similar others may partially explain this phenomenon (Prinstein & Wang, 2005). For example, Goths who ‘hang out’ together may be surrounded by a number of youth in their peer group who self-injure, which may lead them to overestimate the number of youth who self-injure, thereby

normalizing the behavior within this group. Adolescents also may conform to the perceived 'leaders' of their peer group, imitating the behaviors of those they respect (Prinstein & Wang, 2005). Behavioral conformity offers adolescents benefits, such as the avoidance of social 'sanctions' and increased self-esteem (Prinstein & Wang, 2005). When the behavior is not consistent with the individuals' values, they will either terminate the behavior or align their values, beliefs, and attitudes to be consistent with performance of the behavior (Prinstein & Wang, 2005). This may help to explain why some individuals experiment with self-injury, whereas others shift from experimentation to behavioral adoption. Among adults and institutions, the choice to remain silent versus intervene may encourage the latter (Prinstein & Wang, 2005).

Behavioral Correlates of Self-injury

Whereas comorbidity between self-injury and psychological disorders has been established (e.g., eating disorders; Favazza & Conterio, 1989; Solano et al., 2005; Strong, 1998), there is reason to believe self-injury may be related to other risk behaviors. For example, given the relationship between low serotonin levels and cigarette smoking, one would expect to see a relationship between self-injury and cigarette smoking (Malone, Wateraux, Haas, Cooper, Li, & Mann, 2003). Also, alcohol use may increase disinhibition and risk taking, setting the stage for self-injury (McCloskey & Berman, 2003). It is important to note, however, that within clinical samples, at least, alcohol or other substance use is not a necessary condition for self-injury to occur (Nock & Prinstein, 2005). Although suicide and self-injury are distinct phenomena, a substantial proportion of those who self-harm commit suicide; thus, a relationship among suicidal ideation, planning, and attempts and self-injury would be expected (McElroy &

Sheppard, 1999). Antisocial behaviors (e.g., violence) also have been associated with self-injury (Patton et al., 1997). Self-injury is an impulsive behavior; thus, relationships with other impulsive behaviors including alcohol, substance use, suicide, shoplifting, skipping school, and so on would be expected (Lieberman, 2004). However, one study failed to support relationships between self-injury and other impulsive behaviors including alcohol abuse, stealing, and suicide attempts (Solano et al., 2005).

Psychological distress has been associated with health risk behaviors such as unprotected sex, sex with multiple partners, dating violence, smoking, weapon carrying, attempted suicide, and poor health (Rew, 2005). Assuming self-injury is a symptom of psychological distress, it should be associated with other health risk behaviors that have demonstrated relationships with psychological distress.

Prevention and Intervention

Given the impulsive nature of self-injury, Goodman (2005) questioned whether self-injury can be prevented before it occurs, *and* how to prevent youth who experiment with self-injury from becoming repeaters. Intervening in the self-injury process may be especially difficult because most cases of self-injury go undetected and without intervention (Whitlock et al., 2006). Whereas self-injury does not ‘stick’ with most who try it, efforts to teach alternative coping behaviors (i.e., primary and secondary prevention) and intervening before self-injury becomes compulsive or repetitive (i.e., tertiary prevention) should be made given the relationship with suicide and other negative outcomes (Hawton et al., 2006; Hawton et al., 2003; McElroy & Sheppard, 1999; Patton et al., 1997). If in most cases self-injury emerges during early adolescence, efforts to prevent self-injury should begin as early in the developmental trajectory as possible (e.g.,

through supporting parents in teaching emotional regulation skills, identifying vulnerable youth), making recommendations (e.g., Muehlenkamp & Gutierrez, 2004) to focus primary prevention efforts on high school-aged youth misguided. Primary prevention must occur before the behavior has had a chance to stick; by high school, risk and protective factors associated with self-injury have been established, and many youth have already experimented with self-injury, with a smaller proportion having already switched into repetitive self-injury.

There is currently no public health- or population-based approach to the primary prevention of self-injury, which is not surprising given the current state of the literature (Hawton et al., 1997). Studies of peer contagion associated with other risk behaviors suggest when adults remain silent, youth adopt more favorable attitudes toward deviant and health risk behaviors and tend to overestimate the number of youth performing them (Prinstein & Wang, 2005). Failing to implement primary prevention programs targeted at the promotion of adaptive coping behaviors and reliance on after-the-fact interventions that rely on isolation and treatment of youth who are already self-injuring may facilitate the spread of the behavior. As with research conducted within the realm of media and suicide risk (see Gould, 2001), researchers should attempt to identify ways of addressing self-injury within non-clinical settings that do not romanticize the behavior or make it attractive to vulnerable youth. Further, the current literature base, along with empirical research such as that reported herein, could be used to guide the development of primary and secondary prevention programming. For example, the review conducted for this dissertation suggested the following preliminary prevention recommendations:

- ◆ Address self-injury openly (Suyemoto, 1998) but with caution due to potential contagion (Lieberman, 2004). Limit contagion through taking a ‘low key’ approach that focuses on identifying and treating those practicing the behavior and preventing social contagion among their peers (Derouin & Bravender, 2004). Given the potential for triggering the behavior among vulnerable youth, avoid holding assemblies about self-injury (Lieberman, 2004).
- ◆ Incorporate a self-injury component in suicide prevention strategies, including screening for self-injury along with suicide risk (Hawton et al., 2003; Laye-Gindhu & Schonert-Reichl, 2005). Support interventions that offer alternatives for dealing with the emotional demands of the environments in which middle school youth are situated (Ross & Heath, 2002)
- ◆ Educate adolescents on how to help friends who have tried self-injury or are having emotional problems because adolescents who self-injure are most likely to rely on their friends for help (Evans et al., 2005).
- ◆ Reposition self-injury as an unacceptable, pathological behavior—not romantic, desirable, or positive (Suyemoto, 1998), a behavior that goes against the goal of adolescence (e.g., self-injury is an imitative behavior) (Taiminen et al., 1998; Walsh & Rosen, 1985), and a behavioral choice (Saxe, Chawla, & Van Der Kolk, 2002).
- ◆ Teach youth skills, such as problem solving, emotional regulation, affect tolerance, and ways to meet safety and comfort needs (Crouch & Wright, 2004; Gratz, 2003; Laye-Gindhu & Schonert-Reichl, 2005; Suyemoto, 1998). Offer

positive alternatives to self-injury, including opportunities for group cohesion (Crouch & Wright, 2004; Suyemoto, 1998; Taiminen et al., 1998).

- ◆ Support parents of adolescent youth through sharing knowledge of adolescent development, the cultural trend of self-injury, and the transitional nature of adolescence and praising continued efforts to support their adolescents (Derouin & Bravender, 2004).
- ◆ Train those who come into contact with youth who self-injure, including counseling professionals (Zila & Kiselica, 2001). Adults should be trained in appropriate demeanors (i.e., nurturing) to take on when dealing with youth who self-injure because evidence suggests that adults perceived as uncaring, overprotective or intrusive, or uninformed undermine intervention effectiveness (Huband & Tantam, 2004).
- ◆ Offer support, including intervention and treatment, for those who self-injure (Suyemoto, 1998), with potentially different approaches required for boys and girls (Laye-Gindhu & Schonert-Reichl, 2005).

Factors that contribute to relationships between socioeconomic deprivation and suicide (i.e., mediating factors) also may impact self-injury, including family factors (e.g., genetics, family instability, lack of family support, mental illness, unemployment); peer groups; violence and bullying; education and the school environment; nutrition; smoking and substance abuse; and housing (e.g., overcrowding, crime) (Ayton, Rasool, & Cottrell, 2003; Gunnell, Peters, Kammerling, & Brooks, 1995). Thus, policies that address socioeconomic deprivation and related mediators may be helpful in reducing the prevalence of self-injury.

The complex interplay among the numerous factors that have contributed to the spread of self-injury among adolescents will make selecting a prevention approach difficult. Should we target the messengers (e.g., isolate and treat youth who are self-injuring)? Try to make the behavior less sticky (e.g., reposition it as an imitative behavior that goes against the adolescent desire to be unique)? Modify the environments in which youth interact (e.g., lower stress levels, eliminate social reinforcers)? Lessons learned from efforts to prevent other risk behaviors should inform efforts to address self-injury. For example, having adults tell youth to ‘just say no’ to self-injury would most certainly make the behavior more attractive. Second, equating experimentation with addiction should be avoided (Gladwell, 2000/2002). Rather than trying to “tackle the whole problem at once” (i.e., the war against drugs approach), efforts should attempt to “make sure experimentation doesn’t have serious consequences” (pp. 250–251). Although a substantial proportion of youth may experiment with self-injury once exposed, it will only stick to a smaller proportion of vulnerable youth. Focusing on the early identification of vulnerable youth and teaching/modeling adaptive coping skills may be a more effort-, time-, and cost-effective approach than a universal approach (Gladwell, 2000/2002).

Most interventions discussed in the literature are clinical in nature (see Brown, 2001 for a review), which is not surprising given the number of studies conducted within clinical settings. There is currently a lack of empirical evidence to support effective treatments for deliberate self-harm, including repeat suicide attempts and self-injury (Hawton et al., 1998). Specific therapeutic approaches recommended in the literature include: problem solving therapy, dialectic behavior therapy (Linehan, 1993), cognitive

therapy, behavioral therapy, and anger management therapy (Boyce et al., 2001; Jones & Daniels, 1996; Milligan & Waller, 2001; Yates, 2004; Zila & Kiselica, 2001). A mixture of approaches based on the needs of each individual youth who self-injures may represent the best approach (Zila & Kiselica, 2001). Yip (2005) advocated for a multidimensional intervention with emphasis on the social environment, including supportive parents and peers, teaching youth to handle frustration and anger and regulate emotions in positive ways, and nurturing youth with the goal of developing their self-image and promoting their competence. At the core of any intervention designed to address self-injury once established, is an effort to ‘cure a cure’ (Yates, 2004). A review of the literature suggests efforts to ‘cure a cure’ should:

- ◆ Identify individual vulnerabilities (e.g., attitudinal, emotional, relational), consider developmental and current experiences, and offer training and support in the adoption of skills needed to ameliorate vulnerabilities (e.g., affect regulation, interpersonal) (Yates, 2004).
- ◆ Foster the development of a relationship with active listening, talking, understanding, caring, compassion, patience, modeling of alternative ways of coping and assertiveness, and encouragement of self-expression and individualism (Austin & Kortum, 2004; Derouin & Bravender, 2004; Huband & Tantam, 2004; Liebling et al., 1997; Zila & Kiselica, 2001).
- ◆ Recognize self-injury as a maladaptive survival strategy and offer alternatives (Boyce et al., 2001; Harrison, 1997). Focus on support and teaching alternatives/skills—not the cessation of self-injury (Derouin & Bravender, 2004; Saxe et al., 2002; Solomon & Farrand, 1996; Suyemoto, 1998). Avoid reliance on

relaxation techniques because they may make self-injury worse (Huband & Tantom, 2004).

- ◆ Decrease environmental stress through fostering bonds with parents and friends and reducing triggers of self-injury, especially social problems (Boyce et al., 2001; Derouin & Bravender, 2004), and identify and address behavioral reinforcers (Suyemoto, 1998).
- ◆ Address diet issues, such as caffeine consumption, that can affect anxiety; employ efforts to prevent substance abuse, which can decrease inhibitions and alter mood; and screen for depression and anxiety, which may be ameliorated with the use of appropriate psychotropic medication (Boyce et al., 2001; Derouin & Bravender, 2004).

Each school should have a protocol or internal plan for addressing self-injury (Onacki, 2005). School staff including teachers, counselors, nurses, and security personnel need training in recognizing the signs of self-injury, listening and empathizing with students, and adopting a nurturing posture (Froeschle & Moyer, 2004; Lieberman, 2004; Onacki, 2005). Further, staff should be trained to release students from class when negative emotions emerge (Froeschle & Moyer, 2004). Lieberman (2004) recommended incorporating training into the school's crisis team responsibilities. Once students who self-injure are identified, teachers are required to refer students for further assessment, and schools are required to report self-injury to parents because students are considered a danger to themselves (Froeschle & Moyer, 2004; Lieberman, 2004; Onacki, 2005). Further, Froeschle and Moyer (2004) emphasized the need to report suspected abuse.

In addition to external counseling and therapeutic support, schools offer an essential environment in which students who self-injure can receive resiliency or skills training. Depending on the underlying motivation for self-injury, youth who self-injure could benefit from a number of individual or group counseling foci, including self-esteem, grief, loss, divorce, assertiveness training, substance abuse (including alcohol), and/or anger management (Froeschle & Moyer, 2004). Specific skills that may ameliorate the dependence on self-injury as a coping mechanism include: problem solving, interpersonal skills, distress tolerance, and emotion regulation (Suyemoto, 1998). Johnstone (1997) discussed a need for developing partnerships with youth who self-injure, with emphasis placed on understanding feelings versus physical action and behavioral choices, the meaning youth place on self-injury, cultural influences on individual behavior, and giving youth a voice in interventions. Froeschle and Moyer (2004) emphasized the need to create a supportive environment for youth that offers alternatives means of empowerment, encourages youth to voice their feelings, and models appropriate ways of handling negative affect.

Parents and communities play integral roles in youths' lives, and, thus, must be considered when addressing self-injury. Supporting parents of youth who self-injure should be a part of each school's external plan (Onacki, 2005). At a minimum, parents should be notified of their youth's self-injurious behavior and provided with resources (Froeschle & Moyer, 2004; Lieberman, 2004). Parents can play an important role in their children's recovery through participation in counseling and/or family therapy and needed support in how to deal with the behavior and communicating with their children (Froeschle & Moyer, 2004; Suyemoto, 1998). Schools need to collaborate with parents

and clinicians to ensure supportive connections among youth, schools, parents, and communities (Lieberman, 2004). Community involvement through local parent organizations, agencies, and churches could be used to reach parents through identifying and supporting speakers and training for parents and community members (Onacki, 2005).

Segmentation

Available evidence suggests that individuals who self-injure do *not* represent a homogeneous group. More than likely there are smaller homogeneous subgroups, or segments, of individuals who self-injure that share traits in common (e.g., motivation for self-injuring, preference for self-injury behavior). Segmentation is the process used to divide an apparently heterogeneous population (i.e., dataset) into smaller “homogeneous segments” (John & Miaoulis, 1992, p. 131). The logic behind segmentation within social marketing in public health is to identify homogenous groups of individuals who will respond to “specific and efficient marketing strategies designed to elicit particular responses” (John & Miaoulis, 1992, p. 131). According to Yankelovich and Meer (2006), “good segmentations identify the groups most worth pursuing – the underserved, the dissatisfied, and those likely to make a first-time purchase” (p. 124). Within the realm of self-injury, segmentation provides a way to identify groups at risk of adopting self-injury as a maladaptive coping strategy and inform school-based prevention efforts.

Segmentation is a hallmark of effective public health interventions. Social marketing, a strategy employed by some public health professionals, relies on segmentation to identify target audiences and effective strategies for reaching each with health prevention programming. Principles of social marketing include the following:

segment the target audience into homogeneous groups, analyze characteristics that discriminate segments, such as knowledge, attitudes, social norms, and behavior; identify communication channels specific to each segment, develop strategies based on analysis of characteristics of each segment, and pretest materials and interventions with members of each segment (Slater & Flora, 1991). Segmentation, when undertaken well, can “improve the reach, utilization, and effectiveness of health interventions” (Slater & Flora, 1991, p. 222). Rather than segmenting groups based on general attitudes, beliefs, personal characteristics, and psychographics (e.g., lifestyle segmentation schemes), Yankelovich and Meer (2006) argued that segmentation strategies should reflect the “relationships of consumers to a product or product [behavior] category” (p. 124). In other words, emphasis should be placed on consumer behavior and what this behavior reveals about the consumer (Yankelovich & Meer, 2006).

There are two basic approaches to statistical segmentation: *a priori* and cluster-based (Malhotra, 1989). In *a priori* segmentation, segmentation variables and categories are determined before data are gathered (Malhotra, 1989). In cluster-based segmentation approaches, responses to a number of variables are used to determine segments (Malhotra, 1989). There are numerous variables used to segment heterogeneous groups into smaller, homogenous groups, including general observable variables such as demographic variables, product (behavior)-specific observable variables, such as frequency, general unobservable variables such as values, beliefs, and attitudes, and product (behavior)-specific unobservable variables, such as benefits, preferences, intentions, and so on (Vriens, 2001, p. 5).

Chi-square Automatic Interaction Detection (CHAID)

The present study focused on mining data for patterns and structure. Although there are numerous statistical approaches for looking for structure in social and behavioral data, such as multiple regression, factor analysis, multidimensional scaling, discriminant analysis, logistic regression, and log-linear modeling, and for segmenting a population, such as cluster analysis and latent class analysis, this dissertation used the following multivariate approach: Chi-Square Automatic Interaction Detection (CHAID), an exploratory, criterion-based response modeling technique (Dillon & Kumar, 1994). Procedures such as CHAID can be categorized into predictive and descriptive approaches to finding structure in data (Vriens, 2001). CHAID is a predictive cluster analysis approach in that a set of independent variables (i.e., predictors) are used to group participants based on their responses to a categorical or polytomous dependent variable. CHAID was selected based on its use in the fields of marketing research and public health, its appropriateness or match to the guiding research questions, and its ability to handle a large number of variables and identify potentially meaningful patterns in a dataset.

Although CHAID (Kass, 1980) has not received substantial attention within the realm of educational research and measurement or other fields (Hoare, 2004), it has been used by social marketers to identify unique audience segments (i.e., mutually exclusive and exhaustive subgroups) to target with public health interventions (Hoare, 2004; Magidson, 1994). CHAID is a hierarchical, criterion-based approach to segmentation that defines segments based on combinations of predictor variables (Magidson, 1994; Vriens, 2001). CHAID results in mutually exclusive and exhaustive segments that result

from an iterative, chi-square test of independence based analysis of the interactions among predictor variables, such as demographics, psychographics, and behavioral variables (Magidson, 1994). Although CHAID is used with categorical variables, it was initially modeled on stepwise analysis of variance (Kass, 1980). Traditionally, CHAID has been used to create segments based on predictors of a single categorical, criterion variable; however, recent methodological work has resulted in a hybrid algorithm for using CHAID and latent class analysis to segment using multiple, correlated dependent variables (see Magidson & Vermunt, 2005).

As a criterion-based model, CHAID is similar to regression in that it is designed for prediction purposes (Magidson, 1994). Within the CHAID analysis approach, the initial sample is considered one segment (Vriens, 2001). This large, initial segment, which consists of all respondents, is portioned into subgroups (segments) based on interactions among predictor variables, which will, by definition, predict the criterion variable. For example, a segment may form based on the interaction between age and ethnicity where the criterion variable is response to a diabetes screening opportunity. One possible finding may show African Americans between the ages of 25 and 35 are most likely to respond (i.e., be screened) to a diabetes screening opportunity. Unlike regression analysis, CHAID assumes that the predictor variables will interact and enables the investigator to identify the most significant predictors from a large number of possible predictors, thus simplifying the interpretation of complex interactions (Magidson, 1994).

CHAID has three options for categorizing predictor types, including free, monotonic, and floating. The choice between predictor types determines how categories

are merged (Magidson, 1994). Ordinal variables are typically treated as monotonic; in other words, only those categories of a variable that are adjacent can be merged (Magidson, 1994). Free variables are those variables that have no inherent ordering, such as occupation. Thus, whether free variable categories are combined does not depend upon adjacency (Magidson, 1994). Floating variables are similar to those classified as monotonic, with the exception of the last category (e.g., missing, unknown), which is combined with the category that is most alike in terms of distribution (Magidson, 1994).

Magidson (1990, 1994) provides an overview of the basic steps in a CHAID analysis of categorical data. Overall, there are three basic components of a CHAID analysis: the categorical or polytomous dependent variable, a set of predictor variables, and settings for CHAID parameters, including variable classifications (e.g., floating) and stopping criterion (i.e., smallest segment size). There are three steps to the CHAID algorithm, including merging of categories based on their similarity in relation to the dependent variable, splitting the overall group on the 'best' predictor (i.e., the lowest statistically significant, Bonferroni adjusted p -value), and returning to the merging step if the stopping criterion has not been met or there are more subgroups to analyze (Magidson, 1994, p. 124). The merging step is the most complex. Categories are merged within and across independent variables (Vriens, 2001). Two-way cross-tabulations are formed between each independent variable and the dependent variable, categories are merged where appropriate, and the Bonferroni adjusted p -value is calculated for the merged cross-tab (Magidson, 1994; Vriens, 2001).

The results of a CHAID analysis are presented in the form of a tree diagram (see Figure 1) and a gains table is produced that ranks each segment in terms of its likelihood

of response to the behavior of interest (e.g., response). Tree diagrams consist of a root node, parent nodes, child nodes, and terminal nodes (segments), each of which provides the following information: the category that defines the group, percentage response for the particular group, and the sample size for the group (Magidson, 1994, p. 128).

Settings for parent and child node size depend, in part, upon available sample size: within smaller sample sizes, minimum sample size settings are typically 10 for parent node and 5 for child nodes, and, within larger sample sizes, minimum sample sizes can be set at 20 for parent node and 10 for child nodes (The Measurement Group, 1999-2005). Figure 1 represents a segmentation tree with only one predictor variable, gender. Within this diagram, differing prevalence rates between males and females are represented (i.e., 15% among males, 35% among females) and the total sample size and the sample size per gender are displayed.

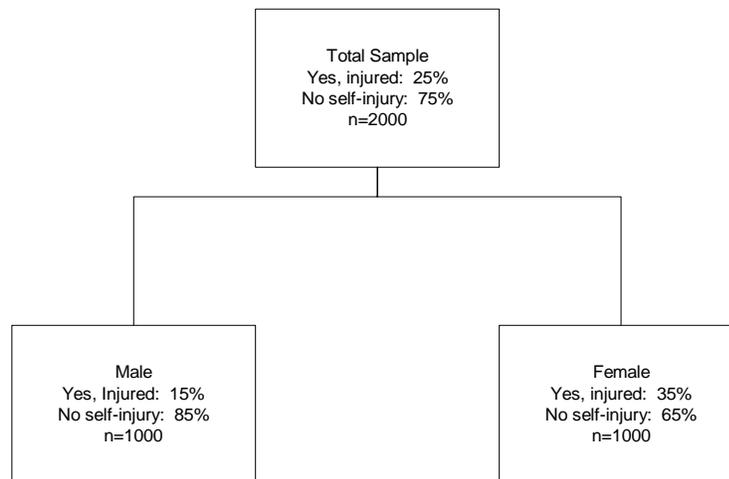


Figure 1. *Sample Tree Diagram.*

CHAID offers several key benefits. CHAID does not require data to be normally distributed. In addition, independent variable categories that do not differ statistically significantly are merged, resulting in a simplified picture of relationships between predictors and the dependent variable (assuming a Type 2 error has not occurred). Further, CHAID is useful as an exploratory data analysis approach in that a large number of predictors can be included in the analysis, and a preliminary segmentation model can be developed and verified using confirmatory approaches such as logistic regression or can be replicated using CHAID within a holdout sample (Magidson, 1990). CHAID allows for the inclusion of cluster variables to determine whether group-level variables (e.g., school) are useful in segmenting the population into subgroups (Magidson, 1990). CHAID includes a Bonferroni alpha adjustment to control inflated Type I error rates associated with the use of multiple, simultaneous statistical tests (Magidson, 1990, 1994). Additional benefits such as the ability to treat missing values for each predictor variable as a “floating category” are discussed in The Measurement Group (1999-2005). A key benefit to CHAID is the ease in which output is understood and communicated to lay individuals (Vriens, 2001).

Important issues to consider when using CHAID are detailed in Vriens (2001). CHAID is a forward stepwise approach; thus, segmentation results depend upon the order in which variables enter the model (The Measurement Group, 1999-2005; Vriens, 2001). Once a predictor has entered the model, it cannot be removed later in the analysis (Vriens, 2001). Also, segments are developed using statistical criteria, not practical or theoretical criteria. Thus, segmentation results may not be useful, and not every

important relationship is identified because the focus is on identifying relationships with the greatest odds of being replicated in new samples (The Measurement Group, 1999-2005). Fortunately, CHAID trees can be revised manually to reflect theoretical or applied knowledge (Vriens, 2001). Investigators can choose to ‘force’ in independent variables at different stages in the tree based on non-statistical criteria (Vriens, 2001). Although the ability to consider a large number of independent variables is a benefit, this increases the risk of including an ‘irrelevant’ variable that may diminish the validity of the segmentation solution (Vriens, 2001). Finally, specifying stopping rules and other CHAID settings can be difficult because there are no agreed upon, objective guidelines. For example, the investigator must specify the minimum number of observations in a segment. This decision must be made with close consideration to practical constraints—how small can the group be and still be worth targeting/considering, and how large can the group be and still be interpretable and responsive to targeted efforts (Magidson, 1990; Vriens, 2001)? Finally, because CHAID relies on significance testing, if the sample size used for a CHAID analysis is small or the tree is ‘grown’ to too many levels (i.e., smaller and smaller subgroups), it is “susceptible to capitalizing on chance” (Magidson, 1990, p. 108).

Segmentation Validity

Gathering validity evidence to support segmentation results is a key aspect of segmentation analysis. Three sources of validity evidence emerged from the literature: the use of theory and applied knowledge in developing segmentations, the use of holdout samples, and predictive validity studies (Aldenderfer & Blashfield, 1984; Magidson, 1994). First, ideally theory and applied knowledge are used in interpreting segmentation

results (i.e., determining the number and nature of segments/classes). Second, holdout samples (i.e., randomly splitting the original sample into two separate samples) can be used to determine the stability/replicability of segmentations across samples and/or provide evidence of predictive validity (Magidson, 1994). Third, Aldenderfer and Blashfield (1984) suggested determining whether cluster or segment membership predicted “theoretically-related criterion variables” was the strongest form of validity evidence (p. 224).

Summary

Early adolescence provides a perfect backdrop for the emergence of self-injury. Self-injury offers adolescents a way to regulate overwhelming affect, gain a sense of identity, separate from parents, solidify relationships with peer groups, and address other conflicts or goals associated with adolescence (e.g., need for self-expression). Evidence suggests self-injury has taken hold among youth in recent cohorts—media attention has increased, schools have taken note, and parents and other adults are bewildered. Self-injury is a mental health issue, but it is not known whether all youth who self-injure have a diagnosable mental illness, whether self-injury is a sign of distress among vulnerable youth in clinical and nonclinical settings, and/or whether the self-injury is a “new” expression of adolescent risk behavior that is being “labeled as risqué by adults in a particular historical and sociocultural setting” and becoming “normative” (Rew, 2005, p. 167).

Current research suggests self-injury is, in many cases, a symptom of distress (i.e., maladaptive coping mechanism) that, during adolescence, is influenced by the environment, especially the phenomenon of social contagion. Self-injury may be a

temporary, maladaptive coping mechanism ('behavioral dysfunction') that is automatically and socially reinforced for many youth that ends with the transition to adulthood, with a smaller proportion switching to chronic, repetitive self-injury (Walsh & Rosen, 1988). In this respect, self-injury is arguably similar to other problem/risk behaviors such as tobacco, alcohol, and other substance use among adolescents that can, in some cases, be defined as expressions of underlying psychological distress and become addictive over time (Rew, 2005). Because suicide is one of the leading causes of death among adolescents, and self-injury is a strong predictor of suicide, self-injury among youth should be considered a significant public health issue in need of attention. Whereas recommendations have been to screen older adolescents for self-injury and implement interventions during mid-to-late adolescence, efforts to prevent self-injury should be made *before* the behavior has a chance to 'stick'.

This study had three purposes: (a) contribute to what is known about self-injury among early adolescents in the general middle school population (i.e., non-clinical population), (b) identify behaviors that are comorbid with self-injury, and (c) identify segments of youth who self-injure. Overall, the study focused on moderate/superficial self-injury as a distinct behavioral phenomenon with multiple causes and functions. A broad definition of self-harm was used, including multiple behaviors noted among early adolescents. For the purposes of this study, self-injury was defined as the performance of a harmful behavior such as cutting, scratching, burning, not allowing wounds to heal, or pinching, by a person who feels upset as a way to feel better (less upset). This study provided general adolescent population estimates of the prevalence, 30-day frequency rates of injury among self-injurers, and information about the extent to which adolescents

know a friend who self-injures. Relationships between self-injury and other risk behaviors were described. Segmentation analyses were used to identify factors associated with self-injury among middle school youth and meaningful segments of youth who self-injure. Recommendations (e.g., Gratz, 2003) to examine sociocultural and gender variations in the prevalence, frequency, and correlates of self-injury were followed (Gratz, 2003). The interaction between environment (e.g., self-reported exposure to peers who self-injure, exposure to bullying and violence in the school setting, social climate) and individual behavior (i.e., having ever tried self-injury and 30-day frequency rate of self-injury) were considered (see Dishion & Dodge, 2005).

Chapter Three: Method

This chapter describes the research approach, accessible population, preliminary prevalence estimates of self-injury, instrumentation, measures of self-injury, data collection, study design, and analysis procedures. A discussion of the protection of human research subjects and dissemination of study results is included at the close of this chapter.

Research Approach

This study involved secondary analysis of data gathered using the middle school Youth Risk Behavior Survey (YRBS) from sixth- and eighth-grade students in eight middle schools in a large, southeastern county in Florida. Given the early state of the literature, the dissertation research focused on mining data for patterns and structure. The concept of principled statistical discovery, an iterative analysis approach that involves exploring datasets, identifying potential patterns or structure, and using further statistical tests and/or information to confirm or disconfirm potential findings, guided the analysis (Mark, 2006). A model of this approach as applied to the research is provided in Figure 2. Overall, there were three distinct, yet related, phases to the study. The first phase focused on providing a description of self-injury within a general school-population setting. The second phase involved exploration and confirmation of relationships between demographic, attitudinal, and behavioral variables and the three self-injury items. The third phase involved the discovery and validation of segments or unique

subgroups of youth who self-injure, self-injure frequently, and know a peer who has self-injured. The reader should note the multilevel nature of the data was considered in confirmatory analyses (e.g., logistic regression) but not in exploratory analyses (e.g., bivariate). Sampling, methods, key decisions, and other considerations are summarized in Figure 2 and are discussed in the next section.

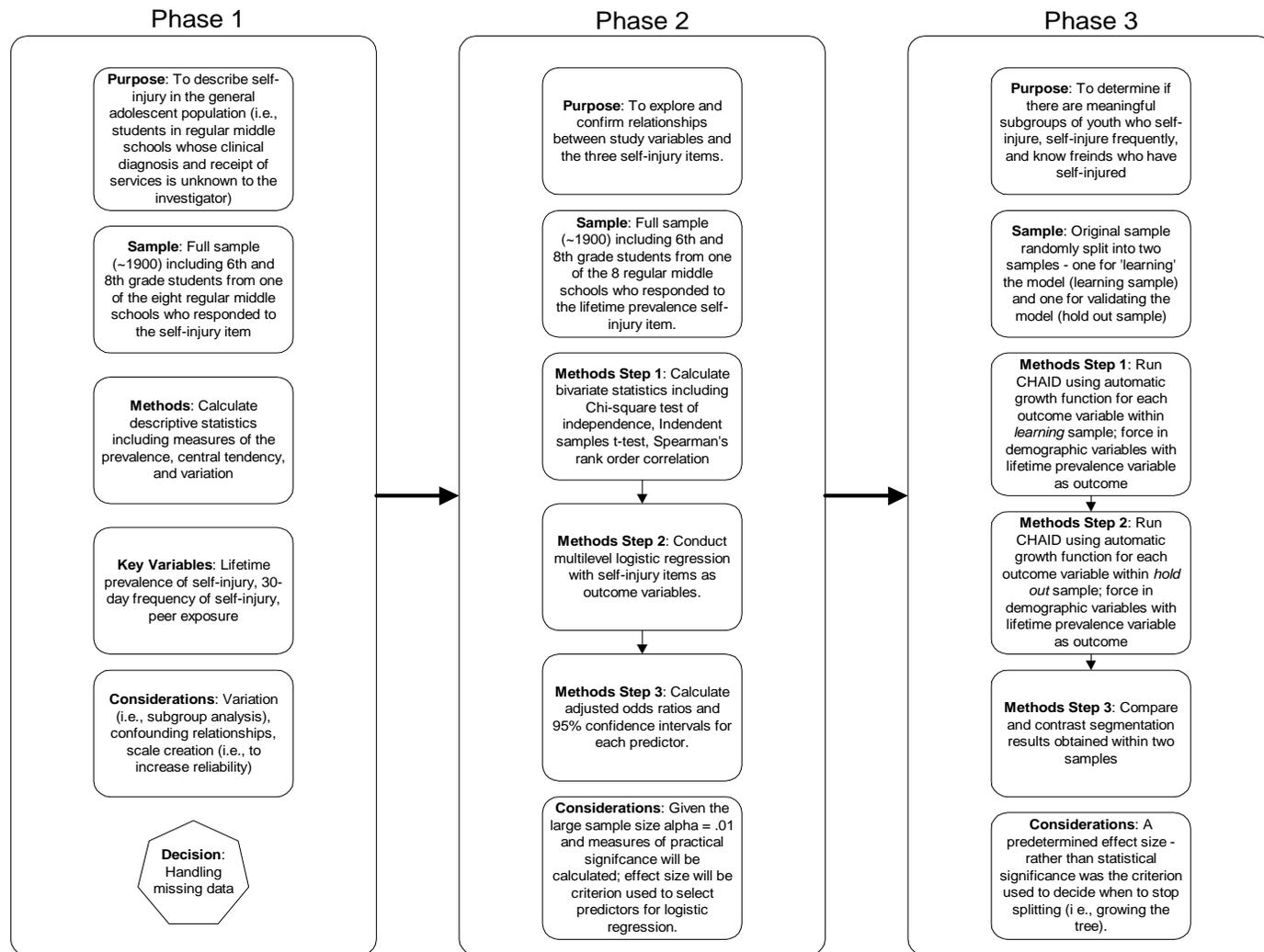


Figure 2. Model of research approach.

Accessible Population

The accessible population for this study included sixth- and eighth-grade students (~ 10 to 14 years of age) in eight middle schools in a large, southeastern county in Florida. Special education students were not included in the accessible population as they were not included in the survey administration as per the study county's district policy. Although data were available from six alternative and private schools in the study county, these were excluded given the small, unrepresentative samples obtained from each site (range = 8 to 21 students). Youth between 10 and 14 years old were selected because many adolescents of this age are initiating a variety of risk behaviors (e.g., sexual activity, smoking, drinking and other drug use) as well as self-injury (Carlson et al., 2005). According to the Florida Department of Education's Statistical Brief (2005-2006) in the fall 2005, the study county had 41,884 students in its public pre-kindergarten through 12th grades. Of those students, 9,663 were in middle school, with 2,939 (30.41%) in sixth grade and 3,423 (35.42%) in eighth grade. The Florida Department of Education reports racial/ethnic data at the county level for public school student membership. The majority of students in the study county's public schools were White, non-Hispanic (N = 31,097; 74.25%), Hispanic (N = 4,516; 10.78%), or Black, non-Hispanic (N = 3,735; 8.92%), with an overall minority population of 10,787 (25.75%).

Total enrollment, demographic, and grade level enrollment information specific to each participating middle school are provided in Tables 2 and 3. A total of 1,748 students were included in the study sample (see Table 2). Examination of free/reduced price lunch information suggests study schools represented a range of socioeconomic (SES) classes, with the lowest percentage of free/reduced price lunch at School 6 and the

highest at School 1. The majority of students at most study schools were White, which is consistent with study county demographics (see Table 2). However, students at School 1 were more ethnically diverse than were those at other study schools (see Table 2).

Table 2

Description of the Accessible Population by School (N=1743, December 2005)

	SCHOOL								χ^2
	1	2	3	4	5	6	7	8	
Total # of Students	222	176	431	122	254	170	158	210	
Gender									
% Female	51	52	51	51	56	58	48	50	5.31, $p = .62$, df=7
Race/Ethnicity									
% White	34	74	76	81	78	84	81	84	310.89, $p <$.0001, df = 35
% Black or African American	28	10	8	6	7	3	2	1	
% Hispanic or Latino	33.5	10	9.5	5	10	6	8	9	
% Other Race or Ethnicity	4	6	7	8	6	7	9	7	
Grade*									69.04, $p <$.0001, df = 7
% 6th grade	48	24	42	39	58	53	44	57	
% Free/Reduced Price Lunch	66.0	35.7	39.8	23.0	33.5	4.1	15.7	27.4	211.34, $p <$.001, df = 7

Note: Five students included in the sample did not report school attended.

*The sample was limited to students in 6th and 8th grades.

A total of 5,592 sixth- and eighth-grade students were enrolled in study schools in 2005-2006 (Table 3). More eighth graders than sixth graders were enrolled. Overall, sampling resulted in an obtained sample of 31% of enrolled sixth graders and 32% of enrolled eighth graders (Table 3). Random sampling was not used. Whereas samples obtained from most study schools were within the 1/3 of the accessible population range (N=1748), samples obtained from Schools 2 and 7 were lower than those obtained from other study schools. At School 2, surveys were obtained from only 13% of enrolled sixth graders compared to 35% of enrolled eighth graders. At School 7, surveys were obtained from only 19% of enrolled sixth graders and 20% of enrolled eighth graders.

Table 3

Comparison of Sample Obtained and Enrollment by School (December 2005)

School	6th Grade Sample (2005)	6th Grade Enrollment (2005/2006)	% of 6th Grade Population Obtained	8th Grade Sample (2005)	8th Grade Enrollment (2005/2006)	% of 8th Grade Population Obtained
1	107	285	37.5	115	359	32
2	42	324	13	134	384	35
3	182	569	32	249	661	38
4	48	146	33	74	250	30
5	148	349	42	106	355	30
6	90	256	35	80	228	35
7	70	365	19	88	450	20
8	120	335	36	90	276	33
Total	807	2629	31	936	2963	32

Unlike clinical samples where the diagnosis and receipt of services are known, individuals included in the accessible population may or may not have had a clinical diagnosis associated in the clinical literature with self-injury (i.e., depression). Further, some students may have been receiving psychological services at the time of survey administration either from a private clinician or from a school psychologist. According to the school board of the study county, approximately 2% to 3% of middle schools students received psychological services in the schools during the 2005–2006 school year. The proportion of students receiving psychological services from private clinicians was unknown.

Instrumentation

The middle school version of the YRBS is used by the county school board to monitor risk health and risk behaviors among middle school youth and for prevention programming and evaluation purposes. The YRBS questionnaire was developed by the Centers for Disease Control and Prevention (CDC), with input from the Methods and Evaluation Unit of the University of South Florida Prevention Research Center (FPRC).

The YRBS is a school-based classroom survey of risk behaviors self-reported by middle school youth (see Appendix A). Usually conducted at the high school level (Grades 9-12), the 104-multiple-choice questionnaire was modified to include questions relevant to middle school students. The middle school survey is used to monitor six categories of priority health and risk behaviors among youth and young adults: (a) unintentional and intentional injuries, (b) tobacco use, (c) alcohol and other drug use, (d) sexual behaviors that contribute to unintended pregnancies and sexually transmitted diseases, (e) unhealthy dietary behaviors, and (f) physical inactivity (Kann et al., 1998). The 2005 middle school YRBS also included questions about demographics, delinquent behaviors, communication/relationship with parents/guardians, exposure to prevention interventions, and self-reported grades (see Table 4).

Table 4

Middle School Youth Risk Behavior Survey Item Categories

Item Category	Number of Items
Demographics	7
Personal safety and violence-related behaviors	8
Bullying	12
Cyberbullying	4
Suicide	3
Self-harm	3
Tobacco use	10
Alcohol use	6
Marijuana use	4
Other drug use	4
Body weight	7
Physical activity	9
AIDS education	1
Sexual intercourse	4
General health behavior	2
Delinquent behavior	4
Exposure to <i>Believe</i> Campaign	4
Parental communication about drugs and alcohol	2
Feelings about future, substance use, and family	4
Attitudes toward school	3
Self-reported academic performance	1
Truthfulness in answering survey questions	2

Measures of Self-Injury

In the study county, Safe School Liaisons were responsible for monitoring risk and protective factors among youth and assisting schools and community agencies in addressing reoccurring and remerging issues. In addition to increases in suicidal ideation, Safe School Liaisons noted increases in the numbers of students practicing self-harm or requiring services for the behavior. To increase their ability to develop or locate interventions to address self-harm among youth, Safe Schools Liaisons needed to be able to identify youth at risk for self-injury and factors to consider when addressing self-injury (e.g., co-morbid behaviors, gender or grade differences, school level variation). In response to those identified needs, the investigator assisted the Safe School Liaisons in developing three items specific to self-harm. These items were designed to assess the prevalence and frequency of self-injury and level of peer exposure. Item development was informed by a review of the self-injury literature.

Safe School Liaisons, who worked with middle school youth and were trained in guidance and prevention, helped define self-injury and played a key role in item generation. Self-injury was defined for youth to help ensure each participant responded using the same frame of reference. The following lead in was placed directly before the series of self-injury items:

The next 3 questions ask about self-harm (cutting, scratching, burning, not allowing wounds to heal, pinching). Sometimes people who feel upset hurt themselves on purpose as a way to feel better (less upset).

Three items were developed to measure three aspects of self-injury: lifetime prevalence, past 30-day prevalence, and awareness of peer self-injury behavior. Each of these items is reprinted below:

1. Have you ever hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
 - a. Yes
 - b. No

2. During the past month, how often have you hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
 - a. Never
 - b. 1 time
 - c. 2 or 3 different times
 - d. 4 or 5 different times
 - e. 6 or more different times

3. Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
 - a. Yes
 - b. No

Data Collection

Safe School Liaisons with the assistance of middle school teachers administered the YRBS to sixth- and eighth-grade students at eight middle schools and six alternative and private schools in the county in December 2005. Approximately 2,350 surveys were distributed across schools. Each school conducted an in-service training for teachers describing the data collection protocol. A letter was sent home to students allowing parents to opt out their child from the survey administration. Students who were opted out (~10% of eligible students) were not allowed to take the survey on the day of administration. An effort was made to survey one-half of all students enrolled in sixth

and eighth grades in the eight schools. Special education students were excluded from participation as per district policy. Teachers, in their respective subjects, then administered the self-reported questionnaire to students during a regular class period (~45 minutes). Survey procedures were designed to protect the students' privacy and allow for anonymous, voluntary participation. Standard electronic answer sheets ("bubble sheets") were used by students to record their responses. Data were then read by an optical scanner. Visual inspection revealed that out of approximately 2,350 surveys distributed, a total of 2,003 valid surveys were completed, resulting in an initial response rate of 85.23%. A total of 1,907 students (~81% of the original sample) self-reported attendance at one of the eight middle schools.

Protection of Human Subjects

Parents were informed of the possibility of their child being administered the YRBS and were provided with a means for opting their child out of survey participation through distribution of a letter to parents at the beginning of the 2005–2006 school year. Students who were opted out of participating were not allowed to complete the YRBS on the day of survey administration. The investigator obtained permission from the director of pupil support services of the school board to utilize the data from the 2005 YRBS administration for dissertation purposes. The study protocol was reviewed and approved by the University of South Florida Institutional Review Board, Social and Behavioral Sciences Division.

Analysis Procedures

Step 1: Data Entry and Cleaning

Youth who agreed to participate recorded their responses to each item on a scantron sheet. Scantrons that were wrinkled or smudged were numbered with a unique identifier and hand entered in a Microsoft Excel database to ensure data quality. Once all surveys were entered into a Microsoft Excel database, the investigator calculated frequencies for each variable to identify response values outside of the established response categories. Values outside of the expected range were double checked against the original scantrons using the unique identifier (i.e., ID variable). Corrections were made where possible. When a correction was not possible, the response was recoded as missing. SAS v. 9.1.3 was used to calculate all statistics, with the exception of CHAID analysis, which was conducted using SPSS Answertree v. 3.1 software, and MPLUS (Muthén & Muthén, 1998-2006) and HLM 6 (Raudenbush, Bryk, Cheong, & Conadon, 2004), which was used to conduct multilevel modeling.

Step 2: Creation of Study Datasets

Multiple datasets, based on the original, were used in the research reported herein. The following actions were taken to limit the overall dataset.

- ◆ Only students who self-reported attending one of the eight middle schools were retained. Responses were validated using the second school item that listed private and alternative schools: students who self-reported attendance at both a public middle school and a private or alternative school (i.e., an invalid response pattern) were excluded.

- ◆ Fifty-eight participants who responded something other than sixth or eighth grade (e.g., “other”) to the grade level item were excluded because the YRBS was primarily administered to sixth and eighth graders.
- ◆ Forty-seven participants who did not respond to the *having ever tried* self-injury item (i.e., those with a missing response), the main dependent variable, were excluded. Missingness on this item was statistically significantly, but weakly associated, with gender: males were more likely to not respond to this item than were females (2.4% vs. 71%; $\chi^2(N = 1959, 1) = 8.78, p < .01$, Cramer’s $V = -0.07$). Missingness also was statistically significantly, but weakly associated, with race or ethnicity: White students were more likely to not respond than Black students (4.6% vs. 1.5%; $\chi^2(N = 1580, 1) = 8.51, p < .01$, Cramer’s $V = 0.07$) and students of other ethnicities (6.1% vs. 1.5%; $\chi^2(N = 1545, 1) = 15.80, p < .0001$, Cramer’s $V = 0.10$).
- ◆ Twenty six participants who reported answering truthfully less than one-half of the time and none of the time were excluded. However, participants who did not respond to this item were *not* excluded given the number of students who were unable to finish the survey and, therefore, were unable to respond to the ‘truth item’ (i.e., survey item #103).

These actions resulted in a final sample size of 1,748, representing approximately 92% of participants who self-reported attendance at one of the eight middle school (N = 1,907) and 74% of the 2,350 surveys originally distributed.

The nature of missing data also was considered. Some youth may have skipped items they did not want to answer, especially those specific to risk behaviors, and some

youth may not have been able to complete all 104 items due to time constraints associated with survey administration. The nature of missing data was explored using descriptive and bivariate statistics (e.g., correlations). Univariate and bivariate statistics were used to describe differences, if any, between those with no missing data and those with some missing data within the reduced sample of 1,748. Approximately 70% of students had zero missing responses. Another 14% had only one or two missing responses. The average number of missing responses was 2.5, with a range of 0 to 46. Missingness was negatively associated with age: as age increased, the number of missing responses decreased ($r = -.09, p < .01$). On average, males had higher numbers of missing responses than did females (2.94 vs. 2.01; $t(1738) = 3.16, p = .0016$; Cohen's $d = 0.15$). On average, sixth graders had higher numbers of missing responses than did eighth graders (3.28 vs. 1.78; $t(1746) = 5.12, p < .0001$; Cohen's $d = 0.24$). Missingness was not significantly statistically associated with the main outcome variable of this study, having ever tried self-injury, $t(1746) = -0.84, p = .40$. Given the size of the available sample and the fact that most participants had zero to two missing responses (84%), listwise deletion was used to eliminate cases with missing data on each variable used in each analysis conducted. Associations between gender and age and missingness were considered when interpreting key study findings.

Step 3: Variable Selection and Modification

Because this study sought to provide a description of self-injury during early adolescence, many of the variables from the 2005 YRBS were used (see Tables 5 and 6). In addition to demographic (e.g., ethnicity) and descriptive items (e.g., perceived health

status), indicators of problem behavior theory, social contagion, precipitants of self-injury, and developmental theory were identified and are summarized in Tables 7 and 8.

Table 5

Interval-Level Variable Descriptive Statistics

Variable	N	Range	Mean	Median	SD	Skewness	Kurtosis
Age	1746	10 – 16	12.52	13.00	1.18	0.06	-0.88
Age at first alcohol use	640	8 – 14	10.56	11.00	1.98	0.03	-1.37
Age at first cigarette use	291	8 – 14	10.70	11.00	1.88	-0.17	-1.26
Age at first marijuana use	194	8 – 14	11.56	12.00	1.83	-0.65	-0.66
Age at first sex	266	8 – 14	11.41	12.00	1.96	-0.58	-0.91
Grades	1519	1 – 9	7.41	8.00	1.58	-1.63	3.02
Health	1734	1 – 5	3.94	4.00	0.91	-0.55	-0.20
Number of sexual partners	253	1 – 3	1.87	2.00	0.86	0.25	-1.62
Time on computer or video games	1610	0 – 7	2.26	2.00	1.82	0.91	0.30
TV hours per day	1659	0 – 6	3.03	3.00	1.75	0.16	-0.84

Note: All variables were coded so that a higher score represented a higher amount of the characteristic, behavior, or attitude being measured.

Table 6

Prevalence Information for Categorical Study Variables

Individual Variables	Yes (%)
During your lifetime, have you ever been cyberbullied?	22.6
During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?	7.7
Have you ever seriously thought about killing yourself?	21.7
Have you ever made a plan about how you would kill yourself?	13.5
Have you ever tried to kill yourself?	7.6
Have you ever tried cigarette smoking, even one or two puffs?	25.1
During the past 30 days, have you smoked cigarettes, even one or two puffs?	10.7
Have you ever had a drink of alcohol, other than a few sips?	36.3
In the past 30 days, have you had any alcohol to drink, other than a few sips?	17.3
In the last year, have you had five or more drinks of alcohol in one day?	12.6
Have you ever used marijuana?	14.0
Have you ever sniffed glue, or breathed the contents of spray cans, or inhaled any paints or sprays to get high?	15.0
Have you ever used prescription drugs or over the counter medicine (cough/cold medicine) to get high?	5.4
Have you ever had sexual intercourse?	17.6
Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?	46.8
Have you ever hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?	28.4

Table 7

*Individual Variables Selected for Use and Associated Theoretical or Conceptual**Framework*

Theory or Concept	Individual Variables
Precipitants of Self-injury	During your lifetime, have you ever been cyberbullied?
	During the past 30 days, how many times were you the victim of cyberbullying?
	During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?
Problem Behavior Theory	Have you ever sniffed glue, or breathed the contents of spray cans, or inhaled any paints or sprays to get high?
	Have you ever had sexual intercourse?
Social Contagion	Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
	On an average school day, how many hours do you watch TV?
	On an average school day, how many hours do you spend playing video games or using a computer for fun? (Include activities such as Nintendo, Game Boy, Play Station, and computer games.)

Table 8

Scales Developed for Use and Associated Theoretical or Conceptual Framework

Theory/Concept	Scale	Number of Items	Cronbach's α	Range of Item to Total Correlations
Developmental Theory	Attitude Toward School	3	.55	.33 - .43
	Belief in Possibilities	3	.76	.45 - .67
	Parent Communication	2	.83	.71 - .71
Precipitants	Bully – Victim	5	.74	.39 - .59
	Abnormal Eating	3	.59	.39 - .51
Problem Behavior Theory	Deviant Behavior Scale	2	.51	.34 - .34
	Suicide Scale	3	.75	.58 - .63
	Substance Use Scale	10	.88	.50 - .70

Cronbach's alpha (Cronbach's α), a measure of internal consistency reliability, was calculated for item sets that were designed to measure the same behavior or underlying construct (i.e., to be used as a scale), including attitudes toward school, belief in possibilities, parent communication, and bullying (see Tables 8 and 9). Many of the

scales had a small number of items and, therefore, reliabilities were generally lower than the minimal levels commonly accepted for research (i.e., $\alpha \geq .70$). Exploratory factor analysis (EFA) with tetrachoric (i.e., dichotomous items) and polychoric (i.e., polytomous items) correlations was conducted using Mplus v. 3.0 to aid in the reduction of the number of variables used in the multivariate component of the study (see Appendix B). Variables that were not necessarily designed to create a scale were included, such as substance use (e.g., tobacco, alcohol, marijuana, inhalants, prescription drugs), theft, and skipping. Promax rotations were used because it was assumed factors would be correlated. Results from the promax solution revealed substantial correlations between factors, so Promax rotated pattern coefficients were interpreted (see Appendix B). Pattern coefficients combined with theory were used to create scales (see Table 8). Cronbach's alpha was calculated for each scale. Where appropriate, variables were modified (e.g., dichotomized) for use in the segmentation analysis (i.e., a set of dummy variables were created for each nominal variable). Tables 8 through 10 present scale definitions and psychometric information. All variables were coded so that a higher score represented a higher amount of the characteristic, behavior, or attitude being measured.

Table 9

Scale Definitions and Internal Consistency Reliability

Abnormal Eating ^a (Cronbach's $\alpha = .59$)	<ol style="list-style-type: none"> 1. Have you ever gone without eating for 24 hours or more (also called fasting) to lose weight or to keep from gaining weight? 2. Have you ever taken any diet pills, powders, or liquids without a doctor's advise [sic] to lose weight or to keep from gaining weights? (Do not include meal replacement products such as Slim Fast.) 3. Have you ever vomited or taken laxatives to lose weight or to keep from gaining weight.
Attitude Toward	<ol style="list-style-type: none"> 1. People at my school notice when I am good at something.

School ^b (Cronbach's $\alpha = .55$)	2. I participate in activities (clubs, sports, WEB, etc.) at this school. 3. There is at least one teacher or adult at this school I can talk with if I have a problem.
Belief in Possibilities ^b (Cronbach's $\alpha = .76$)	1. I believe I can choose to not smoke cigarettes or drink alcohol, even if I'm going through tough times. 2. I believe my future holds many possibilities. 3. I believe I have better things to do than smoke cigarettes or drink alcohol.
Bully – Victim ^c (Cronbach's $\alpha = .74$)	1. During the past 30 days, how many times did another student tease or call you names? 2. During the past 30 days, how many times did another student threaten to hit or hurt you? 3. During the past 30 days, how many times did another student spread rumors about you? 4. During the past 30 days, how many times did other students not let you join in what they were doing? 5. During the past 30 days, how many times did another student push, shove, slap, hit, or kick you on purpose?
Substance Use ^d (Cronbach's $\alpha = .88$)	1. Have you ever tried cigarette smoking, even one or two puffs? 2. During the past 30 days, have you smoked cigarettes, even one or two puffs? 3. During the past 30 days, on how many days did you smoke cigarettes? 4. Have you ever had a drink of alcohol, other than a few sips? 5. In the past 30 days, have you had any alcohol to drink, other than a few sips? 6. In the last year, have you had five or more drinks of alcohol in one day? 7. During the past 30 days, how many times have you had 5 or more drinks in one day? 8. Have you ever used marijuana? 9. During the past 30 days, how often have you used marijuana? 10. Have you ever used prescription drugs or over the counter medicine (cough/cold medicine) to get high?
Parent Communication ^e (Cronbach's $\alpha = .83$)	1. My parents have talked to me about their feelings toward me smoking cigarettes. 2. My parents have talked to me about their feelings toward me drinking alcohol.
Deviant Behaviors ^f (Cronbach's $\alpha = .51$)	1. Since school started this year how many times have you skipped school? 2. During the past 12 months, how often have you shoplifted (stolen something from a store)?
Suicide ^a (Cronbach's $\alpha = .75$)	1. Have you ever seriously thought about killing yourself? 2. Have you ever made a plan about how you would kill yourself? 3. Have you ever tried to kill yourself?

^a Response scale for Items ranges from 0 (No) to 1 (Yes).

^b Response scale for Items ranges from 1 (Strongly Disagree) to 5 (Strongly Agree).

^c Response scale for Items ranges from 0 (0 times) to 4 (10 or more times).

^d Response scale for Items 1 – 2, 4 – 6, 8, and 10 goes from 0 (No) to 1 (Yes). Response scale for Items 3, 7, and 9 ranges from 0 days to 30 days.

^e Response scale for Items ranges from 0 (No) to 2 (Yes).

^f Response scale for Item 1 ranges from 0 (Never) to 4 (More than 3 times). Response scale for Item 2 ranges from 0 (0 times) to 4 (6 or more times).

Original variables were used to create most scales with the exception of the Substance Use and Deviant Behaviors scales (see Table 10). Because response scales

differed between items used to create each scale, item responses needed to be standardized before scales were created. Four out of eight scales demonstrated non-normal distributions (i.e., high skewness and kurtosis values) including: Abnormal Eating, Belief in Possibilities, Substance Use, and Deviant Behaviors. The Abnormal Eating Scale was transformed to normalize the distribution using the natural log function in SAS. The transformation reduced the skewness and kurtosis from 2.60 and 6.65 to 1.88 and 2.05, respectively. The Belief Scale was transformed to normalize the distribution using the cos(ine) function in SAS. The transformation reduced the skewness and kurtosis from -2.13 and 5.39 to -0.91 and -0.56, respectively. The Substance Use Scale was transformed to normalize the distribution using the natural log function in SAS. The transformation reduced the skewness and kurtosis from 2.70 and 8.31 to 0.69 and kurtosis -0.84, respectively. The Deviant Behavior Scale was transformed to normalize the distribution using the natural log function in SAS. The transformation reduced the skewness and kurtosis from 2.46 and 6.58 to 0.90 and -0.83, respectively. Statistical testing was conducted using the original and transformed scales and results were compared to examine the sensitivity of the results to nonnormality. Unless otherwise noted, results are reported based on tests conducted with original scales.

Table 10

Scale Descriptive Statistics

Scale	N	Range	<i>M</i>	Median	<i>SD</i>	Skewness	Kurtosis
Abnormal Eating (Original)	1646	0-3	0.26	0.00	0.62	2.60	6.65
Abnormal Eating (Transformed) ^a	1646	-0.69-1.25	-0.45	-0.69	0.52	1.88	2.05
Attitudes Toward School	1535	1-5	3.74	4.00	0.94	-0.69	0.12
Belief in Possibilities (Original)	1538	1-5	4.53	4.67	0.70	-2.13	5.39
Belief in Possibilities (Transformed) ^b	1538	-0.99-0.54	-0.06	0.28	0.43	-0.91	-0.56
Bully – Victim	1746	0-4	0.73	0.40	0.78	1.51	2.17
Substance Use (Original) ^c	1708	-0.43–3.86	0.00	-0.39	0.69	2.70	8.31

Substance Use (Transformed) ^a	1708	-2.63–1.47	-1.32	-2.21	1.05	0.76	-0.68
Parent Communication	1542	0–2	1.40	2.00	0.81	-0.85	-0.96
Deviant Behavior (Original) ^c	1595	-0.44–3.74	-0.00	-0.44	0.82	2.46	6.58
Deviant Behavior (Transformed) ^a	1595	-2.81–0.44	-1.81	-2.81	1.41	0.87	-0.93
Suicide	1732	0–3	0.43	0.00	0.85	1.96	2.75

Note: All variables were coded so that a higher score represented a higher amount of the characteristic, behavior, or attitude being measured.

^aThis scale was transformed to normalize the distribution using the natural log function in SAS. Statistical testing was conducted using the original and transformed scales.

^bThe belief scale was transformed to normalize the distribution using the cos(ine) function in SAS. Statistical testing was conducted using the original and transformed scales.

^cVariables were standardized ($M = 0$, $SD = 1$), and a composite variable was created by taking the average of the standardized variables.

Step 4: Description of Self-injury in General Middle School Population

Within the full sample, univariate statistics including frequencies, measures of central tendency, and measures of variation were calculated for each study variable, where appropriate. The normality of continuous variables was assessed and the implications of nonnormality were considered when conducting bivariate analyses. The following research questions were addressed through the calculation of frequencies and proportions:

- ◆ What is the prevalence of self-injury among middle school youth?
- ◆ What is the frequency of self-injury among middle school youth who self-injure?
- ◆ What proportion of middle school youth know a friend who self-injures?

Confidence intervals were provided. Because of potential differences between groups, univariate statistics for these three items also were calculated by gender, racial or ethnic classification, age, grade, and school, which partially answered the following questions:

- ◆ Are there gender, racial or ethnic, age, grade, and school differences across rates of self-injury, frequency of self-injury, and knowledge of friends who self-injure?

Interrelationships among these variables (e.g., gender and ethnicity) were examined to address potential confounding relationships.

Step 5: Exploration of Relationships Between Self-Injury and Other Behaviors

Bivariate relationships between possible correlates and self-injury were calculated using appropriate statistical techniques such as Pearson correlations, Spearman correlations, independent samples t-tests, and chi-square tests of independence (see Appendices B and C). The following questions were answered, in part, using bivariate analyses:

- ◆ What demographic, attitudinal, and behavioral variables are related to self-injury (see Table 2)?
- ◆ Are there gender, racial or ethnic, age, grade, and school differences across rates of self-injury, frequency of self-injury, and knowledge of friends who self-injure?
- ◆ Where does self-injury fit in with other risk behaviors such as alcohol use, tobacco use, suicide, and deviance?

Measures of statistical and practical significance were calculated. The overall alpha level, given the large sample size, was set at .01. Measures of practical significance (e.g., Cramer's V for chi-square tests of independence) were calculated where appropriate (e.g., to describe differences in means or proportions among youth who have tried self-injury and those who have not and those who self-injure frequently vs. infrequently). Cohen's "rule-of-thumb" for interpreting effect sizes was used (see Table 11).

Table 11

Cohen's Effect Size Interpretation Rules-of-thumb

	Cohen's d	Correlation Coefficient	Odds Ratio	Cramer's V
Small	.20	.10	1.50	df = 1; $10 < V < .30$ df = 2; $07 < V < .21$ df = 3; $06 < V < .17$
Medium	.50	.25	2.50	df = 1; $30 < V < .50$ df = 2; $21 < V < .35$ df = 3; $17 < V < .29$
Large	.80	.40	4.30	df = 1; $V > .50$ df = 2; $V > .35$ df = 3; $V > .29$

Note: The guideline for chi-square tests of independence with 3 degrees of freedom was used for tests with greater than three degrees of freedom.

To confirm relationships identified at the bivariate level, multilevel logistic regression analysis was conducted using the predictor variables identified in Tables 7 and 8 and demographic variables (e.g., gender, race, grade). Bivariate relationships between predictors were considered to rule out possible multicollinearity (see Appendix C). Multilevel modeling was used because students (Level-1) were nested within schools (Level-2). Only Level-1 predictors were used. Models were run with three outcome variables: having ever self-injured (dichotomous), the frequency of self-injury (polytomous), and peer self-injury (dichotomous). Multinomial logistic regression was conducted with a modified version of the frequency of self-injury outcome variable. Frequency of self-injury (past 30 days) was modified to included three categories: (0) never self-injured, (1) self-injured once, and (2) self-injured two or more times. Two models were run, allowing for the following comparisons to be made: once versus never, more than once versus never, and once versus more than once. The models were estimated using penalized quasi-likelihood estimation (PQL) and were conducted using HLM version 6. The Bernoulli distribution at Level-1 was used for both dichotomous

outcome variables, and the multinomial distribution was used for the polytomous outcome variable. Adjusted odds ratios were calculated, along with 95% confidence intervals for each (see Wright, 1998). The assumptions of logistic regression were considered, such as model specificity, mutually exclusive and collectively exhaustive categories, and a minimum of 50 cases per predictor variable (Wright, 1998). Logistic regression results were summarized in tables specific to each outcome variable.

Step 6: Identification of Meaningful Segments of Youth Who Self-injure

CHAID analyses using SPSS Answertree v. 3.1 audience segmentation software were used to answer the following research question:

- ◆ Are there meaningful segments of youth who self-injure? If so, what characteristics are useful in defining each segment?

More specifically, CHAID was used to divide the sample into subgroups (segments) based on interactions between predictor variables identified in Step 4, which predict each criterion variable. Having ever tried self-injury was the first [dichotomous] dependent variable analyzed. Predictor variables were identified as nominal, ordinal, or continuous (Magidson, 1994). Given the sample size, settings for parent and child node size were as follows: $n = 20$ for parent node and $n = 10$ for child nodes (The Measurement Group, 1999-2005). The overall alpha level was set at .01; however, Bonferroni adjustments were used to control for alpha inflation resulting from simultaneous statistical testing. The size of subgroups and the availability of statistically significant predictors were considered when assessing tree depth. An effect size in addition to statistical significance was used as the criterion for determining when to stop splitting (i.e., growing the tree). Cramer's V (i.e., effect size appropriate for chi-squared tests of independence) was

calculated for each node. [Cramer's V is equivalent to the Phi coefficient when calculated for two-by-two tables.] Nodes that did not meet the minimum value for a small effect size were not considered practically meaningful and, thus, were excluded from the segmentation tree. Segmentation analyses were conducted using the automatic growth function. Segmentation analyses were conducted using original and transformed predictor variables (e.g., belief). Segmentation trees with original predictor variables are presented and differences between trees (i.e., original vs. transformed) are noted. The resulting tree diagram and gains table were reviewed to determine predictor variables useful in segmenting middle school-aged youth according to self-injury behavior and segments of youth most likely to self-injure. Classification accuracy was determined by examining a crosstabulation of the actual categories of the cases and their predicted categories using the model (i.e., the segmentation tree). The risk estimate, or the proportion of misclassified cases, is reported, as is the classification accuracy, or the proportion of correctly classified cases. A description of each segment was developed, including the size and characteristics.

There is a lack of agreement in the literature as to the best approach for model building/testing when using CHAID. Given the fact that the inclusion of extraneous variables can change segmentation results and the number of variables included in this analysis, two approaches were used and the results of each were compared, including: use of all predictor variables (i.e., exploratory approach) and use of predictor variables selected using logistic regression results (i.e., confirmatory approach). Predictors that were found to be statistically significant using logistic regression at the $\alpha = .10$ level were included in the confirmatory approach (see Forthofer & Bryant, 2000). Comparison

of results suggested interpretation of the inclusive model (i.e., that which included all predictors) resulted in a more well-developed tree. Thus, only trees grown using all predictor variables are presented. A final segmentation was developed using results that were statistically and practically significant across methods, approaches, and theory.

The frequency of self-injury during the past month and knowing a friend who self-injures also were used as dependent variables in segmentation analyses. Using having ever self-injured as a dependent variable, the frequency of self-injury during the past month was 'forced in' as a predictor variable. Descriptive information and the results of the segmentation (e.g., where the categories split) were used to transform the original variable into a new dependent variable based on where the frequency variable split. Results suggested differences between those who had never tried self-injury, those who had self-injured once, and those who had self-injured more than once ($p < .01$). Thus, a new variable was created with three response options. The new frequency dependent variable/s was used as a criterion variable in a second segmentation analysis that sought to identify variables that statistically significantly interacted to distinguish between each group.

Test-sample cross-validation was used to validate the CHAID analysis results for each criterion variable. The dataset was randomly split into two samples: a training sample used for initial CHAID analysis, and a test (hold-out) sample for cross-validation analysis. The predictive accuracy of each classification tree developed within the learning sample was tested within the holdout sample (i.e., misclassification rates were compared).

Segmentations were judged using the following criteria (see Malhotra, 1989 for discussion): mutual exclusivity (i.e., segments are distinct) and exhaustivity (i.e., each target member is included in a segment), measurability (i.e., size and other characteristics of segments can be measured), substantiality (i.e., segments are of sufficient size to warrant pursuit), and actionability (i.e., segments can be reached and served).

Step 7: Present Findings

Results are summarized in narrative format, and tables and graphs are used to summarize and illustrate key findings. Results are presented according to each of the three guiding research objectives. Segmentation trees are included. Finally, an overall summary of answers to each research question is provided.

Issues to Consider

Self-injury is affected by numerous, individual and contextual level factors. For example, the literature suggests variation in self-injury rates across gender, grades, and schools. Variability across eight middle schools was considered. Descriptive statistics were calculated for each study variable by gender, grade, and school. Due to the small number of schools, examination of between-school variability was restricted to descriptive and bivariate statistics such as chi-square tests of independence.

This study involved a large number of variables, which can increase the odds of including irrelevant variables that may distort segmentation results (Vriens, 2001). To reduce the number of variables used, summary scales consisting of multiple items were created and internal consistency reliability estimates (i.e., Cronbach's alpha) were calculated for each. Predictor variables used in CHAID can be variables of mixed measurement levels, including categorical or continuous variables (Vriens, 2001). This

poses issues, however, for categorical variables with more than two levels. Categorical levels with more than two levels were transformed into dummy variables (Vriens, 2001).

Chapter Four: Results

Introduction

This chapter begins with a review of the research purpose and questions. The next section, *Description of Self-injury in General Middle School Population*, describes the prevalence and frequency of self-injury among middle school students in this study and the phenomenon of peer self-injury. The remainder of the chapter is organized into three major sections repeated for each of the three dependent variables: having ever tried self-injury, the frequency of self-injury in the past 30 days, and knowing a friend who had tried self-injury (i.e., peer self-injury). The major sections are *Relationships between the Outcome Variable and Other Variables*, *Multilevel Logistic Regression Analyses*, and *CHAID Analyses*. The chapter concludes with a summary of answers to the three broad questions that guided this dissertation research.

Research Purpose and Questions

The purpose of this study was to provide a description of self-injury within a general adolescent population. This research was designed to identify subgroups of self-injurers, identify behaviors associated with self-injury, explore relationships between environmental factors (e.g., peer, media) and self-injury, and suggest risk and protective factors associated with self-injury. Three broad questions guided this dissertation research: (a) What is the status of self-injury within a public middle school setting in terms of prevalence, frequency, exposure, and correlates, including demographic (e.g., gender), attitudinal (e.g., attitudes toward school), and behavioral variables (e.g., having ever been bullied)? (b) How does self-injury relate to other risk behaviors, such as

tobacco use, alcohol use, suicide, and deviance among youth? and (c) What factors are useful in identifying meaningful subgroups (segments) of youth who are more likely to self-injure?

Description of Self-injury in General Middle School Population

Prevalence of Self-injury

Self-injury was defined on the YRBS as a way to “feel better or less upset.” After reading the definition, students were asked whether they had “ever hurt themselves on purpose (i.e., cutting, scratching, burning, not allowing wounds to heal, pinching).” The prevalence of self-injury among 1,734 middle school youth in this study was 28.4% ($n = 492$), with a margin of error of $\pm 2.1\%$ at 95% confidence.

Frequency of Self-injury

During the past month, most youth (74.6%, 95% CI = 73.6-75.6), in general, had never harmed themselves on purpose. Approximately 15% had harmed themselves one time. Smaller proportions of youth had harmed themselves more frequently, including two or three different times (5%), four or five different times (2%), and six or more different times (3%). There was a significant and large relationship between having ever tried self-injury and past month frequency of self-injury, $\chi^2(N = 1746, 4) = 755.74, p < .0001$, Cramer’s $V = .66$. Among youth who self-reported having ever tried self-injury ($N = 495$), 35% had harmed themselves one time during the past month, 18% had harmed themselves two or three different times, 5.5% had harmed themselves four or five different times, and 11% had harmed themselves six or more different times.

Peer Self-injury

Almost one-half (46.8%, 95% CI = 45.6% - 48.0%) of youth surveyed reported knowing of a friend who had harmed himself/herself on purpose to feel better. There was a significant, yet small relationship between knowing a friend who had tried self-injury and having ever tried self-injury. Whereas 39% of those who had not tried self-injury reported knowing of a friend who had tried self-injury, 66% of those who had tried self-injury reported knowing of a friend who had tried self-injury, $\chi^2(N = 1,732, 1) = 105.01$, $p < .0001$, Cramer's $V = .25$.

Bivariate Relationships Between Student Demographic Variables and Self-injury

Outcomes

Possible gender, racial or ethnic, age, grade, and school differences across rates of self-injury, frequency of self-injury, and knowledge of friends who self-injure were examined. Although the relationship between having ever tried self-injury and gender was statistically significant ($p < .01$), the effect size was negligible (i.e., .07).

Approximately 32% of females and 25% of males had ever tried self-injury, $\chi^2(N = 1,740, 1) = 9.75$, $p < .01$, Cramer's $V = .07$. There was no statistically significant or meaningful association between having ever tried self-injury and race or ethnicity, $\chi^2(N = 1,726, 5) = 7.08$, $p = .21$, Cramer's $V = .06$; grade level, $\chi^2(N = 1,748, 1) = .10$, $p = .75$, Cramer's $V = .01$; age, $t(1744) = -.01$, $p = .99$; or school attended, $\chi^2(N = 1,743, 7) = 12.53$, $p = .08$, Cramer's $V = .08$. The frequency of self-injury ranged from a low of 22.2% at School 7 to a high of 33.3% at School 1.

Interrelationships among gender, race or ethnicity, age, grade, and school were examined to address potential confounding relationships. Results suggested race or

ethnicity was statistically significantly associated with school attended, reflecting variations in ethnic diversity across schools, $\chi^2(N = 1,721, 35) = 310.89, p < .0001$, Cramer's $V = .19$. The strength of this relationship, however, did not suggest confounding. Age and grade also were statistically significantly associated, $\chi^2(N = 1,746, 6) = 1635.26, p < .0001$, Cramer's $V = .97$. The strength of this relationship, on the other hand, does suggest confounding. Thus, only grade was used in logistic regression and CHAID analyses. Finally, grade level and school attended were significantly associated (see Table 1), with the proportion of surveys returned by sixth or eighth graders varying across schools, $\chi^2(N = 1,743, 7) = 69.04, p < .0001$, Cramer's $V = .20$. The strength of this relationship, however, did not suggest confounding.

Relationships Between Self-injury and Other Variables

Results suggested small effects of having ever self-injured on student health and academic performance. On average, students who had ever tried self-injury reported poorer health than those who had not tried self-injury ($M = 3.74$ vs. 4.02 ; $t(843) = 5.72, p < .0001$; Cohen's $d = -0.31$). On average, student who had ever tried self-injury reported lower grades than those who had not ever tried self-injury ($M = 7.01$ vs. 7.57 ; $t(674) = 5.82, p < .0001$; Cohen's $d = -0.35$). Having ever tried self-injury was statistically significantly associated with not going to school during the 30 days prior to survey administration because of feeling unsafe, but the effect was small ($r = .08, p < .01$).

Having ever tried self-injury was related to lower average scores on three key factors associated with adolescent development, namely attitudes toward school, belief in possibilities, and parent communication (see Table 12). On average, students who reported they had tried self-injury reported less positive attitudes toward school, lower

belief in their possibilities, and lower levels of parent communication ($p < .0001$).

Overall, small effects were noted with attitudes toward school and parent communication and a medium effect with belief in possibilities. Attitudes toward school, belief in possibilities, and parent communication did not vary by gender ($p > .01$).

Table 12

Self-Injury and Developmental Theory Variables

Scale	Self-injury				t^b	Cohen's d
	Yes		No			
	M	SD	M	SD		
Attitudes Toward School	3.50	0.99	3.84	0.90	6.25	-0.36
Belief in Possibilities ^a	4.20	0.89	4.67	0.55	10.18	-0.64
Parent Communication	1.24	0.85	1.46	0.79	4.86	-0.27

^aThe results reported are for the original scale. Results from analysis conducted using the transformed scale were parallel (i.e., statistically significant mean difference).

^bAll relationships reported were statistically significant ($p < .0001$).

Having been a victim of bullying, having been a victim of cyberbullying, the frequency of having been a victim of cyberbullying, and having been physically hurt by a boyfriend or girlfriend were defined as possible behavioral precipitants of self-injury. All four behavioral precipitants demonstrated statistically significant relationships with having ever self-injured, all of which were in the small effect size range ($p < .0001$; see Tables 13 and 14). Having been a victim of bullying and the frequency of having been a victim of cyberbullying in the past 30 days demonstrated the strongest relationships with having ever tried self-injury (see Tables 13 and 14). Students who had not tried self-injury reported a mean bullying score of 0.63, whereas those who had tried self-injury reported an average of 1.00 ($p < .0001$). Males reported, on average, greater frequency of bullying than did females ($M = 0.80$ vs. 0.67 , Cohen $d = 0.17$). A greater proportion of

females (26%) than males (19%) had ever been cyberbullied; however, this relationship was negligible (Fisher's Exact, $N = 1,732$, $p < .01$, Cramer's $V = .07$). In terms of the frequency of cyberbullying, whereas 10% of students who had not ever tried self-injury had been cyberbullied one or more times during the month prior to survey administration, 20% of students who had ever tried self-injury had been cyberbullied. Males and females did not differ significantly in the frequency of having been a victim of cyberbullying ($p > .01$). A greater proportion of males (10%) compared to females (5%) had been physically hurt by a girl/boyfriend in the past 12 months (Fisher's Exact, $N = 1,707$, $p < .0001$, Cramer's $V = .10$). Interestingly, however, a greater proportion of females who had been physically hurt by a boyfriend/girlfriend (56.5%) had ever self-injured compared to males who had been physically hurt by a girlfriend/boyfriend (45%).

Table 13

Self-Injury and Precipitants of Self-Injury (Chi-square tests of independence)

Precipitants of Self-injury	Ever Self-Injured*		N	Cramer's V
	Yes (%)	No (%)		
During your lifetime, have you ever been cyberbullied?	35	18	1740	.19
During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?	13	6	1715	.13

*All relationships reported were statistically significant ($p < .0001$).

Table 14

Self-injury and Precipitants of Self-injury (Independent t-tests)

Scale	Precipitants of Self-injury*				t	Cohen's d
	Yes		No			
	M	SD	M	SD		
Bully-Victim	1.00	0.87	0.63	0.72	-8.52	0.36
During the past 30 days, how many times were you the victim of cyberbullying?	0.30	0.71	0.12	0.44	-5.03	0.30

*All relationships reported were statistically significant ($p < .0001$).

Two out of three indicators of social contagion, knowing a friend who had harmed themselves on purpose and time spent on the computer or video games, demonstrated significant relationships with having ever tried self-injury, both of which were in the small effect size range (see Tables 15 and 16). Compared to those who had not ever self-injured, a greater proportion of youth who had tried self-injury reported being aware of friends who had hurt themselves on purpose (Fisher's Exact, $N = 1,732$, $p < .0001$; see Table 15). Females (54%) were significantly more likely to know a friend who had harmed themselves than were males (38%; Fisher's Exact, $N = 1,724$, $p < .0001$, Cramer's $V = .16$). On average, youth who had ever tried self-injury spent a greater number of hours playing video games or using a computer for fun on an average school day than those who had not ever tried self-injury ($p < .0001$; see Table 16). Males spent significantly more time, on average, playing video games or using a computer for fun on an average school day than did females ($M = 2.60$ vs. 1.94 , $p < .0001$, Cohen's $d = 0.36$).

Table 15

Self-Injury and Social Contagion (Chi-square tests of independence)

Social Contagion	Ever Self-Injured		N	p-value	Cramer's V
	Yes (%)	No (%)			
Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?	66	39	1732	<.0001	.25

Table 16

Self-Injury and Social Contagion (Independent t-tests)

Social Contagion	Self-injury				t	p-value	Cohen's d
	Yes		No				
	M	SD	M	SD			
Time on computer or video games	2.59	2.00	2.13	1.73	-4.29	<.0001	0.32
TV hours per day	3.09	1.79	3.01	1.73	-0.80	.42	0.05

Having ever tried self-injury was statistically significantly associated with the multiple risk behaviors studied, including suicide, substance use, deviancy, sexual intercourse, and abnormal eating behaviors ($p < .0001$; see Tables 17-19).

Self-injury demonstrated the strongest relationship with suicide⁴ (Cohen's $d = 0.93$; see Table 19). Youth who had self-injured, on average, scored statistically significantly higher on the suicide scale than did those who had not self-injured ($p < .0001$). There was no significant difference between males and females on suicide scale scores ($p > .01$). Relationships between the individual items included in the suicide scale (i.e., suicidal ideation, planning, and attempts) and self-injury were explored.

Statistically significant and substantial relationships (i.e., medium effect size) were noted between self-injury and suicidal ideation (Fisher's Exact Test, $N = 1,739$, $p < .0001$, Cramer's $V = .44$), having a suicide plan (Fisher's Exact Test, $N = 1,739$, $p < .0001$, Cramer's $V = .39$), and having attempted suicide (Fisher's Exact Test, $N = 1,739$, $p < .0001$, Cramer's $V = .32$). Whereas half of the students who had ever tried self-injury reported thinking about suicide, only 10% of those who had not ever self-injured reported thinking about suicide. Most of those (66%) who had thought about suicide also had tried self-injury. Whereas 5% of youth who had not tried self-injury had made a suicide plan, 35% of youth who had tried self-injury had made a suicide plan. The majority of those who had made a suicide plan had also tried self-injury (73%). Six percent of the sample ($n=103$) had tried self-injury and attempted suicide. Only 2% of youth who had

⁴ This relationship would be expected given the failure to distinguish between the two behaviors within the definition of self-injury (i.e., item lead-in).

never tried self-injury had ever attempted suicide. Most of those who had tried suicide had also tried self-injury (78%).

Results suggested age, gender, race or ethnicity, grade, or school attended did not differentiate between those who had ever tried self-injury and attempted suicide and those who had not tried both ($p > .01$). Having tried both self-injury and suicide was statistically significantly associated with frequency of self-injury ($r = .32, p < .0001$). Trying both behaviors was associated with increased frequency of self-injury. Having tried both self-injury and suicide also was associated with knowing a friend who harmed themselves on purpose; however, this relationship was weaker, $\chi^2(N = 1,726, 1) = 34.98, p < .0001$, Cramer's $V = .14$. Whereas 45% of students who had not tried both behaviors knew a friend who had harmed himself/herself on purpose, 75% of students who had tried both behaviors knew friends who had harmed himself/herself on purpose.

Having ever tried self-injury was statistically significantly associated with higher scores on the substance use scale (i.e., indicating greater use) ($p < .0001$; see Table 19). Substance use scores did not differ by gender ($p > .01$). In addition, youth who had tried self-injury were more likely to have sniffed glue, breathed the contents of spray cans, or inhaled any paints or sprays to get high ($p < .0001$). The effect sizes for substance use were in the medium range (see Tables 18 and 19). Although related to substance use, having ever tried self-injury was not statistically significantly associated with average age of first usage of alcohol, cigarettes, or marijuana ($p > .01$; see Table 19).

Table 17

Self-Injury and Substance Use

	Ever Self-injured*		N	Phi
	Yes (%)	No (%)		
Cigarettes	42	18	1738	.25
Alcohol	52	30	1720	.20
Marijuana	22	11	1709	.14
Inhalants	32	8	1702	.30
Prescription	13	3	1706	.20

*Fisher's Exact tests revealed statistical dependence between all substances and having ever tried self-injury ($p < .0001$).

Having ever tried self-injury also was significantly associated with deviant behaviors, with relationships in the small effect-size range ($p < .0001$; see Table 19). Deviant behaviors did not vary by gender ($p > .01$). Having ever tried self-injury demonstrated a significant yet small relationship with sexual behavior (see Tables 18 and 19). A greater proportion of students who had ever tried self-injury had also had sexual intercourse ($p < .0001$). However, having ever tried self-injury was not associated with age at first sexual intercourse or the number of sexual partners among those who had had sexual intercourse ($p > .01$; see Table 19).

Table 18

Self-Injury and Problem Behaviors (Chi-square tests of Independence)

Problem Behaviors	Ever Self-Injured*		N	Cramer's V
	Yes (%)	No (%)		
Have you ever sniffed glue, or breathed the contents of spray cans, or inhaled any paints or sprays to get high?	32	8	1702	.30
Have you ever had sexual intercourse?	26	14	1605	.14

*All relationships reported were statistically significant ($p < .0001$).

Finally, having ever tried self-injury was statistically significantly and substantially associated with the abnormal eating behaviors scale (Cohen's $d = 0.56$, see Table 19). Students who had had ever tried self-injury were statistically significantly

more likely, on average, to report abnormal eating behaviors such as fasting, using diet pills, powders, or liquids, or using laxatives to lose or control their weight than did those who had not tried self-injury ($p < .0001$; see Table 19). Females, on average, reported higher levels of abnormal eating behaviors than did males ($M = 0.33$ vs. 0.19 , $p < .0001$, Cohen's $d = 0.23$).

Table 19

Self-Injury and Problem Behavior Comparisons (Independent t-tests)

Variable/Scale	Self-injury				t	p-value	Cohen's d
	Yes		No				
	M	SD	M	SD			
Abnormal Eating Scale*	0.54	0.84	0.16	0.47	-9.34	<.0001	0.56
Age at first alcohol use	10.22	1.87	10.43	2.05	1.26	.21	-0.11
Age at first cigarette use	10.66	1.76	10.74	2.00	0.38	.71	-0.04
Age at first marijuana use	11.64	1.68	11.49	1.97	-0.60	.55	0.08
Age at first sex	11.50	2.01	11.34	1.93	-0.67	.50	0.08
Deviant Behavior Scale*	0.20	0.96	-0.13	0.69	-6.64	<.0001	0.39
Number of sexual partners	1.85	0.87	1.89	0.86	0.40	.69	-0.05
Substance Use Scale*	0.20	0.80	-0.16	0.49	-9.08	<.0001	0.54
Suicide Scale	1.07	1.12	0.18	0.53	-16.72	<.0001	0.93

*Results reported are for the original scale. Results from analysis conducted using the transformed scale were parallel (i.e., statistically significant mean difference).

Multilevel Logistic Regression Analyses

To confirm relationships identified at the bivariate level, multilevel logistic regression analysis was conducted using the predictor variables identified in Tables 7 and 8 and demographic variables (e.g., gender, race, grade) and having ever tried self-injury (outcome variable), which was coded as 1 (yes) and 0 (no) (see Table 19). Multilevel modeling was used because students (Level-1) were nested within schools (Level-2), thus, creating a lack of independence in the data. Only Level-1 student variables were used as predictors. The models were estimated using penalized quasi-likelihood estimation (PQL) and conducted using HLM version 6. Odds ratios were reported.

Six variables statistically significantly related ($p = .01$) to having ever tried self-injury while controlling for all other variables in the model: peer self-injury, having ever tried inhalants, grade level, belief in possibilities, abnormal eating behaviors, and suicide (see Table 20). With the exception of suicide (medium effect), all relationships were within the small effect size range. In terms of demographics, grade level was the only characteristic that emerged as statistically significant. Students in sixth grade were at decreased risk of having ever tried self-injury when compared to students in eighth grade (Odds Ratio [OR] = 0.80, $p < .01$). Abnormal eating behaviors had the strongest effect on having ever tried self-injury, with an odds ratio of 3.76. Suicide demonstrated the second strongest relationship with having ever tried self-injury: as suicidal tendencies increased, the odds of having ever tried self-injury increased (OR = 2.82, $p < .01$). Two additional factors placed youth at risk for having ever tried self-injury—peer self-injury and having ever tried inhalants. Youth who knew a friend who had harmed themselves on purpose were 1.84 times as likely to have harmed themselves on purpose as did those who did not know a friend who had self-harmed (OR = 1.84, $p < .01$). Youth who had tried inhalants were twice as likely to have tried self-injury as were youth who had not tried inhalants (OR = 2.06, $p < .01$). Youth who had a stronger belief in their possibilities were less likely to have tried self-injury (OR = 0.64, $p < .01$).

Table 20

Multilevel Logistic Regression Analysis of Factors that Predict Having Ever Tried Self-Injury (N=1748)

Predictor	Coefficient	<i>p</i> -value	SE	Odds Ratio	95% CI
Female ^a	0.34	.03	0.16	1.41	1.03, 1.94
Hit by boy/girlfriend ^b	0.56	.04	0.28	1.76	1.02, 3.03

Cyberbullied ^b	0.28	.11	0.18	1.32	<i>0.94, 1.87</i>
Peer self-injury ^b	0.61	.00	0.16	1.84	<i>1.34, 2.54</i>
Inhalant use ^b	0.72	.00	0.22	2.06	<i>1.35, 3.16</i>
TV viewing time	0.01	.78	0.05	1.01	<i>0.92, 1.12</i>
Sex (ever had) ^b	-0.13	.58	0.23	0.88	<i>0.56, 1.39</i>
Video/computer use	0.08	.12	0.05	1.08	<i>0.98, 1.19</i>
Grades	-0.07	.20	0.05	0.94	<i>0.85, 1.04</i>
Grade level ^c	-0.23	.01	0.08	0.80	<i>0.68, .094</i>
Attitudes toward school	-0.01	.91	0.09	0.99	<i>0.83, 1.18</i>
Belief in possibilities	-0.44	.00	0.15	0.64 ^e	<i>0.48, 0.87</i>
Parent communication	0.18	.17	0.13	1.20	<i>0.93, 1.56</i>
Bully (victim) frequency	0.10	.01	0.04	1.10	<i>1.02, 1.20</i>
Abnormal eating behaviors	1.32	.00	0.40	3.76	<i>1.79, 7.91</i>
Substance use	0.05	.76	0.16	1.05	<i>0.76, 1.45</i>
Suicide	1.04	.00	0.10	2.82	<i>2.32, 3.43</i>
Deviant behavior	-0.24	.04	0.11	0.79	<i>0.63, 0.98</i>
Black ^d	-0.26	.41	0.31	0.78	<i>0.43, 1.42</i>
Hispanic ^d	-0.10	.70	0.25	0.91	<i>0.56, 1.47</i>
Other ethnicity ^d	-0.22	.49	0.33	0.80	<i>0.42, 1.52</i>

^aMale is the reference category.

^bNo is the reference category.

^cSixth grade is the reference category.

^dWhite is the reference category.

^eThe inverse of the odds ratio (1/.64 or 1.56) was used to judge the magnitude (i.e., Cohen's Rule of Thumb).

Given the strength of the relationship between self-injury and suicide, the multilevel logistic regression analysis was rerun with suicide removed from the model to determine whether suicide masked relationships among other predictors in the model and self-injury. Three additional variables became statistically significant ($p = .01$): gender (OR = 1.54, 95% CI = 1.15, 2.08), having been hit or pushed by a girlfriend or boyfriend (OR = 1.95, 95% CI = 1.19, 3.21), and the frequency of having been a victim of bullying (OR = 1.16, 95% CI = 1.08, 1.25). Once suicide was removed from the model, females were one- and-a-half times more likely to have ever self-injured than males ($p < .01$). Finally, having been a victim of violence placed youth at increased risk for having ever

tried self-injury compared to those who had not experienced violence at the hands of a boyfriend or girlfriend. However, the frequency of having been a victim of bullying did not meet the minimal criterion for a small effect size (i.e., $OR = 1.50$).

CHAID Analyses

CHAID was used to explore interactions between predictors of having ever tried self-injury (i.e., the same predictors used in the multilevel analyses, see Table 20) with the intent of identifying mutually exclusive, meaningful subgroups or segments at risk for having ever tried self-injury (see Figures 3 and 4). The training sample, which was created through randomly splitting the sample into two separate samples using the 50% sample size option in CHAID, was used to develop the model, and the test sample was used to examine classification accuracy. CHAID searches through the potential predictors to identify the predictor with the most significant relationship with the dependent or criterion variable—in this case, having ever tried self-injury. This process is repeated until a stopping criterion is reached. The overall alpha level was set at .01; however, Bonferroni adjustments were used to control for alpha inflation resulting from simultaneous statistical testing. The size of the subgroups and the availability of significant predictors were considered when assessing tree depth. An effect size, in addition to statistical significance, was used as the criterion for determining when to stop splitting (i.e., growing the tree). Classification accuracy was determined by examining a crosstabulation of the actual categories of the cases and their predicted categories using the model (i.e., the segmentation tree). The risk estimate, or the proportion of misclassified cases, is reported, as is the classification accuracy, or the proportion of correctly classified cases.

The analysis began with a total training sample of 901 cases (29% SI and 71% non-SI). CHAID analyses identified multiple interactions between predictors, with suicide, belief in possibilities, inhalant use, gender, and substance use emerging as the best predictors of having ever tried self-injury (see Figure 3). All relationships were within the small effect size range with the exception of suicide, which was within the medium range (see Table 21). The best predictor of having ever self-injured, according to CHAID, was suicide ($p < .0001$, Cramer's $V = .49$; see Figure 3). Suicide was further divided into three distinct groups: (a) those who had not thought about, planned, or attempted suicide (≤ 0); (b) those who had a low level of suicidal tendencies (> 0 to ≤ 1); and (c) those who had moderate to high levels of suicidal tendencies (> 1 ; see Figure 3). As seen in Figure 3, the segment at greatest risk comprised female youth who have moderate to high levels of suicidal tendencies and used substances in the past. More than 97% of these students reported having injured themselves on purpose. In contrast, the segment with the smallest proportion of youth who have self-injured had not thought about, planned, or attempted suicide, had high belief in their possibilities (> 4), and had not used inhalants (12%, $n=538$). Inhalant use attenuated the relationship between high belief in possibilities and having ever tried self-injury, with 12% of those who had no suicidal tendencies, high beliefs, and no inhalant use having tried self-injury compared to 33% of those with no suicidal tendencies, high beliefs, and inhalant use having tried self-injury (see Figure 3). There was a positive relationship between suicide and self-injury; youth who had self-injured had higher levels of suicidal tendencies than youth who had not self-injured (see Figure 3). Having a low level of suicidal tendencies (0, 1) interacted significantly with belief in possibilities: specifically, low belief placed youth at increased

risk for having ever tried self-injury (92%, $n = 13$) and strong belief protected youth against having ever tried self-injury (43%, $n = 99$).⁵ Having a moderate to high level of suicidal tendencies (>1) interacted significantly with gender: being female and reporting higher levels of substance use placing youth at risk for having ever tried self-injury (98%, $n = 46$). The overall model resulted in a classification accuracy of approximately 80% within the training sample (i.e., risk estimate = .20) and 79% within the test sample (i.e., risk estimate = .21).⁶

⁵ This interaction did not occur with the CHAID analysis conducted using the transformed variables.

⁶ The author was unable to locate guidelines for determining acceptable values for the risk estimate. The higher the classification, and conversely, the lower the risk estimate, the better the model is in terms of performance.

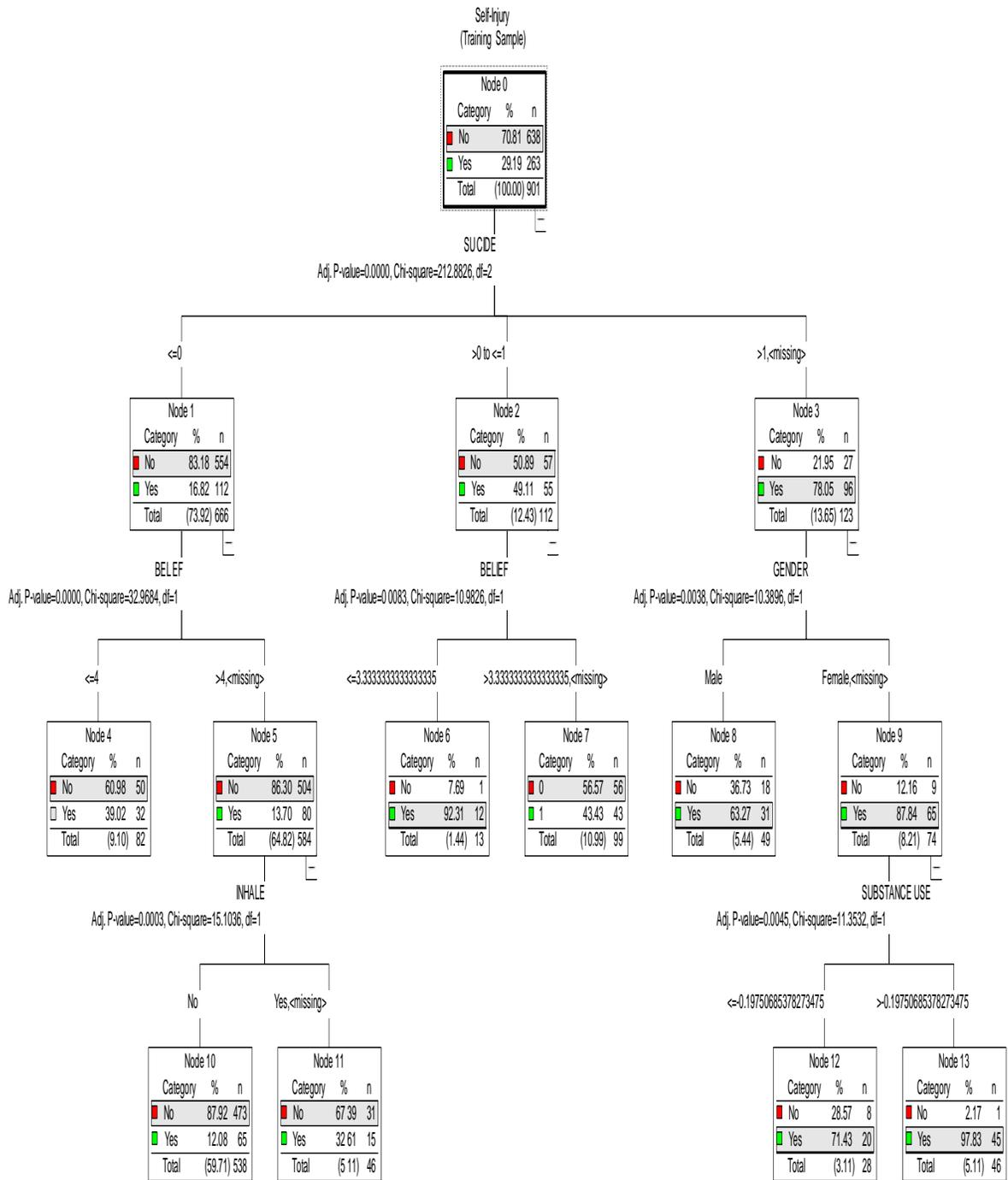


Figure 3. Segmentation of having ever tried self-injury with suicide included in the model.

Table 21

Effect Size Values for Segmentation of Having Ever Tried Self-Injury – Suicide Included

Relationship	Node	Chi-square	Cramer's V
Self-injury with suicide	0	212.8826	.49
Belief with suicide	1	32.9684	.22
Belief with suicide	2	10.9826	.31
Gender with suicide	3	10.3896	.29
Inhale with belief	5	15.1036	.16
Substance use with gender	9	11.3532	.39

Given the strength of the relationship between self-injury and suicide, the CHAID analysis was conducted with suicide removed from the model to determine whether suicide masked relationships among other predictors in the model and self-injury (see Figure 4). CHAID analyses identified multiple interactions between predictors, with belief in possibilities, peer self-injury, inhalant use, and bullying emerging as the best predictors of having ever tried self-injury (see Figure 4). Interestingly, once suicide was excluded from the model, gender and substance use were no longer statistically significant (see Figure 4). All relationships were within the small effect size range with the exception of peer self-injury and belief, which was within the large range (see Table 22). After eliminating suicide, the best predictor of having ever self-injured, based on CHAID results, was belief in possibilities ($p < .0001$, Cramer's $V = .33$; see Figure 4). Belief in possibilities demonstrated a negative relationship with having ever tried self-injury; as level of belief decreased, the proportion of youth who had ever tried self-injury increased (see Figure 4). Belief in possibilities was further divided into three groups roughly corresponding to those with low (≤ 3.33), medium (> 3.33 to ≤ 4.5) and high belief (> 4.5 ; see Figure 4). As seen in Figure 4, the segment at greatest risk comprised youth with low belief in their possibilities (≤ 3.33) who knew a friend who had harmed

themselves on purpose (88%, $n = 58$). In contrast, the segment with the smallest proportion of youth who have self-injured had high belief in their possibilities (> 4.5), not used inhalants, and low bullying ($\leq .80$) (12%, $n = 285$). Low belief in possibilities statistically significantly and substantially (i.e., large effect size) interacted with peer self-injury: youth with low belief who knew a friend who had harmed themselves on purpose were at increased risk for self-injury ($p < .0001$, Cramer's $V = .58$). Having ever used inhalants significantly interacted with moderate belief (> 3.33 to ≤ 4.5): whereas moderate belief appeared to protect against having ever tried self-injury, having ever tried inhalant use attenuated this effect (see Figure 4). Sixty three percent ($n = 173$) of those with moderate belief had never tried self-injury, and, similarly, 71% of those with moderate beliefs who had not tried inhalants had never tried self-injury. However, 69% of those with moderate beliefs who had tried inhalants also had tried self-injury. High belief in possibilities (> 4.5) significantly interacted with inhalant use ($p < .0001$, Cramer's $V = .18$). Among those with high belief, a greater proportion of youth who had never tried inhalants also had never tried self-injury (see Figure 4). Inhalant use significantly interacted with the frequency of having been a victim of bullying ($p < .01$, Cramer's $V = .18$). Among youth with high belief and no history of inhalant use, those with a lesser frequency of having been a victim of bullying ($\leq .80$) were more likely to have never tried self-injury than those with a greater frequency of having been a victim of bullying. The overall model resulted in a classification accuracy of approximately 77% within the training sample (i.e., risk estimate = .23) and 75% within the test sample (i.e., risk estimate = .25).

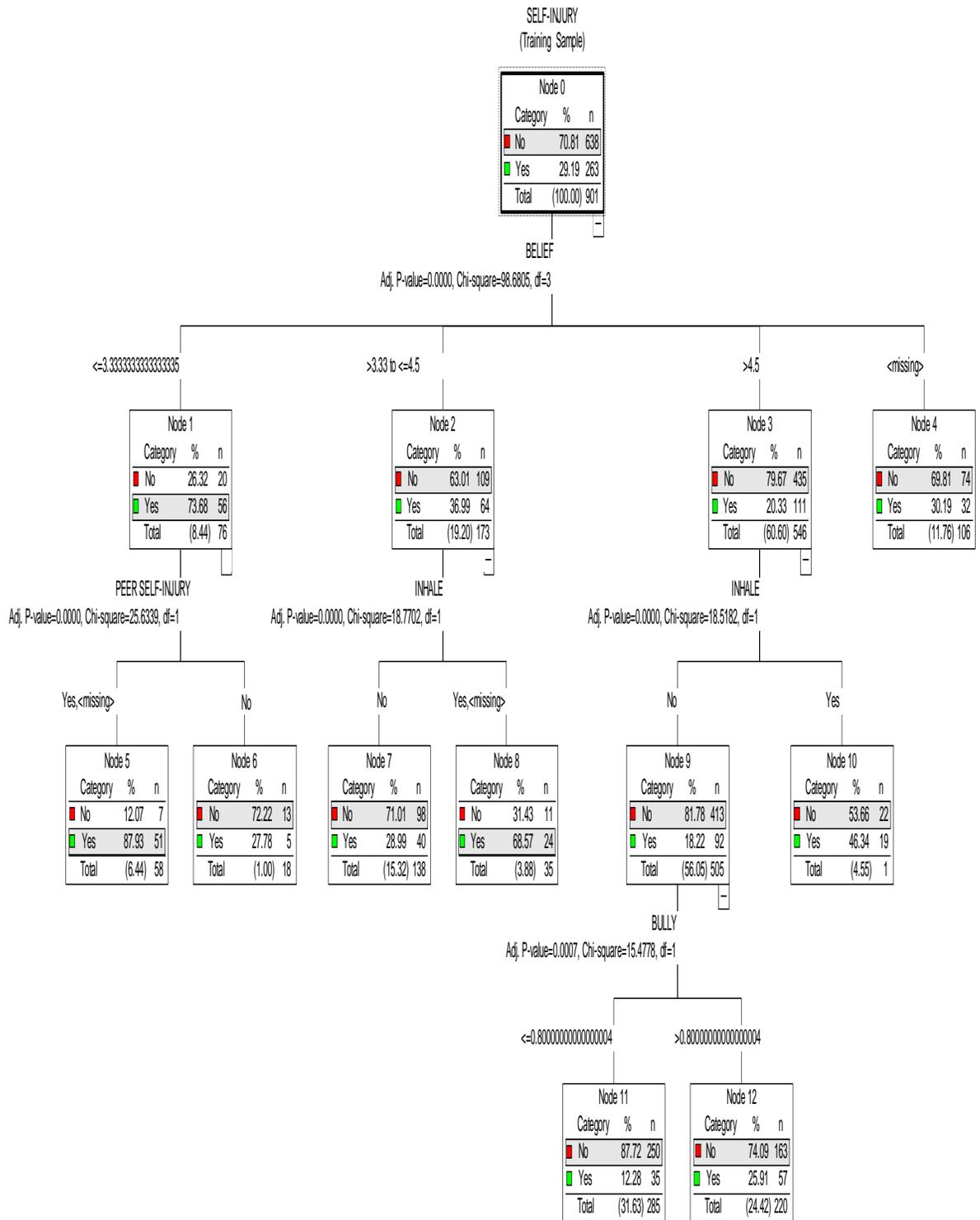


Table 22

Effect Size Values for Segmentation of Having Ever Tried Self-Injury – Suicide Excluded

Relationship	Node	Chi-square	Cramer's V
Self-injury with belief	0	98.6805	.33
Belief with peer self-injury	1	25.6339	.58
Inhale with belief	2	18.7702	.33
Inhale with belief	3	18.5182	.18
Bully with inhale	9	15.4778	.18

Comparison of CHAID analyses conducted with the original versus transformed variables suggested the model excluding suicide was sensitive to nonnormality (see Figures 4 and 5). Whereas in the model containing the original variables, belief in possibilities was the best predictor of having ever self-injured (suicide excluded), when transformed variables were used, having ever used inhalants emerged as the best predictor of having ever self-injured ($p < .0001$, Cramer's V = .31; see Figure 5). Overall, the two models—original and transformed—were more similar than different, sharing the following best predictors of having ever self-injured: inhalant use, belief in possibilities, and peer self-injury. In the transformed model, having never used inhalants statistically significantly interacted with belief in possibilities (transformed); relative to those with lower belief, youth with higher belief in their possibilities were more likely to have never tried self-injury ($p < .0001$, Cramer's V = .22). Knowing a friend who had harmed themselves on purpose statistically significantly interacted with belief in possibilities (transformed); peer self-injury placed youth who had never tried inhalants but had low belief in their possibilities at further risk for having ever tried self-injury ($p < .01$, Cramer's V = .34). The frequency of which youth had been a victim of bullying significantly interacted with belief in possibilities (transformed); however, this relationship did not meet minimal criteria for a small effect size (see Table 23).

Therefore, the decision was made to not grow the branch (i.e., Node 4, see Figure 5). Youth who had tried inhalants and knew a friend who had harmed themselves on purpose comprised the greatest proportion of youth who had injured themselves on purpose ($p < .01$, Cramer's $V = .31$). The overall model resulted in a classification accuracy of approximately 78% within the training sample (i.e., risk estimate = .22) and 75% within the test sample (i.e., risk estimate = .25).

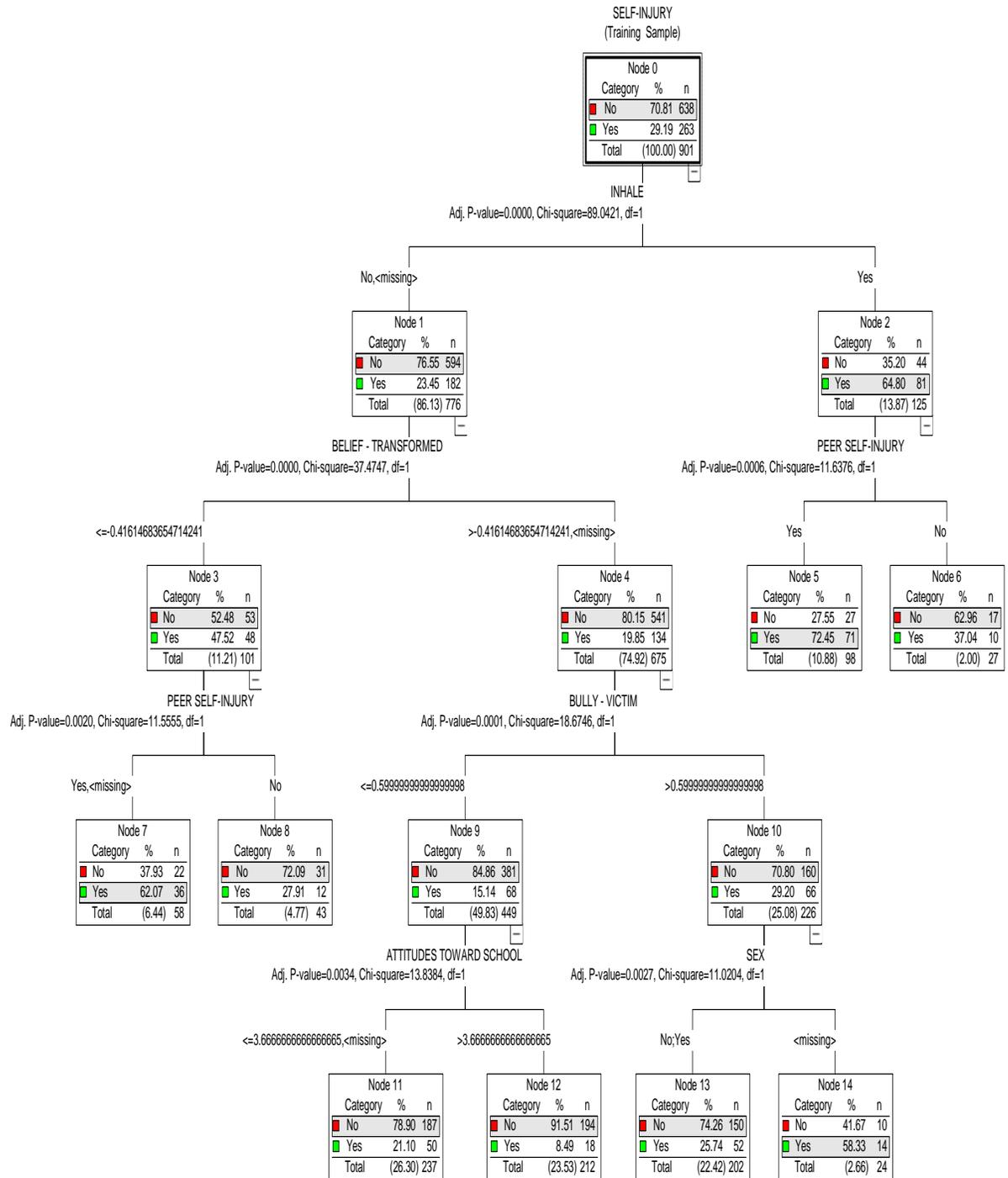


Figure 5. Segmentation of having ever tried self-injury with suicide excluded from the model (transformed variables).

Table 23

*Effect Size Values for Segmentation of Having Ever Tried Self-Injury – Suicide Excluded
(transformed variables)*

Relationship	Node	Chi-square	Cramer's V
Self-injury with inhale	0	89.0421	.31
Belief(transformed) with inhale	1	37.4747	.22
Peer self-injury with inhale	2	89.0421	.31
Peer self-injury with belief(transformed)	3	11.5555	.34
Bullying (victim) with belief(transformed)	4	18.6746	.03
Attitudes toward school with bully(victim)	9	13.8384	.05
Sex with bully(victim)	10	11.0204	.22

Relationships Between the Frequency of Self-injury and Other Variables

This section addresses the outcome of frequency of self-injury (i.e., never, once, more than once). The analyses that are presented parallel those for having ever tried self-injury. Frequency of self-injury was not statistically or meaningfully associated with gender, $\chi^2(N = 1,738, 4) = 7.12, p = .13$, Cramer's V = .06; race or ethnicity, $\chi^2(N = 1,725, 20) = 27.34, p = .13$, Cramer's V = .06; grade, $\chi^2(N = 1,746, 4) = 7.26, p = .12$, Cramer's V = .06; school attended, $\chi^2(N = 1,741, 28) = 35.90, p = .15$, Cramer's V = .07; or age, $r = .00025, p = .99$. Students who self-injured more frequently during the past 30 days tended to report poorer health than did those who self-injured less frequently ($r = -.12, p < .0001$). Frequency of self-injury was significantly associated with not going to school during the 30 days prior to the survey administration because of feeling unsafe ($r = .15, p < .0001$). As the frequency of self-injury increased, the frequency of not going to school because of feeling unsafe increased. As the frequency of self-injury increased, self-reported academic performance tended to decrease ($r = -.17, p < .0001$).

The frequency of self-injury was associated with lower average scores on three key factors associated with adolescent development, including attitudes toward school, belief in possibilities, and parent communication (see Table 24). As the frequency of self-injury increased, attitudes toward school, belief in possibilities, and parent communication decreased ($p < .0001$).

Table 24

Frequency of Self-Injury and Development Variables

Developmental Theory	Correlation (r) ^b
Attitudes Toward School	-.16
Belief in Possibilities ^a	-.28
Parent Communication	-.12

^aResults reported are for the original scale. Results from analysis conducted using the transformed scale were parallel (i.e., statistically significant, negative relationship).

^bAll relationships reported were statistically significant ($p < .0001$).

A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on attitudes toward school, $F(2,1531) = 28.17, p < .0001, \eta^2 = .04$. Tukey's HSD test showed that all groups differed statistically significantly from one another, on average (see Figure 6).

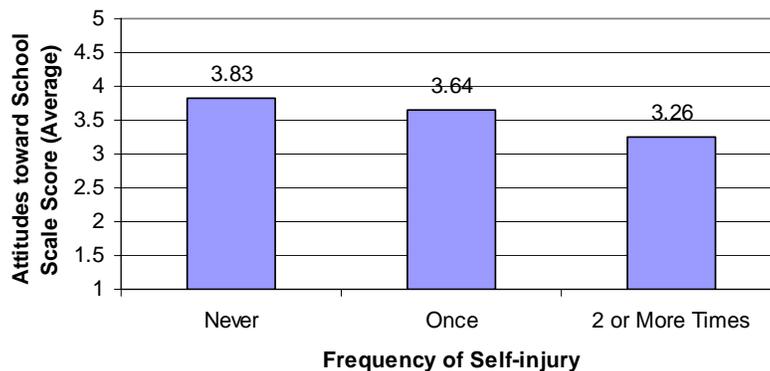


Figure 6. *Frequency of self-injury by attitudes toward school.*

A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on belief in possibilities, $F(2,1534) = 102.57, p < .0001, \eta^2 = .12$. Tukey's HSD test showed that all groups differently statistically significantly from one another, on average (see Figure 7).

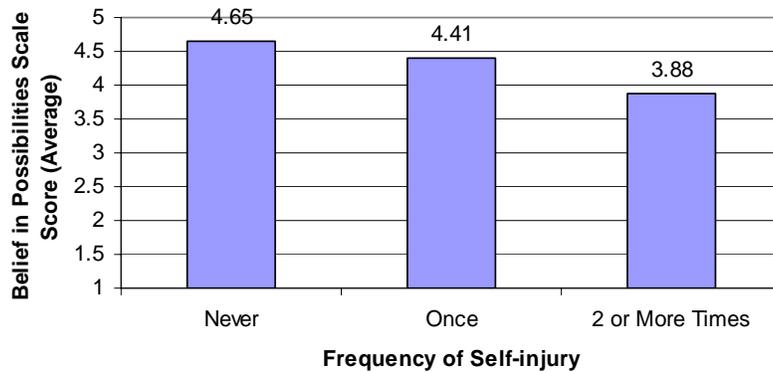


Figure 7. *Frequency of self-injury by belief in possibilities.*

Finally, a one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on parent communication, $F(2,1539) = 12.23, p < .0001, \eta^2 = .02$. Tukey's HSD test showed that students who had self-injured once, or more than once, differed statistically significantly from those who had never self-injured ($p < .05$), with students who had never self-injured reporting, on average, statistically higher levels of parent communication than did those who had self-injured once, or more than once. However, students who had self-injured once did not differ significantly from those who had self-injured more than once ($p > .05$). The sample means are displayed in Figure 8.

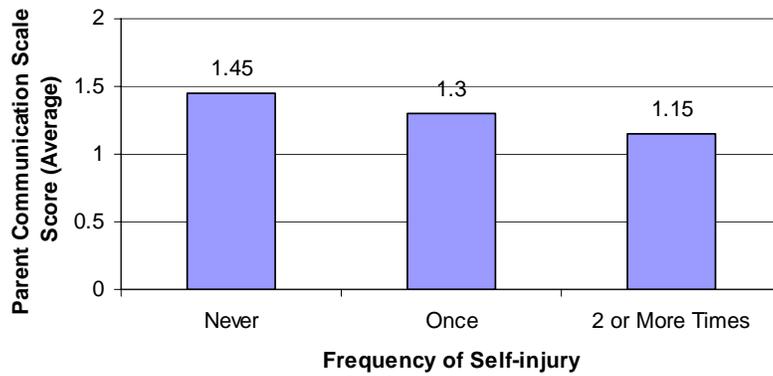


Figure 8. *Frequency of self-injury by parent communication scale scores.*

The frequency of self-injury was associated with all four precipitants of self-injury studied ($p < .0001$; see Table 25). Examination of the Spearman correlation coefficients suggested the frequency of having been a victim of bullying demonstrated the strongest relative relationship with the frequency of self-injury (see Table 25). The frequency of self-injury was positively associated with having been a victim of bullying ($r = .24, p < .0001$). As the frequency of bullying increased, the frequency of self-injury increased. A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on the frequency of having been a victim of bullying, $F(2,1742) = 50.77, p < .0001, \eta^2 = .06$. Tukey's HSD test showed all groups differed statistically significantly from one another, with an average increase in bullying frequency in conjunction with the increase in frequency of self-injury (see Figure 9).

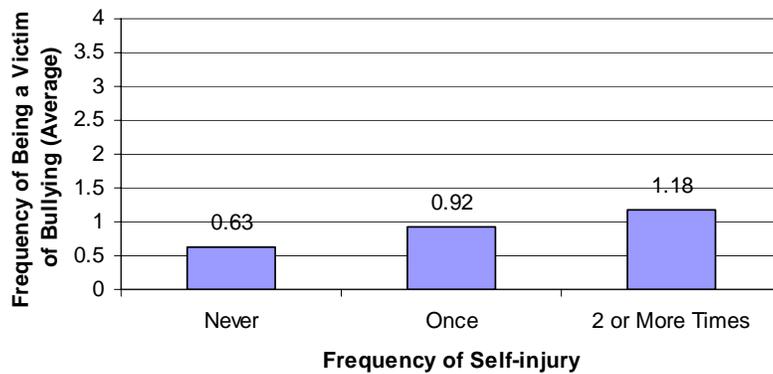


Figure 9. *Frequency of self-injury by the frequency of having been a victim of bullying.*

Students who had been cyberbullied reported self-injuring more frequently than did those who had not ever been cyberbullied ($p < .0001$; see Table 25). Students who had been cyberbullied self-injured more frequently than did those who had not, $\chi^2(N = 1,740, 4) = 43.73, p < .0001$, Cramer's $V = .16$. For example, whereas 4% of those who had not been cyberbullied self-injured four or more times during the past month, 9% of those who had been cyberbullied self-injured four or more times during the past month ($p < .0001$).

Further, as the frequency of self-injury increased, the frequency of having been a victim of cyberbullying increased ($r = .16, p < .0001$). A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on the frequency of having been a victim of cyberbullying, $F(2,1739) = 34.14, p < .0001, \eta^2 = .04$. Tukey's HSD test showed all groups differed statistically significantly from one another, with an average increase in cyberbullying frequency in conjunction with the increase in frequency of self-injury (see Figure 10).



Figure 10. *Frequency of self-injury by frequency of having been a victim of cyberbullying.*

Finally, having been physically hurt by a boyfriend or girlfriend during the past 12 months was positively associated with frequency of self-injury ($p < .0001$; see Table 25). Students who had been physically hurt by a boyfriend or girlfriend during the past 12 months self-injured more frequently than did those who had not, $\chi^2(N = 1,714, 4) = 57.82, p < .0001$, Cramer's $V = .18$. For example, whereas 4% of those who had not been physically hurt by a boyfriend or girlfriend self-injured four or more times during the past month, 16% of those who had been physically hurt by a boyfriend or girlfriend self-injured four or more times during the past month ($p < .0001$).

Table 25

Frequency of Self-Injury and Precipitants of Self-Injury

Precipitants of Self-injury	Correlation ^a (r)
Bully – Victim	.24
During your lifetime, have you ever been cyberbullied?	.15
During the past 30 days, how many times were you the victim of cyberbullying?	.16
During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?	.14

^aAll relationships reported were statistically significant ($p < .0001$).

Three indicators of social contagion were investigated, including knowledge of peer self-injury and two types of media exposure, computer and television. The frequency of self-injury was statistically significantly associated with peer self-injury and time on computer or video games but not television viewing time (see Table 26). Knowing a friend who had harmed themselves on purpose was associated with a greater frequency of self-injury ($p < .0001$). Among those who did not know of a friend who had harmed themselves on purpose, 83% also had never self-injured, 12% had self-injured one time during the past month, and 5% had self-injured two or more times during the past month. However, among those who did know a friend who had harmed themselves on purpose, 65% had never self-injured, 19% had self-injured one time during the past month, and 16% had self-injured two or more times during the past month, $\chi^2(N = 1,732, 4) = 88.98, p < .0001$, Cramer's $V = .23$. Finally, as time spent on the computer or playing video games increased, the frequency of self-injury increased ($p < .0001$). A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on time spent on the computer or playing video games, $F(2, 1606) = 13.77, p < .0001, \eta^2 = .02$. Tukey's HSD test showed that students who had self-injured once, or more than once, differed significantly from those who had never self-injured ($p < .05$). However, students who had self-injured once did not differ significantly from those who had self-injured more than once ($p > .05$). The sample means are displayed in Figure 11. Overall, results suggested peer self-injury demonstrated a medium effect on the frequency of self-injury, and time on video or computer for fun during the school week demonstrated a small effect on the frequency of self-injury.

Table 26

Frequency of Self-Injury and Social Contagion

Social Contagion	Correlation (<i>r</i>)	p-value
Peer Self-injury	.22	<.0001
Time on computer or video games	.11	<.0001
TV hours per day	.05	.07

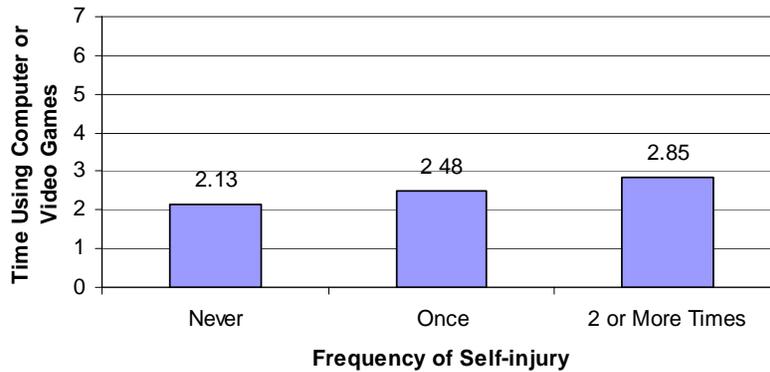


Figure 11. *Frequency of self-injury by time spent using computer or video games for fun.*

The frequency of self-injury was statistically significantly associated with abnormal eating behaviors, suicide, deviant behaviors, substance use, and sexual intercourse ($p < .01$; see Table 27).

The frequency of self-injury was statistically significantly and substantially (i.e., medium effect size) associated with abnormal eating behaviors including fasting, using diet pills, powders, or liquids, or using laxatives. As the number of abnormal eating behaviors increased, the frequency of self-injury increased ($p < .0001$). A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury, $F(2, 1642) = 85.87, p < .0001, \eta^2 = .09$. Tukey’s HSD test showed that students in all three frequency groups—never, once, and more than once—differed statistically

significantly ($p < .05$), on average, in their self-reported abnormal eating behaviors (see Figure 12).

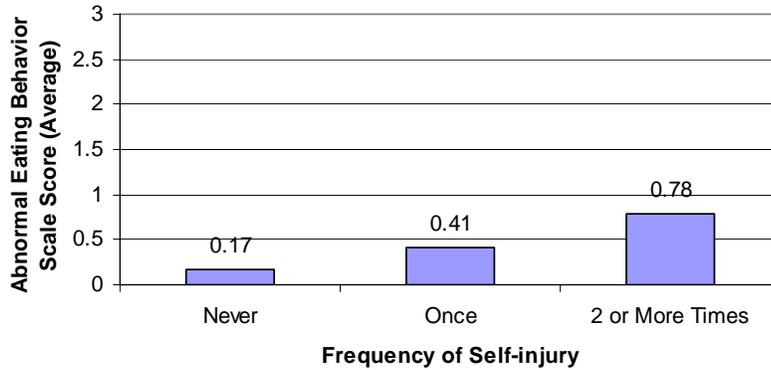


Figure 12. *Frequency of self-injury by abnormal eating scores.*

The frequency of self-injury was statistically significantly and substantially associated with suicide scale scores ($p < .0001$; see Table 27). As the frequency of self-injury increased, scores on the suicide scale increased ($p < .0001$; see Table 28). A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on suicide scale scores, $F(2, 1728) = 224.84, p < .0001, \eta^2 = .21$. Tukey's HSD test showed that students in all three frequency groups—never, once, and more than once—differed statistically significantly ($p < .05$), on average, in their self-reported suicidal tendencies (see Figure 13). Results were consistent across tests—as self-injury increased in frequency, suicidal tendencies increased.

Table 27

Frequency of Self-Injury and Problem Behaviors

Problem Behaviors	Correlation (r)	p-value
Abnormal Eating Scale*	.27	<.0001
Age at first alcohol use	-.06	.11
Age at first cigarette use	-.10	.08

Age at first marijuana use	-.13	.07
Age at first sex	.03	.64
Deviant Behavior Scale*	.23	<.0001
Have you ever sniffed glue, or breathed the contents of spray cans, or inhaled any paints or sprays to get high?	.27	<.0001
Have you ever had sexual intercourse?	.19	<.0001
Substance Use Scale*	.25	<.0001
Suicide Scale	.39	<.0001
With how many people have you ever had sexual intercourse?	.08	.19

*Results reported are for the original scale. Results from analysis conducted using the transformed scale were parallel (i.e., statistically significant, possible relationship of same magnitude).

Table 28

Frequency of Self-Injury and Suicidal Ideation, Plans, and Attempts (N=1738)

		Frequency of Self-injury*			χ^2	Cramer's V
		Never (%)	Once (%)	2 or more times (%)		
Suicide	Thought	14	30	66	259.71	.39
	Planned	7	21	50	262.07	.39
	Tried	4	7	35	211.66	.35

*All relationships were statistically significant at $p < .0001$ with 2 degrees of freedom.

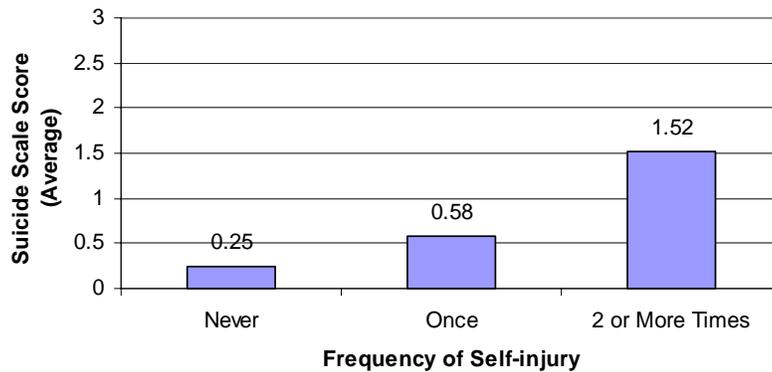


Figure 13. *Frequency of self-injury by suicide scale scores.*

Finally, the frequency of self-injury was statistically significantly associated with the deviancy scores ($p < .0001$; see Table 27). As self-injury increased, deviancy scores increased ($p < .0001$). The relationship was within the small to medium effect size range. A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on deviancy scores, $F(2, 1591) = 46.47, p < .0001, \eta^2 = .06$.

Tukey’s HSD test showed that students in all three frequency groups—never, once, and more than once—differed statistically significantly ($p < .05$), on average, in their self-reported deviancy (see Figure 14).



Figure 14. *Frequency of self-injury by deviancy scores.*

The frequency of self-injury was associated with substance use scores and having ever used inhalants ($p < .0001$). A one-way between-groups ANOVA revealed a statistically significant effect for frequency of self-injury on substance use, $F(2, 1704) = 82.28, p < .0001, \eta^2 = .09$. Tukey’s HSD test showed that students in all three frequency groups—never, once, and more than once—differed statistically significantly ($p < .05$), on average, in their self-reported substance use levels (see Figure 15).

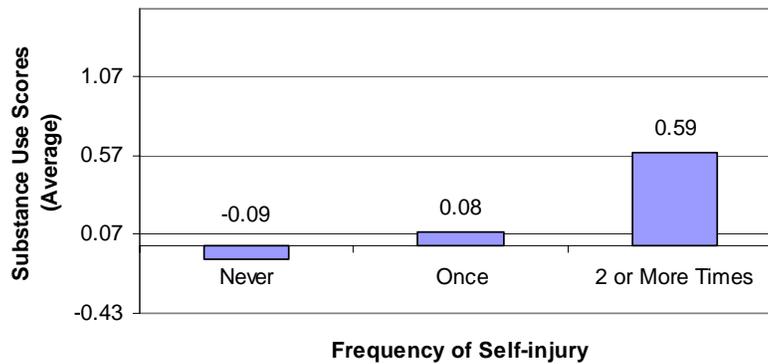


Figure 15. *Frequency of self-injury by substance use scores.*

Examination of Spearman correlation coefficients suggested medium effects between the frequency of self-injury and substance use (see Table 27). Compared to 6% of students who had not ever tried inhalants, 31% of those who had tried inhalants had self-injured two or more times during the past month, $\chi^2(N = 1,701, 4) = 178.72, p < .0001$; see Table 29. Students who reported any of the substances studied tended to self-injure more frequently than did those who did not ($p < .0001$). For example, whereas 7% of students who had not ever tried cigarette smoking self-injured two or more times during the past month, 20% of those who had tried cigarette smoking self-injured two or more times during the past month, $\chi^2(N = 1,737, 7) = 94.91, p < .0001$; see Table 29. The frequency of self-injury was not statistically significantly associated with the age of first alcohol, cigarette, or marijuana use ($p > .01$; see Table 27).

The frequency of self-injury demonstrated a statistically significant and small relationship with having ever had sexual intercourse (see Table 27). Youth who had ever had sexual intercourse self-injured more frequently than did those who had never had sexual intercourse ($p < .0001$). Among those who had never had sex, 78% also had never

self-injured, 15% had self-injured one time during the past month, and 7% had self-injured two or more times during the past month. However, among those who had had sexual intercourse, 59% had never self-injured, 17% had self-injured one time during the past month, and 24% had self-injured two or more times during the past month, $\chi^2(N = 1,604, 4) = 80.78, p < .0001, \text{Cramer's } V = .22$. The frequency of self-injury was not statistically significantly associated with the age of first sexual intercourse or the number of sexual partners among those who had ever had sexual intercourse ($p > .01$).

Table 29

Frequency of Self-Injury and Having Ever Used Substances

	Frequency of Self-injury*			N	χ^2	Cramer's V
	Never (%)	Once (%)	2 or more times (%)			
Cigarettes	20	36	50	1737	93.52	.23
Alcohol	32	41	61	1719	59.67	.19
Marijuana	12	15	26	1708	23.15	.12
Inhalants	10	20	46	1701	161.46	.31
Prescription	3	7	22	1705	109.12	.25

*All relationships were statistically significant at $p < .0001$ with 2 degrees of freedom.

Multilevel Logistic Regression Analyses

Multilevel multinomial logistic regression was conducted to examine further the relationships between a subset of individual level predictor variables and the frequency of self-injury in the past 30 days coded as: 0 (never), 1 (once), and 2 (more than once).⁷ The following comparisons were made: once versus never, more than once versus never, and once versus more than once. Standard errors were adjusted to take into account the nested nature of the data.

⁷ For analyses purposes, the variable was reverse coded so the values being predicted would be “once” and “more than once”. Probabilities modeled were cumulated over the lower-ordered values (i.e., “once” and “more than once”).

The first comparison compared those who had self-injured once to those who had never self-injured in the past 30 days. Four variables statistically significantly predicted ($p = .01$) the frequency of self-injury while controlling for all other variables in the model: abnormal eating behaviors, peer self-injury, suicide, and grade level (see Table 30). Abnormal eating behaviors demonstrated the strongest relationship with the frequency of self-injury (see Table 30). The odds of self-injuring once compared to never in the past 30 days increased as abnormal eating behaviors increased ($p < .01$; see Table 30). Peer self-injury demonstrated the second strongest relationship. Youth were 1.72 times more likely to have self-injured once compared to never if they knew a friend who had harmed themselves on purpose ($p < .01$; see Table 30). Suicide also was associated, with the odds of having self-injured once compared to never increasing as suicidal tendencies increased ($p < .01$; see Table 30). Although statistically significant, the magnitude of the odds ratio for grade level did not meet criteria for a small effect size (i.e., OR = 1.50).

Table 30

Multilevel Logistic Regression Analysis of Factors that Predict the Frequency of Self-Injury – Once versus Never (Past 30 Day Frequency) (N=1748)

Predictor	Coefficient	p -value	SE	Odds Ratio	95% CI
Female ^a	-0.14	0.44	0.17	0.87	0.62, 1.23
Hit by boy/girlfriend ^b	-0.15	0.65	0.33	0.86	0.46, 1.64
Cyberbullied ^b	0.22	0.26	0.19	1.24	0.85, 1.81
Peer self-injury ^b	0.54	0.00	0.18	1.72	1.21, 2.44
Inhalant use ^b	0.43	0.07	0.24	1.54	0.96, 2.47
TV viewing time	0.01	0.79	0.05	1.02	0.91, 1.13
Sex (ever had) ^b	0.01	0.97	0.25	1.01	0.62, 1.64
Video/computer use	0.06	0.29	0.05	1.06	0.95, 1.18
Grades	-0.02	0.66	0.06	0.98	0.87, 1.09
Grade level ^{c,e}	-0.24	0.01	0.09	0.78	0.66, 0.93
Attitudes toward	-0.03	0.76	0.10	0.97	0.80, 1.17

school					
Belief in possibilities	-0.32	0.05	0.16	0.73	0.53, 1.00
Parent communication	0.05	0.73	0.15	1.05	0.79, 1.40
Bully (victim) frequency	0.10	0.02	0.04	1.10	1.01, 1.20
Abnormal eating behaviors	1.31	0.00	0.40	3.69	1.70, 8.05
Substance use	0.15	0.39	0.18	1.16	0.82, 1.65
Suicide	0.49	0.00	0.11	1.63	1.33, 2.01
Deviant behavior	-.30	0.02	0.13	0.74	0.57, 0.95
Black ^d	0.68	0.02	0.28	1.99	1.14, 3.46
Hispanic ^d	-0.08	0.76	0.27	0.92	0.55, 1.56
Other ethnicity ^d	0.25	0.45	0.33	1.28	0.67, 2.45

^aMale is the reference category.

^bNo is the reference category.

^cSixth grade is the reference category.

^dWhite is the reference category.

^eThe inverse of the odds ratio (1/.78 or 1.28) was used to judge the magnitude (i.e., Cohen's Rule of Thumb).

The second comparison compared those who had self-injured more than once to those who had never self-injured in the past 30 days. Four variables statistically significantly predicted ($p = .01$) the frequency of self-injury while controlling for all other variables in the model: suicide, having ever tried inhalants, belief in possibilities, and the frequency of having been a victim of bullying. Suicide demonstrated the strongest relationship. As suicidal tendencies increased, the odds of having self-injured twice or more compared to never increased ($p < .01$; see Table 31). Having ever tried inhalants demonstrated the second strongest relationship. Youth who had ever tried inhalants were 1.54 times more likely than their non-inhaling counterparts to have self-injured twice or more during the past 30 days ($p < .01$; see Table 31). The extent to which youth believed in their possibilities was associated with the frequency of self-injury. As belief in possibilities increased, the odds of having self-injured twice or more compared to never decreased (see Table 31). Although the relationship between bullying (victim frequency)

was statistically significant, the magnitude of the odds ratio did not meet minimal criteria for a small effect size (i.e., OR = 1.50).

Table 31

Multilevel Logistic Regression Analysis of Factors that Predict the Frequency of Self-Injury – More than Once versus Never (Past 30 Day Frequency) (N=1748)

Predictor	Coefficient	p-value	SE	Odds Ratio	95% CI
Female ^a	0.54	0.03	0.25	1.72	1.06, 2.78
Hit by boy/girlfriend ^b	0.74	0.03	0.34	2.11	1.08, 4.10
Cyberbullied ^b	0.17	0.48	0.25	1.19	0.73, 1.93
Peer self-injury ^b	0.64	0.01	0.26	1.89	1.14, 3.12
Inhalant use ^b	0.92	0.00	0.28	2.52	1.47, 4.31
TV viewing time	0.07	0.32	0.07	1.08	0.93, 1.24
Sex (ever had) ^b	0.60	0.04	0.29	1.82	1.03, 3.22
Video/computer use	0.13	0.05	0.07	1.14	1.00, 1.30
Grades	-0.07	0.34	0.07	0.93	0.81, 1.07
Grade level ^c	-0.18	0.13	0.12	0.83	0.66, 1.06
Attitudes toward school	-0.00	0.98	0.13	1.00	0.78, 1.28
Belief in possibilities ^c	-0.49	0.01	0.19	0.61	0.42, 0.88
Parent communication	0.29	0.14	0.20	1.33	0.91, 1.96
Bully (victim) frequency	0.15	0.00	0.05	1.16	1.04, 1.29
Abnormal eating behaviors	0.93	0.05	0.47	2.53	1.00, 6.38
Substance use	-0.14	0.50	0.20	0.87	0.59, 1.30
Suicide	1.04	0.00	0.11	2.84	2.27, 3.55
Deviant behavior	-0.14	0.30	0.14	0.87	0.66, 1.14
Black ^d	0.19	0.65	0.43	1.21	0.52, 2.81
Hispanic ^d	0.03	0.94	0.34	1.03	0.52, 2.01
Other ethnicity ^d	-0.01	0.98	0.47	0.99	0.37, 2.49

^aMale is the reference category.

^bNo is the reference category.

^cSixth grade is the reference category.

^dWhite is the reference category.

^eThe inverse of the odds ratio (1/.61 or 1.64) was used to judge the magnitude (i.e., Cohen's Rule of Thumb).

The final comparison was made between those who had self-injured more than once and those who had self-injured once in the past 30 days. Only one variable, suicide, statistically significantly distinguished ($p = .01$) the two groups. As suicidal tendencies

increased, the odds of have self-injured more than once compared to once increased ($p < .01$; see Table 32).

Table 32

Multilevel Logistic Regression Analysis of Factors that Predict the Frequency of Self-Injury – More than Once versus Once (Past 30 Day Frequency) (N=1748)

Predictor	Coefficient	<i>p</i> -value	SE	Odds Ratio	95% CI
Female ^a	0.67	0.01	0.27	1.96	1.16, 3.31
Hit by boy/girlfriend ^b	0.90	0.02	0.38	2.45	1.17, 5.14
Cyberbullied ^b	-0.05	0.86	0.27	0.95	0.57, 1.61
Peer self-injury ^b	0.09	0.74	0.28	1.10	0.63, 1.91
Inhalant use ^b	0.49	0.10	0.30	1.64	0.91, 2.93
TV viewing time	0.06	0.46	0.08	1.06	0.91, 1.24
Sex (ever had) ^b	0.59	0.07	0.32	1.80	0.96, 3.36
Video/computer use	0.07	0.30	0.07	1.08	0.94, 1.24
Grades	-0.04	0.57	0.08	0.96	0.83, 1.11
Grade level ^c	0.06	0.64	0.13	1.06	0.82, 1.38
Attitudes toward school	0.03	0.85	0.14	1.03	0.79, 1.34
Belief in possibilities	-0.18	0.37	0.20	0.84	0.57, 1.23
Parent communication	0.24	0.27	0.22	1.27	0.83, 1.94
Bully (victim) frequency	0.05	0.37	0.06	1.05	0.94, 1.18
Abnormal eating behaviors	-.038	0.43	0.48	0.68	0.27, 1.75
Substance use	-0.29	0.18	0.21	0.75	0.50, 1.14
Suicide	0.55	0.00	0.12	1.74	1.37, 2.21
Deviant behavior	0.16	0.32	0.16	1.17	0.86, 1.60
Black ^d	-0.49	0.28	0.46	0.61	0.25, 1.49
Hispanic ^d	0.11	0.78	0.38	1.12	0.53, 2.35
Other ethnicity ^d	-0.26	0.60	0.50	0.77	0.29, 2.05

^aMale is the reference category.

^bNo is the reference category.

^cSixth grade is the reference category.

^dWhite is the reference category.

CHAID Analyses

In addition to multinomial logistic regression, CHAID was used to explore interactions between predictors of the frequency of self-injury (i.e., never, once, or more

than once in the past 30 days) with the intent of identifying mutually exclusive, meaningful subgroups or segments (see Figures 16 and 17). The analysis began with a total training sample of 900 cases (72% never, 16% one time, and 12% two or more times). CHAID analyses identified multiple interactions between predictors, with suicide, belief, Hispanic ethnicity, and inhalant use emerging as the best predictors of the frequency of self-injury (see Figure 16). All relationships were within the small effect size range (see Table 33). The best predictor of the frequency of self-injury, according to CHAID, was suicide ($p < .0001$, Cramer's $V = 0.31$; see Figure 16). Suicide was further divided into three distinct groups: (a) those who had not thought about, planned, or attempted suicide (≤ 0); (b) those who had a low level of suicidal tendencies (> 0 to ≤ 1); and (c) those who had moderate to high levels of suicidal tendencies (> 1 ; see Figure 16). As seen in Figure 16, the segment at greatest risk of frequent self-injury comprised those who had a moderate to high level of suicidal tendencies, were non-Hispanic, and had used inhalants (66%, $n = 47$). In contrast, the largest proportion of youth who had never self-injured in the past 30 days were those students who had not thought about, planned, or attempted suicide (≤ 0), used the computer or played video games, on average, for less than 1 hour per day, and had not used inhalants (90%, $n = 339$). There was a positive relationship between suicide and the frequency of self-injury; as suicidal tendencies increased, the proportion of youth who had self-injured at least once in the past month increased (see Figure 16). Low suicidal tendencies statistically significantly interacted with time spent playing video games or on the computer for fun; however, examination of the effect size (Cramer's $V = .09$) suggested this relationship did not meet minimal criteria for a small effect size. Thus, the decision was made to stop growing the low

suicidal tendency branch at Node 1 (see Figure 16). Belief statistically significantly interacted with moderate suicidal tendencies ($p < .01$, Cramer's $V = .20$). Lower belief (≤ 4) placed youth with moderate suicidal tendencies at risk for greater frequencies of self-injury compared to those with stronger belief (> 4). For example, whereas, among those with moderate suicidal tendencies ($n = 115$), 10% of those with higher belief had self-injured more than once in the past 30 days, over 26% of those with relatively lower belief had self-injured more than once in the past 30 days ($p < .01$, Cramer's $V = .20$). High suicidal tendencies statistically significantly interacted with Hispanic ethnicity ($p < .01$, Cramer's $V = .29$). Among youth with high suicidal tendencies ($n = 126$), Hispanic youth (56%) when compared to youth of other ethnicities (26%) were statistically significantly more likely to have never self-injured. Among non-Hispanic youth (i.e., White, Black, Other) with high suicidal tendencies, those who had used inhalants were at increased risk for self-injuring more frequently than those who had never tried inhalants. For example, 66% ($n = 110$) of those who had used inhalants had self-injured more than once in the past 30 days compared to 38% ($n = 110$) of those who had not ever tried inhalants ($p < .01$, Cramer's $V = .29$). The overall model resulted in a classification accuracy of approximately 75% within the training sample (i.e., risk estimate = .25) and 75% within the test sample (i.e., risk estimate = .25).

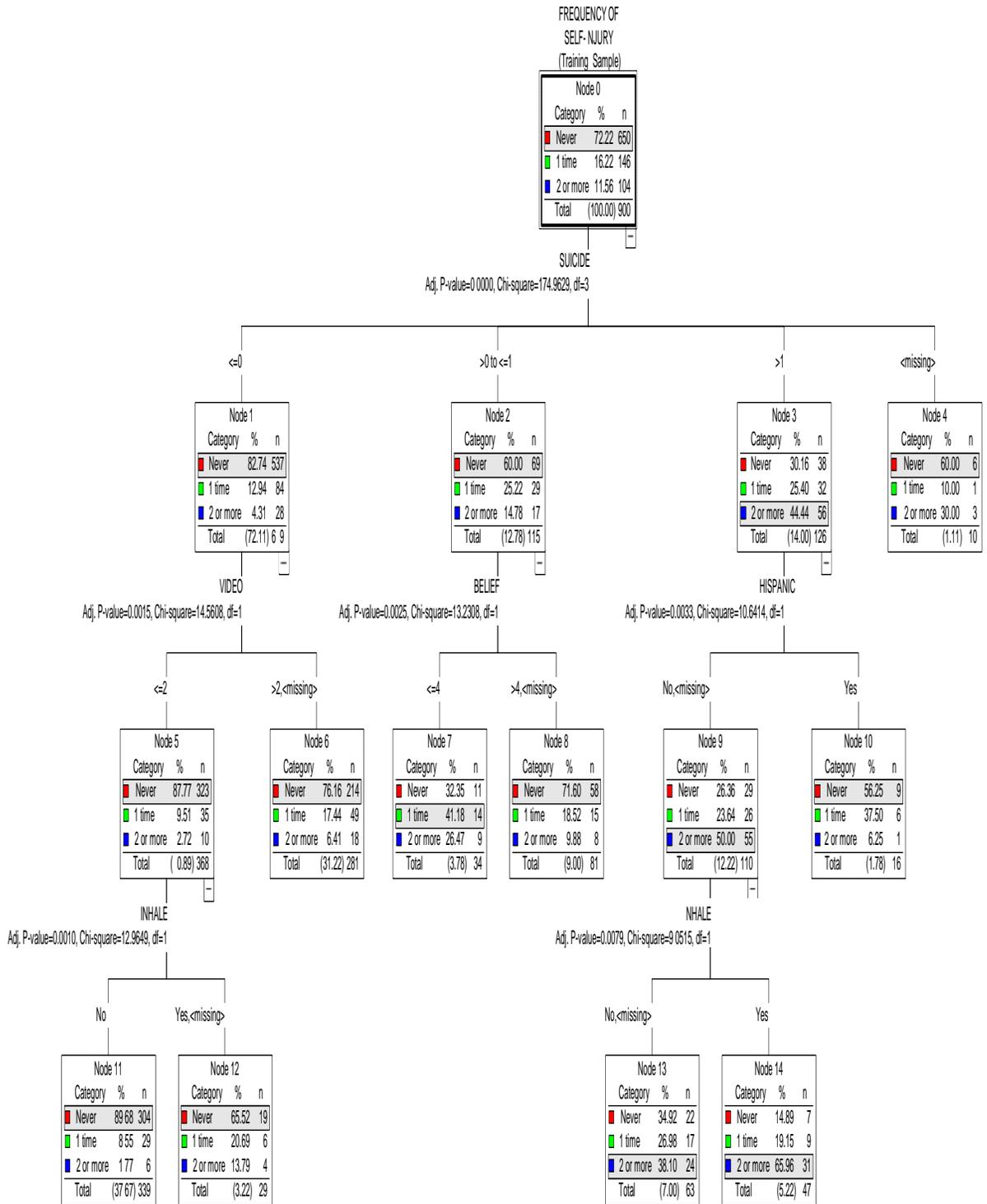


Figure 16. Segmentation of frequency of self-injury with suicide included in the model.

Table 33

Effect Size Values for Segmentation of Frequency of Self-Injury – Suicide Included

Relationship	Node	Chi-square	Cramer's V
Frequency of self-injury with suicide	0	174.9629	.31
Video with suicide	1	14.5608	.09
Belief with suicide	2	13.2308	.20
Hispanic with suicide	3	10.6414	.29
Inhale with video	5	12.9649	.19
Inhale with Hispanic	9	9.0515	.29

Comparison of CHAID analyses conducted with the original versus transformed variables suggested the model including suicide was sensitive to nonnormality. Overall, the models containing the original and transformed variables were similar. However, the transformed model introduced two new ‘best predictors’ of the frequency of self-injury: substance use and bullying (victim). Whereas belief in possibilities statistically significantly interacted with low suicidal tendencies in the model using the original variables (see Figure 16), it did not do so in the model using transformed variables (see Figure 17 and Table 34). Instead, in the model using the transformed variables, substance use significantly interacted with low suicidal tendencies ($p < .01$, Cramer's V = .20). Among youth with low suicidal tendencies, the largest proportion of youth who self-injured most frequently comprised youth who had higher relative substance use and a higher relative frequency of being a victim of bullying ($p < .01$, Cramer's V = .11). The overall transformed model resulted in a classification accuracy of approximately 76% within the training sample (i.e., risk estimate = .24) and 76% within the test sample (i.e., risk estimate = .24).

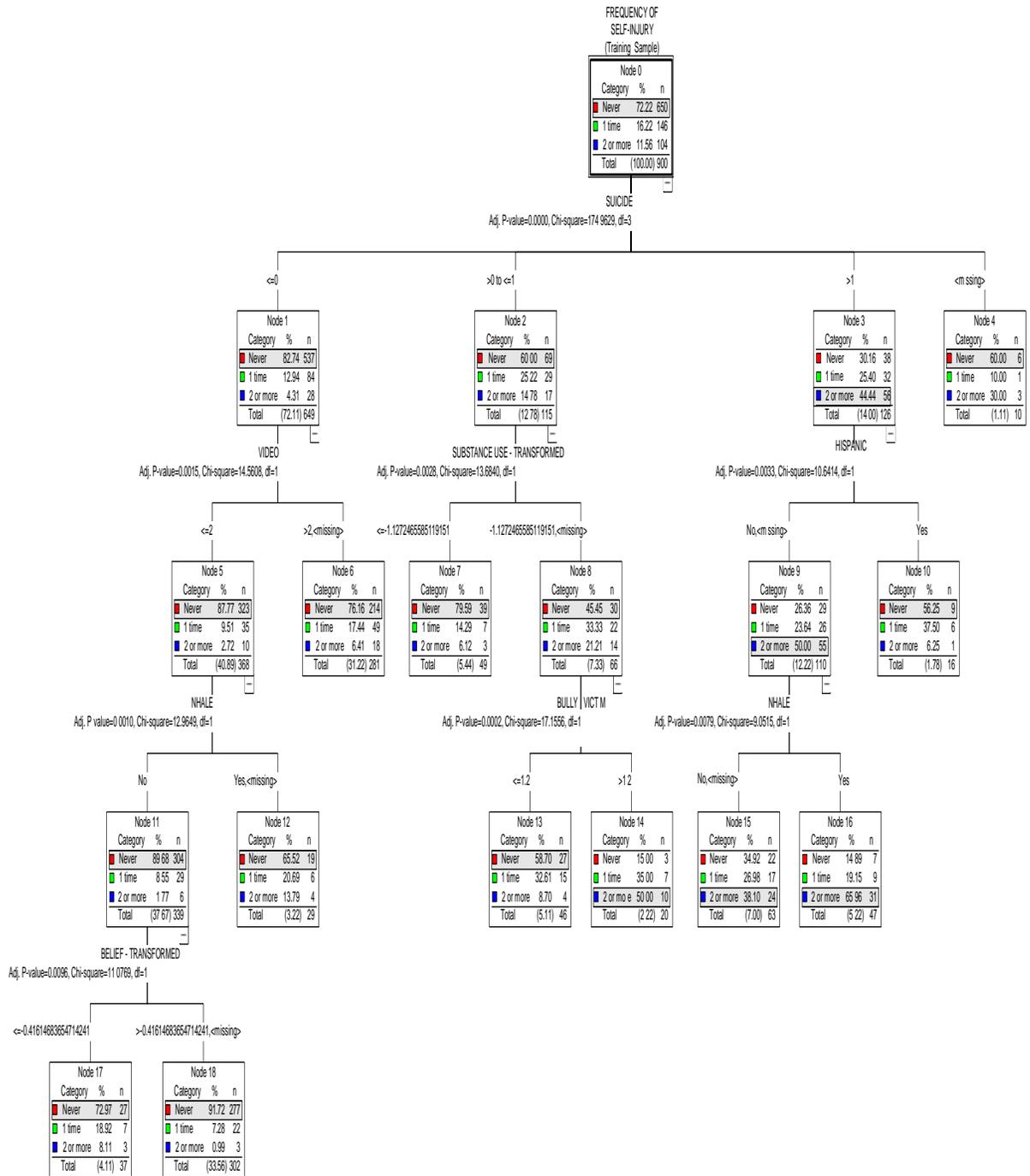


Figure 17. Segmentation of frequency of self-injury with suicide included in the model (transformed variables).

Table 34

Effect Size Values for Segmentation of Frequency of Self-Injury – Suicide Included

(transformed variables).

Relationship	Node	Chi-square	Cramer's V
Frequency of self-injury with suicide	0	174.9629	.31
Video with suicide	1	14.5608	.09
Substance use with suicide	2	13.6840	.20
Hispanic with suicide	3	10.6414	.29
Inhale with video	5	12.9649	.19
Bully(victim) with substance use	8	17.1556	.11
Inhale with Hispanic	9	9.0515	.29
Belief with inhale	11	11.0769	.18

Given the strength of the relationship between self-injury and suicide, the CHAID analysis was conducted with suicide removed from the model to determine whether suicide masked relationships among other predictors in the model and the frequency of self-injury (see Figure 18). The analysis began with a total training sample of 900 cases (72% Never, 16% one time, and 12% two or more times). CHAID analyses identified multiple interactions between predictors, with abnormal eating behaviors, peer self-injury, belief in possibilities, having ever had sexual intercourse, and being Black emerging as the best predictors of frequency of self-injury (see Figure 18). Interestingly, once suicide was excluded from the model, Hispanic ethnicity and inhalant use were no longer statistically significant (see Figure 18). All relationships were within the small effect size range with the exception of peer self-injury and abnormal eating behavior, which was within the medium range (see Table 35). The best predictor of the frequency of self-injury in the reduced model, according to the CHAID results, was abnormal eating behaviors ($p < .0001$, Cramer's V = .21; see Figure 18). Abnormal eating behaviors demonstrated a positive relationship with frequency of self-injury; as abnormal eating

behaviors increased, the proportion of youth who self-injured more than once during the past 30 days increased (see Figure 18). Abnormal eating behaviors were further divided into three groups: (a) those who had not gone without eating for 24 hours or more to lose weight, taken diet pills, powders, or liquids without a doctor's advice to lose weight or keep from gaining weight, or vomited or taken laxatives to lose weight or keep from gaining weight (≤ 0); (b) those who had a low level of abnormal eating behavior (> 0 to ≤ 1); and (c) those who had moderate to high levels of abnormal eating behavior (> 1 ; see Figures 18). As seen in Figure 18, the segment at greatest risk is comprised of students with moderate to high levels of abnormal eating behaviors and who know a friend who had harmed themselves on purpose (50%, $n = 48$). In contrast, the segment with the largest proportion of youth who had never self-injured in the past 30 days comprised youth who had no abnormal eating behaviors, did not know a friend who had harmed themselves on purpose, and was not Black (87%, $n = 348$). No abnormal eating behaviors significantly interacted with knowing a peer who had harmed themselves on purpose ($p < .0001$, Cramer's $V = .21$). Examination of the branch that contained those youth who knew a friend who had harmed themselves on purpose suggested those who had never had sexual intercourse and had high belief in their possibilities were more likely to have never self-injured in the past 30 days (see Figure 18). On the other hand, peer self-injury and having ever had sexual intercourse attenuated the effect of no abnormal eating behaviors on the frequency of self-injury (see Figure 18). Examination of the branch that contained those youth who did not know a friend who had harmed themselves on purpose suggested when compared to White, Hispanic, and Other ethnic youth, a greater proportion of Black youth self-injured more frequently. For example,

among youth with no abnormal eating behaviors and who did not know a friend who self-harmed ($n = 389$), approximately 3% of non-Black youth self-injured more than once in the past 30 days compared to more than 12% of Black youth ($p < .01$, Cramer's $V = .16$). Low abnormal eating behaviors (> 0 to ≤ 1) statistically significantly interacted with belief; relatively higher belief protected youth with moderate abnormal eating behaviors against a higher frequency of self-injury (see Figure 8; $p < .01$, Cramer's $V = .15$).⁸ Moderate to high abnormal eating behaviors statistically significantly interacted with knowing a friend who had harmed themselves on purpose; peer self-injury placed youth with moderate to high levels of abnormal eating behaviors at further risk for increased frequency of self-injury ($p < .01$, Cramer's $V = .40$). The overall model resulted in a classification accuracy of approximately 75% within the training sample (i.e., risk estimate = .25) and 77% within the test sample (i.e., risk estimate = .23).

⁸ This interaction did not occur in the CHAID analysis conducted using transformed variables.

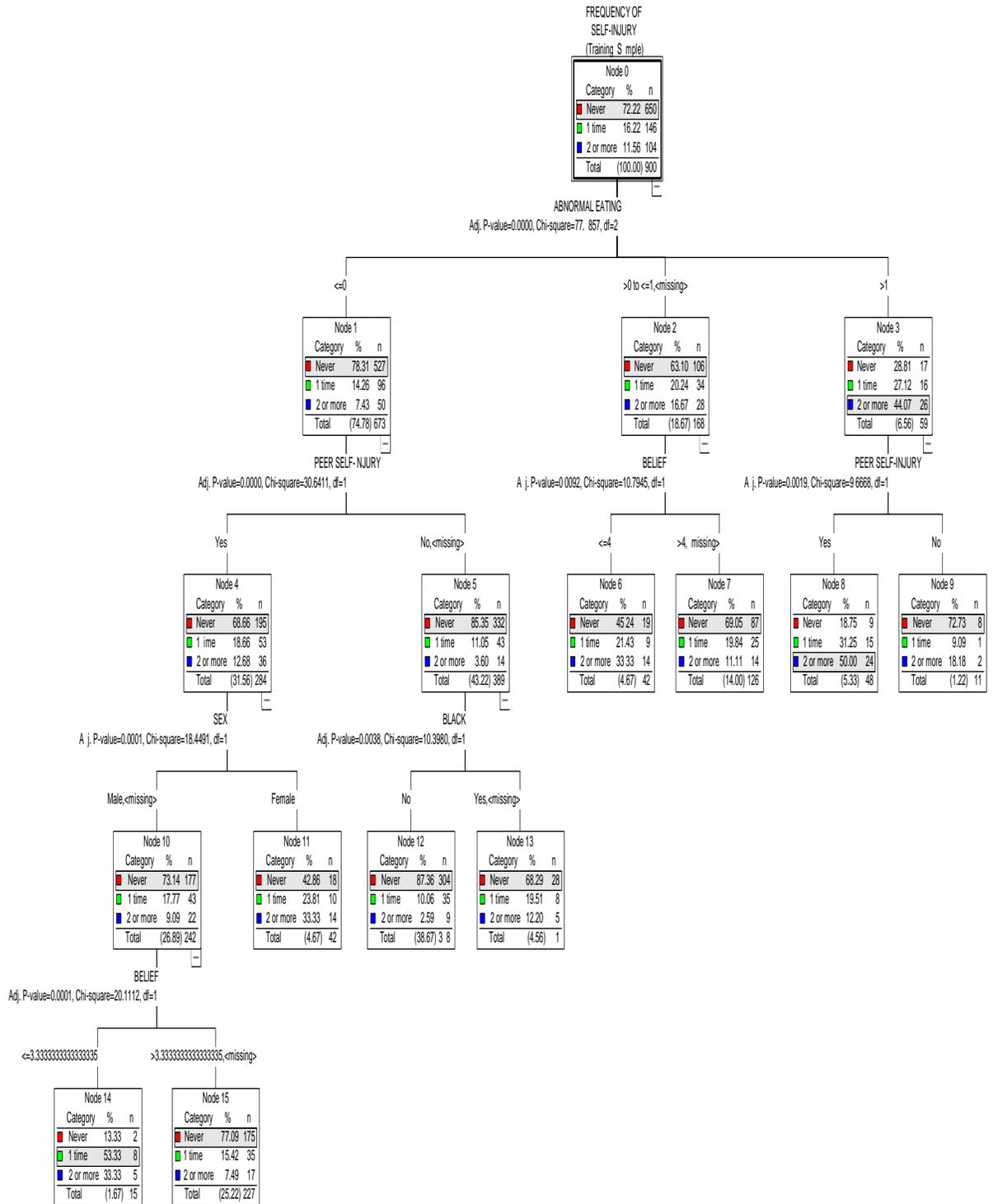


Figure 18. Segmentation of frequency of self-injury with suicide excluded from the model.

Table 35

Effect Size Values for Segmentation of Frequency of Self-Injury – Suicide Excluded

Relationship	Node	Chi-square	Cramer's V
Frequency of self-injury with abnormal eating	0	77.4857	.21
Peer self-injury with abnormal eating	1	30.6411	.21
Belief with abnormal eating	2	10.7945	.15
Peer self-injury with abnormal eating	3	9.6668	.40
Sex with peer self-injury	4	18.4491	.25
Black with peer self-injury	5	10.3980	.16
Belief with sex	10	20.1112	.29

Relationships between Peer Self-injury and Other Variables

This section addresses the outcome variable of knowing a friend who has harmed themselves on purpose (yes, no). Gender demonstrated a statistically significant and small effect on knowing a friend who had injured themselves on purpose, $\chi^2(N = 1,724, 1) = 44.03, p < .0001$, Cramer's V = .16. Compared to 38% of males, 54% of females knew of friends who had injured themselves on purpose. Knowing a friend who had self-injured was not statistically or practically associated with race or ethnicity, $\chi^2(N=1711, 5) = 9.92, p = .08$, Cramer's V = .08. Knowing a friend who had injured themselves on purpose was statistically and substantially associated with grade level, $\chi^2(N = 1,732, 1) = 82.54, p < .0001$, Cramer's V = .22. Compared to 35% of sixth graders, 57% of eighth graders knew of a friend who had injured themselves on purpose. School attended had a statistically significant and small effect on knowing a friend who had injured themselves on purpose, $\chi^2(N=1727, 7) = 29.78, p < .01$, Cramer's V = .13. The percentage of students who knew a friend who had injured themselves on purpose ranged from a low of 36.4% at School 4 to a high of 60.6% at School 5 (see Table 36). Finally, students who reported knowing a friend who had injured themselves on purpose were, on average,

statistically significantly older ($M = 12.76$ years) than did those who did not ($M = 12.23$ years), $t(1729) = -7.87, p < .0001$, Cohen's $d = 0.38$.

Table 36

Prevalence (%) of Knowing a Friend Who Had Self-Injured by School Attended

	School							
	1	2	3	4	5	6	7	8
Yes	44.8%	51.7%	44.0%	36.4%	60.6%	44.4%	41.8%	46.2%
95%	43.6 –	50.5 –	42.8 –	35.3 –	59.4 –	43.2 –	40.6 –	45.0 –
CI	46.0	52.9	45.2	37.6	61.8	45.6	43.0	47.4

Knowing a friend who had harmed themselves on purpose was associated with lower average scores on two out of three key factors associated with adolescent development, including attitudes toward school and belief in possibilities (see Table 37). On average, students who knew a friend who had harmed themselves on purpose reported lower attitudes toward school and lower beliefs in their possibilities ($p < .0001$). Both relationships were in the small effect size range, with a stronger relative effect on belief in possibilities.

Table 37

Developmental Theory Variables (Independent t-tests)

Scale	Peer Self-injury				t	p-value	Cohen's d
	Yes		No				
	M	SD	M	SD			
Attitudes Toward School	3.63	0.99	3.85	0.87	4.53	<.0001	-0.24
Belief in Possibilities ^a	4.38	0.81	4.68	0.54	8.70	<.0001	-0.44
Parent Communication	1.37	0.81	1.43	0.81	1.40	0.16	-0.09

^aResults reported are for the original scale. Results from analysis conducted using the transformed scale were parallel (i.e., statistically significant mean difference).

All four behavioral precipitants were statistically significantly associated with knowing a friend who had harmed themselves on purpose ($p < .01$; see Tables 38 and 39). However, examination of the associated effect sizes for each suggested, whereas bullying

and cyberbullying demonstrated small effects on the frequency of self-injury, the effect of having been physically hurt by a boyfriend or girlfriend on purpose was negligible (i.e., did not meet minimum requirements for a small effect). Among those who had ever been cyberbullied, a greater proportion knew a friend who had harmed themselves on purpose than did those who did not know a friend who had harmed themselves on purpose, $\chi^2(N = 1,725, 1) = 80.50, p < .0001$, Cramer's $V = .22$.

Table 38

Peer Self-injury and Precipitants of Self-Injury (Chi-square tests of independence)

Precipitants of Self-injury	Peer Self-Injury		N	p-value	Cramer's V
	Yes (%)	No (%)			
During your lifetime, have you ever been cyberbullied?	32	14	1725	<.0001	.22
During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?	10	5	1701	.00	.08

Knowing a friend who had harmed themselves on purpose was statistically significantly associated with having been a victim of bullying and the frequency with which students had been a victim of cyberbullying ($p < .0001$). On average, students who knew a friend who had harmed themselves on purpose reported a greater frequency of being bullied than did those who did not ($p < .0001$). Finally, students who knew a friend who had harmed themselves reported, on average, a higher frequency of being the victim of cyberbullying ($p < .0001$).

Table 39

Peer Self-injury and Precipitants of Self-Injury (Independent t-tests)

Precipitants of Self-injury	Peer Self-injury*				t	Cohen's d
	Yes		No			
	M	SD	M	SD		
Bully-Victim	1.81	1.98	1.27	1.74	-6.04	0.29
During the past 30 days, how many	0.49	1.46	0.16	0.70	-5.79	0.29

times were you the victim of cyberbullying?

*All relationships reported were statistically significant ($p < .0001$).

Knowing a friend who had harmed themselves on purpose was statistically significantly associated with the time spent on the computer or playing video games ($p < .01$). Students who knew a friend who had harmed themselves on purpose, on average, spent more time on the computer than did those who did not ($p < .01$). Neither met the minimum criteria for a small effect size (see Table 40).

Table 40

Peer Self-Injury and Social Contagion (Independent t-tests)

Scale	Peer Self-injury						Cohen's d
	Yes		No		t	p-value	
	M	SD	M	SD			
Time on computer or video games	1.65	1.66	1.44	1.45	-2.75	.01	0.13
TV hours per day	2.26	1.53	2.11	1.57	-1.98	.05	0.10

Knowing a friend who had harmed themselves on purpose was statistically significantly associated with multiple risk behaviors studied, including suicide, substance use, sexual intercourse, deviancy, and abnormal eating behaviors ($p < .0001$; see Tables 41 and 42).

There was a statistically significant and meaningful relationship (i.e., small to medium effect size) between knowing a friend who had harmed themselves on purpose and suicide ($p < .0001$). Students who knew a friend who had harmed themselves reported higher suicide scores than did those who did not know a friend who had harmed themselves on purpose ($p < .0001$; see Table 42). For example, whereas 12% of those who reported not knowing a friend who had harmed themselves had thought about

suicide, 32% of those who reported knowing a friend had harmed themselves had thought about suicide (Fisher's Exact, $N = 1,726$, $p < .0001$).

Knowing a friend who had harmed themselves on purpose was statistically significantly and substantially (i.e., medium effect size) associated with substance use scores and inhalant use ($p < .0001$). Knowing a friend who had harmed themselves on purpose was associated with higher substance use scores, and a greater proportion of those who had used inhalants also were exposed to peer self-injury (23% vs. 8%; see Table 41). Age at first alcohol use was statistically significantly associated with knowing a friend who had harmed themselves on purpose ($p < .01$). The magnitude of the relationship was within the small effect size range. Youth who had been exposed to peer self-injury were, on average, older at first alcohol use than did those who had not been exposed to peer self-injury. Knowledge of peer self-injury was not statistically significantly associated with age at first cigarette use or age at first marijuana use ($p > .01$).

Knowing a friend who had harmed themselves on purpose demonstrated a statistically significant and small relationship with having ever had sexual intercourse (see Table 41). A greater proportion of those who knew a friend who had harmed themselves on purposes had had sexual intercourse compared to those who did not know a friend who had harmed themselves on purpose ($p < .0001$). Knowing a friend who had harmed themselves on purpose was not statistically significantly associated with age of first sexual intercourse or the number of sexual partners among those who had ever had sexual intercourse ($p > .01$).

Table 41

Peer Self-injury and Problem Behaviors (Chi-square tests of independence)

Problem Behaviors	Peer Self-Injury*		N	Cramer's V
	Yes (%)	No (%)		
Have you ever sniffed glue, or breathed the contents of spray cans, or inhaled any paints or sprays to get high?	23	8	1689	.21
Have you ever had sexual intercourse?	21.5	14	1591	.10

*All relationships reported were statistically significant ($p < .0001$).

Knowing a friend who had harmed themselves on purpose was statistically significantly associated with deviancy scores ($p < .0001$; see Table 42). On average, youth who knew a friend who had harmed themselves reported statistically significantly higher deviancy scores than did youth who did not know a friend who had harmed themselves on purpose ($p < .0001$). Examination of effect sizes suggested a small association between knowing a friend who had self-harmed and deviancy.

Knowing a friend who had harmed themselves on purpose was statistically significantly and substantially (i.e., small to medium effect size) associated with abnormal eating behaviors ($p < .0001$; see Table 42). Students who knew a friend who had harmed themselves on purpose, on average, reported more abnormal eating behaviors than did those who did not know a friend who had harmed themselves on purpose ($p < .0001$).

Table 42

Problem Behavior Comparisons (Independent t-tests)

Scale	Peer Self-injury				t	p-value	Cohen's d
	Yes		No				
	M	SD	M	SD			
Abnormal Eating Scale*	0.14	0.25	0.05	0.16	-8.66	<.0001	0.43
Age at first alcohol use	10.76	1.95	10.20	1.98	-3.41	.00	0.28
Age at first cigarette use	10.88	1.82	10.26	1.97	-2.53	.01	0.33
Age at first marijuana use	11.76	1.72	11.07	2.05	-2.34	.02	0.36

Age at first sex	11.46	1.98	11.41	1.90	-0.22	.83	0.03
Deviant Behavior Scale*	0.12	0.89	-0.18	0.64	-7.53	<.0001	0.39
Number of sexual partners	1.87	0.87	1.90	0.87	0.34	.73	-0.03
Substance Use Scale*	0.11	0.74	-0.21	0.42	-10.96	<.0001	0.53
Suicide Scale	0.64	0.98	0.24	0.65	-9.97	<.0001	0.48

*Results reported are for the original scale. Results from analysis conducted using the transformed scale were parallel (i.e., statistically significant mean difference).

Multilevel Logistic Regression Analyses

Multilevel logistic regression with the Bernoulli distribution option at level-1 was conducted to examine further relationships between a subset of individual level predictor variables and knowing a friend who had harmed themselves on purpose (see Table 43). Standard errors were adjusted to take into account the nested nature of the data. Five variables statistically significantly predicted ($p = .01$) peer self-injury while controlling for all other variables in the model: gender, having ever been cyberbullied, having ever tried self-injury, grade level, and substance use (see Table 42). All relationships were in the small effect size range. In terms of demographics, gender and grade level emerged as statistically significant. Gender demonstrated the strongest relationship with peer self-injury. Females were 2.25 times more likely than were males to know a friend who had harmed themselves on purpose ($p < .01$). Eighth graders were 1.55 times more likely than sixth graders to know a friend who had harmed themselves on purpose ($p < .01$). Youth who had ever been cyberbullied were almost twice as likely to know a friend who had harmed themselves on purpose than did those who had not ($p < .01$). Youth who had themselves ever tried self-injury were 1.88 times more likely than were those who had not to know a friend who had harmed themselves on purpose ($p < .01$). Finally, higher levels of substance use increased the probability of knowing a friend who had harmed themselves on purpose (OR = 1.51, $p < .01$).

Table 43

*Multilevel Logistic Regression Analysis of Factors that Predict Peer Self-Injury**(N=1748)*

Predictor	Coefficient	<i>p</i> -value	SE	Odds Ratio	95% CI
Female ^a	0.81	.00	0.13	2.25	1.74, 2.91
Hit by boy/girlfriend ^b	0.54	.03	0.26	1.72	1.05, 2.84
Cyberbullied ^b	0.65	.00	0.15	1.92	1.42, 2.60
Self-injury ^b	0.63	.00	0.18	1.88	1.31, 2.69
Frequency of self- injury	-0.03	.70	0.07	0.97	0.85, 1.11
Inhalant use ^b	0.47	.03	0.21	1.61	1.06, 2.43
TV viewing time	0.04	.37	0.04	1.04	0.96, 1.13
Sex (ever had) ^b	-0.49	.02	0.20	0.62	0.41, 0.91
Video/computer use	0.05	.31	0.05	1.05	0.96, 1.14
Grades	-0.04	.45	0.05	0.97	0.88, 1.06
Grade level ^c	0.44	.00	0.07	1.55	1.36, 1.76
Attitudes toward school	0.05	.55	0.07	1.05	0.90, 1.21
Belief in possibilities	-0.14	.29	0.14	0.87	0.66, 1.13
Parent communication	-0.09	.40	0.11	0.91	0.73, 1.13
Bully (victim) frequency	0.09	.02	0.04	1.09	1.02, 1.17
Abnormal eating behaviors	0.65	.08	0.37	1.92	0.93, 3.97
Substance use	0.41	.01	0.16	1.51	1.12, 2.05
Suicide	0.23	.02	0.10	1.26	1.04, 1.54
Deviant behavior	0.01	.94	0.10	1.01	0.83, 1.23
Black ^d	-0.46	.07	0.25	0.63	0.39, 1.03
Hispanic ^d	-0.08	.68	0.20	0.92	0.62, 1.36
Other ethnicity ^d	0.65	.02	0.26	1.92	1.15, 3.19

^aMale is the reference category.^bNo is the reference category.^cSixth grade is the reference category.^dWhite is the reference category.

CHAID Analyses

In addition to multilevel logistic regression, CHAID was used to explore interactions between predictors of the peer self-injury (i.e., knowing a friend who had harmed themselves on purpose) with the intent of identifying mutually exclusive, meaningful subgroups or segments (see Figure 19). The analysis began with a total

training sample of 894 cases (48% Yes and 52% No). CHAID analyses identified multiple interactions between predictors, with substance use, grade level, frequency of self-injury, abnormal eating behaviors, gender, grades, and having ever been cyberbullied emerging as the best predictors of peer self-injury (see Figure 19). Interestingly, suicide did not enter the model. All relationships were within the small effect size range, with the exception of grade level by academic grades (see Table 44). The best predictor of peer self-injury, according to CHAID, was substance use ($p < .0001$, Cramer's $V = .28$; see Figure 19). Substance use was further divided into three distinct groups, approximately corresponding to low ($\leq -.39$), moderate ($> -.39$ to $\leq .27$), and high ($> .27$, see Figure 19). As seen in Figure 9, the segment at greatest risk, which is large enough to be worthy of consideration, comprised youth with high levels of substance use ($> .27$) and who have self-injured at least once during the past 30 days (90%, $n = 77$). In contrast, the segment with the largest proportion of youth who did not know a friend who had harmed themselves on purpose comprised youth who had low levels of substance use ($< .39$), were in sixth grade, and had no abnormal eating behaviors (74%, $n = 236$). There was a positive relationship between substance use and peer self-injury; as substance use increased, the proportion of youth who knew a friend who had harmed themselves on purpose increased (see Figure 19). Low substance use statistically significantly interacted with grade level; youth in sixth grade were more likely to not know a friend who had harmed themselves on purpose (70%, $n = 464$) than had youth in eighth grade (54%) ($p < .01$, Cramer's $V = .16$). Among sixth graders, low substance using youth, a greater frequency of abnormal eating behaviors placed them at risk for knowing a friend who had harmed themselves on purpose ($p < .01$, Cramer's $V = .26$).

Among eighth graders, low substance using youth, and being a female placed them at risk for knowing a friend who had harmed themselves on purpose ($p < .01$, Cramer's $V = .27$). Moderate substance use statistically significantly interacted with grade level; youth in 8th grade were more likely to know a friend who had harmed themselves on purpose ($p < .01$, Cramer's $V = .23$). Among moderate substance using youth, grade level statistically significantly and substantially (i.e., medium effect) interacted with academic grades; however, examination of proportions suggested a lack of a meaningful difference in peer self-injury based on academic performance (see Figure 19). Among eighth graders, moderate substance using youth, having ever been a victim of cyberbullying placed them at increased risk for knowing a friend who had harmed themselves on purpose ($p < .01$, Cramer's $V = .28$). High substance use statistically significantly interacted with frequency of self-injury; youth who self-injured once or more during the past 30 days were more likely to know a friend who had harmed themselves on purpose (78%, $n=174$) than were those who had not harmed themselves (60%) (see Figure 19; $p < .0001$, Cramer's $V = .14$). Among non-self-injuring, high substance using youth, high grades placed them at risk for knowing a friend who had harmed themselves on purpose ($p < .01$, Cramer's $V = .25$). The overall model resulted in a classification accuracy of approximately 64% within the training sample (i.e., risk estimate = .36) and 64% within the test sample (i.e., risk estimate = .36).

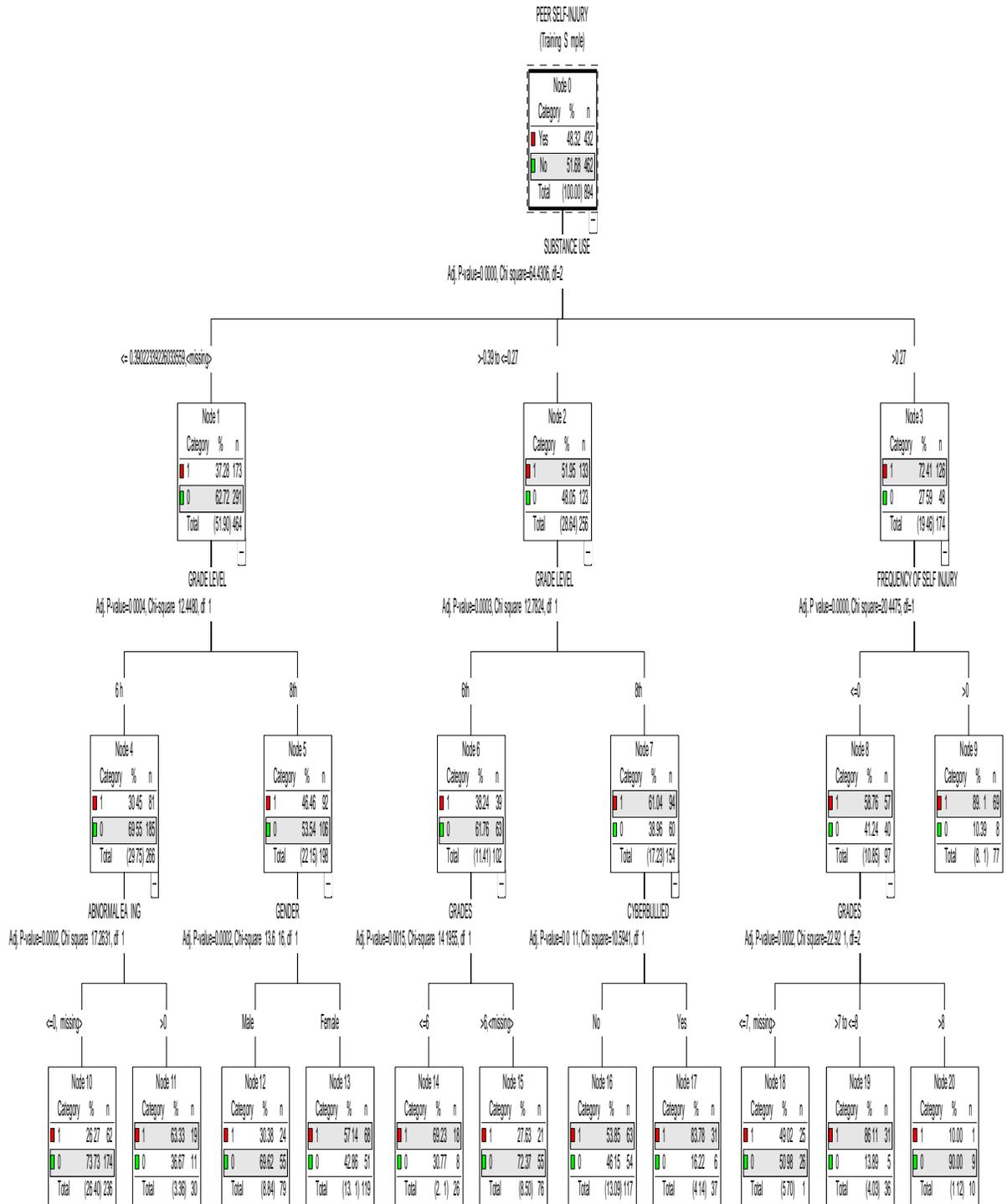


Table 44

Effect Size Values for Segmentation of Peer Self-Injury

Relationship	Node	Chi-square	Cramer's V
Peer self-injury with substance use	0	64.4306	.28
Grade level with substance use	1	12.4480	.16
Grade level with substance use	2	12.7824	.23
Frequency of self-injury with substance use	3	20.4475	.14
Abnormal eating with grade level	4	17.2631	.26
Gender with grade level	5	13.6716	.27
Grades with grade level	6	14.1955	.38
Cyber with grade level	7	10.5941	.28
Grades with frequency of self-injury	8	22.9221	.25

Cognitive Interviewing

Cognitive interviewing with a small sample of middle school aged youth ($n = 4$) was conducted as a part of the dissertation research to identify possible issues with the items (e.g., problematic words) and to document item validity (i.e., whether items measured what they were intended to measure). Four middle school aged females were interviewed. Interviews lasted approximately 10 minutes. Participants were asked to read the survey items to themselves and then were asked to repeat the questions in their own words. All participants were able to repeat the questions in their own words. One participant equated hurting themselves on purpose specifically with cutting. All participants agreed that pinching did not fit with hurting themselves on purpose and should not be included in the definition of self-harm. Two participants mentioned specific behaviors that were left out, including ripping hair out and banging ones head into the wall.

Youth were asked why people their age harm themselves on purpose. Most responses were consistent with the definition provided—to relieve distress, or, as one youth described it, “Because they don’t know how to let their anger exit.” One youth

stated some may try it because “it’s cool.” Another emphasized the role of the media and “everywhere else” in encouraging some youth to try self-injury when they “see no other option.”

Youth were asked how often someone their age could hurt themselves on purpose in a month. Two youth stated the existing response options were enough to cover (e.g., 4 or 5 times per month). The other two youth stated you could self-injure as often as once per day, necessitating a revision of the response options.

All youth were able to respond to the peer self-injury item. All stated friends tell one another when they have harmed themselves on purpose. When asked how they tell, they stated they tell one another in person—not online, unless necessary (i.e., they cannot see one another in person). At school, one youth explained, “most people try to hide it but you can tell by the way they act.” When asked to explain, she stated, “they wear the same long sleeve shirts every day,” and they pull the sleeves over their thumbs so the cuts will not show. While most youth “act like they don’t want people to see” while at school, some youth may be “attention whores” and use self-injury as a means to gain attention from their peers. These youth roll up these sleeves and show their injuries freely, and some cut during class in front of their peers (and teachers).

Summary

This study describes the prevalence of self-injury in the general middle school population and the relationships between self-injury and other risk behaviors during middle school. This study also identified meaningful segments of youth who self-injure, and factors that place them at risk or protect them from self-injury (see Table 45). A

summary of key findings, provided in Table 45 and Appendix D, will be discussed in Chapter 5.

Table 45

Study Research Questions, Procedures, and Key Findings (N = 1748)

What is the prevalence of self-injury among middle school youth?
28.4% (95% CI = 26.3,30.5; N = 1734)
What is the frequency of self-injury among youth who self-injure?
N=495 (had ever tried self-injury) 35% - once during past month 18% - two or three different times during past month 5.5% - four or five different times during past month 11% - six or more different times during past month
What proportion of middle school youth know someone who self-injures?
46.8% (95% CI = 45.6%, 48.0%)
What demographic, attitudinal, and behavioral variables are related to self-injury?
Having <i>ever tried self-injury</i> was associated with (suicide included): <ul style="list-style-type: none"> ◆ self-reported poor health (bivariate test only) ◆ peer self-injury (OR = 1.84, 95% CI = 1.34, 2.54) ◆ inhalant use (OR = 2.06, 95% CI = 1.35, 3.16) ◆ belief in possibilities (OR = .64, 95% CI = 0.48, 0.87) ◆ abnormal eating behaviors (OR = 3.76, 95% CI = 1.79, 7.91) ◆ suicide scale scores (OR = 2.82, 95% CI = 2.32, 3.43) <p>In addition, having <i>ever tried self-injury</i> was associated with (suicide excluded):</p> <ul style="list-style-type: none"> ◆ gender (OR = 1.54, 95% CI = 1.15,2.08) ◆ having been hit or pushed by a girlfriend or boyfriend (OR = 1.95, 95% CI = 1.19, 3.21) <p><i>Frequency of self-injury</i> was associated with:</p> <ul style="list-style-type: none"> ◆ self-reported poor health (bivariate test only) ◆ self-reported frequency of not going to school because of feeling unsafe (bivariate test only) <p><i>Frequency of self-injury – Once vs. Never (Past 30 days)</i> was associated with:</p> <ul style="list-style-type: none"> ◆ abnormal eating behaviors (OR = 3.69, 95% CI 1.70, 8.05) ◆ peer self-injury (OR = 1.72, 95% CI = 1.21, 2.44) ◆ suicide scale scores (OR = 1.63, 95% CI = 1.33, 2.01) <p><i>Frequency of self-injury – More than Once vs. Never (Past 30 days)</i> was associated with:</p> <ul style="list-style-type: none"> ◆ suicide (OR = 2.84, 95% CI 2.27, 3.55) ◆ having ever tried inhalants (OR = 2.52, 95% CI = 1.47, 4.31) ◆ belief in possibilities (OR = 0.61, 95% CI = 0.42, 0.88) <p><i>Frequency of self-injury – More than Once vs. Once (Past 30 days)</i> was associated with:</p> <ul style="list-style-type: none"> ◆ suicide (OR = 1.74, 95% CI 1.37, 2.21)

<p><i>Peer self-injury</i> was associated with:</p> <ul style="list-style-type: none"> ◆ gender (more common knowledge among females, OR = 2.25, 95% CI = 1.74, 2.91) ◆ grade level (more common knowledge among 8th graders, OR = 1.55, 95% CI = 1.36, 1.76) ◆ school attended (range = 36.4% - 60.6%) ◆ age (more common among older youth, <i>mean</i> = 12.23 years) ◆ age at first alcohol use (those exposed to peer self-injury, older, on average) ◆ having ever been cyberbullied (OR = 1.92, 95% CI = 1.42, 2.60) ◆ having ever tried self-injury (OR = 1.88, 95% CI = 1.31, 2.69)
<p>Are there gender, racial or ethnic, age, grade, and school differences in rates of self-injury, frequency of self-injury, and knowledge of friends who self-injure?</p>
<p>Neither having ever tried self-injury nor the frequency of self-injury were associated with gender, race/ethnicity, grade, school attended, or age (bi/multivariate).</p> <p>Peer self-injury varied according to gender, grade, age, and school attended. Knowing a friend who had self-injured was more common among females, 8th graders, older youth, and students in Schools 2 (~52%) and 5 (~61%), for example.</p>
<p>Where does self-injury fit in with other risk behaviors such as alcohol use, tobacco use, suicide, and deviance?</p>
<p>Having <i>ever tried self-injury</i> was associated with:</p> <ul style="list-style-type: none"> ◆ inhalant use (OR = 2.06, 95% CI = 1.35, 3.16) ◆ abnormal eating behaviors (OR = 3.76, 95% CI = 1.79, 7.91) ◆ suicide scale scores (OR = 2.82, 95% CI = 2.32, 3.43) <p><i>Frequency of self-injury – Once vs. Never (Past 30 days)</i> was associated with:</p> <ul style="list-style-type: none"> ◆ abnormal eating behaviors (OR = 3.69, 95% CI 1.70, 8.05) ◆ suicide scale scores (OR = 1.63, 95% CI = 1.33, 2.01) <p><i>Frequency of self-injury – More than Once vs. Never (Past 30 days)</i> was associated with:</p> <ul style="list-style-type: none"> ◆ suicide (OR = 2.84, 95% CI 2.27, 3.55) ◆ having ever tried inhalants (OR = 2.52, 95% CI = 1.47, 4.31) <p><i>Frequency of self-injury – More than Once vs. Once (Past 30 days)</i> was associated with:</p> <ul style="list-style-type: none"> ◆ suicide (OR = 1.74, 95% CI 1.37, 2.21) <p><i>Peer self-injury</i> was associated with:</p> <ul style="list-style-type: none"> ◆ age at first alcohol use (those exposed to peer self-injury, older, on average) ◆ having ever tried self-injury (OR = 1.88, 95% CI = 1.31, 2.69)
<p>Are there meaningful segments of youth who self-injure? If so, what characteristics are useful in defining each segment?</p>
<p><i>Having ever tried self-injury</i>:</p> <p><u>Segment at greatest risk</u>: female youth who have moderate to high levels of suicidal tendencies and used substances in the past</p> <p><u>Segment at greatest risk (suicide excluded)</u>: youth with low belief in possibilities and who know a friend who has harmed themselves on purpose</p> <p><u>Segment at greatest risk (suicide excluded, transformed variables)</u>: youth who have tried inhalants and know a friend who has harmed themselves on purpose</p> <p><u>Segment at least risk</u>: youth who have not thought about, planned, or attempted suicide, have high belief in</p>

their possibilities, and have not used inhalants

Segment at least risk (suicide excluded): youth with high belief in their possibilities, who have not used inhalants, and report low levels of bullying (victim)

Frequency of self-injury:

Segment at greatest risk: those who have a moderate to high level of suicidal tendencies, are non-Hispanic, and have used inhalants

Segment at greatest risk (suicide excluded): youth with moderate to high levels of abnormal eating behaviors who know a friend who have harmed themselves on purpose

Segment at least risk: those who have not thought about, planned, or attempted suicide

Segment at least risk (suicide excluded): youth with no abnormal eating behaviors, who do not know a friend who have harmed themselves on purpose, and of non-Black race/ethnicity

Peer Self-injury:

Segment at greatest risk: youth with high levels of substance use and who have self-injured at least once during the past 30 days

Segment at least risk: youth with low levels of substance use, in 6th grade, and have no abnormal eating behaviors

Chapter Five: Discussion

Introduction

This chapter begins with a review of the purposes of the research. An overview of study methods is provided, as is a summary of findings. Results are discussed in relation to theory and previous research. Similarities and differences in the results compared to previous studies are highlighted. Limitations of the study are discussed. Plans for disseminating the results of this study are presented, along with implications for prevention and further research.

Purposes of the Research

This study sought to increase what is known about superficial/moderate self-injury among the general adolescent population, including factors related to the behavior, especially those amenable to change and useful in identifying vulnerable youth (Favazza, 1998; Purington & Whitlock, 2004). This study had three purposes: (a) contribute to what is known about self-injury among early adolescents in the general middle school population, (b) identify behaviors that are comorbid with self-injury, and (c) identify segments of youth who self-injure. Overall, the study focused on moderate/superficial self-injury as a distinct behavioral phenomenon with multiple causes and functions. For the purposes of this study, self-injury was defined as the performance of a harmful behavior such as cutting, scratching, burning, not allowing wounds to heal, or pinching, by a person who feels upset as a way to feel better (less upset). This study provided

general adolescent population estimates of the prevalence, 30-day frequency rates of injury among self-injurers, and information about the extent to which adolescents knew a friend who self-injured. Relationships between self-injury and other risk behaviors were described. Segmentation analyses were used to identify factors associated with self-injury among middle school youth and segments of youth who self-injure.

Recommendations (e.g., Gratz, 2003) to examine sociocultural and gender variations in the prevalence, frequency, and correlates of self-injury were followed. The relation between the environment (e.g., self-reported exposure to peers who self-injure, exposure to bullying and violence in the school setting, social climate) and individual behavior (i.e., having ever tried self-injury and 30-day frequency rate of self-injury) were considered (see Dishion & Dodge, 2005).

Overview of Method

This study involved a secondary analysis of data gathered using the middle school YRBS from sixth- and eighth-grade students in eight middle schools in a large, southeastern county in Florida. The YRBS is a school-based classroom survey of risk behaviors self-reported by middle school youth. Approximately 2,350 surveys were distributed across schools. A total of 2,003 valid surveys were completed, resulting in an initial response rate of 85.23%. Only students who self-reported attending one of the eight middle schools, reported being in sixth or eighth grade, responded to the having ever tried self-injury item, and did not report responding untruthfully were retained, resulting in a total study sample of 1,748 students. Three items were developed to measure three aspects of self-injury: lifetime prevalence—Have you ever hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?; past 30-

day prevalence—During the past month, how often have you hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?; and awareness of peer self-injury behavior—Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?

In addition to demographic items (e.g., grade, gender, race), indicators of problem behavior theory, social contagion, precipitants of self-injury, and developmental theory were identified in the 2005 YRBS. Cronbach's alpha was calculated for item sets that were designed to measure the same behavior or underlying construct (i.e., to be used as a scale). Statistical testing involved univariate, bivariate, and multivariate analyses and was conducted using the original and transformed scales and results were compared to examine the sensitivity of the results to nonnormality.

Multilevel modeling was used because students (Level-1) were nested within schools (Level-2). Only Level-1 predictors were used. Models were run with three outcome variables: having ever self-injured (dichotomous), the frequency of self-injury (polytomous), and peer self-injury (dichotomous). Multinomial logistic regression was conducted with a modified version of the frequency of self-injury outcome variable. Two models were run, allowing for the following comparisons to be made: once versus never, more than once versus never, and once versus more than once. CHAID analyses using SPSS Answertree v. 3.1 audience segmentation software were used to determine whether there were meaningful segments of youth who self-injure, self-injure frequently, and know a friend who has self-injured.

Summary of Findings

A substantial percentage of students surveyed (28.4%) had tried self-injury. This rate is higher than those reported in most other studies conducted with adolescents in community settings, with the exception of Lloyd-Richardson et al.'s finding of 46.5%. Laye-Gindhu and Schonert-Reichl (2005) reported 15%, Muehlenkamp and Gutierrez (2004) reported 16%, and Ross and Heath (2002) reported 14% (see Table 1). There are numerous potential reasons for the discrepancy, including possible sample differences between studies, and cohort differences, but the most plausible would seem to be the more inclusive definition used in this study, which included pinching. Further research should be conducted with items that differentiate the various forms of self-injury (e.g., cutting, burning, not allowing wounds to heal), such as those used in Muehlenkamp and Gutierrez (2004) and Lloyd-Richardson et al. (2007).

The prevalence of having ever tried self-injury did not vary by race or ethnicity, grade, school attended, or age but did differ by gender. Approximately 32% of females and 25% of males had ever tried self-injury ($p < .01$). Whereas the relationship between gender and self-injury was statistically significant, the effect size (i.e., Cramer's $V = .07$) was negligible. The difference was not of the same magnitude as that reported in Ross and Heath (2002), but was more in keeping with that of Muehlenkamp and Gutierrez (2004), suggesting boys must be catching up with girls in using self-injury as a maladaptive coping behavior. This finding is consistent with Winter's (2005) suggestion that increasing rates of self-injury among males represents either an increase in distress and depression among males and/or the influence of media exposure to self-injury on

males' choices of coping behaviors. This finding is inconsistent with feminist interpretations of self-injury as a gendered phenomenon (Shaw, 2002).

Youth who had tried self-injury reported, on average, poorer health, lower grades, and a greater tendency to stay home from school if they felt unsafe ($p < .01$). At the bivariate level, results suggested youth who had ever tried self-injury had less positive attitudes toward school (small effect), lower levels of parent communication (small effect), and weaker belief in their possibilities (medium effect). All four behavioral precipitants—frequency of bullying (victim), having ever been cyberbullied, the frequency of having been cyberbullied, and having been pushed or hit by a girl/boyfriend in the past 12 months—demonstrated weak (small) relationships with having ever tried self-injury; two out of the three measures of social contagion, peer self-injury (small effect), and time spent using the computer or video games for fun (small effect), were associated with having ever tried self-injury. Consistent with problem behavior theory (Jessor & Jessor, 1977), having ever tried self-injury was associated with all risk behaviors studied, including suicide (large effect), substance use (medium effect), inhalant use (medium effect), deviant behavior (small effect), having ever had sex (small effect), and abnormal eating behaviors (medium effect). Overall, the assumption that self-injury is a White, female, high-achieving, middle-to-upper middle class issue was challenged (Abrams, 2003; Conterio & Lader, 1998; Ross & Heath, 2002).

Many key variables were associated with the three self-injury outcome variables at the bivariate level; however, these relationships disappeared when entered into a multivariate model. This indicates that many of these variables are interrelated and represent a system of variables, rather than isolated entities. Variables that demonstrate

relationships with the outcome variable at the bivariate level but not at the multivariate level may have either an indirect relationship with the outcome variable or even a spurious relationship (i.e., dependent on a third variable) with the outcome of interest. The nature of the relationships could be examined using structural equation modeling.

When controlling for all other variables in the multivariate model including suicide, having ever tried self-injury was associated with peer self-injury, inhalant use, belief in possibilities, abnormal eating behaviors, and suicide scale scores. Compared to youth who had never tried self-injury, youth who had tried self-injury were more likely to know a friend who had harmed themselves on purpose, tried inhalants, have lower belief in their possibilities, have higher levels of abnormal eating behaviors, and have higher suicide scale scores. With the amount of attention recently given to the impact of Internet exposure on self-injury (Teens Health, 2005; Whitlock et al., 2006), it was surprising that the amount of time spent using the computer or video games for fun did not emerge as significant within the multivariate logistic model. This may have been due to the lack of precision of the measure (i.e., not directly asking about Internet usage). Further research using a more precise measure of Internet use should be used to explore this relationship. When suicide was excluded from the multivariate model, two additional variables became statistically and practically significant: gender and having ever been hit or pushed by a girlfriend or boyfriend. Compared to youth who had never tried self-injury, youth who had tried self-injury were more likely to be female and to have been hit or pushed by a boy/girlfriend. This finding is consistent with Laye-Gindhu and Schonert-Reichl's (2005) supposition that as with gender differences in other expressions of emotional distress (i.e., internalizing behaviors versus externalizing behaviors), there may be gender

differences in self-injurious behaviors and underlying motivations. Support for this argument is found in the average developmental trajectories associated with depression, self-esteem, and anger, all of which are associated with self-injury (Brown, 2001). Depression, low self-esteem, and anger peak during early adolescence and the gender gap between males and females is the largest (Galambos et al., 2006).

It is because of this gender gap that gender differences in key study variables were explored at the bivariate level. In summary, attitudes toward school, belief in possibilities, and parent communication did not vary by gender ($p > .01$). Males reported, on average, a greater frequency of bullying than females ($p < .01$, small effect). A greater percentage of females (26%) than males (19%) had been cyberbullied ($p < .01$); however, this relationship was negligible. Males and females did not differ statistically significantly in the frequency of having been a victim of cyberbullying ($p > .01$). Interestingly, however, a greater percentage of females who had been physically hurt by a boyfriend/girlfriend (56.5%) had ever self-injured compared to males who had been physically hurt by a girlfriend/boyfriend (45%). Females (54%) were significantly more likely to know a friend who had harmed themselves compared to males (38%; $p < .0001$, small effect). Males spent significantly more time, on average, playing video games or using a computer for fun on an average school day than did females (small effect). There was no statistically significant difference between males and females on suicide scale scores ($p > .01$). Substance use scores and deviant behaviors did not differ by gender ($p > .01$). Females, on average, reported higher levels of abnormal eating behaviors than did males (small effect). Overall, results suggested a mixed picture of gender differences,

with some evidence that males may have become more similar to females on suicide risk, and females more similar to males on substance use and deviance.

CHAID analyses suggested large groups of youth at risk for (and not at risk) having ever tried self-injury, depending on whether suicide was included in the model. When suicide was included in the model, the segment at greatest risk for having ever tried self-injury comprised female youth who have moderate to high levels of suicidal tendencies and used substances in the past. This segment is consistent with clinical descriptions of individual who self-injure (i.e., White females with depression or other diagnoses). When suicide was excluded, the role of peer self-injury became apparent: the segment at greatest risk (original variables) comprised youth with low belief in their possibilities and who know a friend who has harmed themselves on purpose. When suicide was excluded and transformed scales were used, the segment at greatest risk comprised youth who have tried inhalants and know a friend who has harmed themselves on purpose.

In contrast, the segment at least risk for having ever tried self-injury (suicide included in the model) comprised youth who have not thought about, planned, or attempted suicide, have high belief in their possibilities, and have not used inhalants. When suicide was excluded from the model, the segment at least risk comprised youth with high belief in their possibilities, who have not used inhalants, and report low levels of bullying (victim).

During the past month, most youth had never harmed themselves on purpose. Approximately 15% had harmed themselves one time. Smaller proportions of youth had harmed themselves more frequently, including two or three different times (5%), four or

five different times (2%), and six or more different times (3%). There was a statistically significant and large relationship between having ever tried self-injury and past month frequency of self-injury. Among youth who self-reported having ever tried self-injury (N = 495), 35% had harmed themselves one time during the past month, 18% had harmed themselves two or three different times, 5.5% had harmed themselves four or five different times, and 11% had harmed themselves six or more different times. The frequency of self-injury did not vary by gender, race or ethnicity, grade, or school attended. Although Goodman (2005) suggested repetitive self-injury may be more common among females, this study failed to support this assertion. At the bivariate level, the frequency of self-injury was negatively associated with attitudes toward school, belief in possibilities, and parent communication. Whereas all groups (i.e., never, once, and more than once self-injured) differed from one another in terms of their attitudes toward school and belief in possibilities, youth who had never tried self-injury reported significantly higher levels of parent communication than did youth who had self-injured more frequently, but there were not significant differences in parent communication between youth who had self-injured once and youth who had self-injured more than once in the past 30 days. This is consistent with the finding that communication difficulties between parent and youth may place some youth at risk for self-injury (Derouin & Bravender, 2004).

The frequency of self-injury was associated with all four behavioral precipitants. The three groups differed from one another, on average, in terms of bullying frequency (victim) and cyberbullying frequency (victim), with youth who had self-injured more than once reporting the greatest frequency of both. The frequency of self-injury was

associated with two indicators of social contagion—peer self-injury and time spent using the computer or video games for fun. Youth who had never self-injured reported substantially lower average use of computer or video games for fun than did either youth who had self-injured once or more than once, which is consistent with emerging research on Internet use and self-injury (Teens Health, 2005; Whitlock et al., 2006). However, there was no statistically significant difference, on average, between youth who had self-injured once and those who had self-injured more than once, which suggests a threshold effect (i.e., once a certain level of Internet use is reached, a child is at risk).

Consistent with problem behavior theory (Jessor & Jessor, 1977), the frequency of self-injury was associated with all risk behaviors studied, including abnormal eating behaviors (medium effect), suicide scale scores (medium to large effect), deviant behavior scores (small to medium effect), substance use (medium effect), inhalant use (medium effect), and having ever had sex (small effect). All groups differed from one another on each risk behavior studied, with youth who had self-injured more than once reporting the highest level of each risk behavior (for continuous variables).

Relationships changed substantially between predictors and the frequency of self-injury, however, when the variables were entered into a multivariate model. The first comparison compared those who had self-injured once to those who had never self-injured in the past 30 days. Three variables were directly related to the frequency of self-injury: abnormal eating behaviors, peer self-injury, and suicide. As abnormal eating behaviors increased, the odds of having self-injured once, compared to never, increased. Youth who knew a friend who had harmed themselves on purpose were almost twice as likely to have self-injured once in the past 30 days compared to never. Suicide also was

associated with the odds of having self-injured once (compared to never), increasing as suicidal tendencies increased.

The second comparison compared those who had self-injured more than once to those who had never self-injured in the past 30 days. Three variables were related to the frequency of self-injury while controlling for all other variables in the model: suicide, having tried inhalants, and belief in possibilities. As suicidal tendencies increased, the odds of having self-injured twice or more (compared to never) increased. Youth who had tried inhalants were more two- and one-half times more likely to have self-injured twice or more in the past 30 days compared to never. Finally, as levels of belief in possibilities increased, the odds of having self-injured twice or more (compared to never) decreased.

The final comparison was made between those who had self-injured more than once and those who had self-injured once in the past 30 days. Only one variable, suicide, significantly distinguished the two groups. As suicidal tendencies increased, the odds of having self-injured twice or more (compared to once) increased. Suicidal tendencies were the most important factor in distinguishing between those who try the behavior once in the past 30 days and those who self-injure more frequently. This suggests the presence of two basic groups of youth—youth who may be catching a cultural trend (i.e., those who try the behavior once) and youth who have underlying mental health issues (i.e., those who self-injure more than once).

CHAID analyses with and without suicide in the model were used to identify segments at greatest and least risk of frequent self-injury. When suicide was included in the model, the segment at greatest risk of frequent self-injury comprised those who have a moderate to high level of suicidal tendencies, are non-Hispanic, and have used

inhalants. When suicide was excluded, the segment at greatest risk of frequent self-injury comprised youth with moderate to high levels of abnormal eating behaviors who know a friend who have harmed themselves on purpose.

In comparison, when suicide was included in the model, the segment at least risk of frequent self-injury comprised those who have not thought about, planned, or attempted suicide, use the computer or played video game, on average, for less than 1 hour per day, and have not used inhalants. Finally, when suicide was excluded, the segment at least risk comprised those with no abnormal eating behaviors, who do not know a friend who have harmed themselves on purpose, and of non-Black race/ethnicity.

Results suggested a sizable proportion of youth are already discussing self-injury and are aware of its presence among their peers (Fennig et al., 1995). This was not surprising because youth spend more time with their peers than ever before; they are connected 24/7 via cell phone, Internet, telephone, and face-to-face contact at school and other locations (Roberts et al., 2005). Almost one-half of students surveyed (46.8%) knew a friend who had harmed themselves on purpose. At the bivariate level, peer self-injury was associated with age (small effect), attitudes toward school (small effect), belief in possibilities (small effects), all four precipitants of self-injury (small effects), suicide scale scores (small to medium effects), substance use scores and inhalant use (medium effects), having ever had sex (small effect), deviancy scores (small effect), and abnormal eating scores (small effect).

However, peer self-injury demonstrated multivariate relationships with gender, grade, and school attended. Knowing a friend who had self-injured was more common among females, eighth graders, and students in Schools 2 (~52%) and 5 (~61%). Further,

in the multivariate model, peer self-injury also was associated directly with age at first alcohol use, having ever been cyberbullied, and having ever tried self-injury. Compared to youth who were not exposed to peer self-injury, youth exposed were older at first alcohol use, more likely to have ever been cyberbullied, and were more likely to have ever tried self-injury ($p < .01$). Self-injury is operating via the Internet: results suggest that youth who have tried self-injury and who have been cyberbullied may reach out to like others in cyberspace.

CHAID analyses revealed the segment at greatest risk of exposure to peer self-injury comprised youth with high levels of substance use and who have self-injured at least once during the past 30 days. This role of substance use is consistent with McCloskey and Berman's (2003) finding that alcohol use may increase disinhibition and risk taking, setting the stage for self-injury. Information is not available to explain why having ever tried self-injury would place youth at risk for peer self-injury, but the literature suggests some possible explanations. For example, youth who self-injure may share their injuries with members of their peer groups expecting social reinforcement (e.g., attention, sympathy), which may, in part, explain the shift between experimentation and repetition (Nock & Prinstein, 2004; Oliver et al., 2005). Some youth may compete with one another (i.e., comparing their injuries) and overestimate the number of their peers who self-injure. As Dishion and Dodge (2005) explained, peer contagion works through competition and false consensus bias (i.e., thinking more peers are performing a behavior than actually are).

Conversely, the segment at least risk of exposure to peer self-injury comprised youth with low levels of substance use, in sixth grade, and with no abnormal eating

behaviors. These youth have not had the early adverse experiences or been socialized to gravitate toward risky peer groups (i.e., Goths; Young et al., 2006; see also Hartup, 2005).

Strengths & Limitations

Quantitative approaches such as those used in this dissertation offer advantages. In addition to anonymity and privacy, the reduction of a complex topic in a careful manner can provide useful information, in terms of empirical evidence, obtained from a large, representative group of individuals. In this study, the collection of information on a wide range of demographic, attitudinal, and behavioral variables, combined with the use of CHAID resulted in the development of typologies of youth most at risk for self-injury. These results have important implications for prevention and intervention.

Although this study had many strengths, there were limitations that need to be kept in mind when interpreting the results. One of these limitations stems from the development of the self-injury items. Ideally, youth would have been allowed to conceptualize self-injury, which would have then informed item development. In addition, pretesting was not conducted, which may have picked up on ambiguities in the items. On the positive side, a preliminary review of the literature was conducted and used to inform item development. Also, professionals well-versed with adolescent mental health informed the item development process. Cognitive interviewing with a small sample of middle school aged youth was conducted as a part of the dissertation research to identify possible issues with the items (e.g., problematic words) and to document item validity (i.e., whether items measured what they were intended to measure). In summary, results suggested items represented valid measures of self-injury;

however, the inclusion of pinching may have resulted in the over-inflation of prevalence rates. In addition to serving as validity evidence, cognitive interviewing results were used to suggest improvements to self-injury items for future administrations of the YRBS.

The current state of the literature made it difficult to develop or identify items appropriate for a large scale survey. Most items in the literature are qualitative or open-ended in nature, and, thus were not suited for large-scale survey research. In addition, the need to limit the number of items included on the YRBS precluded the inclusion of multiple items designed to measure all key aspects of self-injury (e.g., preferred methods, precipitants). For example, items used in this study were not specific enough to enable the determination of types of self-injury. On the other hand, the desire for information was weighed against the desire to do no harm. The inclusion of multiple items seeking more in-depth information about the behavior may have triggered the behavior among vulnerable youth. Finally, the definition provided to youth gave examples, which may or may not have tapped into self-injury preferences among males (e.g., punching). This may result in higher prevalence estimates within gender.

The lack of clear distinction between self-injury and suicide within the self-injury lead in also is a limitation of this study. This lack of distinction represents a potential source of contamination between the two behaviors. The inclusion of separate sections—one for suicide and one for self-injury—may have helped to distinguish between the two behaviors. However, there remains the possibility that self-injury prevalence rates reported may include suicide attempts.

The sampling approach used in this study also poses limitations. Because classrooms and participants were not randomly sampled, the segments identified in this study may not correspond to associated segments in the general population (Vriens, 2001). Further, the reader should consider the demographics of the county when attempted to generalize the results of this study since random sampling was not utilized. In addition, students who participated in the survey administration were nested within schools. CHAID does not offer strategies for addressing the multilevel nature of the data. However, HLM 6 multilevel software, which can handle nested data involving categorical outcome variables, was used to conduct the logistic regressions.

Another limitation stemmed from the use of existing or secondary data. The low reliability of some of the scales used in this study represents a limitation as lower reliability makes it more difficult to find relationships. The definition of self-injury used on the YRBS was broad, which limited the ability of this study to focus on specific types of self-injury such as cutting and burning. The use of a broad definition resulted in a higher prevalence rate, which included behaviors such as pinching and scratching that may not be as problematic as other forms of self-harm (e.g., cutting). Further, the definition did not distinguish between repetitive self-injury and one-time self-injury. Also, the reliance on existing data limited the ability to ensure all key variables were included in the analysis. The absence of these variables along with the correlational design in this study precluded the examination of questions of etiology or causality. Also, relationships between self-injury and variables more useful in segmenting youth from an intervention design perspective (e.g., group affiliation), but were not included in the YRBS, could not be addressed. Further, even though theories of social contagion

(e.g., Gladwell, 2000/2002; Marsden, 1998) informed this study, items specific to these theories were not available. Only three items, which measured whether youth knew of a friend who self-injured and media exposure, were included that had the potential to tap into this theory. By no means did these items enable an exhaustive test of this body of literature. Also, a measure of lifetime frequency of self-injury was not included, which limited the ability to distinguish accurately between youth who had tried self-injury once and those who practiced the behavior regularly. The measure of past month frequency of self-injury made it possible to identify those who had practiced the behavior recently. Overall, segmentation and logistic regression models were underspecified because of the inability to include all relevant variables (e.g., self-identification with Goth subculture; Young et al., 2006). This was demonstrated, for example, in the classification accuracy rates of the CHAID models. Results suggested the models for having tried self-injury performed well, within the training samples, for example, correctly classifying 78% to 80% of cases. However, the model for peer self-injury did not perform as well. Within the training sample, it correctly classified only 64% of cases (comparison studies are not available), although this proportion still exceeds chance. As a result, the findings from this study should be considered preliminary.

The use of self-report data using closed-ended questions is also a limitation. This study relied on students' self-reports of several risk behaviors—information that is sensitive to some. The following precautions were taken to ensure the validity of students' self-reports: students were assured of the anonymity of the survey administration, identifying information was not collected, and a truthfulness item was

included on the YRBS. Students who reported responding truthfully less than one-half of the time were excluded from the analyses.

There also were limitations associated with CHAID. CHAID is a forward stepwise approach; thus, segmentation results depend upon the order in which variables enter the model (The Measurement Group, 1999-2005; Vriens, 2001). Once a predictor has entered the model, it cannot be removed later in the analysis (Vriens, 2001). Fortunately, CHAID trees can be revised manually to reflect theoretical or applied knowledge (Vriens, 2001). Investigators can choose to ‘force’ in independent variables at different stages in the tree based on non-statistical criteria (Vriens, 2001). Once a predictor variable is removed or added to a model, the entire model changes, making CHAID results unstable. Thus, CHAID is most useful for exploring large data sets and model building. Results should be considered suggestive and need to be confirmed using some external criteria (e.g., qualitative research with members of segments identified). Finally, the lack of agreed up stopping rules should be addressed with future research. The approach used in this study (i.e., statistical significance combined with effect size) represents an improvement over standard approaches (i.e., statistical significance alone); however, it is not without limitations. For example, statistical and practical effects can occur in nodes following those that do not meet a minimum effect size value.

Finally, this study relied on cross-sectional data. Thus, prevalence estimates represent a one-time snapshot of self-injury in a community sample of adolescents. Given the lack of baseline information available for early adolescents in the general population and the methodological variation across studies conducted within general populations of adolescents, it was impossible to explain differences in prevalence

estimates between this study and others or determine whether self-injury has increased among early adolescents. Finally, analyses using these cross-sectional data were not able to inform issues of directionality and causality.

Dissemination & Utilization

Dissemination of this study's results will occur through a brief report and presentation to peers and faculty during the dissertation defense. Study results will be summarized in a brief report that will be made available to Pupil Support Services of the county school board where data were collected. In addition, papers were presented at the 2007 American Educational Research Association (AERA) conference and the 2007 American School Health Association Conference. Finally, a journal-ready article will be prepared and submitted for possible publication in a professional journal. Journal options include *Journal of Youth and Adolescence*, *Journal of Adolescent Health*, and *Journal of Counseling & Development*. Efforts have been made to reach school administrators and guidance through two presentations, *Best Practices in the School Setting for Children at Risk*, delivered in the study county. The presentations have been delivered to approximately 85 to 100 school counselors, nurses, and interested staff.

Implications for Prevention

This is the first study to empirically examine self-injury in relation to multiple risk behaviors within a community sample of early adolescents with the goal of informing school-based prevention efforts. The results of this study suggest self-injury serves different functions for different youth. Self-injury operates as an expression of distress among youth with multiple risk factors (e.g., depression, abnormal eating behaviors, substance use) and is a "new" expression of adolescent risk behavior among

youth who may not have diagnosable mental illness that is being “labeled as risqué by adults in a particular historical and sociocultural setting” and becoming “normative” (Rew, 2005, p. 167). A substantial proportion of youth in the general population of early adolescents have tried the behavior and an even larger proportion of youth know friends who have tried the behavior.

When shared within a group setting, whether a clinical setting (e.g., mental health ward) or community setting (e.g., Goth subculture), self-injury may offer group cohesion, acceptance, and understanding (Crouch & Wright, 2004; Machoian, 2001; Muehlenkamp, 2005; Young et al., 2006). On campuses where the prevalence of peer self-injury is high, schools should offer youth alternatives to gaining group cohesion, acceptance, and understanding. Further research should seek to identify characteristics of schools that encourage high rates of peer self-injury (e.g., social dynamics, environmental determinants).

Among more recent cohorts, it is assumed that adolescents have been exposed to self-injury via some social venue (e.g., media, school) (Adler & Adler, 2005; Hodgson, 2004). This assumption was tested in this study and was supported. Knowing a friend who had harmed themselves on purpose (i.e., peer self-injury) was associated with an increased risk of having ever tried self-injury, possibly by setting the scene for some youth to experiment with self-injury when exposed within their peer networks. More than likely, some adolescents who self-injure (“individual deviants”) may be surrounded by “fellow deviants” who share their views of self-injury (i.e., the benefits, motivations) (e.g., Goths; Young et al., 2006), which may make it difficult for them to cease the behavior (Adler & Adler, 2005, p. 372). Being surrounded by their “fellow deviants”

confirms the “deviant identity” and makes it difficult for some adolescents to stop self-injuring and adopt healthier coping behaviors (Adler & Adler, 2005, p. 372). Although there is a relationship between these two variables, it may not be causal. Rather, it may be caused by some other variable (i.e., third variable).

One possible prevention approach is to reposition self-injury as an unacceptable, pathological behavior—not romantic, desirable, or positive (Suyemoto, 1998), a behavior that goes against the goal of adolescence (e.g., self-injury is an imitative behavior) (Taiminen et al., 1998; Walsh & Rosen, 1985), and a behavioral choice (Saxe et al., 2002). Repositioning self-injury in such a way may discourage social reinforcement for the behavior (e.g., attention, sympathy), which may, in turn, discourage the shift between experimentation and repetition. Providing youth with materials that coach them on how to deal with a friend who has self-injured and addressing the role of competition and overestimation in spreading the behavior would be essential in addressing self-injury on school campuses.

This study informs the growing literature on self-injury among males, suggesting gender differences may be negligible. Males are understudied due to their underrepresentation within clinical settings (Gratz, 2003; Laye-Gindhu & Schonert-Reichl, 2005). Thus, prevention programming should target males as well as females. Further research, however, should seek to identify differential motivations for self-injury, settings, and expressions of the behavior. For example, females were more likely than males to know a friend who had harmed themselves on purpose. This may suggest that males are more private about their self-injury than are females.

Interestingly, youth who had never tried self-injury reported that significantly higher levels of parent communication than did youth who had self-injured once or more than once. Recall that the communication items were, “My parents have talked to me about their feelings toward me smoking cigarettes” and “My parents have talked to me about their feelings toward me drinking alcohol.” Conceptualizing self-injury as a new risk behavior would mean needing to educate parents about the need for talking to their child about self-injury. Parents should be informed of the current cultural trend, the risks associated with self-injury, and resources available to help youth and families who are dealing with self-injury, associated behaviors, and traumas, if relevant. Future research should seek to identify familial influences on the initiation and maintenance of self-injury (e.g., family systems theory).

In addressing self-injury, one would need to identify aspects of individuals transmitting the self-injury message that make them attractive sources of information. Not having a measure of group affiliation was a limitation of this study. Knowing whether a student self-identified with certain groups (e.g., Goths, Skaters, Preps) prevalent in middle schools would have allowed for more powerful and informative segmentation strategies. For example, Young et al. (2006) found that identification with the Goth subculture was the best predictor of having self-injured or attempted suicide (Young et al., 2006). It would be interesting to know the extent to which the Goth identity overlapped with the at risk segments identified in this study. Further research conducted with early adolescents should include a measure of group identification such as that used in Young et al. (2006).

Primary prevention is defined as any type of intervention designed to prevent a behavior or negative outcome before it occurs. Primary prevention efforts are geared to general populations. Although childhood sexual abuse was not measured in this study, it should be considered an invisible third variable linked to many of the risk behaviors at play, including suicidal tendencies, abnormal eating behaviors, substance use, deviance, and self-injury (Darkness to Light, 2001-2005; Favaro, Ferrara, & Santonastaso, 2007; Gratz, Conrad, & Roemer, 2002; Muehlenkamp & Gutierrez, 2004). Within clinical settings, sexual abuse has been identified as the single best predictor of self-injury, and a recent study conducted among adults supported the association (Favaro et al., 2007). Approximately 21% of adults report having experienced sexual abuse as children (CDC, 1995/1997). One in four girls and one in six boys are sexually abused before the age of 18 (Darkness to Light, 2001-2005). The median age for reported abuse is 9 years of age—if the abuse is reported (Darkness to Light, 2001-2005). Most (80%) initially deny the abuse or tentatively disclose, and, of those who do come forward, most recant (Darkness to Light, 2001-2005). Most children do not disclose sexual abuse even if directly asked (Darkness to Light, 2001-2005). Self-injury, substance use and abuse, deviance, and suicidal thoughts, planning, and attempts offer these youth who have been harmed by the adults in their lives maladaptive ways to cope with the trauma. Self-injury in particular offers a unique way to communicate distress, one that seems to operate quite effectively in peer and online settings. Although not explored in this study, it would seem one of the most critical means of preventing self-injury would be through the prevention of child sexual abuse through such public health approaches as Stop It Now! (<http://www.stopitnow.com/>).

Prevention efforts should address current adverse experience in the adolescent's life, including bullying online and on school campuses, and dating violence. For example, although boys are more likely to experience dating violence, girls who had experienced this were more likely to report self-injury. Prevention programming that addresses dating violence could also address maladaptive coping behaviors such as self-injury. Also, schools should implement evidence-based bullying prevention programs and make sure that every student is ensured a safe learning environment. Finally, schools and community-based agencies need to partner together to address cyberbullying. There is a need for further research and development in this area.

Belief in possibilities reduces the risk for self-injury. Youth who believed they could choose not to use substances even if they were going through difficult times, believed their future held many possibilities, and believed they had better things to do than use substances such as cigarettes or alcohol, were much less likely to self-injure. On the other hand, youth who had relatively low levels of belief in their possibilities were more likely to have tried self-injury. Prevention and intervention efforts should offer youth who have had adverse experiences (i.e., children at risk) alternatives to using substances and self-injury for dealing with pain and other emotions that stem from these experiences. Efforts to inspire these youth to continue to believe in their possibilities *despite* what they have faced should be made (i.e., building resiliency). Engaging children at risk in community youth development activities or other prevention programming such as Teen Theater are possibilities.

Substance use, including inhalant use, plays a role in the initiation and maintenance of self-injury. Although this study was not able to shed light on this role

because of the limitations discussed previously, the literature suggests substance use, in and of itself, is a form of self-abuse (Favaro et al., 2007) and may set the stage for self-injury to occur through the disinhibition process (McCloskey & Berman, 2003).

Prevention efforts should target all substances; however, the results of this study suggest that particular attention should be paid to the prevention of inhalant use, particularly when seeking to prevent experimentation with self-injury and increasing frequency of self-injury among those who have already tried the behavior.

Secondary prevention, or prevention that occurs among those at risk for performing a behavior or developing a disease, could focus on peer prevention. The initial reaction to the behavior is a key time point for intervention—some youth will cut once and move on, whereas others cut once and find it works. Since youth gravitate more toward their peers at this age, they are more likely to disclose their first attempt—if at all—to a close friend. Equipping peers with the right things to say at the right time (i.e., when a peer discloses self-injury) to prevent their friends from self-injuring again could prevent some youth from developing a chronic, maladaptive behavioral condition.

The results of this study suggest self-injury is associated with time spent using the computer for fun (i.e., bivariate results); however, this relationship is outweighed by many other aspects in the child's life (Whitlock et al., 2006). Further research using more sensitive and comprehensive measures of Internet usage may find stronger relationships between Internet exposure and self-injury and shed light on the nature of this relationship. Given the role of cyberbullying and peer self-injury, it would seem wise to follow segmentation results that suggested the most protected youth were those who spent less than one hour per day using the computer or playing video games for fun.

Schools and parents should be made aware of this recommendation. One logical placement of self-injury prevention information would be in Internet safety training for students and parents. It is important to note the relationship may not be causal; some other variable (e.g., social skills) may account for the relationship between self-injury and time spent on the computer.

Tertiary prevention, or prevention efforts targeted at those who have already adopted a behavior, should focus on reducing the frequency of the behavior while simultaneously increasing the individual's adaptive coping skills. Results suggested self-injury, for some youth, is part of a problem (risk) behavior syndrome that includes substance and inhalant use, deviance, abnormal eating behaviors, and suicidal tendencies (Jessor, 1991). Jessor (1991) argued that youth who demonstrate such a syndrome may be in need of interventions that focus at the lifestyle level rather than at the level of individual problem or risk behaviors. Youth who tried self-injury exhibited multiple problems and reported poorer health, lower grades, and a tendency to stay home from school if they felt unsafe. This is a group in need of attention. Interesting, youth who self-injured in this study differed from those described in Fennig et al. (1995). These youth were described as high functioning socially and academically but who exhibited internalizing traits (e.g., anxiety)—not severe emotional disturbance. Focusing on the early identification of vulnerable youth and teaching/modeling adaptive coping skills may be a more effort-, time-, and cost-effective approach than a universal approach (Gladwell, 2000/2002). Yip (2005) advocated for a multidimensional intervention with emphasis on the social environment, including supportive parents and peers, teaching youth to handle

frustration and anger and regulate emotions in positive ways, and nurturing youth with the goal of developing their self-image and promoting their competence.

In practice, self-injury should be considered comorbid with other risk behaviors. Screening for one behavior should include screening for self-injury. For example, if a student exhibited a pattern of visiting the school nurse to be weighed on a frequent basis, the student should be screened for self-injury. Another example of combining prevention approaches would be including a self-injury component with suicide screening and prevention programming.

Implications for Further Research

Much continues to be learned about self-injury during early adolescence. Several recommendations for further research were already made and will not be repeated here. One area needing further research is understanding how youth conceptualize and attribute meaning to self-injury. To achieve this understanding, both qualitative (e.g., phenomenological) and mixed methods approaches are needed. In public health research, typically mixed methods designs result in the best information necessary for designing interventions that will be most responsive to the target audience and, thus, achieve behavior change. In this study, it was not possible to conduct extensive qualitative research with students. To complete the description and develop an intervention to address self-injury in the study county's schools, further research would need to be conducted with students, staff, and parents. For example, in-depth interviews with individuals who fell into selected segments could be conducted to gather information needed to design an intervention (e.g., peer communication). Focus groups or interviews could be conducted with parents to gather information needed to develop a social

marketing campaign targeted at increasing awareness of the behavior and seeking resources for their child if needed. Peer groups could be observed and both individual and group interviews could be conducted. Clinical skills, given the nature of the topic, may be needed when conducting qualitative research with youth. Supporting youth (i.e., peer research) in conducting research in this area would provide a novel means of learning more about self-injury and culturally appropriate interventions (see Alfonso (2003, 2004) for an overview of working with youth researchers).

Finally, to my knowledge this study is the first to investigate empirically the extent of peer self-injury (i.e., the frequency of self-injury among their friends). Much work remains to be undertaken in this area. Early adolescents are very much aware of each other's behavior and may encourage one another to adopt and continue a behavior that places them at risk for negative outcomes. Some questions for future research include: Are there some youth who try self-injury during middle school or beyond for attention ("fakes", "attention whores"; Taiminen et al., 1998) and some who self-injure 'legitimately' (Crouch & Wright, 2004)? What are youths' reactions to other youth who self-injure (e.g., social reinforcement, isolation)? Should schools remain quiet ("reluctant") about the issue and isolate those who self-injure to prevent contagion (e.g., Derouin & Bravender, 2004; Lieberman, 2004)? What can schools do to address peer contagion without making it worse?

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Appendices

2005

YOUTH RISK BEHAVIOR SURVEY

MIDDLE SCHOOL QUESTIONNAIRE

This survey is about health behavior. It has been developed so you can tell us what you do that may affect your health. The information you give will be used to develop better health education for young people like yourself.

DO NOT write your name on this survey. The answers you give will be kept private. No one will know what you write. Answer the questions based on what you really do.

Completing the survey is voluntary. Whether or not you answer the questions will not affect your grade in this class. If you are not comfortable answering a question, just leave it blank.

The questions that ask about your background will be used only to describe the types of students completing this survey. The information will **NOT** be used to find out your name. No names will ever be reported.

- **Make sure to read every question.**
- **Use a #2 pencil only.**
- **Fill in the ovals completely.**
- **When you are finished, follow the instructions of the person giving you the survey.**

Thank you very much for your help.

1. How old are you?
 - A. 10 years old or younger
 - B. 11 years old
 - C. 12 years old
 - D. 13 years old
 - E. 14 years old
 - F. 15 years old
 - G. 16 years old or older

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

3. In what grade are you?
 - A. 6th grade
 - B. 7th grade
 - C. 8th grade
 - D. Other

4. How do you describe yourself?
 - A. American Indian or Alaska Native
 - B. Asian
 - C. Black or African American
 - D. Hispanic or Latino
 - E. Native Hawaiian or Other Pacific Islander
 - F. White

5. What school do you go to?
 - A. Middle School 1
 - B. Middle School 2
 - C. Middle School 3
 - D. Middle School 4
 - E. Middle School 5
 - F. Middle School 6
 - G. Middle School 7
 - H. Middle School 8
 - I. None of the above

6. What school do you go to?
- A. Other School 1
 - B. Other School 2
 - C. Other School 3
 - D. Other School 4
 - E. Other School 5
 - F. Other School 6
 - G. None of the above
7. How do you describe your health in general?
- A. Excellent
 - B. Very good
 - C. Good
 - D. Fair
 - E. Poor

The next 8 questions ask about personal safety and violence-related behaviors.

8. How often do you wear a seat belt when riding a car?
- A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always
9. When you ride a bicycle, how often do you wear a helmet?
- A. I do not ride a bicycle
 - B. Never wear a helmet
 - C. Rarely wear a helmet
 - D. Sometimes wear a helmet
 - E. Most of the time wear a helmet
 - F. Always wear a helmet
10. When you rollerblade or ride a skateboard, how often do you wear a helmet?
- A. I do not rollerblade or ride a skateboard
 - B. Never wear a helmet
 - C. Rarely wear a helmet
 - D. Sometimes wear a helmet
 - E. Most of the time wear a helmet
 - F. Always wear a helmet

11. Have you ever ridden in a car driven by someone who had been drinking alcohol?
- A. Yes
 - B. No
 - C. Not sure
12. During the past 30 days, have you ever carried a weapon, such as a gun, knife, or club to school?
- A. Yes
 - B. No
13. During the past 30 days, have you ever been in a physical fight at school?
- A. Yes
 - B. No
14. Have you ever been in a physical fight at school in which you were hurt and had to be treated by a doctor or nurse?
- A. Yes
 - B. No
15. During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?
- A. Yes
 - B. No

The next 12 questions ask about bullying at school during the past 30 days.

Definition of Bullying: Bullying is anything from teasing, saying mean things, writing mean notes, or leaving someone out of the group, to physical attacks (hitting, pushing, kicking) where one person or a group of people picks on another person over and over again. Kids who are bullied have a hard time defending themselves.

16. During the past 30 days, how many times did another student tease or call you names?
- A. Never
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times

17. During the past 30 days, how many times did another student threaten to hit or hurt you?
- A. Never
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
18. During the past 30 days, how many times did another student spread rumors about you?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
19. During the past 30 days, how many times did other students not let you join in what they were doing?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
20. During the past 30 days, how many times did another student push, shove, slap, hit, or kick you on purpose?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
21. During the past 30 days, how many times did you tease or call another student names?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times

22. During the past 30 days, how many times did you threaten to hit or hurt another student?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
23. During the past 30 days, how many times did you spread rumors about another student?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
24. During the past 30 days, how many times did you keep another student from joining in what you were doing?
- A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 or more times
25. During the past 30 days, how many times did you push, shove, slap, hit, or kick another student on purpose?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
26. Have you been taught about not bullying at school?
- A. Yes
 - B. No
 - C. Not sure

27. During the past 30 days, how many days did you not go to school because you felt you would be unsafe at school or on your way home from school?
- A. Never
 - B. 1 day
 - C. 2 or 3 days
 - D. 4 or 5 days
 - E. 6 or more days

The next 4 questions are about "cyberbullying".

Cyberbullying is "using the Internet or cell phone to send or post harmful or cruel text or images to bully others." Examples of cyberbullying include sending cruel or threatening messages, creating websites that ridicule others, posting pictures of classmates online and asking students to rate them, morphing photos, taking a picture of a person in a locker room or bathroom using a digital phone camera and sending to others, or engaging someone in instant messaging (IM) to trick them into revealing sensitive information for the purpose of sending on to others.

28. During your lifetime, have you ever been cyberbullied?
- A. Yes
 - B. No
29. Have you ever cyberbullied someone else?
- A. Yes
 - B. No
30. During the past 30 days, how many times were you the victim of cyberbullying?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times
31. During the past 30 days, how many times did you cyberbully someone else?
- A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 or more times

The next 3 questions ask about attempted suicide. Sometimes people feel so depressed about the future that they may consider attempting suicide or killing themselves.

32. Have you ever **seriously** thought about killing yourself?
- A. Yes
 - B. No
33. Have you ever made a **plan** about how you would kill yourself?
- A. Yes
 - B. No
34. Have you ever **tried** to kill yourself?
- A. Yes
 - B. No

The next 3 questions ask about self-harm (cutting, scratching, burning, not allowing wounds to heal, pinching). Sometimes people who feel upset hurt themselves on purpose as a way to feel better (less upset).

35. Have you ever hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
- A. Yes
 - B. No
36. During the past month, how often have you hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
- A. Never
 - B. 1 time
 - C. 2 or 3 different times
 - D. 4 or 5 different times
 - E. 6 or more different times
37. Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?
- A. Yes
 - B. No

The next 10 questions ask about tobacco use.

38. Have you ever tried cigarette smoking, even one or two puffs?
- A. Yes
 - B. No
39. How old were you when you smoked a whole cigarette for the first time?
- A. I have never smoked a whole cigarette
 - B. 8 years old or younger
 - C. 9 years old
 - D. 10 years old
 - E. 11 years old
 - F. 12 years old
 - G. 13 years old
 - H. 14 years old or older
40. **During the past 30 days**, have you smoked cigarettes, even one or two puffs?
- A. Yes
 - B. No
41. **During the past 30 days**, on how many days did you smoke cigarettes?
- A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days
42. **During the past 30 days**, on the days you smoked, how many cigarettes did you smoke **per day**?
- A. I did not smoke cigarettes during the past 30 days
 - B. Less than 1 cigarette per day
 - C. 1 cigarette per day
 - D. 2 to 5 cigarettes per day
 - E. 6 to 10 cigarettes per day
 - F. 11 to 20 cigarettes per day
 - G. More than 20 cigarettes per day

43. **During the past 30 days, how did you usually get your own cigarettes?** (Select only **one** response)
- A. I did not smoke cigarettes during the past 30 days
 - B. I bought them in a store, such as a convenience store, super market, or gas station
 - C. I bought them from a vending machine
 - D. I gave someone else money to buy them for me
 - E. I borrowed (or bummed) them from someone else
 - F. A person 18 years or older gave them to me
 - G. I took them from a store or family member
 - H. I got them some other way
44. **When you bought or tried to buy cigarettes in a store during the past 30 days, were you ever asked to show proof of age?**
- A. I did not try to buy cigarettes in a store during the past 30 days
 - B. Yes, I was asked to show proof of age
 - C. No, I was **not** asked to show proof of age
45. Have you ever smoked cigarettes daily, that is, at least one cigarette every day for 30 days?
- A. Yes
 - B. No
46. **During the past 30 days, on how many days did you use chewing tobacco or snuff, such as Redman, Levi Garrett, Beechnut, Skoal Bandits, or Copenhagen?**
- A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days
47. **During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?**
- A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days

- F. 20 to 29 days
- G. All 30 days

The next 6 questions ask about drinking alcohol. This includes drinking beer, wine, wine coolers, and liquor such as rum, gin, vodka, or whiskey. For these questions, drinking alcohol does not include drinking a few sips of wine for religious purposes.

- 48. Have you ever had a drink of alcohol, other than a few sips?
 - A. Yes
 - B. No

- 49. How old were you when you had your first drink of alcohol other than a few sips?
 - A. I have never had a drink of alcohol other than a few sips
 - B. 8 years old or younger
 - C. 9 years old
 - D. 10 years old
 - E. 11 years old
 - F. 12 years old
 - G. 13 years old
 - H. 14 years old or older

- 50. **In the past 30 days**, have you had any alcohol to drink, other than a few sips?
 - A. Yes
 - B. No

- 51. In the last year, have you had **five or more drinks** of alcohol in one day?
 - A. Yes
 - B. No

- 52. During the past 30 days, how many times have you had 5 or more drinks in one day?
 - A. 0 days
 - B. 1 to 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days

53. During the past 30 days, how did you get alcohol?
- A. I did not drink alcohol during the past 30 days.
 - B. I bought alcohol in a store such as a gas station, super market, or convenience store.
 - C. I took alcohol from my house.
 - D. I had a person 21 years or older buy alcohol for me.
 - E. I had a stranger buy alcohol for me.
 - F. I was with a group that was drinking alcohol.

The next 4 questions ask about marijuana use. Marijuana also is called grass or pot.

54. Have you ever used marijuana?
- A. Yes
 - B. No
55. During the past 30 days, how often have you used marijuana?
- A. 0 days
 - B. 1 to 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days
56. How old were you when you tried marijuana for the first time?
- A. I have never tried marijuana
 - B. 8 years old or younger
 - C. 9 years old
 - D. 10 years old
 - E. 11 years old
 - F. 12 years old
 - G. 13 years old
 - H. 14 years old
57. During the past 30 days how did you get marijuana?
- A. I did not use marijuana in the past 30 days.
 - B. I took marijuana from my house.
 - C. I was with a group that was using marijuana.
 - D. I bought it at school.

E. I bought it outside of school.

The next 4 questions ask about other drug use.

58. Have you ever used **any** form of cocaine, including powder, crack, or freebase?

A. Yes

B. No

59. Have you ever sniffed glue, or breathed the contents of spray cans, or inhaled any paints or sprays to get high?

A. Yes

B. No

60. Have you ever used prescription drugs or over the counter medicine (cough/cold medicine) to get high?

A. Yes

B. No

61. Have you ever used a needle to inject any **illegal** drug into your body?

A. Yes

B. No

The next 7 questions ask about body weight.

62. How do **you** describe your weight?

A. Very underweight

B. Slightly underweight

C. About the right weight

D. Slightly overweight

E. Very overweight

63. 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

64. Have you ever **exercised** to lose weight or to keep from gaining weight?

- A. Yes
- B. No

65. Have you ever **eaten less food, fewer calories, or foods low in fat** to lose weight or to keep from gaining weight?

- A. Yes
- B. No

66. Have you ever **gone without eating for 24 hours or more** (also called fasting) to lose weight or to keep from gaining weight?

- A. Yes
- B. No

67. Have you ever **taken any diet pills, powders, or liquids** without a doctor's advise to lose weight or to keep from gaining weight? (Do **not** include meal replacement products such as Slim Fast.)

- A. Yes
- B. No

68. Have you ever **vomited** or **taken laxatives** to lose weight or to keep from gaining weight?

- A. Yes
- B. No

The next 9 questions ask about physical activity.

69. **On how many of the past 7 days** did you exercise or participate in physical activity for **at least 20 minutes that made you sweat and breathe hard**, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?

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

70. **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
71. Do you play on any sports teams? (Include any teams run by your school or community groups.)
- A. Yes
 - B. No
72. In an average week when you are in school, on how many days do you go to physical education (PE) classes?
- A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
73. In the last 2 months, did you try a new game or sport (rock climbing, roller blading, or other fun thing) that you've never done before?
- A. Yes
 - B. No
74. Have you ever seen, read, or heard any messages or ads about VERB?
- A. Yes
 - B. No
75. Have you ever seen, read, or heard any messages or ads about **VERB Summer Scorecard**?
- A. Yes
 - B. No

76. Think about an average week during this school year. How many days of the week do you do a physical activity or play a sport, NOT including PE?
- A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
 - G. 6 days
 - H. 7 days
77. If I did physical activities on most days it would be fun.
- A. Really Agree
 - B. Sort of Agree
 - C. Sort of Disagree
 - D. Really Disagree

The next question asks about AIDS education.

78. Have you ever been taught about AIDS or HIV infection in school?
- A. Yes
 - B. No
 - C. Not sure

The next 4 questions ask about sexual intercourse.

79. Have you ever had sexual intercourse?
- A. Yes
 - B. No
80. How old were you when you had sexual intercourse for the first time?
- A. I have never had sexual intercourse
 - B. 8 years old or younger
 - C. 9 years old
 - D. 10 years old
 - E. 11 years old
 - F. 12 years old
 - G. 13 years old
 - H. 14 years old or older

81. With how many people have you ever had sexual intercourse?
- A. I have never had sexual intercourse
 - B. 1 person
 - C. 2 people
 - D. 3 or more people
82. The **last time** you had sexual intercourse, did you or your partner use a condom?
- A. I have never had sexual intercourse
 - B. Yes
 - C. No

The next 2 questions are about health-related behaviors.

83. How often do you wear sunscreen or sun block when you are outside for more than an hour?
- A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always
84. On an average school day, how many hours do you spend playing video games or using a computer for fun? (Include activities such as Nintendo, Game Boy, Play Station, and computer games.)
- A. I do not play video games or use a computer for fun
 - B. Less than 1 hour
 - C. 1 hour
 - D. 2 hours
 - E. 3 hours
 - F. 4 hours
 - G. 5 hours
 - H. 6 or more hours

The next 4 questions are about delinquent behaviors.

85. Since school started this year how many times have you skipped school?
- A. Never
 - B. 1 time

- C. 2 times
- D. 3 times
- E. More than 3 times

86. During the past 12 months, how often have you shoplifted (stolen something from a store)?

- A. 0 times
- B. 1 time
- C. 2 or 3 times
- D. 4 or 5 times
- E. 6 or more times

87. During the past 12 months, have you been a member of a gang? (A group of people who identify themselves with the same symbol, color, and/or name and participate in criminal activity.)

- A. Yes
- B. No

88. Do you think you will be involved in a gang in the future?

- A. Yes
- B. No

The next question asks about the *Believe in All Your Possibilities* campaign.

89. Have you ever heard, seen, or read anything about the *Believe in All Your Possibilities* campaign (BELIEVE)?

- A. Yes
- B. No
- C. Not sure

The next 2 questions ask about *SOURCE Teen Theatre* performances. High school students from *SOURCE Teen Theatre* have performed plays about underage smoking and drinking (“End of Summer”), bullying (“Surviving Lunch”), and other topics (“Read My Lips”).

90. Have you seen a *SOURCE Teen Theatre* performance?

- A. Yes
- B. No
- C. Not sure

91. Was the *SOURCE Teen Theatre* play talked about in your classroom either before or after the performance?
- A. I have not seen a SOURCE Teen Theatre play
 - B. Yes, we talked about the play.
 - C. No, we did not talk about the play.
 - D. Not sure

The next question asks about the Welcome Everybody or Where Everybody Belongs (WEB) program.

92. Have you participated in WEB activities such as the 6th grade back to school assembly?
- A. Yes
 - B. No
 - C. Not sure

The next two questions ask about your parents.

93. My parents have talked to me about their feelings toward me smoking cigarettes.
- A. Yes
 - B. No
 - C. Not sure
94. My parents have talked to me about their feelings toward me drinking alcohol.
- A. Yes
 - B. No
 - C. Not sure

The next several questions ask about your feelings about your future, substance use, and your family.

95. I believe my future holds many possibilities.
- A. Strongly Agree
 - B. Agree
 - C. Neither Agree nor Disagree
 - D. Disagree
 - E. Strongly Disagree
96. I believe I have better things to do than smoke cigarettes or drink alcohol.

- A. Strongly Agree
- B. Agree
- C. Neither Agree nor Disagree
- D. Disagree
- E. Strongly Disagree

97. My parents stick by what they believe is best for me even if I disagree.

- A. Strongly Agree
- B. Agree
- C. Neither Agree nor Disagree
- D. Disagree
- E. Strongly Disagree

98. I believe I can choose to not smoke cigarettes or drink alcohol, even if I'm going through tough times.

- A. Strongly Agree
- B. Agree
- C. Neither Agree nor Disagree
- D. Disagree
- E. Strongly Disagree

99. There is at least one teacher or adult at this school I can talk with if I have a problem.

- A. Strongly Agree
- B. Agree
- C. Neither Agree nor Disagree
- D. Disagree
- E. Strongly Disagree

100. People at my school notice when I am good at something.
- A. Strongly Agree
 - B. Agree
 - C. Neither Agree nor Disagree
 - D. Disagree
 - E. Strongly Disagree
101. I participate in activities (clubs, sports, WEB, etc.) at this school.
- A. Strongly Agree
 - B. Agree
 - C. Neither Agree nor Disagree
 - D. Disagree
 - E. Strongly Disagree
102. How would you describe the grades you usually get on school assignments?
- A. Mostly A's
 - B. Mostly A's and B's
 - C. Mostly B's
 - D. Mostly B's and C's
 - E. Mostly C's
 - F. Mostly C's and D's
 - G. Mostly D's
 - H. Mostly D's and F's
 - I. Mostly F's

The next questions ask about your answers on this survey.

103. In general, how often did you tell the truth in answering the questions on this survey?
- A. All of the time
 - B. Most of the time
 - C. About half of the time
 - D. Less than half the time
 - E. None of the time
104. I read this survey carefully
- A. All of the time
 - B. Most of the time

- C. About half of the time
- D. Less than half the time
- E. None of the time

Thank you very much for your help!

Appendix B

Exploratory Factor Analysis Results

Variable	Promax Factor Loadings			
	1	2	3	4
Thought about suicide	-0.037	0.901	-0.020	0.068
Planned suicide	-0.040	0.913	-0.001	0.064
Tried suicide	0.081	0.822	-0.096	0.117
Carried weapon to school	0.063	0.124	-0.069	0.759
Fight at school	-0.015	0.0044	0.010	0.616
Hurt in a fight	0.006	0.184	0.046	0.383
Hit or pushed by girl/boyfriend	0.134	0.165	0.091	0.231
Ever been cyberbullied	-0.092	-0.071	1.059	0.010
Ever tried cigarettes	0.835	0.077	0.099	-0.074
Smoked cigarettes in past 30 days	0.907	0.205	0.039	-0.257
Ever tried alcohol	0.735	-0.098	0.057	0.163
Frequency of 5 or more drinks in one day in past 30 days	0.743	-0.094	-0.063	0.306
Drank alcohol in past 30 days	0.674	-0.059	0.019	0.298
Ever had five or more drinks of alcohol	0.748	-0.142	-0.079	0.247
Ever tried marijuana	0.919	-0.065	-0.037	-0.006
Used marijuana in the past 30 days	0.814	0.020	-0.095	0.154
Ever used inhalants	0.267	0.192	0.083	0.371
Ever used OTC or prescription medications to get high	0.641	0.074	0.012	0.233
Ever had sex	0.516	-0.009	-0.051	0.306
Frequency of skipping school	0.278	-0.015	0.009	0.383
Frequency of shoplifting	0.457	0.015	0.009	0.383
Frequency of cigarette smoking during past 30 days	0.890	0.209	-0.017	-0.091
TV viewing hours	0.042	-0.034	-0.045	0.088
Video game and computer use for fun – hours	-0.173	-0.075	0.195	0.329
Peer self-injury	0.267	0.249	0.242	-0.108
Frequency of having been the victim of cyberbullying	0.055	0.008	0.789	-0.062

Inter-Factor Correlations				
Factor	1	2	3	4
1	1.000			
2	0.522	1.000		
3	0.420	0.436	1.000	
4	0.618	0.431	0.347	1.000

Appendix C

Relationships among Predictor Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	1.00																						
2	-.13	1.00																					
3	.16	-.05	1.00																				
4	-.22	.44	-.13	1.00																			
5	.18	-.07	.16	-.13	1.00																		
6	.30	-.21	.16	-.34	.14	1.00																	
7	.16	-.09	.11	-.13	.22	.19	1.00																
8	.22	-.11	.23	-.24	.10	.29	.11	1.00															
9	.28	-.16	.13	-.28	.23	.23	.19	.14	1.00														
10	.29	-.19	.15	-.32	.16	.35	.19	.28	.30	1.00													
11	.18	-.08	.11	-.14	.21	.16	.50	.11	.14	.11	1.00												
12	.27	-.16	.14	-.28	.24	.23	.15	.19	.65	.28	.16	1.00											
13	.12	-.02	-.10	-.02	-.06	-.02	.07	-.09	.07	.01	.03	.04	1.00										
14	.08	-.09	.01	-.13	.02	.17	.10	.19	.01	.07	.08	.01	.01	1.00									
15	-.12	.23	-.05	.32	-.11	-.22	-.09	-.16	-.16	-.17	-.11	-.17	.09	-.08	1.00								
16	.23	-.10	.08	-.22	.19	.23	.22	.10	.25	.21	.14	.22	.16	.22	-.14	1.00							
17	-.10	.17	-.03	.21	-.02	-.11	-.04	-.03	-.13	-.12	-.06	-.12	-.04	.04	.14	-.04	1.00						
18	.00	-.07	-.02	.01	.01	-.01	.06	-.09	.00	-.01	.03	-.03	.02	-.01	.08	.01	.09	1.00					
19	.01	-.03	-.01	.01	-.08	-.04	.03	-.07	-.04	.02	.01	-.04	.00	-.12	.05	.00	-.00	.24	1.00				
20	.31	-.18	.19	-.40	.17	.41	.19	.43	.26	.40	.19	.25	-.06	.29	-.25	.30	-.10	-.02	-.01	1.00			
21	.35	-.19	.17	-.30	.26	.26	.19	.23	.48	.34	.17	.39	.06	.11	-.18	.26	-.11	-.00	-.03	.32	1.00		
22	.02	-.02	.00	-.07	.07	.04	-.03	.02	.03	.03	-.04	.05	.11	.06	-.11	.06	-.05	-.14	-.11	.03	.01	1.00	
23	.02	-.08	.05	-.05	.13	.09	.15	.06	.10	.06	.09	.11	-.19	.04	-.06	.05	-.02	-.07	-.07	.06	.07	.26	1.00

Appendix C Continued

Variable Key

# in Correlation Matrix	Variable Description	Middle School YRBS Item #
1	Abnormal eating behavior scale	66 – 68
2	Attitudes toward school scale	99 – 101
3	Been physically hurt by girlfriend or boyfriend	15
4	Belief in possibilities scale	95, 96, 98
5	Bully scale	16 – 20
6	Deviant Behaviors	85 – 86
7	Ever been cyberbullied	28
8	Ever had sexual intercourse	79
9	Ever harmed themselves on purpose	35
10	Ever tried inhalants	59
11	Frequency of being a victim of cyberbullying	30
12	Frequency of self-injury during past 30 days	36
13	Gender	2
14	Grade level	3
15	Grades – self-reported academic performance	102
16	Knowledge of peer self-injury	37
17	Parent communication scale	93 – 94
18	Race or ethnicity	4
19	School	5
20	Substance Use	38, 40 – 42, 48, 50 – 52, 54, 55, 60
21	Suicide	32 – 34
22	TV viewing – amount per school day	70
23	Video/computer use – amount per school day	84

Appendix D

Summary of Bivariate and Multivariate Results

Predictor	Self-injury		Frequency of SI		Peer Self-injury	
	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate
Female	S+	NS	NS	NS	S+	S+
Hit by boy/girlfriend	S+	NS	S+	NS	S+	NS
Cyberbullied	S+	NS	S+	NS	S+	S+
Tried self-injury	NA	NA	NA	NA	S+	S+
Peer self-injury	S+	S+	S+	S+	S+	NS
Inhalant use	S+	S+	M+	M+	S+	NS
TV viewing time	NS	NS	NS	NS	NS	NS
Sex (ever had)	S+	NS	S+	NS	S+	NS
Video/computer use	S+	NS	S+	NS	S+	NS
Grades	S-	NS	S-	NS	S-	NS
Grade level	NS	S+	NS	S-	S+	S+
Attitudes toward school	S-	NS	S ₋	NS	S-	NS
Belief in possibilities	M-	S-	M-	S-	S-	NS
Parent communication	S-	NS	S-	NS	S-	NS
Bully (victim) frequency	S+	NS	S+	S+	S+	NS
Abnormal eating behaviors	M+	M+	M+	M+	S+	NS
Substance use	M+	NS	M+	NS	M+	S+
Suicide	L+	M+	M+	S+ & M+	S+	NS
Deviant behavior	S+	NS	S+	NS	S+	NS
Black	NS	NS	NS	NS	NS	NS
Hispanic	NS	NS	NS	NS	NS	NS
Other ethnicity	NS	NS	NS	NS	NS	NS

NS = non-statistically significant

S = small

M = moderate/medium

L = large

+ = positive

- = negative

About the Author

Moya has spent her professional career conducting community-based research and evaluation. She is known for her ability to help community-based institutions such as schools identify prevention needs and effective strategies and conduct evaluations. She is a staff member of the Methods and Evaluation Unit of the Florida Prevention Research Center at the University of South Florida (USF). Currently, she provides evaluation support for three physical activity social marketing campaigns building on CDC's national VERB™ campaign for “tweens” and *Believe in All Your Possibilities*, a community-based alcohol and tobacco prevention program.

Moya Lynn Alfonso has an interdisciplinary background in psychology, anthropology, public health, and education. She obtained her master's of science in public health from the USF, College of Public Health. She received her doctoral degree from USF in Educational Measurement and Research. Moya plans to continue her research related to adolescent and family health and teach at the university level.