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DISSERTATION

UNDERSTANDING INHALANT ABUSE: AN APPLICATION OF PRIMARY SOCIALIZATION THEORY

Submitted by

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In partial fulfillment of the requirements

for the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Spring 2000

COLORADO STATE UNIVERSITY

May 5, 1999

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY DEBRA MICHELLE SMITHAM ENTITLED UNDERSTANDING INHALANT ABUSE: AN APPLICATION OF PRIMARY SOCIALIZATION THEORY BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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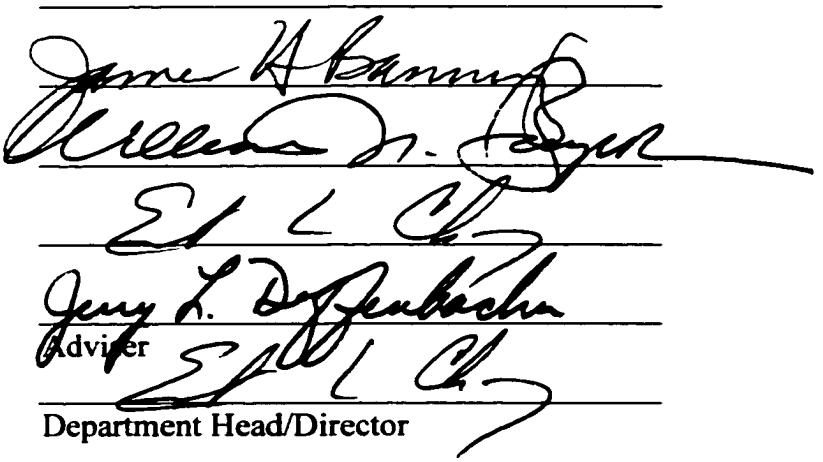

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ABSTRACT OF DISSERTATION

UNDERSTANDING INHALANT ABUSE: AN APPLICATION OF PRIMARY SOCIALIZATION THEORY

Trend data suggest that the majority of inhalant use is concentrated among 12 to 14 year-old youth. However, research on the characteristics of inhalant users has been conducted almost entirely with older inhalant users in treatment or detention programs. Moreover, this research has lacked a guiding theoretical framework, resulting in a list of risk factors without obvious relation to one another. The present study addresses these shortcomings in two phases. The first phase replicates and extends past findings linking inhalant use to serious emotional, social, school, and family problems within a representative sample of 12-14 year-old students. The second phase integrates the risk and protective factors for inhalant use using primary socialization theory.

Archival data from 12 to 14 year-old, White non-Hispanic youth (N = 12,905) were taken from a national school sample. Six drug use comparison groups were created based on self-reported drug use patterns: non/negligible drug users, experimental inhalant users, recreational inhalant users, heavy inhalant users, recreational drug users with no history of inhalant use, and heavy drug users with no history of inhalant use.

Multivariate analysis of variance was used to compare the six groups on emotional distress, deviant attitudes, school adjustment, family relations, and peer drug involvement. Group differences on violence, criminal behavior, and victimization were

also examined. Results corroborate past research linking inhalant use to serious psychosocial difficulties. Inhalant users reported more severe psychosocial problems and greater incidence of violence, criminal behavior, and victimization than other drug users.

The second phase employed structural equation modeling to evaluate primary socialization theory as a model for understanding drug use among heavy inhalant, heavy drug, recreational inhalant, and recreational drug users. Results support primary socialization theory as a satisfactory model of drug use for all groups. Drug using peers were identified as the biggest risk factor for drug use. Personal, family, and school effects were mediated by peer influences. Model comparisons suggest that primary socialization theory operated in the same manner to predict drug use for inhalant and other drug users. Results suggest comprehensive treatment and prevention programs that simultaneously address peer, family, and school influences on inhalant use.

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ACKNOWLEDGEMENTS

First and foremost, I would like to thank my adviser, Jerry Deffenbacher, for his continuous support and guidance. Your knowledge, kindness, and generosity have made a tremendous difference throughout my undergraduate and graduate education and will always be remembered.

I would also like to thank Nathan Luther, for his infinite patience and sincere friendship. This project would not have been possible without your contributions, especially your unending moral support.

My most heartfelt thanks go to my family, Bill, Janette, and Will Smitham, for a lifetime of love and support. Thoughts of you brighten my life every day and I love you more than you may ever know.

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Chapter I

Understanding Inhalant Abuse: An Application of Primary Socialization Theory

Inhalant abuse, defined as the repeated, intentional inhalation of solvent vapors for the purpose of intoxication (Altenkirch & Kindermann, 1986), has been increasing in prevalence among youth. Many reasons might be cited for the popularity of solvents, including their availability, ease of administration, and relatively inconspicuous methods of use (Altenkirch & Kindermann, 1986; de la Garza, Mendiola, & Rabago, 1980). Virtually any volatile solvent can be abused, including aerosols, gasoline, cleaning fluids, and paint thinners. Industrial and household products containing solvents are inexpensive, and their sale is not legally regulated. Volatile solvents may be obtained in even the bleakest economies and remotest areas where access to other psychoactive drugs may be limited (Arif & Grant, 1988). Reported methods of use include direct inhalation, inhalation from a solvent soaked rag, inhaling from plastic bags, spraying a substance directly into the oral cavity, heating solvents to inhale vapors, and even intravenous injection (Arif & Grant, 1988; Dinwiddie, Zorumski, & Rubin, 1987). Inhalant use poses serious dangers, including increased risk for future drug use, adverse health consequences, and, in rare cases, death (Edwards, 1993; Garriott, 1992; Sharp & Fornazzari, 1991).

The deliberate inhalation of volatile solvents has become a cause for concern in many regions of the world (Arif & Grant, 1988). Solvent abuse has reached epidemic

proportions in segments of geographically isolated and poverty-stricken communities, including reservation American Indians. For example, Mesteth (1968) estimated that 80 to 90% of adolescents on one reservation had used inhalants to achieve mood-altering effects. Five years later on a different reservation, Kaufman (1973) found that 62% of American Indian youth had sniffed gasoline.

Although not at pandemic levels in the general population, solvent use has been steadily increasing among school aged youth in the United States. According to Edwards and Oetting (1995), 20% of eighth graders have tried inhalants, and one-third to one-half of these youth are using inhalants once a month or more. They argue that "high risk" youth are not the only ones experimenting with the drug. Currently, very little is known about the characteristics of these young inhalant users. However, the research suggests that the relatively small proportion of youth who proceed to chronic solvent abuse will be plagued by a host of emotional, social, and physical consequences, such as depression, antisocial personality features, deviance, criminal behavior, school and family problems, and potential liver, kidney and neurological damage. According to Matthews and Korman (1981), "behavior patterns which will affect the entire life-history of an individual drug user may be significantly altered in a negative direction by abuse of inhalants or other drugs during childhood" (p. 520).

Prevalence Rates and Trends in Solvent Use

Precise estimates of inhalant abuse among youth are difficult to determine for a number of reasons. Changes in the wording of survey questions appear to produce discrepant endorsement rates. For example, Johnston, O'Malley, and Bachman (1992) reported a lifetime prevalence rate of 17%, 6 % higher than the 11% reported by Edwards

and Oetting (1995). Both samples were representative of the general population and lifetime prevalence rates reported for marijuana were essentially the same for both surveys. While there may have been a 6 percentage point jump between the years the two surveys were conducted, inhalant trend data (e.g., Beauvais, 1992) suggests that use rates have remained stable since 1987. Therefore, it is likely that the discrepancy resulted from slight differences in the wording of survey questions. Johnston and colleagues utilized the Monitoring the Future survey, which uses the following question: "On how many occasions (if any) have you sniffed glue, or breathed the contents of aerosol spray cans, or inhaled any other gases or sprays to get high in your lifetime?" (Edwards & Oetting, 1995, p. 10). Edwards and Oetting's lifetime prevalence rates were obtained from the American Drug and Alcohol Survey, which uses a different question: "Have you ever "sniffed" (or "huffed") glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine)" (Edwards & Oetting, 1995, p. 11). Edwards and Oetting (1995) conclude that it is very difficult to determine exact rates of use when survey results are so dependent on the form of the question. Further studies are necessary to determine exactly why young people seem to be interpreting these very similar questions differently (Edwards & Oetting, 1995).

In addition, a trend unique to lifetime inhalant prevalence rates suggests that rates of inhalant use are actually underestimated. For inhalants, lifetime prevalence rates decrease with each age cohort following the 8th grade (Edwards & Oetting, 1995). Several explanations for this peculiar phenomenon have been advanced, including the possibility that research participants deny or forget earlier use when responding to high school drug surveys. In addition, inhalant users are more likely to have dropped out of school;

therefore, the inhalant use they reported during adolescence is no longer captured in surveys of high school populations (Beauvais, 1988b). In either case, this unusual pattern suggests that inhalant abuse may be underreported on high school surveys and that the problem may be more pervasive than would appear based on prevalence rates.

Despite inconclusive baserate estimates, various studies have reached the same general conclusion about inhalant use trends. Beauvais (1992) notes that inhalant use steadily increased between 1979 and 1987, and has remained relatively stable since 1987. However, breaking inhalant prevalence data down by age reveals a disturbing trend. A significant proportion of children as young as six years old have used inhalants (Segal, 1997), and by the fourth grade, approximately 6% of U.S. children have tried inhalants (Edwards & Oetting, 1995). Furthermore the highest rates of inhalant use occur among younger adolescents, with use peaking at around 17% in the 8th grade (Edwards & Oetting, 1995).

Until recently, research found consistently higher lifetime drug use prevalence rates among males than females. However, prevalence rates among males and females have been converging for many drugs, including inhalants (Beauvais, 1992). Johnston and colleagues (1992) reported that 21% of male high school seniors admitted to having used inhalants compared to 14% of their female counterparts. However, more recently, Edwards and Oetting (1995) reported that males are more likely to use inhalants up to the 6th grade and again after the 10th grade; however, gender differences during the 7th through 9th grades are very small. In a recent study, no gender differences in inhalant use were found among a sample of illicit substance abusers (Compton, Cottler, Dinwiddie, Spitznagel, Mager, & Asmus, 1994). In addition, Bates, Plemons, Jumper-Thurman, and

Beauvais (1997) report a notable long-term trend wherein American Indian females have surpassed American Indian males in their use of solvents. Taken together, these findings support Beauvais' (1992) contention that gender patterns in inhalant use are converging among adolescents.

While the evidence suggests that inhalant use among males and females is converging, the results regarding inhalant use among different ethnic groups are less clear. Much of the research on inhalant use has focused on ethnic communities, specifically Latinos and Native Americans. The results have been inconsistent. Several researchers have reported higher rates of solvent use among American Indians (Beauvais, Oetting, & Edwards, 1985), Latinos (De Barona & Simpson, 1984; Padilla, Padilla, Morales, Olmedo, & Ramirez, 1979), and Alaska Natives (Segal, 1997), while lower rates have been reported among African Americans (Compton et al., 1994; De Barona & Simpson, 1984).

Conflicting results have been reported more recently. May and Del Vecchio (1997) report a number of studies that found substantially higher rates of inhalant use among Latinos; however, a breakdown by communities reveals extreme variation in solvent use. That is, certain Latino communities appear to suffer from extremely high rates of inhalant abuse, whereas others report no problems, which may skew the results of any single survey. Furthermore, Chavez and Swaim (1992) report that lifetime prevalence is no higher nationally among Latinos than among White non-Latinos. The inconsistent patterns of inhalant use between ethnicities may be due, in part, to the nature of inhalant outbreaks: inhalant use tends to "flare up" within specific communities, becoming

extremely popular and dissipating just as quickly. This pattern may skew or obscure real ethnic differences in solvent use in any small-scale research study.

Physical and Psychological Consequences of Solvent Use

Solvents are potentially dangerous due to their unpredictable immediate and long-term effects. Research findings suggest that inhalants put the user at risk for a number of negative physical and psychological consequences, both short-term and long-term.

Solvent users experience a wide variety of immediate physical and psychological effects. Depending upon the substance, dose, and duration of use, effects may last anywhere from approximately 15 minutes to a few hours (Segal, 1997). The immediate consequences of solvent use include rapid central nervous system depression, accompanied by sensations similar to alcohol or barbiturate intoxication. The resulting state of inebriation may be characterized by various experiential effects including dizziness, floating sensations, exhilaration, intense feelings of well-being, and a sense of increased power and aggressiveness (Segal, 1997).

Rosenberg and Sharp (1992) specify additional psychological, physical, and behavioral symptoms that are frequently exhibited during solvent intoxication, including initial excitation turning to drowsiness, disinhibition, lightheadedness, and agitation. With increasing intoxication, individuals may develop ataxia, dizziness, and disorientation. Cognitive and neuropsychological deficits, including impairment in abstraction, insight, judgment, and memory, are clearly present during intoxication as well. Sleeplessness, general muscle weakness, nystagmus, and occasionally hallucinations and disruptive behavior may develop as a result of extreme intoxication. When the effects of the solvent wear off, the user may become sleepy and experience impaired recall of

events that occurred during intoxication (Dinwiddie et al., 1987). There is no evidence that tolerance develops, and physical dependence has not been demonstrated (Segal, 1997).

There is considerable evidence from research on animals and occupational exposure showing the potential for serious physical damage from either severe, one time solvent exposure or repeated exposure at lower levels. For organic solvents with proven neurotoxic properties, the type of damage is often related to the chemical structure of the solvent; however, the degree of damage and potential for reversibility are often related to the potency, dose, and duration of exposure (Spencer & Schaumburg, 1985).

Solvent use has been linked to damage of the liver, kidneys, lungs and blood-forming organs (Beauvais, 1988a; Garriott, 1992). Cognitive and neuropsychological deficits, including impairment in abstraction, insight, judgment and memory, occur during solvent intoxication and may persist for weeks or months as neural tissue regenerates following cessation of use. Furthermore, chronic solvent abuse is associated with additional complications including weight loss, muscle weakness, general disorientation, inattentiveness, and lack of coordination. At high levels of exposure, many organic solvents are capable of producing acute, reversible encephalopathy (Rosenberg & Sharp, 1992). Despite the alarming range of physical and neurological effects, few solvents induce chronic, long lasting, or irreversible changes in nervous system structure or function.

Although the neurotoxic effects of solvents have been documented, it is very difficult to isolate a specific solvent damage syndrome due to the varying properties of the large number of different chemicals that are inhaled (Rosenberg & Sharp, 1992).

Sharp (1992) lists seven different classes of chemicals containing literally hundreds of different compounds that can be used to produce euphoriant effects. Most commercial products contain several of these solvents, each with its own potential toxicity (Rosenberg & Sharp, 1992). In addition, chronic solvent abusers frequently have numerous problems in addition to solvent use, making it difficult to sort out physiological and neurological damage that may have been present prior to use from that occurring as a result of use (Beauvais, 1988b).

Lastly, a number of deaths have been reported from the use of solvents (Garriott, 1992). Deaths reportedly related to solvent use have occurred from cardiac arrest, asphyxiation, accidents, or suicide (Arif & Grant, 1988). While solvents may be a contributing factor, it is unclear what percentage of reported deaths is directly attributable to solvent inhalation. According to Siegal and Wason (1992), the number of deaths attributed to Sudden Sniffing Death (SSD) in the United States underrepresents the true number of fatalities. The authors cite several reasons for the underreporting of Sudden Sniffing Death. For example, the circumstances surrounding inhalant related fatalities might be intentionally misrepresented to coroners. Furthermore, screening for solvents after death is not a routine or precise practice, and there is no formalized registry of deaths occurring from inhalant use. In addition, inhalants are often used in conjunction with other drugs, making it difficult to attribute death solely to the effects of an inhalant rather than to a drug interaction. As a result, the risk of death from inhalant use is difficult to determine, and the occurrence of Sudden Sniffing Death may be underestimated.

Treatment and Prevention

Despite potentially severe consequences, inhalant abuse has proven resistant to traditional drug treatment strategies (Jumper-Thurman & Beauvais, 1992). Treatment becomes progressively more difficult when inhalant use shifts from experimental to chronic and neurological deficits become more pronounced (Rosenberg & Sharp, 1992). The inadequacy of drug treatment programs highlights the need for effective inhalant prevention campaigns. However, inhalant prevention programs have been implicated as contributing to increased levels of inhalant use among youth. Brecher (1972) asserted that youth who had been previously unaware that solvents could produce an euphoric effect learned the behavior through prevention activities. Prevention materials that explicitly describe the effects of specific substances and modes of administration may inadvertently teach youth how to use solvents and increase experimentation. In addition, it is possible that youth may not consider solvents, which are easily purchased or found in the home, to be "drugs." Therefore, it is absolutely essential to educate youth about the dangers associated with solvent use in a manner that is effective but safe.

The failure of treatment programs and prevention efforts for inhalant abusers suggests that more research is required. Inhalant use is concentrated among normal adolescents aged 12 to 14. However, most of the research on inhalant use has not focused on this group. Much of the research has been conducted on atypical samples such as those youth that are already in drug treatment programs due to their inhalant use or youth incarcerated in detention facilities. Therefore, the understanding of the typical inhalant user is limited. In order to develop and implement effective prevention and treatment

programs, more research must be conducted on the characteristics of typical 12 to 14 year-old inhalant users.

Evidence for Inhalants as a Gateway Drug

Unlike other drugs in the United States, there is no evidence that use of inhalants among youth is declining (Edwards & Oetting, 1995). In fact, inhalants have overtaken marijuana as the drug that youth are most likely to try first, leading to a conception of inhalants as the "new gateway drug" (Edwards & Oetting, 1995, p. 26). There is concern that their availability, low cost, and ease of administration make inhalants attractive to children and that experimentation will lead to continuing use. Even though most youth who experiment with solvents do not become chronic abusers, solvents appear to act as a stepping stone to further drug use in many cases.

Survey research has consistently shown that inhalant users are likely to be involved in other drug use (Bachrach & Sandler, 1985; Dinwiddie et al., 1987; Jacobs & Ghodse, 1988). This alone does not implicate inhalants as a gateway drug. In fact, there is some disagreement regarding the "gateway" status of solvents. Altenkirch and Kindermann (1986) report that research results are contradictory as to whether solvents lead to further drug use. Furthermore, Edeh's (1989) review of the literature in the United Kingdom concluded that "the prevailing view is that volatile solvent abuse is essentially a passing phase and a self-limiting activity, and that only a minority of chronic users progress to misuse of other substances" (p. 317). Despite these conclusions, more recent studies clearly support the conception of solvents as a gateway drug (Edwards, 1993; Edwards & Oetting, 1995).

The first illicit drug used by children is currently more likely to be inhalants than marijuana (Edwards, 1993). Edwards argues that "the shift of emphasis from marijuana to inhalants is particularly disturbing; inhalants can kill you the first time you try them" (p. 1623). Edwards and Oetting (1995) report that a significant segment of very young children try inhalants. By the fourth grade, 6% of children in the United States have tried inhalants, with one third to one half reporting inhalant use once a month or more. This suggests that they are not just trying inhalants once but are continuing to use them. While marijuana has been considered the gateway to other illicit drugs, more than half of the very young children who have tried inhalants have not yet tried marijuana. This supports earlier findings that inhalant use precedes marijuana use in many cases (Edwards, 1993). Furthermore, Edwards and Oetting (1995) note that more eighth graders reported having tried inhalants than marijuana in 1988, a difference that increased in magnitude over the next five years of their study.

Compton and others (1994) consider inhalant use as a predictor of other illicit substance use (except marijuana), because first inhalant use precedes the use of other substances. In addition, they found that inhalant users in their study began using other substances earlier than non-inhalant users. Similarly, in a study of adult chronic solvent abusers in inpatient treatment, solvent abuse preceded and presumably contributed to other drug abuse (Dinwiddie et al., 1987). The authors concluded that "solvent use may be only the first manifestation of long-term problems with substance abuse" (Dinwiddie et al., 1987, p. 334).

This disturbing pattern has also been illustrated among heroin users. In a sample of heroin addicts, a significant proportion reported a preliminary "soft" drug phase, during

which they were using solvents (Altenkirch & Kindermann, 1986). Schutz, Chilcoat, and Anthony (1994), using data from the 1990 National Household Survey on Drug Abuse, found that those with a history of inhalant use were 12 times more likely than non-users to report injection drug use. After controlling for gender, age, race, SES, and history of marijuana use, inhalant users remained over five times more likely to report injection drug use. Furthermore, the length of time between inhalant use and onset of use of other substances appeared to be brief. This study of a large sample of the general household population supports the notion that inhalant use is a risk factor or vulnerability marker for subsequent drug injecting. The results highlight the importance of considering solvents as a potential gateway drug, one with serious implications for future drug use and personal adjustment.

Inhalants and Other Drug Use

The notion of inhalants as a gateway drug presumes further drug use. Even if inhalants are not acting as a gateway to other drugs, a considerable body of evidence suggests that inhalant use goes hand in hand with other substance use (Crites & Schuckit, 1979; Edeh, 1989; Oetting, Edwards, & Beauvais, 1988). Beauvais (1992) points out that exclusive use of solvents is rare; solvent users commonly use other drugs as well. In a sample of illicit substance abusers, Compton and colleagues (1994) found a relationship between inhalant abuse and alcohol and tobacco dependence. In addition, inhalant users reported higher use rates of injection drugs, amphetamines, sedatives, cocaine, PCP, opiates, and hallucinogens than non-inhalant users. Among American Indian youth, Beauvais and colleagues (1985) reported that less than one third of 7th through 9th grade

non-inhalant users currently engage in drug use; however, over three-fourths of inhalant users reported current involvement with one or more other drugs.

In De Barona and Simpson's (1984) study of youth in a state-funded prevention program, 88% of inhalant users indicated that they smoked marijuana and 78% reported using alcohol. Uppers, hallucinogens, and downers were also used by 14% to 22% of inhalant using youth. Because almost all of the inhalant users in the sample also reported marijuana and alcohol use, De Barona and Simpson argue that inhalants may not be used as the drug of choice but rather because of low cost and accessibility.

It has been well established that inhalant use is linked to other substance use. In addition, limited research suggests that inhalant users are more susceptible to negative drug-related consequences than other drug users. For example, Matthews and Korman (1981) found that inhalant users reported being more negatively affected by drug use than heavy or light polydrug users. The negative effects reported include "changes in personal behaviors and activities, interpersonal adjustment, impulsivity, bad consequences, distal consequences, and general drug-related trouble" (p. 525). Even if inhalants do not act directly as a gateway, their established relationship with other, more serious drug use is cause for concern. In this sense, prevention of inhalant use may help curtail the use of other drugs.

Types of Inhalant Users

Based on current patterns of reported inhalant use and reviews of the characteristics of users, Beauvais and Oetting (1987) propose a three-group typology of inhalant abusers. *Young inhalant users* have a median age of 12 to 13. Their use is generally not extensive, and neurological or other physical consequences are not particularly severe, if they have

occurred at all. This type of user frequently uses marijuana and alcohol in addition to inhalants (Beauvais, 1992). *Polydrug users* tend to be older and engage in more extensive inhalant and other drug use. They differ from other multiple drug users by the addition of moderate to severe inhalant use. *Inhalant-dependent adults* use inhalants almost exclusively, usually every day, and are thought to be extremely dysfunctional. Although the three groups differ in age and use patterns, within each group inhalant use suggests "a very high level of drug involvement for that age group and suggests potentially serious adjustment difficulties" (Beauvais & Oetting, 1987, p. 781). Further efforts have corroborated Beauvais and Oetting's typology. May and Del Vecchio (1997) describe three analogous types of inhalant use: (1) experimental, vicarious, youthful use, (2) inhalant abuse as part of polysubstance abuse, and (3) adult chronic use.

Siegel (1984) proposed a general drug use classification scheme that may be applied to inhalant users. Siegel described five categories of drug users based on patterns of substance use - experimental, recreational, circumstantial, intensified, and compulsive. Experimental use refers to experimentation with drugs only when available and condoned by peers. Recreational use is defined by the user's self-control over use of a substance. Circumstantial use involves use of a substance only under certain conditions or in particular settings. Intensified use is defined by a regular pattern of substance use that does not significantly interfere with ordinary functioning. Compulsive use involves high intensity, high frequency use over a longer period of time and is typically accompanied by psychological or physical dependency.

Most of the research studies that attempt to define characteristics of inhalant users have focused on the 15 to 18 year-olds classified as polydrug users in Beauvais and

Oetting's (1987) typology. However, trend data indicates that inhalant use may begin during middle childhood and peaks at age 13 or 14 (Edwards & Oetting, 1995). Beauvais and Oetting classify these younger users (median age of 12 to 13) as young inhalant users. Since the primary objective of drug prevention efforts is to stop drug use before it starts, it is extremely important to study the characteristics of these young inhalant users in addition to those of other groups.

Although the overall level of functioning of young inhalant users has been characterized as poor to fair (Beauvais & Oetting, 1987), little is known about the specific characteristics of this group. It is critical to better understand these youth that face potentially serious consequences if inhalant use should continue. Prevention programs may then be designed to target younger inhalant users before they progress to polydrug use.

Psychosocial Correlates of Inhalant Use

The research on inhalant abuse has a fairly short history compared to research on other drugs. Much of the early research was concerned with defining inhalant use, isolating consequences, and determining prevalence rates and trends. More recently, the focus has shifted to identifying characteristics that might lead to or be risk factors for inhalant use. The research on psychosocial correlates of inhalant use has generated a substantial, albeit disorganized, body of information about factors which likely contribute to inhalant use. While some psychosocial factors have been clearly and repeatedly associated with inhalant use, the evidence regarding other psychosocial variables is less clear. The inconsistency in findings for many psychosocial factors may be attributed to the lack of a theoretical framework to guide research and to the wide variety of

instruments used. In addition, the use of atypical or extreme samples in past inhalant research may contribute to these inconsistencies. However, a review of this research suggests the utility of many psychosocial factors for understanding inhalant use.

Peer group effects. Perhaps no single factor is as pivotal in adolescent drug use as the peer group. Even though inhalant users have been characterized as more dysfunctional and disturbed than other drug users (Oetting & Webb, 1992), the role of peers in inhalant use is considerable. Previous research supports a strong influence of peer drug use attitudes and behavior on individual inhalant and other drug use (Barnes, 1979; Dworkin & Stephens, 1980; Oetting & Beauvais, 1987b). Based upon their review of the international solvent literature, Arif and Grant (1988) highlight the importance of peer influence by attributing experimental use primarily to peer influence and availability. Most studies report that inhalant use occurs in groups (Clements & Simpson, 1978) and that gratification received from peers serves to reinforce inhalant use and facilitate the internalization of deviant peer group norms (McBride, Joe, & Simpson, 1991). Jumper-Thurman and Beauvais (1992) suggest that peers may be even more influential with respect to inhalant use than other drug use. "When inhalant use appears, it is always a reflection of the peer group. The literature makes this clear. Friends, acquaintances and siblings provide access to inhalants and teach the young person how to use them. Peers shape attitudes and provide the social context for use" (Beauvais, 1988b, p. 218).

Beauvais and colleagues (1985) separated the peer influence construct into two components - peer encouragement to use and peer sanctions against use. In a sample of American Indian youth, only 19% of those who reported strong peer sanctions against use and low peer encouragement reported ever trying inhalants; however, of those who

reported strong peer encouragement to use and low peer sanctions against use, 84% had tried inhalants.

Just as inhalant users have been characterized as more deviant than other drug users, their peer groups have been described as reflecting this level of deviance (Jumper-Thurman & Beauvais, 1992). In a sample of Mexican-American youth admitted to a prevention program, McBride and colleagues (1991) found that association with deviant peers predicted lifetime inhalant use. In addition, the friends of inhalant users are likely to be inhalant users themselves, with serious school, family and adjustment problems (Bachrach & Sandler, 1985; De Barona & Simpson, 1984). One consequence of this increased level of peer deviance is that inhalant using peer groups are more resistant to positive social influences than other drug using peer groups (Jumper-Thurman & Beauvais, 1992).

De Barona and Simpson (1984) found that chronic inhalant users reported spending more time with their friends than non-users, experimental users, or recreational inhalant users. In addition, the friends of chronic inhalers were more likely to dislike their teachers, be truant from school, and commit acts of vandalism than the friends of experimental and nonusers. Finally, nonusers and experimenters reported having significantly more friends who were involved in socially sanctioned activities, such as sports, than either recreational or chronic inhalant users.

In summary, peer groups appear to create an atmosphere that shapes and rewards inhalant use and isolates the individual user from potential protective factors. However, most of these conclusions are based on research with unusual samples of serious inhalant users. No study to date has comprehensively examined the factors associated with

inhalant use among a representative sample of young inhalant abusers. It remains to be seen whether peer effects are as strong or consistent within this group.

Family effects. Another consistent finding regarding inhalant users is a dysfunctional family background. The research is nearly unanimous in finding that family disruption, with a high proportion of missing fathers, is associated with chronic inhalant abuse (Beauvais, 1988b; Edeh, 1989). Even within intact families, poor family relationships, especially with the father, are usually reported. Parents of inhalant users may demonstrate a general lack of concern about children and provide few sanctions against deviance, including inhalant use (Beauvais, 1988b). To this end, Oetting and Beauvais (1987b) found that the best predictor of association with a drug using peer group was lack of family sanctions against use. In addition, numerous studies reveal drug and alcohol abuse among the parents of inhalant abusers (Barnes, 1980; Beauvais, 1988b; Edeh, 1989; Guitierrez, Hernandez, & Rabago, 1978). Overall, home environments of inhalant users have been defined as extremely dysfunctional, characterized by drug/alcohol abuse, family conflict, and single parents (Lewis & Patterson, 1974; Oetting & Webb, 1992).

In fact, there seems to be a linear relationship between the level of family dysfunction and severity of inhalant use. In their study of youth admitted to a state-funded prevention program, De Barona and Simpson (1984) found that significantly more anger, criticism, and aggression were reported in families of chronic inhalant users than were reported in families of experimental or recreational inhalant users. In addition, chronic inhalant users reported that their parents expressed expectations less clearly and required less rule compliance than the families of their recreational using counterparts. McBride

and others (1991) found that family warmth was negatively related to lifetime inhalant use in their study of Mexican American youth with behavior problems. However, they demonstrated that altering family involvement might affect subsequent inhalant use. The rate of inhalant use changed from 36% at intake to 6% at follow-up, and was attributed to "family or social pressures and attitudinal changes about its use (including concerns about health)" (p. 220). This research suggests that family disruption or deviance is a risk factor for inhalant use. Disrupted families may be incapable of providing prosocial relations and open communication with youth in order to prevent or discourage inhalant use. It is also possible that disrupted families encourage inhalant use by modeling deviant attitudes and behavior related to drug and alcohol use.

School effects. In addition to family dysfunction and deviant peer groups, another consistent finding related to inhalant abuse is school difficulties. Inhalant users have significant educational problems with both achievement and adaptation (Beauvais, 1988b). Inhalant use has been consistently linked to lack of academic success, accompanied by a constellation of school related difficulties (Edwards & Oetting, 1995; Oetting & Webb, 1992). In addition to poor academic performance, inhalant users experience more disciplinary actions, truancy, and poor relations with school officials (Barnes, 1980; Beauvais, 1988b; Korman, 1977).

Inhalant users appear less able to function successfully within the school environment, which culminates in a greater likelihood of dropping out (Barnes, 1980). In fact, the loss of data on dropout inhalant use has been implicated in the underestimation of inhalant prevalence (Smart, 1988). Actual data on inhalant use by dropouts are sparse (Edwards & Oetting, 1995), but Compton and others (1994) found that dropouts were 2.5

times more likely to use inhalants than those who remained in school. Bates and colleagues (1997) found that a higher proportion of dropouts in their samples of American Indian, Mexican-American, and White American youth had used solvents, and used them with more regularity and intensity, than academically at risk students or students in good standing. Their findings are significant in supporting the relationship between enrollment status and inhalant use across three ethnic groups.

It is clear that inhalant users experience less academic success, poor school adjustment, and a greater likelihood of dropping out than do non-users. However, it is unclear whether problems at school contribute to self-medicating with inhalants, inhalant use degrades academic and social skills, or both are elements of extreme problem prone behavior. It is likely that peer groups play a role in both inhalant use and school difficulties, creating an atmosphere which rewards deviance while preventing youth from forming connections with prosocial school influences.

Emotional variables. Persistent emotional distress has frequently been hypothesized as a cause of drug and alcohol abuse (Labouvie, 1986; Smith, Mercy, & Rosenberg, 1986; Watts & Wright, 1988). It has been suggested that youth use drugs to compensate for or cope with emotional distress (Powers & Kutash, 1985). While this hypothesis is intuitively appealing, studies examining the relationship between emotional distress and general substance use have produced mixed results (Pedigo, 1983; Swanson, Bratude, & Brown, 1971).

The research examining psychopathology and emotional characteristics is not as extensive or consistent as the research on other psychosocial correlates of inhalant use (Oetting & Webb, 1992). In general, a limited number of studies indicate that inhalant

users exhibit greater levels of emotional distress and dysfunction than other drug users (Jacobs & Ghodse, 1987; Oetting & Webb, 1992). Most notably, Oetting and colleagues (1988) found that young inhalant users exhibit more emotional problems than young marijuana users and nondrug users, who did not differ from each other on emotional distress measures. Young inhalant users in their study reported higher levels of depression, anxiety, blame, and anger. These findings are quite significant since most research on drug use has not revealed a clear pattern of emotional problems among drug using youth. However, Oetting and colleagues concluded that inhalant users in their study clearly experienced more emotional problems than other drug users.

A study by Comstock (1978) provides further evidence that young inhalant users may be psychologically distinguishable from other drug users. Comstock compared MMPI profiles of adolescent inhalant users with those of other drug users who were hospitalized for treatment. Other drug users exhibited peaks on scales 4 and 9, suggesting the hostility, rebelliousness, and acting out typical of many adolescents. However, inhalant users' profiles peaked on scales 4, 6, and 8, suggesting the presence of peculiar thinking and, in extreme cases, thought disorders. The causal relationship between psychopathology and inhalant use remains unclear. It has been suggested that both may be the result of unusually disrupted families (Oetting & Webb, 1992). Regardless, while most young inhalant users may not suffer from serious psychological disturbance, the available research suggests potential links between emotional distress variables and solvent abuse.

Depression. Several studies have found a relationship between solvent use and depression. For example, in a study comparing solvent abusing youth to non-abusing,

delinquent youth, Zur and Yule (1990) found that chronic solvent abusers were more severely depressed. These results led Zur and Yule to hypothesize a reciprocal relationship whereby depression may make solvent abuse attractive. Frequent inhalation of solvents may then exacerbate pre-existing depression, leading to continuing abuse in attempt to self medicate.

Jacobs and Ghodse (1987) compared depression levels of solvent abusers and non-solvent abusers in a secure unit for delinquent adolescent boys in West London. Groups were equivalent across demographic, family, and educational variables. Significantly more solvent abusers than non-solvent using drug users were depressed; in fact, 70% of solvent abusers specifically cited depression as a reason for their solvent use. In a follow-up study, Jacobs and Ghodse (1988) again found that inhalant users were more depressed than other adolescent drug users. While the evidence seems to suggest a link between depression and inhalant use, contrary findings were obtained by Joe, Barrett, and Simpson (1991), who found no evidence of a relationship between depression and inhalant use in a sample of youth admitted to a state-funded prevention program.

Self-esteem. The role of self-esteem in solvent use has been examined in several studies; however, consistent findings have not emerged. De Barona and Simpson (1984) found that non-users reported higher self-esteem, defined as greater confidence in their abilities and higher satisfaction with personal qualities, than experimental, recreational, or chronic inhalant users. Annis, Klug, and Blackwell (1971) found that inhalant users scored lower on variables related to self-esteem. However, other researchers have found little or no relationship between self-esteem and inhalant use (Beauvais & Oetting, 1988; Jessor & Jessor, 1977; Kandel, 1985). Oetting, Deffenbacher, and Donnermeyer (1998)

suggest that the inconsistent relationship between solvent use and self-esteem may be a result of how self-esteem is conceptualized. That is, self-esteem may not be a global personality trait but may be derived from several specific sources. For example, for youth that gain self-esteem from a drug using peer group, there may be a positive relationship between inhalant use and self-esteem. Conversely, when self-esteem is derived from positive sources such as school, family, and non-deviant peers, high self-esteem is likely to be negatively related to inhalant use. Therefore, it is probable that the inconsistent findings regarding self-esteem and solvent use may be due to imprecise definition and measurement of the self-esteem construct.

Anger. Past research has uncovered a consistent relationship between anger and substance use (Oetting, Swaim, Edwards, & Beauvais, 1989; Swaim, Oetting, Edwards, & Beauvais, 1989). Furthermore, in developing a path model of alcohol use, Oetting and colleagues (1989) found that the links between alcohol use and other emotional distress variables (self-esteem, depression, anxiety, and alienation) were mediated through anger. These results suggest that anger may be a key emotional distress characteristic associated with drug use. Other emotional characteristics may have an effect on substance use, but their effects may be channeled through anger.

The guidebook "Understanding Inhalant Use" (Texas Commission on Alcohol and Drug Abuse, 1997) lists anger as a risk factor for inhalant use. Furthermore, Oetting and others (1988) compared levels of emotional distress between inhalant users and marijuana users. Their results indicated that inhalant users exhibited greater levels of anger than did their marijuana-using counterparts. Other studies have found that inhalant users typically suffer from greater levels of emotional distress than do other drug users (e.g. Comstock,

1978; Dinwiddie et al., 1987; Jacobs & Ghodse, 1988), but anger has not been specifically studied. These limited findings and the patterns of results regarding general emotional distress suggest that increased levels of anger might be correlated with inhalant use. This relationship deserves further research attention.

Most research to date on the link between inhalant use and emotional distress has focused on either delinquent youth or youth in treatment or prevention programs. It is likely that the results from these studies are not fully generalizable to more typical school aged youth. However, there is some evidence that inhalant using youth from a more representative sample will also exhibit higher levels of emotional distress than other drug users or their non-using counterparts. For example, Mitic, McGuire, and Neumann (1987) surveyed 7th through 12th graders and found that male non-users obtained lower stress scores than experimental and regular inhalant users. Among females, non-users exhibited lower stress scores than regular inhalant users but did not differ from experimental users. Oetting and colleagues (1998) hypothesize that the effects of emotional distress on drug use are mediated by peer variables. Emotional distress could motivate youth to seek similar friends who are more likely to use drugs, or drug use intended to relieve stress could lead to deviant peer associations. The present study will examine this hypothesis for explaining inhalant use among a school sample of 12 to 14 year old students.

Deviance and delinquency. There is consistent support from existing research for a strong relationship between inhalant abuse and juvenile delinquency. Oetting and Webb (1992) argue that "inhalant use is drug use and is, therefore, a deviant act. But even among other drug users, inhalant users stand out as deviant" (p. 63). Compared to other drug users, inhalant users have earlier and more frequent contacts with police related to

more serious matters (Jacobs & Ghodse, 1988; Oetting & Webb, 1992). In addition, inhalant users tend to exhibit more aggressive behavior than other types of drug users (Cohen, 1977; Korman, Trimboli, & Semler, 1980). In a study of youth admitted to a state-funded prevention program, De Barona and Simpson (1984) found that serious inhalant users had significantly more contacts with police. In fact, 90% of chronic inhalers reported being arrested versus 65% of non-inhalant users (a high proportion of the non-inhalant users used other drugs), and 55% of chronic inhalers were on probation, compared to 33% of non-inhalant users.

Frost-Reed and May (1984) compared chronic inhalant abusers and other delinquents and found that inhalant abusers were much more likely to be arrested for virtually every category of delinquent activity, including total number of offenses, status offenses, crimes against property and persons, and violent offenses. Furthermore, in a sample of drug users entering treatment, inhalant users experienced trouble with the law earlier than other types of drug users (Compton et al., 1994). Compton and colleagues concluded that inhalant use could be considered a marker for future social deviance.

A relationship between chronic inhalant abuse and antisocial personality disorder has also been reported in several studies. In a study of adult, chronic solvent abusers in inpatient treatment, Dinwiddie and colleagues (1987) found an extraordinarily deviant population with which treatment was uniformly unsuccessful. The majority of the sample met the criteria for the diagnosis of antisocial personality disorder. The authors concluded that most young inhalant users who become chronic adult abusers would also meet the diagnosis for antisocial personality disorder by adulthood. Additional research has

supported the connection between solvent use and antisocial personality disorder (Compton et al., 1994; Crites & Shuckit, 1979; Korman et al., 1980).

A demonstrable relationship between inhalant use and delinquency exists. However, it is not clear whether inhalant use leads to delinquency or vice versa. In fact, the relationship may not be direct at all. Research suggests that both may stem from another source - deviant peers. The peer groups of inhalant abusers tend to be considerably more deviant than those of other drug users (Oetting & Webb, 1992). Within the inhalant users' peer environment, delinquency may be the norm. The deviant atmosphere of this peer group is likely to lead to a constellation of deviant outcomes, including inhalant use and delinquency.

Current State of Inhalant Abuse Research

The previous review indicates that there is a considerable body of research regarding antecedents and consequences of solvent use. However, most of this research has been conducted without the benefit of a guiding theoretical model. This has led to fragmented approaches that result in lengthy lists of risk and protective factors with little obvious relation to one another. Rather than clarifying the nature of inhalant use, the lack of a concerted research focus has served to further cloud the issue. In response, Segal (1997) has called for the development of more complex models that adequately describe the phenomenon of inhalant abuse. However, few attempts have been made to integrate the existing findings.

Currently, disagreement exists regarding the interrelationships among various predictors of inhalant abuse. For example, Barnes (1979) posits direct effects for psychological vulnerability and peers on inhalant use while contending that other factors

exert only indirect effects. In contrast, the conceptual frameworks of Dworkin and Stephens (1980), Jessor and Jessor (1980), and Morales (1984) suggest that direct effects might also be posited for other factors such as low social assets, parental modeling, and acculturative stress. Matthews and Korman (1981) and Barnes (1979) assert that stress resulting from dysfunctional social structure leads to the use of inhalants through the mechanism of poor coping skills.

Only a single study by Joe and colleagues (1991) attempted to integrate these findings in a model of inhalant use. Their sample consisted of Mexican American youth involved in a prevention program due to behavior problems, including drug experimentation. Their Psychological-Peer Model was based on Barnes' (1979) study of factors influencing drug use. Psychological status and peer drug/deviancy were specified as direct influences on inhalant use. Family problems, family control, family inhalant use, education level, socioeconomic status, and acculturative stress were considered indirect influences on inhalant use through psychological status. Availability of inhalants was specified as an indirect influence on inhalant use through peer drug/deviancy. The model as originally proposed proved to be a poor fit. *Post hoc* tests yielded a revised model that suggested that the primary influence on inhalant use at admission was drug-using peers, but provided no support for the influence of psychological status on inhalant use. The model also suggested that increased inhalant use is related to lower levels of education, family inhalant use, and increased parental attempts to exert control. Low social assets and family environment exerted indirect effects operating through peer drug use/deviancy. However, the revised model still provided only a marginal fit to the data.

Past findings on the antecedents of inhalant use still need to be integrated under a single model of inhalant use.

Furthermore, although the literature has uncovered a number of psychosocial correlates of inhalant abuse, it is unclear which of these risk factors are important for younger users. Very little research has systematically examined the characteristics of younger inhalant users, even though this group contains the majority of those using solvents, including those that will go on to become chronic abusers (Beauvais, 1988b). Typologies have been created based on age groups and patterns of use; however, most research has ignored these typologies and collapsed findings across all types of inhalant users. Because clear and meaningful differences between the different types exist, research is needed that investigates age-specific patterns of inhalant abuse (May & Del Vecchio, 1997).

In addition, the large majority of research studies on correlates of adolescent inhalant use have been conducted with at-risk youth, incarcerated youth, or youth in treatment. Historically, solvents have not been as popular as other drugs; therefore, there are relatively fewer studies of characteristics of users in large, representative samples (Smart, 1988). It is unclear whether the findings of studies conducted with atypical samples are applicable to a general sample of young inhalant users. Research conducted with a representative school sample of younger users is called for to understand the characteristics of this group and to provide a general understanding of inhalant use.

In order to systematically improve treatment and prevention interventions in a manner that will be both safe and effective, a clear understanding of the mechanisms underlying inhalant use is needed. It is essential to target the larger group of young

inhalant users before a small subset of these children progress to chronic abuse. Furthermore, it is critical to clarify the risk factors and relationships among them that lead to inhalant use within this group to develop effective prevention programs.

Primary socialization theory (Oetting & Donnermeyer, 1998) is a general theory of deviant behavior that examines the interrelationships of social and personal variables in order to predict drug use (Oetting et al., 1989). However, this theory has not been applied to inhalant use. The present study will apply primary socialization theory to inhalant use within a large, general school sample, in order to clarify the psychosocial variables that put youth at risk for inhalant use.

Of the litany of risk and protective factors for drug use, the influence of peers has the strongest and most consistent connection with drug use. The role of peer influence in general drug use has been well documented. Oetting and Beauvais (1987a) proposed a "peer cluster theory" of drug use, in which all socialization and personal effects are mediated by peer effects. Tests of this theory have found that peer influences are the primary influence on drug use in a representative, adolescent sample. Socialization influences of family sanctions against drug use, family strength, school adjustment, and religious identification were all mediated by their association with drug using peers, and thus were only indirectly related to drug use. Further revisions of this theory have resulted in primary socialization theory, which holds that during adolescence, the learning of social behaviors is dominated by interactions with socialization sources, primarily through peer effects (Oetting & Donnermeyer, 1998).

Primary Socialization Theory

Primary socialization theory (Oetting & Donnermeyer, 1998) has been developed to integrate the research on personal characteristics and social influences in the etiology of adolescent deviance. The theory is an expansion of peer cluster theory (Oetting & Beauvais, 1987a) and like peer cluster theory, has been primarily applied to understanding adolescent substance use. The fundamental premise of primary socialization theory is that many, if not all, social behaviors, including drug use, are learned (Oetting & Donnermeyer, 1998). This learning takes place through individual interactions with a network of socialization sources that define, monitor, and sanction acceptable and unacceptable behavior. The socialization sources themselves may endorse prosocial or deviant behaviors. However, deviance is not simply the result of an absence of prosocial forces. Rather, primary socialization theory stresses the role of active learning in the emergence of deviant behaviors.

Adolescence is a crucial time for learning patterns of prosocial and deviant behavior that may endure into adulthood (Oetting & Donnermeyer, 1998). Primary socialization theory proposes that adolescents learn these behaviors through interactions with socialization sources. Primary socialization sources are the entities that have the greatest social influence over the adolescent's attitudes, beliefs, values, and behavior (Oetting & Donnermeyer, 1998). These socialization agents channel critical normative information about acceptable and unacceptable social behavior to the individual and reward or sanction behavioral expressions of these norms.

According to primary socialization theory, primary socialization sources "bond," or connect, directly with the individual. The term "bond" is used somewhat differently

within the primary socialization literature than has classically been the case in the field of psychology. In primary socialization theory, bonds denote the emotional and cognitive connections between an individual and the primary socialization sources, rather than implying a critical period for attachment. Through bonds, the primary socialization sources communicate normative standards and monitor and shape behavior through rewards and sanctions. While there are a myriad of potential socialization forces present in any individual's development, primary socialization sources are distinctive by their direct influence over the individual. In the United States, the family, the school, and peer clusters are the three primary socialization sources that exert the most control over adolescents. Any other socialization sources (e.g., religious institutions, culture, and media) act on the individual indirectly through the primary socialization process.

Within the primary socialization process, two critical forces combine to shape individual behavior. These are the strength of the bond between an individual and the socialization source and the direction of the norms endorsed by the socialization sources. In general, the norms advocated by primary socialization sources follow societal conventions by encouraging and rewarding prosocial behavior (Oetting & Donnermeyer, 1998). However, at all levels of socialization, it is not unusual to encounter normative pressures toward deviant behavior. In either case, the socialization sources exert behavioral influence by rewarding the behavioral and verbal expression of the norms that they espouse.

Furthermore, the individual is connected to each of these primary socialization sources by cognitive and emotional bonds, which allow the transmission of normative information. When the bonds between an individual and a socialization source are

weakened, the impact of the source's normative influence is lessened. The norms of a particular socialization source fail to have an impact on individual behavior if the person feels no connection with that particular source. The result is that the normative information from other sources takes precedence, providing their bonds remain intact. On the other hand, strong bonds will increase the impact that a particular socialization source has on behavior. Thus, by themselves, norms and bonds have little direct impact on individual behavior. Patterns of prosocial and deviant behavior emerge from a combination of bond strength and normative valence.

For the most part, weak bonds between the individual and the positive socialization sources are risk factors for deviance. This is especially the case for bonds with the family and school. Primary socialization theory suggests that, of the socialization sources, the peer group is most pivotal in determining adolescent drug use. Peer groups, compared with family and school sources, have a higher probability for transmitting deviant norms. In this case, weak bonds to family and school create a risk factor for deviance when bonds to deviant peers remain strong. When this occurs, the individual is likely to gravitate even more toward deviant peers. Deviant norms are then learned and internalized through interactions with the deviant peer group.

In addition to bonds between the individual and the socialization sources, primary socialization theory also proposes a set of bonds connecting socialization sources (Oetting & Donnermeyer, 1998). The links between each of the primary socialization sources impact the overall normative climate to which the adolescent is exposed. However, the normative influence exerted between socialization sources is conditioned by the strength of the bonds between the sources. For example, if the youth's friends do not like school,

the bond between the youth and school is likely to be affected. Similarly, it is unlikely that the bonds between the family and a deviant peer group will be strong, unless the family itself endorses deviant norms.

Like many normative transmission theories of deviance, primary socialization theory places emphasis on socialization forces in shaping deviant behavior. However, the theory dismisses the notion of the individual as a passive sponge of normative information, stressing the active role of the individual in the socialization process through learning and bonding (Oetting & Donnermeyer, 1998). In addition, primary socialization theory distinguishes itself from other normative transmission theories by explicitly acknowledging the critical role which individual characteristics play in deviant behavior.

Much of personality theory has assumed a direct relationship between individual personality characteristics and behavior, without specifying an underlying mechanism. In addition, much of this research has ignored the interplay between personality and social systems (Schneider, 1983, 1987). Rather than positing a direct link between personal characteristics and deviance, primary socialization theory suggests that personal characteristics have an indirect impact on deviance: "Traits are likely to relate to deviant behaviors when, and only when, they influence the primary socialization process" (Oetting, Deffenbacher, et al., 1998, p. 1341). Primary socialization theory departs from both normative transmission and personality theories of deviance by positing a mediational effect of personality on deviance. That is, personal characteristics influence the socialization process that, in turn, affects deviance.

Personal characteristics may alter the socialization process, thereby increasing the likelihood of deviant outcomes, in two ways. First, most individuals are capable of

bonding with socialization sources and are in fact motivated to do so. However, some personal characteristics interfere with bonding to prosocial socialization sources. This prevents the transmission of prosocial norms to the youth. Second, among individuals who are capable of bonding with socialization sources, certain characteristics may increase the likelihood of bonding with deviant socialization sources rather than prosocial ones. For example, youth with high sensation seeking and anger may gravitate toward, and be more readily accepted by, similar others. In either case, primary socialization theory suggests that personal characteristics only lead to deviance by altering the primary socialization process. Characteristics that do not influence the socialization process, while perhaps making life difficult for the individual, are unlikely to have a major effect on deviance.

Primary Socialization Theory Applied to Inhalant Use

As previously mentioned, primary socialization theory was developed as an extension of peer cluster theory (Oetting & Beauvais, 1987a). Both theories have been successfully applied to predicting patterns of general drug use in a wide variety of samples. As applied to adolescents, the basic premise of primary socialization theory is that all effects on drug use, including the effects of other primary socialization sources and personal characteristics, are mediated through peer influences. For adolescents, peer group effects act as the linchpin of adolescent drug use. However, primary socialization theory has only been applied to general drug and alcohol use; it has never been applied to inhalant users. The present study will test the applicability of primary socialization theory to understanding drug use among inhalant and other drug users.

Oetting and Donnermeyer (1998) propose that the adolescent is enmeshed in a network of socialization sources. Within this network, the adolescent learns acceptable and unacceptable behavior based on patterns of bonding and norming with the primary socialization sources. In the United States, the socialization sources that exert the greatest influence over adolescent behavior are the family, school and peers.

Family. As noted in Oetting and Donnermeyer (1998), primary socialization theory conceptualizes the family as a major potential source for transmitting prosocial norms. However, for a family to be a strong source of prosocial norms, strong bonds must exist between the family and child. In addition, the family must use these bonds to communicate prosocial norms. Most families establish and maintain reasonably strong bonds with their children and are therefore able to communicate prosocial normative standards to them. However, even if the family espouses prosocial norms, it is difficult to pass them on to children when bonds have been weakened or severed, as is often the case in dysfunctional families.

One of the most consistent findings from past inhalant research is that inhalant users tend to come from dysfunctional or disrupted families (Beauvais, 1998a; Edeh, 1989). Often, the father is not present in the family of the inhalant user (Beauvais, 1988b). Even if the family is intact, poor parent-child relations are consistently reported in inhalant users' families. For example, the parents of inhalant users generally exhibit a lack of concern for the child's welfare or fail to provide sanctions for delinquent or disruptive behavior (Beauvais, 1988b; De Barona & Simpson, 1984). In addition, De Barona and Simpson (1984) characterized the family relations of inhalant users as angry, critical and aggressive. These results indicate that the bonds between families and inhalant users have

often broken down, making the transmission of prosocial norms to the child difficult, if not impossible.

It is also possible that the families of inhalant abusers inadvertently transmit deviant norms to the child. For example, families, "...may also directly transmit deviant norms by modeling or teaching their children to steal, drink, or use drugs" (Oetting & Donnermeyer, 1998, p. 1002). In fact, several studies have found that the families of inhalant users exhibit high rates of drug and alcohol abuse (Beauvais, 1988b). Furthermore, McBride and colleagues (1991) found that family support helped to reduce inhalant use among chronic abusers. In any case, "parenting problems are likely to weaken family/child bonds, thereby reducing the effective transmission of prosocial norms. Because this increases the chances of bonding with deviant peers, poor parenting may eventually lead to deviant behaviors" (Oetting & Donnermeyer, 1998, p. 1003). This appears to be the case among the inhalant users that have been described by past research. However, the nature of family bonds and processes in younger inhalant users remain unclear.

School. The school takes on the role of teaching basic skills and monitoring and controlling personal behavior in the school environment. Strong bonds with prosocial schools are likely to inoculate against deviance. However, just as the bonds between dysfunctional families and adolescents are compromised, so may be the bonds between schools and students. There are schools, "...in which deviant behavior is not adequately controlled, leading to weak school/child bonding and directly encouraging or reinforcing deviant behaviors" (Oetting & Donnermeyer, 1998, p. 1007). Oetting and Donnermeyer (1998) report several conditions which might prevent bonding with schools, including

school discipline climate, normlessness, school size and unclear rules. In addition, personal characteristics such as low intelligence or achievement may interfere with bonding to schools.

Similar to family effects, one of the most consistent findings related to inhalant use is school difficulties (Beauvais, 1988b). Inhalant users are generally poor students who exhibit a wide range of behavioral problems at school. These problems range from absenteeism and misbehavior to dropping out. These difficulties signify that the bonds between the school and the child have broken down or, in the case of dropouts, been severed entirely. When this occurs, the potential prosocial influence of the school is lost, leaving the youth more susceptible to the influence of the peer group. At this point, the youth is likely to bond with other youth who experience similar difficulties at school and who are more likely to engage in deviant behavior, including inhalant use.

Peers. Within primary socialization theory, peer groups play a pivotal role in the development of deviant behaviors. If the peer group holds positive values and communicates prosocial norms, it is likely to inoculate individual youth against deviant behaviors. However, of the primary socialization sources, peer groups are the most likely to both maintain strong bonds with the adolescent and to be purveyors of deviant norms. In this case, the chances are great that the adolescent will follow peer group norms and engage in deviant behaviors.

The bonds with family and school have an effect on the peer group with whom the youth associates. When bonds between the family and school are strong, the child likely develops prosocial norms that are often reflected in their choice of a peer group. Prosocial attitudes make it easier to form attachments with other prosocial forces. However, weak

bonds to family and school often lead the youth to seek out others with similar difficulties (Bachrach & Sandler, 1985). Furthermore, the breakdown in family and school bonds mean that peer groups will dominate the primary socialization process, increasing the likelihood of deviant behavior.

Research on inhalant use has found a consistent, strong relationship between peers and solvent abuse. The peer groups of inhalant users tend to be more deviant and delinquent than peer groups that engage in other drug use, but refrain from inhalants (Jumper-Thurman & Beauvais, 1992). It is within these deviant peer groups that youth learn deviant attitudes and behaviors and find the social context for inhalant use (McBride et al., 1991). Research findings also reveal that peer sanctions and peer encouragement play a substantial role in inhalant use (Beauvais et al., 1985); that is, peers actively support and encourage inhalant use when it occurs.

Objectives of the Present Study

The present study examines inhalant use within a general school sample from across the United States. Preliminary analyses revealed that meaningful comparisons involving ethnicity were not possible due to insufficient numbers of inhalant users within ethnic groups other than White non-Latino (see Method section). Furthermore, much of the past research has focused on inhalant use among American Indian and Latino youth, with less attention to use among White non-Latino youth. As Beauvais and Oetting (1988) noted, no data have been utilized to describe inhalant use among children in nonminority populations. Therefore, the present study focuses on inhalant use among White non-Latino youth.

A considerable amount of research has examined the antecedents of inhalant abuse. However, much of this research has been conducted with atypical samples, such as youth in drug treatment facilities, prevention programs, and detention centers. With such samples it is often difficult to disentangle general inhalant abuse findings from the specific characteristics of the sample. In addition, much of the research on inhalant use has targeted older adolescents and adults. While inhalant abuse is clearly a problem among these age groups, the most likely inhalant users are youth between the ages of 12 and 14. It is unclear whether the risk factors for inhalant use among older adolescents and adults apply to younger adolescents. Therefore, the first objective of the present study is to replicate past research on factors that distinguish between inhalant users, other types of drug users, and non-drug users within a representative sample of 12 to 14 year old youth.

The age range in the present study corresponds with Beauvais and Oetting's (1987) young inhalant user group. However, there is evidence that this broad grouping is insufficient for understanding inhalant use among 12 to 14 year olds. Beauvais (personal communication, August 17, 1998) suggested that there is an identifiable group of youth who experiment with inhalants on isolated occasions; however, their level of use does not warrant classification in the young inhalant users group. In addition to lower levels of inhalant use, experimental inhalant users use less alcohol and marijuana than those classified as young inhalant users. Furthermore, clinical reports suggest that experimental inhalant users may be socially and emotionally distinct from both young inhalant users and youth who never experiment with inhalants (Beauvais, personal communication, August 17, 1998).

Siegel's (1984) classification scheme, which reflects types and patterns of drug use rather than age, also suggests an experimental inhalant use group. Furthermore, Siegel's taxonomy suggests that identifiable subgroups of recreational and heavy users of inhalants (corresponding to his "recreational" and "intensified" categories) may exist within Oetting and Beauvais' (1987) original young inhalant use group. Based on the classification schemes of Oetting and Beauvais and Siegel, an expanded taxonomy including three groups of young inhalant users are identified and examined in the present study: (1) experimental inhalant users, (2) recreational inhalant users, and (3) heavy inhalant users.

Three groups of non-inhalant users are also identified for comparison purposes: (1) non/negligible drug users, who serve as a baseline comparison group, (2) recreational drug users with no inhalant use history, and (3) heavy drug users with no inhalant use history. The recreational and heavy drug use groups are comparable to the recreational and heavy inhalant use groups on substance use levels besides inhalants. The first phase of the present study compares these six groups on a number of psychosocial measures that past research has identified as predictors of inhalant use. The primary objective is to identify personal, peer, school, and family characteristics that distinguish various types of inhalant users and non-inhalant users within a representative sample of youth.

A second limitation of the inhalant abuse literature is the lack of a coherent theoretical model that integrates past research findings. The result is a lengthy, disorganized list of risk and protective factors related to inhalant use. The second objective of the present study is to use primary socialization theory to integrate the findings on inhalant abuse. Past research has demonstrated the utility of primary

socialization theory for predicting drug use within the general adolescent population. However, as outlined in the preceding review, inhalant users appear to differ from general drug users on several important dimensions of primary socialization theory. For this reason, it is important to test the generalizability of primary socialization theory for explaining drug use among inhalant users.

This second phase of the study focuses on the portion of the sample that reported significant inhalant or other drug use. A primary socialization model of general drug use is tested within the heavy inhalant, heavy drug, recreational inhalant, and recreational drug use groups. Consistent with primary socialization theory, it is hypothesized that the family, school, and peer group primary socialization sources are related to overall drug use. However, primary socialization theory suggests that school and family problems lead to association with deviant peers, which in turn leads to drug use. Thus, it is hypothesized that family and school effects on drug use are mediated by peer effects. In addition, primary socialization theory asserts that personal characteristics influence drug use only when they affect the interactions between the individual and the primary socialization sources. Therefore, the effects of emotional distress and deviance on drug use are hypothesized to be mediated by the primary socialization sources, particularly the peer effects.

Once the primary socialization model of general drug use is established for each drug use group, it is tested for equivalence between heavy inhalant and heavy drug users, and between recreational inhalant and recreational drug users. Model comparison explores the similarities and differences in primary socialization models of drug use between comparable groups of inhalant users and other drug users. The goal is to

determine if socialization factors influence drug use differently for inhalant users compared to other drug users. For example, Jumper-Thurman and Beauvais (1992) suggested that peer effects on inhalant use may be stronger than for other types of drug use. This effect might be reflected by a stronger link between peer drug encouragement and overall drug use for inhalant users. In addition, past research suggests that inhalant users exhibit greater emotional distress and deviant behavior than other drug users (Jacobs & Ghodse, 1988; Oetting & Webb, 1992). Elevated emotional distress and deviance may alienate inhalant users from sources of prosocial norms (i.e., family and school) and strengthen the connection with similarly distressed and deviant peers. A stronger path coefficient from emotional distress or deviance to peer drug encouragement for inhalant users would support the presence of such effects.

Results from the first portion of the present study provide information about the characteristics of a large sample of young inhalant users, as well as the factors that distinguish between inhalant users, other drug users, and negligible/non-drug users. The second portion of the study identifies how these characteristics operate to explain general drug use for both inhalant and other drug users. Overall, the results will help guide and tailor effective inhalant abuse treatment and prevention programs.

Chapter II

Method

Participants

The overall sample included 69,795 students ranging from 7th to 12th grade and composed of 48.9% males and 51.1% females. The ethnic breakdown was 76.6% White non-Latino, 4.7% African American, 3.0% Native American, 3.0% Asian American, 7.5% Latino, and 5.2% reporting "other" ethnic origins. A non-significant chi-square statistic indicated that males and females were equally represented across ethnic groups, χ^2 (5, $\underline{N}$ = 64,890) = 8.50, $\underline{V}$ = .01. Age breakdown was as follows: 0.1% were 11 years or younger, 5.3% were 12 years old, 17.7% were 13 years old, 21.6% were 14 years old, 17.2% were 15 years old, 16.1% were 16 years old, 14.3% were 17 years old, 6.7% were 18 years old, and 0.9% were 19 years or older.

As outlined in the introduction, the present study was limited to complete cases of 12 to 14 year old, White non-Latino youth. The resulting sample included 12,905 students, of whom 44.6% were male and 55.4% were female. In addition, 10.6% of participants were 12 years old, 39.7% were 13 years old, and 49.7% were 14 years old. A significant chi-square statistic indicated a relationship between gender and age, χ^2 (2, $\underline{N}$ = 12,905) = 33.20, $\underline{p} < .001$, $\underline{V}$ = .05. A greater proportion of females (62.4%) among the 12 year-old participants drove this effect.

The Inhalant and Other Drug Use Comparison Groups. The first phase of the present research involved creating and comparing six drug use groups - heavy inhalant users, recreational inhalant users, experimental inhalant users, heavy drug (but not inhalant) users, recreational drug (but not inhalant) users, and non/negligible drug users. The heavy, recreational, and experimental inhalant use groups were created based on responses to four inhalant-related questions from the American Drug and Alcohol Survey (see Instruments section). Using these four questions, several cutoff points were tested for each group and validated against information about other substance use, including the drug use grouping scale (described in Instruments section), and alcohol, marijuana, cocaine, and LSD use. Heavy and recreational drug use groups were created to be equivalent to the heavy and recreational inhalant use groups on the use of several substances other than inhalants. These groups were created as contrast or control groups in order to distinguish effects for inhalant use from general drug use. Lastly, a group of non/negligible drug users was identified who reported no inhalant history and very little or no drug use.

Non/negligible drug users. A group of non/negligible drug users was identified to serve as a baseline comparison group. The two criteria for inclusion in the non/negligible drug use group were having (1) no history of inhalant use and (2) limited or no experience with drugs and alcohol. The non/negligible drug use group was comprised of non-inhalant users from the two least severe categories of the drug use grouping scale - negligible or no use and light alcohol use (n = 4,103 males, n = 5,384 females).

Experimental inhalant users. Experimental inhalant users were defined by minimal experience with inhalants. Respondents who reported using inhalants one to two times in

the past year were categorized as experimental inhalant users. Respondents who indicated that they had used inhalants previously, but not in the past twelve months were also included in this group (n = 390 males, n = 383 females).

Recreational inhalant users. Recreational inhalant users were defined as having used inhalants one or two times in the past month, three to nine times in the past year, or describing themselves as very light or light inhalant users. Respondents who met one or more of these criteria were placed in the recreational inhalant use group (n = 446 males, n = 555 females).

Heavy inhalant users. Heavy inhalant users were defined as having used inhalants three or more times in the past month, ten or more times in the past year, or describing themselves as moderate, heavy, or very heavy inhalant users (n = 148 males, n = 177 females). An examination of the drug use grouping scale revealed that all of the heavy inhalant users were classified in the five most severe categories of drug use (i.e., between occasional drug users and multi-drug users).

Recreational drug users (without inhalants). The recreational drug use group was formed to be equivalent to the recreational inhalant use group on alcohol, marijuana, LSD, and cocaine use. Those participants who reported any history of inhalant use were not eligible for inclusion in the recreational drug use group. Several groups were compared with the recreational inhalant users to find the most similar comparison group with respect to use of the aforementioned substances. The recreational drug use group was ultimately comprised of participants from the "light marijuana users" and "drug experimenters" categories of the drug use grouping scale (n = 533 males, n = 479 females). The recreational drug use group differed significantly from the recreational

inhalant use group on alcohol, marijuana, LSD, and cocaine use, ts (2,011) = 5.23, 3.02, 6.73 and 8.23, respectively. However, the effect sizes for these differences were extremely small (ω^2 = .01, .004, .03, and .02, respectively), suggesting relative equivalence between the two groups across several types of substance use.

Heavy drug users (without inhalants). The heavy drug use group was formed to be equivalent to the heavy inhalant use group on alcohol, marijuana, LSD, and cocaine use. Those participants who reported any history of inhalant use were not eligible for inclusion in the heavy drug use group. Several groups were compared to the heavy inhalant users to find the most similar comparison group with regard to use of the aforementioned substances. A combination of "occasional drug users" and "heavy alcohol users" from the drug use grouping scale did not differ from the heavy inhalant use group on alcohol, marijuana, or LSD use, ts (630) = .54, .73, and .06, ω^2 = .0004, .0008, .0001, respectively, and exhibited only a small mean difference on cocaine use, t (630) = 3.41, p < .001; ω^2 = .02. These results suggested that the combination of "occasional drug users" and "heavy alcohol users" formed the most appropriate heavy drug use group (139 males, n = 168 females).

After the six drug use groups had been formed, a small number of participants remained who did not fit in the established groups (n = 160). These were participants classified in the three most serious drug use grouping scale categories (multi-drug use, stimulant use, or heavy marijuana use) with no history of inhalant use. They were omitted from further analyses.

Within the final sample (N = 12,905), 44.6% were male and 55.4% were female. Examination of the comparison groups indicated that drug use group membership was

related to gender, χ^2 (5, N = 12,905) = 44.55, p < .001, V = .06. However, the small effect size suggested that males and females were nearly equally represented across drug use groups. Inspection of cell frequencies revealed that in the present sample, proportionally more males were involved in experimental inhalant use and recreational drug use. However, the proportions of males and females in the heavy inhalant use group (2.6% and 2.5%, respectively) and the heavy drug use group (2.4% for both) were nearly identical. The age distribution at time of data collection showed that 10.6% of participants were 12 years old, 39.7% were 13 years old, and 49.7% were 14 years old. Age was also related to drug use group membership, χ^2 (10, N = 12,905) = 209.87, p < .001, V = .09. This effect was due to the greater proportion of non-drug using 12 year olds in the sample. However, roughly equivalent percentages of 12, 13, and 14 year-olds were categorized as heavy inhalant users (1.8%, 2.9%, and 2.4%, respectively).

Instruments

The American Drug and Alcohol Survey (ADAS). The ADAS (Oetting, Beauvais, & Edwards, 1985) is a commercially available instrument that provides information to school districts about local levels and patterns of student drug and alcohol use. The survey has been administered to more than a million students nationwide. In over two decades of use, the ADAS has been extensively researched and revised. The resulting survey provides reliable and valid self-report measures of substance use among several different ethnic groups (Oetting & Beauvais, 1990a; Oetting, Beauvais, Edwards, & Waters, 1984; Oetting, Edwards, & Beauvais, 1985). Furthermore, drug prevalence rates obtained using the ADAS are comparable to those obtained from other national surveys of adolescent drug use (Oetting & Beauvais, 1990a).

Each survey is subjected to 40 different checks for inconsistency (e.g., marking repeated items differently, marking that occasional use of a drug is more harmful than regular use) and exaggeration (e.g., endorsing use of a fake drug or claiming implausible levels of drug involvement). Surveys with three or more indications of inconsistency or exaggeration were removed from the database prior to analysis.

The ADAS contains questions about the use of a variety of substances including alcohol, marijuana, cocaine, LSD, PCP, stimulants, downers, narcotics, and inhalants. Based on responses to these questions, each respondent is classified into one of nine mutually exclusive and exhaustive substance use groups, referred to as the drug use grouping scale. Drug use frequency and severity progressively increase throughout the classification scheme. The drug use grouping scale includes negligible or no use, light alcohol use, drug experimentation, light marijuana use, occasional drug use, heavy alcohol use, heavy marijuana use, stimulant use, and multi-drug use. In addition to the drug use grouping scale, substance-specific scales assess levels of alcohol, marijuana, inhalant, LSD, uppers, downers, and cocaine use. Validity evidence for the drug use grouping scale and the substance-specific scales includes scale intercorrelations, age group norming, scale discrimination using clustering techniques, and correlation with variables predictive of drug use (Oetting & Beauvais, 1990a; Oetting, Edwards, et al., 1985; Oetting, et al., 1984).

The inhalant-related items on the ADAS (see Appendix) define inhalant use more specifically than items on other national surveys by instructing the respondent that cocaine is not considered an inhalant. Consequently, inhalant prevalence estimates from the ADAS are somewhat lower than those derived from other national surveys (Edwards

& Oetting, 1995). Four inhalant-related items from the ADAS were used in conjunction with additional substance use information to classify the present participants into six comparison groups. The first item asked, "Have you ever 'sniffed' (or 'huffed') glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine)." Response options included 1 = yes and 2 = no. The second item asked, "How often in the last 12 months have you 'sniffed' (or 'huffed') glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine)." Response options included 1 = none, 2 = 1-2 times, 3 = 3-9 times, 4 = 10-19 times, 5 = 20-49 times, and 6 = 50 or more times. The third item asked, "How often in the last month have you 'sniffed' (or 'huffed') glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine)." Response options included 1 = none, 2 = 1-2 times, 3 = 3-9 times, 4 = 10-19 times, and 5 = 20 or more times. The fourth item asked, "In 'sniffing' something like glue or gas, are you a. . . ?" Response options included 1 = non-user, 2 = very light user, 3 = light user, 4 = moderate user, 5 = heavy user, and 6 = very heavy user.

The Prevention Planning Survey (PPS). The Prevention Planning Survey (Oetting, Edwards, & Beauvais, 1996) is a drug use risk/protective factor instrument often administered in conjunction with the ADAS. The PPS contains items pertaining to emotional distress, deviance, peer and family relationships, and school-related attitudes and behavior. Individual items are combined to form subscales to assess the psychological, social, and cultural characteristics related to adolescent social networks and drug use (see later descriptions).

The PPS scales were developed to ensure construct validity and brevity (Oetting et al., 1984). Initially, constructs of interest were identified and defined. Next, items were

written to specifically assess each construct. Because the scales were designed to identify at-risk youth, items were written to accommodate low reading comprehension levels. Following scale construction, the instruments were administered to large samples and modified in an iterative process. Key cluster analysis (Tryon & Bailey, 1965) was used to examine scale reliability and potential group differences and to confirm the unitary structure of the scales. Items were consequently dropped, rewritten, or added to maximize internal consistency and minimize group differences. The new scales were administered to large samples, re-analyzed, and modified. This process continued until internal consistency, ethnic group equivalence, and scale structure stabilized (Oetting, Edwards, et al., 1985).

Emotional distress measures. Emotional distress was measured with a six-item anger scale, a six-item depression scale, and an eleven-item self-esteem scale (α = .88, .91, and .86, respectively). The respondent was asked to rate how characteristic certain emotions and behaviors were of him or her (e.g., aggressive behavior and hotheadedness for anger, loneliness and sadness for depression, and self-liking and competence for self-esteem). All items were measured on a 4-point Likert-type scale (1 = no, 2 = not much, 3 = some, and 4 = a lot). Past research on these scales has reported internal consistency reliability estimates ranging from .84 to .89 for anger (Oetting et al., 1984; Swaim et al., 1989), .89 to .94 for depression (Oetting et al., 1989; Smitham, 1997), and .80 to .89 for self-esteem (Oetting et al., 1989; Swaim et al., 1989).

The validity of the anger scale is supported by a number of studies. In a sample of Mexican American and White non-Latino adolescents, Deffenbacher and Swaim (1999) found that scores on the anger scale were strongly related to self-reports of three forms of

aggressive anger expression (rs = .52 to .60). Moreover, the anger scale correlated more highly with aggressive anger expression than did scales measuring anxiety (rs = .16 to .39) or depression (rs = .28 to .46), providing evidence of discriminant validity. In addition, research has demonstrated a consistent relationship between anger and substance use (Oetting, Deffenbacher, et al., 1998; Oetting et al., 1989; Swaim et al., 1989). Compared to other emotional distress measures included in the ADAS, the anger scale has been the strongest predictor of adolescent substance use (Oetting et al., 1989; Swaim et al., 1989). Moreover, Oetting, Edwards, Kelly and Beauvais (1997) classified a sample of rural youth into three groups: heavy drug users, moderate drug users, and non-drug users. Heavy drug users reported the highest scores on anger, followed by moderate drug users and non-drug users, respectively.

Additional validity evidence for the anger scale is obtained from studies that have replicated established relationships between anger and other emotional distress variables, including depression and anxiety (Deffenbacher, 1992). In a study linking emotional distress to adolescent drug use, the anger scale was positively correlated with a measure of anxiety (r = .51), as well as with measures of depression and blame-alienation (rs = .38 and .42, respectively) (Swaim et al., 1989). In the same study, the relation of the anger scale to self-esteem was negligible (r = -.07). This pattern of results was replicated in a study examining alcohol use among White non-Latino and Native American adolescents (Oetting et al., 1989). The only discrepancy was a positive relationship between anger and self-esteem for Native American adolescents.

Several studies provide validity evidence for the depression scale. Consistent with past research demonstrating greater depression among adolescent females (Hankin,

Abramson, Moffitt, Silva, McGee, & Angell, 1998; Hankin, Roberts, & Gotlib, 1997), Oetting and colleagues (1997) found that females reported higher scores on the depression scale in a study of rural youth. Furthermore, research has consistently found a positive relationship between depression and substance use among women but not men (Oetting, Dinges, & Beauvais, 1993). Consistent with this finding, Swaim and colleagues (1989) found that the depression scale predicted drug use only for women. Intercorrelations between the depression scale and other emotional measures provide additional validity evidence. For example, the depression scale was negatively related to self-esteem (rs = -.26 to -.40), and positively related to anger (rs = .37 to .38), anxiety (rs = .54 to .55), and blame-alienation (rs = .65 to .74) in studies of substance abuse risk-factors (Oetting et al., 1989; Swaim et al., 1989).

Validity evidence for the self-esteem scale may be derived from several previous studies. In general, past research suggests lower self-esteem among females than males (Moran & Eckenrode, 1991; Overholser, 1993). Accordingly, females reported significantly lower scores on the self-esteem scale than did males in a study of rural youth (Oetting et al., 1997). Correlations between the self-esteem scale and other emotional measures provide further validity evidence. The self-esteem scale yielded moderate negative relationships with depression, anxiety, and blame-alienation (rs = -.40, -.23, -.35, respectively) in a study of adolescent substance use (Oetting et al., 1989). These relationships between the self-esteem scale and other emotional variables were replicated by Swaim and colleagues (1989) in a study of adolescent alcohol use.

Deviance measures. Deviance was measured with a five-item deviant behavior scale, a four-item tolerance of deviance scale, and a three-item excitement seeking scale

(α = .80, .83, and .69, respectively). Individual deviance items asked how descriptive certain attitudes and behaviors were of the respondent (e.g., theft and cheating for deviant behavior, attitudes toward lying and cheating for tolerance of deviance, and risk-taking and dare-devil behavior for excitement seeking). All items were measured on a 4-point Likert-type scale (1 = no, 2 = not much, 3 = some, and 4 = a lot). Past research on these scales has reported reliability estimates ranging from .76 to .87 for deviant behavior (Oetting et al., 1984), .79 to .87 for tolerance of deviance (Oetting et al., 1984; Smitham, 1997), and .77 for excitement seeking (Smitham, 1997). In addition, a moderate correlation between the deviant behavior scale and the tolerance of deviance scale (r = .47) suggests that these scales measure somewhat distinct facets of deviance (Oetting et al., 1984).

Several studies provide construct validity evidence for the deviance scales. For example, research on substance abuse has consistently revealed substantive relationships between deviant behavior, tolerance of deviance, and drug use (Jessor & Jessor, 1977; Newcomb & Bentler, 1988; Oetting et al., 1997). In studies of adolescent drug use, scores on the deviant behavior and tolerance of deviance scales were strongly related to severity of drug use. Adolescents who reported higher scores on deviant behavior and tolerance of deviance also reported using a greater number of drugs more frequently (Oetting et al., 1984, 1997). Further validity evidence for the deviant behavior and tolerance of deviance scales is obtained from intercorrelations with variables commonly related to deviance. For example, in a study of adolescent drug use (Oetting et al., 1984), the deviant behavior and tolerance of deviance scales were both negatively correlated with school liking (rs = -.45 and -.47, respectively) and school performance (rs = -.45 and -.24, respectively).

The validity of the excitement seeking scale is less well established. A positive relationship between excitement seeking and substance use has been firmly established in prior research (Sutker, Archer, & Allain, 1978; Zuckerman, 1988). A single published study using the excitement seeking scale was consistent with these findings. Oetting and colleagues (1997) found that heavy drug users reported the highest levels of excitement seeking, followed by moderate drug users and non-drug users, respectively.

Primary socialization measures. Several PPS scales assess the link between the primary socialization sources (school, peers, and family) and substance use (Oetting & Beauvais, 1987b; Oetting, et al., 1988, 1997; Swaim, Oetting, & Casas, 1996). As with the emotional distress and deviance measures, continuous improvements of the measurement properties of these scales have been made on successive versions of the PPS. Because these primary socialization scales are relatively new, reliability and validity evidence in the published literature is very limited. All items included in the peer, school, and family scales are listed in the Appendix.

School adjustment. The respondent's overall school adjustment was measured by a two-item school liking scale (e.g., "School is fun"), a two-item teacher liking scale (e.g., "I like my teachers"), and a two-item academic performance scale (e.g., "What kind of grades do you get?") (α = .84, .78, and .83, respectively). School and teacher liking items were measured on a 4-point Likert-type scale (1 = no, 2 = not much, 3 = some, and 4 = a lot). Academic performance items were also measured on a 4-point Likert-type scale (1 = poor, 2 = not too good, 3 = good, and 4 = very good). Previous studies have used these scales as indicators of a latent school adjustment factor in structural equation models (Swaim, Bates, & Chavez, 1998; Swaim et al., 1996). High factor loadings (most above

.60) for both Mexican American and White non-Latino youth indicated that the school liking, teacher liking, and academic performance scales (α = .77 to .85) were adequate measures of school adjustment. Moreover, the resulting school adjustment factor was moderately related to family caring, religious identification, and peer substance involvement (i.e., tobacco use and polydrug use).

Peer school adjustment. The five-item peer school adjustment scale (α = .85 in the current sample) measured the respondent's perceptions of academic performance and school-related attitudes within his or her peer group (e.g., "Do your friends like school?" "Do your friends like their teachers?"). Response options were 1 = no, 2 = not much, 3 = some, and 4 = a lot. Past research reported an alpha reliability of .85 for the peer school adjustment scale (Oetting et al., 1997). In addition, Oetting and Donnermeyer (1998) noted that the peers of drug users are likely to experience serious school adjustment problems. In a study of rural youth, Oetting and colleagues (1997) found that heavy drug-users reported lower scores on the peer school adjustment scale than moderate and non-drug users.

Peer drug encouragement. Peer drug encouragement was assessed with four substance-specific scales measuring peer group involvement with alcohol, marijuana, inhalants, and other drugs. Previous versions of a general peer group drug involvement scale were strongly correlated with self-reports of drug use (rs = .44 to .74) (Oetting & Beauvais, 1987b; Swaim et al., 1989; Swaim, Oetting, Jumper-Thurman, Beauvais, & Edwards, 1993). In addition, past research using the peer drug sanction items included in the present scales found that drug users perceived fewer peer sanctions against drug use than did non-drug users (Oetting et al., 1984, 1997). More recently, Swaim and

colleagues (1998) identified substance-specific alcohol, marijuana, and other drug components of peer drug encouragement. In a structural model of polydrug use, peer alcohol, marijuana, and other drug encouragement indicators (α = .85 to .91) were used to represent a latent peer drug encouragement factor. Factor loadings ranging from .58 to 1.00 indicated that all three substance-specific measures loaded highly on peer drug encouragement. Moreover, the peer drug encouragement factor explained between 34% and 55% of the variance in overall drug use. Therefore, substance-specific peer drug encouragement scales for alcohol, marijuana, other drugs, and inhalants were used in the present study.

The five-item peer alcohol encouragement scale (α = .82 in the current study) asked about peer alcohol use, peer group sanctions toward alcohol use, and peer encouragement to use alcohol (e.g., "How many of your friends get drunk every weekend?" "How much would your friends try to stop you from getting drunk?"). Response options included 1 = none, 2 = a few, 3 = most of them, and 4 = all of them, and 1 = a lot, 2 = some, 3 = not much, and 4 = not at all, respectively. The four-item peer marijuana encouragement scale (α = .80 in the current study) asked about peer marijuana use, as well as peer encouragement and sanctions related to marijuana (e.g., "How much would your friends try to stop you from using marijuana?" "How much would you try to stop your friends from using marijuana?"). Response options included 1 = a lot, 2 = some, 3 = not much, and 4 = not at all. The twelve-item peer other drug encouragement scale (α = .90 in the current study) asked about peer use, sanctions, and encouragement related to uppers, downers, and cocaine (e.g., "How often have your friends asked you to use uppers?"). Response options included 1 = not at all, 2 = not very often, 3 = some, and 4 = very often.

In addition, a four-item peer inhalant encouragement scale (α = .77 in the current study) assessed peer inhalant use, sanctions, and encouragement (e.g., "How often have your friends asked you to use inhalants?"). Response options were 1 = not at all, 2 = not very often, 3 = some, and 4 = very often.

The measurement properties of the individual peer drug encouragement scales have not been well examined in past research. A previous study by Oetting and others (1997) specifically examined two of the items from the peer inhalant encouragement scale (α = .93 in the present study) and found that heavy drug users reported more peer encouragement and fewer peer sanctions with respect to inhalant use than did moderate or non-drug users.

Family relations. Family relations were measured by the two-item family conflict scale and the two-item family caring scale (both αs = .79 in the current study). The family conflict scale assessed the respondent's perception of family conflict (e.g., "Do the members of your family fight with each other?" "Do the members of your family argue with each other?"), while the family caring scale measured mutual family concern (e.g., "Does your family care about you?" "How much do you care about your family?"). Response options included 1 = no, 2 = not much, 3 = some, and 4 = a lot. Previous research has yielded acceptable reliability estimates (α = .77 to .89) for similar versions of the family caring and family conflict scales (Oetting et al., 1984, 1997; Swaim et al., 1996).

Validity evidence for the family conflict and family caring scales is derived from several studies. In a study of drug use among rural youth, heavy drug users reported higher scores on family conflict than moderate or non-drug users (Oetting et al., 1997).

This difference was most dramatic among 7th and 8th graders, suggesting that family conflict may be a greater risk factor for drug use among younger adolescents. In addition, research has established a consistent negative link between family caring and drug use (McBride et al., 1991; Oetting & Beauvais, 1987a; Oetting & Donnermeyer, 1998). Consistent with this finding, research using the family caring scale has found that drug involved youth report lower scores than non-drug users (Oetting et al., 1984, 1997). Furthermore, Oetting and Beauvais (1987b) found that family caring scores were negatively related to self-reports of drug use (r = -.17) and peer drug associations (r = -.24).

Family drug sanctions. Family sanctions against drug use were measured with a two-item family alcohol sanctions scale, a two-item family marijuana sanctions scale, and a two-item family other drug sanctions scale (α = .77, .73, and .63, respectively). Items asked about the respondent's perception of sanctions against drug use within their family (e.g., "How much would your family care if you used marijuana?" "How much would your family try to stop you from using other drugs?"). Response options included 1 = not at all, 2 = not much, 3 = some, and 4 = a lot. Previous research on a combined family drug sanctions scale found that family sanctions were negatively related to self-reports of drug use (r = -.32) and peer drug associations (r = -.36) (Oetting & Beauvais, 1987b). Furthermore, Oetting and colleagues (1997) found that heavy drug users reported fewer family sanctions against drug use than did moderate drug users or non-drug users. Swaim and colleagues (1998) used the three substance-specific family sanctions scales (α = .86 to .87) as indicators of a latent family drug sanctions factor. The high factor loadings (.47 to .96, with most above .70) supported the substance-specific indicators as appropriate

measures of family drug sanctions. Moreover, the resulting family drug sanctions factor was strongly related to family caring, peer drug involvement, and drug use among both White non-Latino and Mexican American males (Swaim et al., 1998).

Violence, criminal behavior, and victimization. A number of individual items were used to measure involvement in violence, criminal behavior, and victimization (see Appendix). The first class of four items pertained to violent behavior on the part of the respondent. The respondent was asked if he or she had ever beaten someone, scared someone with a weapon, hurt someone with a weapon, or used force in a robbery. The second set of items asked about involvement in other forms of criminal behavior, specifically if the respondent had ever been arrested, taken a gun to school, stolen a car, or committed acts of vandalism. Five additional items asked about incidents in which the respondent had been victimized, specifically if he or she had ever been beaten by someone the same age, beaten by someone else, scared with a weapon, hurt with a weapon, or sexually assaulted. Response options for all dichotomous items were 1 = yes and 2 = no. Reliability analyses were conducted on the three classes of items; however, the dichotomous nature and low endorsement rates for all three classes of items resulted in low scale reliability estimates. Consequently, the items were retained as single-item indicator variables.

Procedure

Several thousand students complete the ADAS/PPS every year. The survey is administered anonymously in classrooms of several hundred schools located in all regions of the United States (with slight underrepresentation in the Southeast). Data for this study were collected during school years between 1993 and 1996.

Informed consent. Notification of the survey is sent to parents approximately two weeks prior to survey administration. Parents are fully informed about the date and time, survey procedures, and types of questions that will be asked. Parents are also given the opportunity to examine a copy of the survey at the school prior to administration. Those who do not wish for their child to complete the survey simply sign and return the notification to the school, or call the school office with their request prior to survey administration. At the time the survey is given, students whose parents did not want them to participate are given a school-related assignment to complete. The school is instructed to do this in a manner that does not call attention or cause embarrassment to the student.

Administration. School personnel, usually classroom teachers, administer the ADAS/PPS to students. Teachers are provided with written instructions for survey administration. These include: (1) reading a statement to students about survey confidentiality and anonymity; (2) remaining in an area of the classroom where individual student responses cannot be observed but where fairly tight control over classroom behavior may be maintained; (3) emphasizing the voluntary nature of the survey; (4) emphasizing permission to omit specific items or discontinue at any time without penalty; and (5) procedures for collection of the surveys in a manner that preserves anonymity. The survey instruments do not ask for any identifying information, and students are further instructed not to write their names any of the survey materials. When students complete their surveys, they are asked to continue with regular classroom work until all students have finished. Students are then instructed to place their surveys in a box or envelope that is circulated around the room. The administrator is asked to seal the box or envelope immediately and return it promptly to the main office for shipping.

Chapter III

Results

The first phase of the present study involved replicating and extending past findings regarding the characteristics of inhalant users. A series of 2 (Gender) x 6 (Drug use group) MANOVAs was conducted on psychosocial characteristics. The multivariate effects discussed below refer to these MANOVAs. Significant multivariate effects were followed by univariate ANOVAs, resulting in the univariate effects referred to below. The sensitivity of F statistics to sample size is well documented (e.g., Cohen, 1988; Hays, 1993; Murphy & Myors, 1998). Due to the large sample in the present study, the presentation of MANOVA and ANOVA results was limited to those effects that reached statistical significance ($p < .05$) and accounted for 1% or more of the outcome variance (based on Roy's trace for MANOVA and eta squared for ANOVA). The latter criterion is the bottom end of Cohen's (1988) definition of a small effect size. Any effect failing to reach this minimal standard was not considered meaningful and therefore was not reported. Using these criteria, no multivariate gender x drug use group interactions and only four multivariate gender main effects were detected. Therefore, findings involving main effects for drug use group on univariate outcomes (Table 1) are collapsed across gender. *Post hoc* Tukey comparisons were utilized to test for significant univariate differences among drug use groups.

Table 1

Drug Use and Psychosocial Variables

		Drug use group						ANOVA
		ND	EI	RD	RI	HD	HI	F(5, 12,893)
	n	9,487	773	1,012	1,001	307	325	(η^2)
Emotional distress								
Depression	M	9.66	11.34_{a}	11.08_{a}	12.52_{b}	12.36_{b}	13.07_{b}	139.15*
	SD	4.18	4.89	4.89	5.30	5.36	5.34	(.05)
Anger	M	12.89	$15.51_{a,b}$	14.94_{a}	16.50_{c}	$15.77_{b,c}$	17.83	264.71*
	SD	4.21	4.67	4.63	4.70	4.61	4.56	(.09)
Self-	M	37.00	$35.32_{a,b}$	35.70_{a}	$34.74_{b,c}$	$34.72_{b,c}$	33.99_{c}	73.60*
esteem	SD	5.00	5.55	5.49	5.75	5.78	5.95	(.03)
Deviance								
Deviant	M	7.63	10.13_{a}	10.02_{a}	11.56	11.01	12.89	740.02*
behavior	SD	2.57	3.27	3.31	3.36	3.31	3.84	(.22)
Tolerance	M	5.71	7.33_{a}	$7.53_{a,b}$	8.29_{c}	$7.93_{b,c}$	9.31	406.98*
of deviance	SD	2.27	3.03	3.02	3.18	2.94	3.86	(.14)
Excitement	M	6.97	8.73_{a}	8.67_{a}	$9.30_{b,c}$	$9.09_{a,b}$	9.72_{c}	378.31*
seeking	SD	2.42	2.35	2.32	2.14	2.32	2.16	(.13)

School adjustment								
School	M	5.57	4.75_{a}	4.72_{a}	4.47_{b}	$4.51_{a,b}$	4.00	208.07*
liking	SD	1.55	1.71	1.64	1.73	1.65	1.68	(.08)
Teacher	M	6.42	5.79_{a}	5.76_{a}	5.48_{b}	$5.62_{a,b}$	5.03	254.00*
liking	SD	1.16	1.35	1.33	1.44	1.38	1.63	(.09)
Academic	M	6.68	6.09_{a}	$5.97_{a,b}$	5.80_{c}	$5.86_{b,c}$	5.54	234.30*
performance	SD	1.11	1.21	1.24	1.36	1.22	1.44	(.08)
Peer school	M	14.44	12.91_{a}	12.71_{a}	12.17_{b}	12.22_{b}	11.29	294.23*
adjustment	SD	2.63	2.85	2.87	3.08	2.87	3.21	(.10)
Family relations								
Family	M	7.84	7.54_{a}	7.60_{a}	7.34	7.54_{a}	7.00	171.28*
caring	SD	0.59	1.03	0.94	1.18	0.91	1.40	(.06)
Family	M	3.96	4.71_{a}	4.54_{a}	4.98_{b}	$4.77_{a,b}$	5.42	154.39*
conflict	SD	1.58	1.78	1.78	1.83	1.87	1.96	(.06)
Family drug concern								
Alcohol	M	7.77	7.44	7.35	7.19_{a}	$7.07_{a,b}$	7.03_{b}	178.70*
concern	SD	0.73	1.08	1.14	1.35	1.43	1.56	(.07)
Marijuana	M	7.92	7.75	7.56_{a}	7.54_{a}	$7.50_{a,b}$	7.43_{b}	118.60*
concern	SD	0.52	0.87	1.03	1.16	1.15	1.32	(.04)
Drug	M	7.93	7.85_{a}	7.85_{a}	7.74_{b}	$7.80_{a,b}$	7.60	44.20*
concern	SD	0.48	0.68	0.64	0.86	0.66	1.10	(.02)

Peer drug encouragement

Alcohol	M	7.50	10.61	11.54_a	11.80_a	12.84_b	13.21_b	962.19*
	SD	2.82	3.74	3.50	3.68	3.80	3.77	(.27)
Marijuana	M	5.01	7.08	8.88_a	8.08	9.04_a	9.23_a	1,145.86*
	SD	1.73	3.08	3.05	3.34	3.47	3.54	(.31)
Inhalant	M	5.03	7.03	6.00	9.46	6.57	11.44	1,562.49*
	SD	1.72	2.55	2.24	2.68	2.45	3.06	(.38)
Other	M	14.15	17.47_a	17.33_a	20.20_b	20.08_b	23.76	545.41*
drug	SD	4.36	6.48	5.74	7.64	7.23	8.79	(.18)

* $p < .001$.

Note. ND = non/negligible drug users; EI = experimental inhalant users; RD = recreational drug users; RI = recreational inhalant users; HD = heavy drug users; HI = heavy inhalant users.

η^2 is presented for each ANOVA in parentheses.

All means in the same row with matching subscripts are not significantly different based on *post hoc* Tukey tests. All means in the same row with differing or absent subscripts are significantly different from one another.

Emotional Distress

The multivariate main effect for gender on emotional distress (anger, depression, and self-esteem) was significant, $\Lambda = .987$, $F(3, 12{,}891) = 57.12$, $p < .001$, Roy's = 0.01. However, univariate tests for the gender effect failed to meet the effect size criterion for inclusion. The multivariate main effect for drug use group on emotional distress was significant, $\Lambda = .895$, $F(15, 35{,}587) = 97.41$, $p < .001$, Roy's = 0.12. Univariate effects for drug use group on depression, anger, and self-esteem were also significant (Table 1). Heavy inhalant users, recreational inhalant users, and heavy drug users did not differ significantly on depression, but were more depressed than the experimental inhalant and recreational drug use groups, which were statistically indistinguishable from one another. Non/negligible drug users reported significantly lower levels of depression than all other drug use groups. Heavy inhalant users reported significantly higher anger than all other groups. Recreational inhalant users were similar to heavy drug users on anger, but were significantly higher than recreational drug and experimental inhalant users. Heavy drug users also reported anger levels similar to recreational drug and experimental inhalant users; however, these three groups were significantly higher on anger than the non/negligible drug users. Heavy inhalant users reported the lowest self-esteem levels, although they did not differ significantly from the heavy drug and recreational inhalant users. Recreational drug and experimental inhalant users were higher than the aforementioned groups on self-esteem, and did not differ significantly from each other. Non/negligible drug users reported significantly greater self-esteem levels than other groups.

Deviance

A significant multivariate main effect for gender was found on deviance, $\Lambda = .987$, $F(3, 12{,}891) = 56.01$, $p < .001$, Roy's = 0.01. Univariate gender effects on deviant behavior, tolerance for deviance, and excitement-seeking were all significant, but gender explained at least 1% of the variance only in excitement-seeking, F (1, 12,893) = 129.06, $p < .001$, $\eta^2 = .01$, with males reporting higher levels ($M = 8.16$, $SD = 2.50$) than females ($M = 6.99$, $SD = 2.47$). The multivariate main effect for drug use group on deviance was also significant, $\Lambda = .741$, $F(15, 35{,}587) = 271.98$, $p < .001$, Roy's = 0.35. Significant univariate drug use group effects were found on deviant behavior, tolerance for deviance, and excitement-seeking (Table 1). Heavy inhalant users reported significantly more deviant behavior than recreational inhalant users, who in turn were significantly higher than heavy drug users. Heavy drug users reported greater deviant behavior than the experimental inhalant and recreational drug use groups, which did not differ. Non/negligible drug users reported significantly less deviant behavior than all other drug use groups. Heavy inhalant users reported significantly higher tolerance for deviance than all other groups. Heavy drug, recreational inhalant, recreational drug, and experimental inhalant users reported similar levels of tolerance for deviance, with only minor differences between groups. However, non/negligible users reported significantly less tolerance for deviance compared to all other groups. On excitement-seeking, heavy inhalant users were significantly higher than the heavy drug, recreational drug, and experimental inhalant use groups, which did not differ. Recreational inhalant users, while not differing from heavy inhalant users or heavy drug users, reported higher levels of excitement-seeking than recreational drug and

experimental inhalant users. Non/negligible drug users reported significantly lower levels of excitement-seeking than all other groups.

School Adjustment

The multivariate main effect for gender on school adjustment was significant, Λ = .990, $F(3, 12{,}891) = 44.61$, $p < .001$, Roy's = 0.01; however, univariate tests of the gender effect on school liking, teacher liking, and academic performance all failed to reach the minimum effect size criterion. The multivariate main effect for drug use group on school adjustment was also significant, $\Lambda = .875$, $F(15, 35{,}587) = 117.62$, $p < .001$, Roy's = 0.14. Univariate drug use group effects on school liking, teacher liking, and academic performance were all significant (Table 1). Heavy inhalant users reported significantly lower school and teacher liking than all other groups. Recreational inhalant users were not significantly different from heavy drug users on school and teacher liking, but were significantly lower than all other groups. Heavy drug users did not differ from recreational drug and experimental inhalant use groups, all of which reported significantly lower school and teacher liking than non/negligible drug users. Heavy inhalant users reported substantially worse academic performance than all other groups. Recreational inhalant users reported poorer academic performance than all other groups, except heavy drug users. Heavy drug users were also similar to recreational drug users and experimental inhalant users; however, all of these groups reported significantly lower academic performance than the non/negligible drug users.

Peer School Adjustment

A significant univariate main effect for gender on peer school adjustment was detected, $F(1, 12{,}893) = 132.86$, $p < .001$, $\eta^2 = 0.01$, with males reporting lower levels of

peer school adjustment (M = 13.28, SD = 2.93) than females (M = 14.41, SD = 2.73). A significant univariate effect for drug use group on peer school adjustment was also found (Table 1). Heavy inhalant users reported significantly lower levels of peer school adjustment than all other groups. Recreational inhalant and heavy drug users were similar and reported significantly lower peer school adjustment than the recreational drug and experimental inhalant use groups, which also did not differ. Lastly, non/negligible drug users reported significantly higher peer school adjustment levels than all other groups.

Family Relations

A significant multivariate main effect was found for gender on family relations (i.e., family caring and family conflict), $\Lambda = .989$, $F(2, 12{,}892) = 72.40$, $p < .001$, Roy's = 0.01. The univariate effect for gender was significant only on family conflict, $F(1, 12{,}893) = 135.83$, $p < .001$, $\eta^2 = 0.01$, with females reporting more conflict ($M = 4.37$, $SD = 1.72$) than males ($M = 3.96$, $SD = 1.63$). The multivariate main effect for drug use group on family relations was also significant, $\Lambda = .909$, $F(10, 25{,}784) = 125.97$, $p < .001$, Roy's = 0.10. Univariate effects for drug use group were significant for both family caring and family conflict (Table 1). Heavy inhalant users reported significantly lower levels of family caring than all other groups. Recreational inhalant users perceived significantly lower levels of family caring than heavy drug, recreational drug, and experimental inhalant users, all of which did not differ from one another. Non/negligible drug users reported significantly greater amounts of family caring than all other groups. Heavy inhalant users also reported significantly higher family conflict than all other drug use groups. Recreational inhalant users were similar to heavy drug users, but reported significantly greater family conflict than all remaining groups. Heavy drug users were

also similar to the recreational drug and experimental inhalant use groups, while non/negligible drug users experienced significantly less family conflict than all other groups.

Family Drug Sanctions

A significant multivariate main effect was found for drug use group on family drug sanctions. $\Lambda = .914$, $F(15, 35{,}587) = 78.83$, $p < .001$, Roy's = 0.08. Univariate effects for family concern about alcohol, marijuana, and other drugs were all significant (Table 1). Heavy inhalant users reported significantly lower family concern about alcohol than all groups, except heavy drug users. Recreational inhalant users did not differ from heavy drug users, but reported significantly lower family concern about alcohol than the remaining groups. Recreational drug users were significantly lower than experimental inhalant users, while non/negligible drug users reported significantly higher family alcohol concern than all other groups. Heavy inhalant users reported significantly less family concern about marijuana than all groups, except heavy drug users. Recreational inhalant users did not differ from either heavy or recreational drug users, but reported lower levels of family concern about marijuana than experimental inhalant and non/negligible drug users. Lastly, non/negligible drug users reported significantly higher levels of family concern about marijuana than all other groups. With respect to other drugs, heavy inhalant users reported significantly less family concern than all other groups. Few meaningful differences were reported on family concern about other drugs between recreational inhalant, heavy drug, recreational drug, and experimental inhalant use groups. Non/negligible drug users reported significantly higher family concern about other drugs than all other groups.

Peer Drug Encouragement

A multivariate main effect was detected for drug use group on peer drug encouragement (i.e., peer encouragement to use alcohol, marijuana, inhalants, and other drugs), $\Lambda = .441$, $F(20, 42{,}752) = 598.90$, $p < .001$, Roy's = 0.75, with significant univariate drug use group effects on all variables (Table 1). On peer encouragement to use alcohol, heavy inhalant and heavy drug users did not differ, but reported significantly greater peer encouragement than all other groups. Recreational inhalant and recreational drug users did not differ from each other, but experienced significantly higher peer encouragement to use alcohol than experimental inhalant users and non/negligible drug users. Non/negligible drug users reported lower peer alcohol encouragement than all other groups. With respect to marijuana use, heavy inhalant, heavy drug, and recreational drug users experienced similarly high levels of peer encouragement and were significantly different from all other groups. In descending order of magnitude, recreational inhalant, experimental inhalant and non/negligible drug users all differed significantly on peer marijuana encouragement. All groups differed from one another on peer encouragement to use inhalants. Heavy inhalant users reported the greatest peer encouragement to use inhalants, followed, in order, by recreational inhalant users, experimental inhalant users, heavy drug users, recreational drug users, and non/negligible drug users. Compared to all other groups, heavy inhalant users reported significantly higher peer encouragement to use other drugs. Recreational inhalant and heavy drug users were similar, but significantly higher than recreational drug and experimental inhalant use groups, which did not differ. Non/negligible drug users reported significantly less peer encouragement to use other drugs than all other groups.

Physical Violence, Criminal Behavior, and Victimization

All items pertaining to violence, victimization, and criminal behavior were dichotomous (yes-no). These items failed to form reliable scales due to their response format and skewed distributions. Therefore, each item was examined individually using a two-way (drug use group by yes-no response option) χ^2 test. Significant effects were followed by pairwise difference in proportions tests (Bruning & Kintz, 1977). In order to control for experimentwise error, the significance criterion for individual pairwise comparisons was adjusted to $\alpha = .01$. Post hoc tests revealed that non/negligible drug users reported significantly lower response rates than all other groups on every violence, criminal behavior, and victimization item and are not further reported.

Physical violence. Four questions asked if participants had ever committed specific violent acts, including having beaten someone, scared someone with a weapon, hurt someone with a weapon, or used force to rob someone. All χ^2 tests between drug use group and violence items were statistically significant (Table 2). A significantly higher proportion of heavy inhalant users admitted to having beaten someone compared to all other groups. In addition, proportionally more recreational inhalant users had beaten someone than experimental inhalant users. Other comparisons were nonsignificant. Heavy inhalant users reported a greater incidence of having scared or hurt someone with a weapon than all other groups. Furthermore, recreational inhalant users reported the second highest proportion and were significantly more likely to have scared or hurt someone with a weapon than both recreational drug and experimental inhalant users. The remaining comparisons were nonsignificant. As with the other violence items, heavy inhalant users reported a significantly greater incidence of having used force in a robbery

Table 2

Drug Use and Physical Violence

	Proportion responding "yes"							
	Drug use group							
	ND	EI	RD	RI	HD	HI		
n	9,320	746	983	965	303	308	χ^2 (5, N = 12,625)	V
Have you ever:								
Beaten up someone	$22.1_{\dagger}$	51.2_{a}	52.8	58.3_{a}	54.5	$69.5_{\dagger}$	1,335.04*	.33
Scared someone with a weapon	$3.8_{\dagger}$	17.7_{a}	17.7_{b}	$25.1_{a,b}$	23.4	$40.6_{\dagger}$	1,254.61*	.32
Hurt someone with a weapon	$1.3_{\dagger}$	7.6_{a}	7.2_{b}	$15.3_{a,b}$	10.9	$22.7_{\dagger}$	873.40*	.26
Used force to rob someone	$2.8_{\dagger}$	12.1_{a}	$8.7_{b,c}$	$17.9_{a,b}$	16.2_{c}	$29.2_{\dagger}$	833.09*	.26

* $p < .001$.

Note. ND = non/negligible drug users; EI = experimental inhalant users; RD = recreational drug users; RI = recreational inhalant users; HD = heavy drug users; HI = heavy inhalant users. † = Significantly different from all other groups ($\alpha = .01$). Proportions in the same row with matching subscripts are significantly different ($\alpha = .01$).

than all other groups. Proportionally more recreational inhalant users had used force in a robbery than both experimental inhalant and recreational drug users. In addition, a greater proportion of heavy drug users used force during a robbery than recreational drug users. All other comparisons were nonsignificant.

Criminal activity. Significant group differences were found on all four questions regarding involvement in other forms of criminal activity, including having been arrested, taken a gun to school, stolen a car, or committed acts of vandalism (Table 3). A higher proportion of heavy inhalant users had been arrested than experimental inhalant and recreational drug users, and proportionally more recreational inhalant and heavy drug users reported being arrested than experimental inhalant users. A greater proportion of heavy inhalant users had stolen a car and taken a gun to school than recreational inhalant, recreational drug, and experimental inhalant users. Recreational inhalant users reported the second highest proportion of car theft and were significantly different from experimental inhalant users. Finally, proportionally more heavy inhalant users admitted to vandalism than all other groups, and more recreational inhalant users reported vandalism than heavy drug, recreational drug, and experimental inhalant users. All remaining comparisons failed to reach statistical significance.

Victimization. Five questions (Table 4) asked participants about having been the victim of various forms of assault (i.e., beaten by a peer, beaten by someone else, scared with a weapon, hurt with a weapon, and sexually assaulted). Group differences were found on all variables. A higher proportion of heavy inhalant users had been beaten by someone their own age compared to all other groups, whereas the other groups did not differ. Despite the significant relationship between drug use group and having been

Table 3

Drug Use and Criminal Behavior

	Proportion responding "yes"							
	Drug use group							
	ND	EI	RD	RI	HD	HI		
n	9,320	746	983	965	303	308	χ^2 (5, N = 12,625)	V
Have you ever:								
Been arrested	$2.4_{\dagger}$	$11.3_{a,b,c}$	14.0_{d}	16.2_{a}	17.8_{b}	$21.1_{c,d}$	770.32*	.25
Taken a gun to school	$0.4_{\dagger}$	2.1_{a}	1.4_{b}	2.6_{c}	3.0	$5.8_{a,b,c}$	172.21*	.12
Stolen a car	$0.4_{\dagger}$	$3.1_{a,b}$	4.0_{c}	$5.9_{a,d}$	5.9	$11.0_{b,c,d}$	449.58*	.19
Slashed tires/ vandalism	$7.1_{\dagger}$	28.6_{a}	26.6_{b}	$42.5_{a,b,c}$	32.3_{c}	$53.2_{\dagger}$	1,729.12*	.37

* $p < .001$.

Note. ND = non/negligible drug users; EI = experimental inhalant users; RD = recreational drug users; RI = recreational inhalant users; HD = heavy drug users; HI = heavy inhalant users. † = Significantly different from all other groups ($\alpha = .01$). Proportions in the same row with matching subscripts are significantly different ($\alpha = .01$).

Table 4

Drug Use and Victimization

	Proportion responding "yes"							
	Drug use group							
	ND	EI	RD	RI	HD	HI		
n	9,320	746	983	965	303	308	χ^2 (5, N = 12,625)	V
Have you ever been:								
Beaten by person your age	$4.0_{\dagger}$	11.5	10.4	14.0	12.9	$24.4_{\dagger}$	432.02*	.19
Beaten by someone else	$13.9_{\dagger}$	26.0	27.3	31.2	26.7	29.9	360.94*	.17
Scared with a weapon	$3.6_{\dagger}$	9.9_{b}	$7.9_{a,c}$	11.4_{a}	8.9	$15.6_{b,c}$	245.73*	.14
Hurt with a weapon	$8.2_{\dagger}$	18.2	19.2	21.1	19.1	$29.5_{\dagger}$	399.71*	.18
Sexually assaulted	$3.7_{\dagger}$	10.1_{a}	12.1_{b}	$16.9_{a,b}$	15.2	$24.4_{\dagger}$	558.53*	.21

* $p < .001$.

Note. ND = non/negligible drug users; EI = experimental inhalant users; RD = recreational drug users; RI = recreational inhalant users; HD = heavy drug users; HI = heavy inhalant users. † = Significantly different from all other groups ($\alpha = .01$). Proportions in the same row with matching subscripts are significantly different ($\alpha = .01$).

beaten by someone other than a peer, post hoc comparisons failed to detect any significant differences among the groups that used drugs. A higher proportion of heavy inhalant users had been scared with a weapon than both recreational drug and experimental inhalant users. In addition, a significantly greater proportion of recreational inhalant users reported having been scared with a weapon than recreational drug users. Proportionally more heavy inhalant users had been hurt with a weapon than all other groups, which did not differ from one another. Regarding sexual assault, heavy inhalant users reported a significantly higher incidence than all other groups. In addition, proportionally more recreational inhalant users had been sexually assaulted than recreational drug and experimental inhalant users. All other pairwise comparisons were nonsignificant for the victimization variables.

Structural Equation Modeling

The second phase used structural equation modeling (SEM) to test primary socialization theory as an explanation for drug use within four of the drug use groups. SEM is a multivariate statistical technique that simultaneously examines the full set of relationships proposed by a given theory. Structural models involve graphic representations of the patterns of hypothesized relationships. The "structural equations" are a set of regression equations that statistically reflect the structure of the proposed model. As such, the structural equations are used to empirically test whether the observed data support the set of relationships proposed by the model. In the present study, primary socialization theory generated a set of hypotheses regarding the prediction of drug use. SEM was used to represent and statistically test this set of proposed relationships.

The adequacy of a structural model is defined in terms of model "fit." SEM compares the hypothesized set of relationships (i.e., the model) to the observed pattern of relationships (i.e., the data). The difference between what is expected based on the model and what is observed in the data is reflected in model fit. If the data confirm the existence of the pattern of relationships specified in the model, the fit is good. However, if there is little correspondence between the hypothesized pattern of relationships and the observed pattern, the model is a poor fit with the data and may be rejected, which does not provide support for the theory underlying the model.

An important, distinctive feature of SEM is the focus on latent constructs. Commonly referred to as "factors," latent constructs are variables that are not directly observed or measurable. Since factors cannot be directly measured, they must be linked to observable variables. In structural modeling, latent factors are represented by a set of measurable variables, referred to as "indicators," that are selected on the basis of theory or past research. Viewed another way, the latent variable reflects (and presumably is the source of) the shared variance among a set of indicators.

The first step in SEM is the confirmatory factor analysis (CFA), which tests the quality of the indicators as measures of the latent factors. The pattern of relationships between indicators and their corresponding factors (the "measurement model") is specified *a priori*. As implied by the name, CFA confirms that the hypothesized links between indicators and factors are present in the data. CFA is solely concerned with how well the indicators measure their respective factors. Moreover, CFA tests the adequacy of the entire measurement model simultaneously.

The individual links, or "paths," between factors and indicators are represented as regression equations with the factor acting as the predictor and the indicator as the outcome. Therefore, the path coefficient between factor and indicator may be interpreted as a regression weight. Like regression weights, the scaling of the factor and the indicator influence the interpretation of individual path coefficients. An additional index, the "factor loading," which is analogous to a correlation coefficient, provides standardized information about the strength of the factor-indicator relationship. Furthermore, like a correlation, factor loadings may be squared in order to determine the amount of shared variance between the factor and each indicator. The variance in the indicator that is not accounted for by the factor is referred to as the error term or the residual. Squaring the residual reflects the percentage of indicator variance that is unaccounted for by the factor. As such, the residual may be interpreted as the unique variance in a particular indicator. In general, residuals are presumed to be independent and uncorrelated with any other part of the model. However, in some cases, correlations between residuals may be reasonable. In general, large factor loadings and small residuals indicate a strong relationship between the factor and the indicator. Conversely, small factors loadings and large residuals suggest that the factor does not explain the majority of the variance in the indicator. When all measurement paths are examined simultaneously, a good CFA model fit suggests that the indicators have considerable overlap with their underlying factors (i.e., they are good measures). Weak relationships between indicators and factors are reflected in a poor measurement model fit.

Once the adequacy of the measurement model is established, the second step in SEM examines the relationships between latent factors. The full pattern of relationships

between latent variables is referred to as the "structural model." It should be recognized that the structural model subsumes the measurement model. That is, the measurement model forms the basis for the structural model. If the measurement model is poor (i.e., the observed variables are not adequate or appropriate indicators of the latent factors), the resulting structural model is compromised. Therefore, measurement model fit must be established before conclusions may be drawn about structural paths.

Examination of the structural model proceeds in much the same way as the CFA. A pattern of structural relationships among the latent variables is hypothesized *a priori* on the basis of a given theory and/or past research. As in the CFA, structural paths are interpreted as regression coefficients. In the measurement model, residuals indicate the amount of variance in each indicator that is unexplained by its respective factor. In other words, the residual represents measurement error. In the structural model, error in predicting one latent variable from another is referred to as a "disturbance term." As such, disturbance terms indicate the amount of variance in a latent variable that is unexplained by the paths from other latent variables. As a variance statistic, a squared standardized disturbance term may be interpreted as the percentage of variance in a given latent factor that is unaccounted for by other latent factors in the model. This is especially important for interpreting outcome variables in a structural model. Evaluation of the overall structural model confirms or disconfirms that the hypothesized pattern of relationships exists in the data. If the data reflect the structural pattern (i.e., the hypothesized relationships are present in the observed data), the structural model is considered an adequate representation of the phenomenon. If the hypothesized relationships are not present in the data, the structural model is a poor representation and is rejected.

Model evaluation. Measurement and structural model fit were evaluated using EQS (Bentler, 1995). All model parameters (e.g., path coefficients, variances) were estimated using maximum likelihood estimation. Model fit was assessed using multiple indices. The traditional test of model fit is distributed as χ^2. A nonsignificant χ^2 indicates correspondence between the hypothesized model and the observed pattern of relationships. However, the χ^2 statistic is very sensitive to sample size and model complexity (Bentler, 1980; Bentler & Bonett, 1980; Byrne, 1994: Hayduk, 1987). Therefore, the significance of the χ^2 statistic is often misleading as an index of model fit. With large samples, even an excellent fitting model will yield a statistically significant χ^2. Therefore, the comparative fit index (CFI; Bentler, 1990) and the non-normed fit index (NNFI) were included to supplement the significance test results. Both the CFI and NNFI have an effective range from 0.0 to 1.0, and a CFA or NNFI exceeding .90 is considered to represent adequate model fit (Byrne, 1994; Newcomb, 1994).

Even though structural modeling is confirmatory in nature, it is possible that unnecessary paths have been specified in the CFA or the structural model. In addition, there may be substantive links between factors or indicators that were unspecified. The omission of a substantive path or the specification of a meaningless path may adversely affect model fit. Therefore, *post hoc* model-fitting involves exploring the possibility of redundant or missing links in the measurement or structural model.

The elimination of redundant or nonsignificant paths is guided by the results of the Wald test (Bentler & Dijkstra, 1985). The Wald test removes each individual path and examines the resulting increase in the model χ^2 statistic. A nonsignificant χ^2 increase suggests that the path in question is redundant or does not meaningfully contribute

explanatory power to the model. Therefore, such paths may be removed without compromising model fit. The addition of unspecified substantive paths is informed by results of the Lagrangian Multiplier (LM) test (Chou & Bentler, 1990). The LM test examines the decrease in the model χ^2 statistic accompanying the addition of new paths, thereby identifying additional paths that would improve model fit. However, it is important to note that both the Wald test and LM test are exploratory, data-driven, and subject to capitalization on chance (Byrne, 1994). Therefore, the present study incorporated recommendations from the Wald and LM tests into the model only when theoretically sound and consistent across all four groups.

Multiple group comparisons. A second set of analyses tested measurement and structural model equivalence between pairs of drug use groups. Heavy inhalant users were compared with heavy drug users, and recreational inhalant users were compared with recreational drug users. The hypothesis being tested was that primary socialization theory operates in the same manner for predicting drug use within these pairs of drug use groups. Multiple group analyses of model equivalence are conducted in a manner similar to testing for general model fit. Groups are initially compared on measurement model equivalence using CFA. Once the measurement properties of the comparison models are established, structural model equivalence is tested.

Multiple group analyses proceed in a stepwise fashion, with increasingly stringent constraints applied at each successive step. The first step in the multiple group CFA is the creation of a baseline measurement model that includes both comparison groups. The baseline model is used as the standard of comparison for all subsequent models, which are nested (i.e., having the same basic path structure) within the original baseline model.

In specifying the baseline model, the paths between indicators and factors are allowed to take on any possible value (i.e., are allowed to vary freely) within each group. In a sense, the baseline measurement model is a combination of the best-fitting measurement model for each comparison group. Moreover, it can be shown that the χ^2 statistic for the baseline measurement model is a simple sum of the χ^2 statistics for the initial measurement models for each group.

The second step in the multiple group CFA is to build a constrained model in which all factor-indicator paths are constrained to equivalence across groups. The assumption in the constrained model is that the factor-indicator paths are exactly the same (or within limits defined by sampling error) for each group under comparison. That is, the regression equation for each indicator in the measurement model is exactly the same within each comparison group. This condition is known as "factor invariance." Since the values each path can take are now restricted, by definition the constrained model will provide a worse fit than the baseline model. A difference test is conducted to determine the decrement in model fit when measurement paths are restricted to equivalence. The difference test is conducted by subtracting the baseline model χ^2 statistic from the constrained model χ^2 statistic. This difference is also distributed as χ^2. The difference in degrees of freedom (df) between the two models is used to determine the critical value for the significance test. If the resulting χ^2 is nonsignificant, then it may be concluded that the measurement models are invariant across groups. If the difference test is significant, then the constrained model provides a significantly worse fit than the baseline model. That is, there are certain paths in the measurement model that differ across groups.

Measurement paths that are non-invariant may be identified through the use of the LM test. The LM test releases the equality constraint on each individual factor-indicator path and calculates the resulting improvement in model fit. In the constrained model, individual factor-indicator paths that significantly reduce model fit may be assumed to differ across groups. The equivalence constraints are removed for these non-invariant paths, resulting in a partially constrained measurement model. The final step in the multiple group CFA is to compare the partially constrained measurement model to the baseline model. The resulting difference test should be nonsignificant.

It should be noted that measurement model comparisons are based on path coefficients rather than factor loadings. Path coefficients contain information about scaling and variance in addition to information about the strength of the factor-indicator relationship. As such, it is possible to arrive at different path coefficients for multiple groups even if the underlying factor-indicator correlations are exactly the same. For this reason, it is often advisable to examine the factor loadings of non-invariant paths. If the factor loadings are similar across groups, it may be concluded that amount of indicator-factor overlap is consistent across groups. In other words, the measurement models are comparable.

Once comparable measurement models are established, the next step in multiple group analysis is a comparison of structural paths between groups. The results of the structural model comparison reveal whether the latent factors influence each other in the same manner (i.e., the structural paths are equivalent) in the groups under comparison. Multiple group structural model comparison proceeds in the same stepwise fashion as measurement model comparison. The first step is the creation of a baseline structural

model for both groups. The baseline structural model simply adds the structural (factor-factor) paths to the final partially-constrained measurement model, forming the standard of reference for further nested model comparisons. The value of structural paths are allowed range freely within each group in the multiple group baseline structural model.

The second step in structural model comparison fixes all structural paths to equivalence across groups. That is, the factor-factor relationships are assumed to be exactly the same (within sampling error limits) in each group. A difference test is conducted between the constrained model and the baseline structural model to determine if there is a significant difference in model fit. If the resulting χ^2 statistic (using the model difference in df to establish the critical value) is significant, then some of the structural paths differ across groups. The exact sources of the model non-invariance may again be identified using the LM test. If the difference test is not significant, it may be concluded that the structural models are equivalent, and therefore operated in the same manner across groups.

An important caveat exists for multiple group structural model comparisons: the results of this comparison must be interpreted within the context of the CFA results. That is, if the measurement models are different for the comparison groups, interpretation of the resulting structural models must take those differences into consideration.

General model tests. A general model of drug use was proposed based on the propositions of primary socialization theory and research on its predecessor, peer cluster theory (e.g., Oetting & Beauvais, 1987a, 1987b; Swaim et al., 1998, 1989, 1996). This general model proposed that the effects of personal characteristics and the family and school socialization sources on drug use are mediated through peer drug encouragement.

The only hypothesized direct effect on drug use was exerted by peers. A second step involved comparing model equivalence across pairs of drug use groups. Heavy inhalant users were compared to heavy drug users, and recreational inhalant users were compared with recreational drug users. These groups had been equated on overall level of drug use; however, heavy and recreational drug users reported no history of inhalant use. Comparisons were conducted in order to determine whether primary socialization theory operated in the same manner for predicting drug use within these pairs of drug use groups.

Measurement model. An initial measurement model was hypothesized for all four drug use groups based on the propositions of primary socialization theory. Initially, seven latent factors were specified. Three substance involvement indicators - alcohol, marijuana, and other drug use - measured the latent drug use factor. The other drug use indicator was a composite of scales measuring cocaine, LSD, PCP, upper, downer, and heroin use. The indicators of the latent emotional distress factor were scales measuring anger, depression, and self-esteem. The latent deviance factor was represented by deviant behavior, tolerance of deviance, and excitement-seeking scales. The latent school adjustment factor had three indicators - school liking, teacher liking, and academic performance. The family relations latent factor was measured with family caring and family conflict indicators. The latent family drug sanctions factor was comprised of substance-specific sanction indicators for alcohol, marijuana, and other drug use. Lastly, substance-specific peer encouragement indicators for alcohol, marijuana, and other drug use measured the peer drug encouragement factor. All indicators were hypothesized to load only on their respective factors (i.e., no cross-loadings were specified). Moreover, all

measurement residuals were presumed to be independent and uncorrelated with any other variables in the model, including other residuals.

Fit indices for the initially proposed measurement model indicated some degree of mis-fit. An examination of measurement equations for individual indicators suggested that the hypothesized emotional distress, deviance, and family relations factors did not hold together for any of the four drug use groups. The initially hypothesized emotional distress factor was measured by anger, depression, and self-esteem. However, measurement equations and standardized factor loadings suggested that emotional distress was defined primarily by anger, and that the indicators for self-esteem and depression did not overlap substantially with the resulting emotional distress factor. Self-esteem and depression were subsequently examined as factors (each with two indicators); however, the factor-factor covariances suggested that self-esteem and depression had little overlap with other substantive parameters in the model, including peer drug encouragement and drug use. In the interests of model parsimony, subsequent tests of the measurement model retained anger, but omitted self-esteem and depression. The latent anger factor was defined by a three-item temperament scale (α = .69) that measured stable, enduring anger-related characteristics (e.g., I am hotheaded), and a three-item reactivity scale (α = .85) that assessed behavioral responses to anger (e.g., I lose my temper). The anger temperament and reactivity scales were strongly related in all four groups (rs = .76 to .78, ps < .001), which suggested that they measured a common anger construct.

The initially hypothesized deviance factor was comprised of deviant behavior, tolerance of deviance, and excitement-seeking. Factor loadings suggested that the

indicator for excitement-seeking did not have substantial overlap with the latent deviance factor and was a source of measurement model mis-fit. Therefore, excitement-seeking was subsequently omitted as an indicator of deviance. Lastly, the hypothesized family relations factor was defined by two indicators, family caring and family conflict. Examination of factor loadings and measurement equations indicated that family conflict did not load highly on the family relations factor, which was primarily defined by family caring. The distributional characteristics of the family conflict scale suggested that an extreme amount of skew may have contributed to the low factor loading. That is, most respondents reported extremely low levels of family conflict (Table 1). The resulting restriction in range may have artificially depressed the amount of overlap between family conflict and the family relations factor. The revised measurement model did not include the family conflict indicator, and substituted a latent family caring factor represented by two single-item indicators (i.e., How much does your family care about you? How much do you care about your family?).

The revised measurement model specified seven latent factors - drug use, anger, deviance, school adjustment, family caring, family drug sanctions, and peer drug encouragement. Factor-indicator path coefficients were all significant. Furthermore, all but one standardized factor loading exceeded 0.40, which Hayduk (1987) suggested as a lower bound for factor loading values. The only factor loading that failed to meet this minimum criterion was the other drug use indicator loading on the drug use factor within the recreational drug use group. However, the factor loading for this indicator was acceptable in the other three groups and was considered an integral part of the model. Therefore, the indicator was retained as a measure of drug use. At this point, CFAs across

the four groups revealed marginally acceptable fit indices. The CFIs ranged from .86 for heavy drug users to .91 for recreational inhalant users, which suggested that further improvements in measurement model fit were possible. Thus, results from the Wald and LM tests were examined across groups to guide *post hoc* measurement model fitting.

The results of the Wald test indicated that removing parameters would not appreciably improve model fit. However, LM test results for all groups consistently suggested adding paths between the error terms for the drug use indicators and the error terms for the peer drug encouragement indicators. As previously mentioned, the residuals in the measurement model are defined as the portion of the indicator variance unexplained by the latent factor (Byrne, 1994). For example, the error term for the alcohol use indicator is composed of variance that is not explained by the drug use factor. Part of the residual may be pure measurement error, but a portion may be unique variance in alcohol use that is independent of drug use. The LM test results indicated that the assumption of independence between these two sets of error terms was untenable. That is, the substance-specific pairs of error terms for drug use and peer drug encouragement were correlated.

Based on these results, covariance paths were specified between three pairs of substance-specific residuals - alcohol use and peer alcohol encouragement, marijuana use and peer marijuana encouragement, and drug use and peer drug encouragement. The specification of these paths in the CFAs resulted in significant decreases in χ^2 statistics and substantial increases in fit indices for each drug use group. The addition of these error covariances resulted in the final measurement model (Figure 1). The standardized factor loadings and fit indices for the final measurement models are listed in Tables 5 and 6,

Fig. 1. Final common measurement model for all drug use groups (including hypothesized structural paths. Alc = alcohol; Marij = marijuana; Drug = other drug; TolDev = tolerance of deviance; DevBeh = deviant behavior; Liking = school liking; Perf = academic performance; Tchrs = teacher liking; They Care = Does your family care about you?; You Care = Do you care about your family?

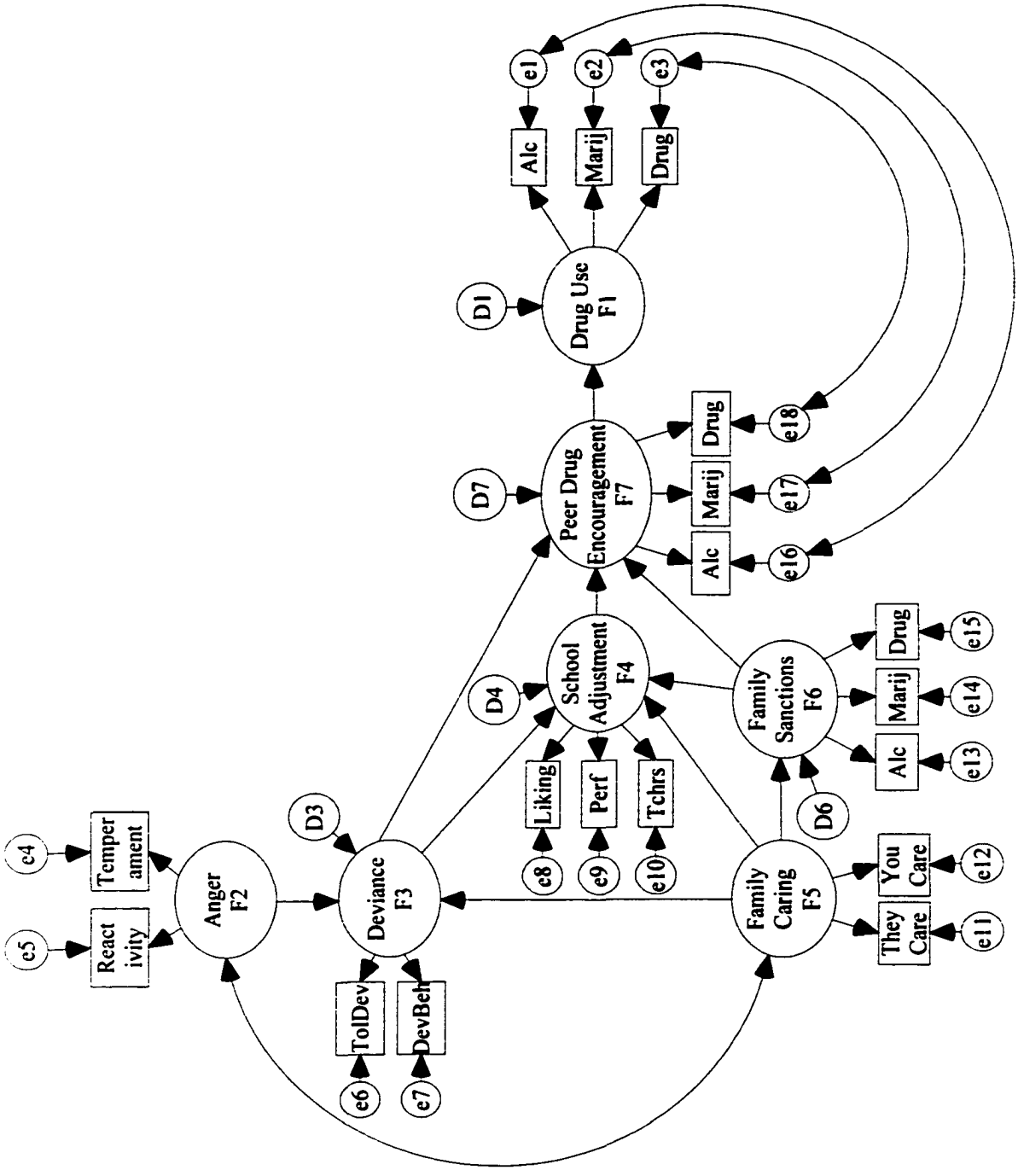


Table 5

Standardized Factor Loadings and Residuals by Drug Use Group

	Heavy users				Recreational users			
Latent variable	Inhalant		Drug		Inhalant		Drug	
(Indicator)	FL	Res	FL	Res	FL	Res	FL	Res
Drug use								
Alcohol	.56	.83	.49	.87	.44	.90	.52	.85
Marijuana[a,b]	.72	.69	.69	.73	.84	.54	.62	.78
Other drug[a,b]	.64	.77	.66	.75	.64	.77	.25	.97
Anger								
Temperament[a]	.81	.59	.99	.09	.86	.51	.91	.42
Reactivity	.93	.36	.79	.61	.91	.43	.85	.52
Deviance								
Deviant behavior[a]	.78	.62	.77	.64	.80	.60	.82	.57
Tolerance of deviance	.67	.75	.61	.79	.57	.82	.56	.83
School adjustment								
School liking	.73	.69	.78	.63	.71	.70	.68	.73
Teacher liking[a]	.83	.56	.77	.64	.76	.65	.77	.64
Performance	.65	.76	.59	.81	.62	.78	.58	.81

Family caring								
Family cares$_a$	.84	.55	.72	.70	.74	.68	.77	.64
You care$_{a,b}$	.73	.69	.82	.57	.86	.50	.86	.51
Family drug sanctions								
Alcohol$_a$	.72	.70	.56	.82	.70	.72	.76	.65
Marijuana$_b$	.87	.49	.86	.52	.88	.48	.82	.57
Other drug$_{a,b}$	.75	.66	.80	.61	.80	.61	.73	.68
Peer drug encouragement								
Alcohol	.68	.73	.60	.80	.71	.71	.76	.65
Marijuana$_b$	.88	.47	.87	.49	.91	.42	.78	.62
Other drug$_{a,b}$	.83	.57	.71	.71	.77	.63	.57	.82

Note. FL = factor loading, Res = residual.

a = Significantly different path coefficient between heavy inhalant and heavy drug users.

b = Significantly different path coefficient between recreational inhalant and recreational drug users.

Table 6

Model Fit Indices by Drug Use Group

	χ^2	df	NNFI	CFI
Heavy inhalant				
CFA	304.96*	111	0.89	0.92
SEM	354.02*	122	0.88	0.91
Heavy drug				
CFA	274.77*	111	0.90	0.93
SEM	320.72*	122	0.89	0.91
Recreational inhalant				
CFA	575.33*	111	0.92	0.94
SEM	669.19*	121	0.91	0.93
Recreational drug				
CFA	500.13*	111	0.91	0.94
SEM	562.94*	121	0.91	0.93

* $p < .001$.

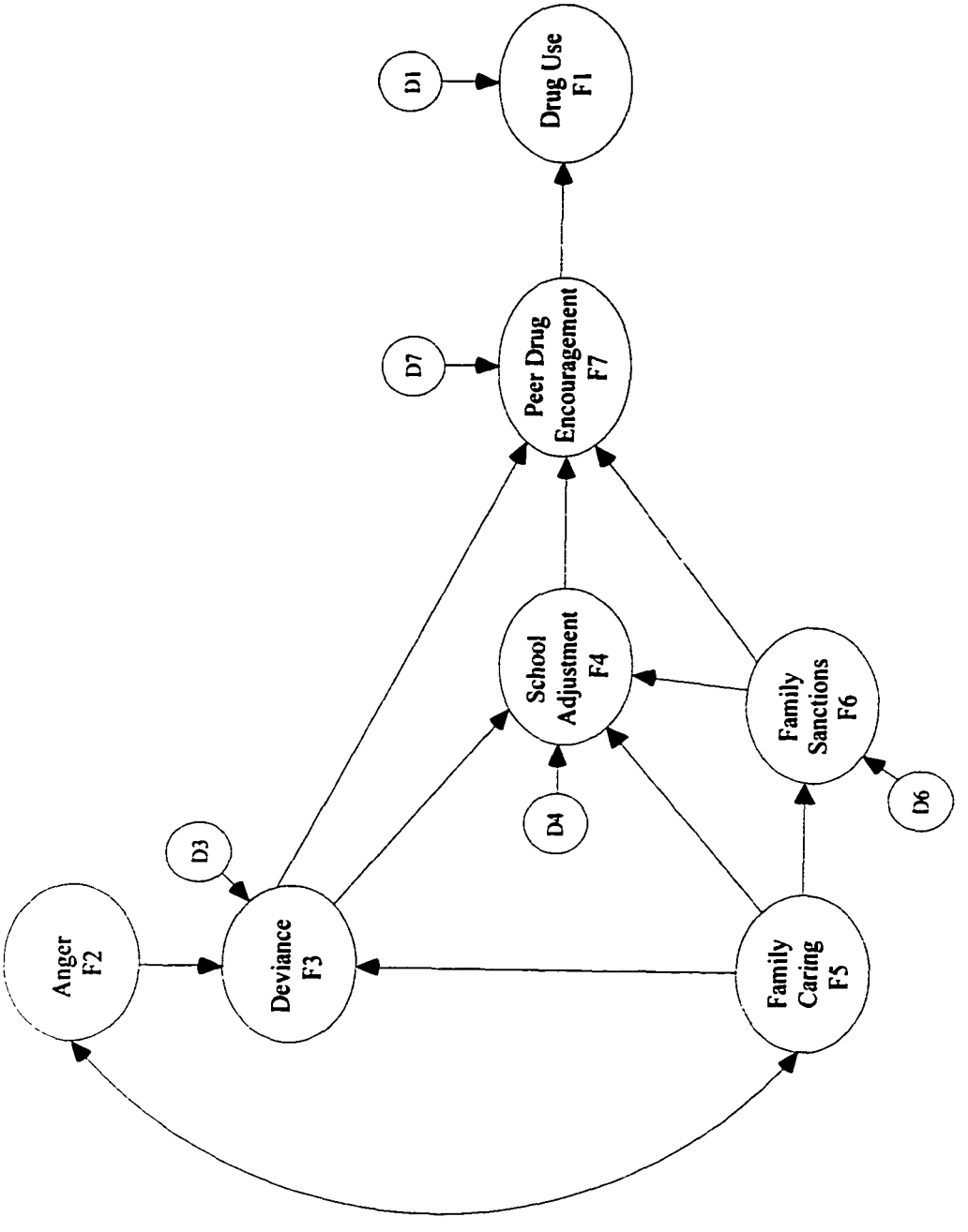
Note. CFA = confirmatory factor analysis; SEM = structural equation model; NNFI = non-normed fit index; CFI = comparative fit index.

respectively. It should be noted that the addition of these paths does not necessarily imply meaningful, interpretable relationships between drug use and peer drug encouragement residuals. It is quite possible that common method variance accounted for the observed relationships between these sets of error terms.

Structural models. A common structural model for explaining drug use on the basis of primary socialization theory was proposed for all four drug use groups (Figure 2). The only hypothesized direct effect on drug use was for peer drug encouragement. Deviance, school adjustment, and family drug sanctions were hypothesized to exert effects on drug use through the peer drug encouragement factor. Lastly, anger and family caring contributed to the understanding of other latent factors, but were not directly linked to either peer drug encouragement or drug use. The common structural model was tested for all four drug use groups separately.

Table 6 presents a summary of structural model tests for all groups. The χ^2 value for heavy inhalant users was significant; however, the fit indices suggest adequate fit for the structural model. The same pattern of results emerged for heavy drug users, yielding a significant χ^2 statistic but adequate fit indices. Moreover, an examination of the squared standardized error term for drug use indicated that the primary socialization model accounted for substantial amounts of variance in drug use for heavy inhalant users and heavy drug users (R^2 = .44 and .43, respectively).

The fit indices for both groups, while acceptable, suggested there was room for model improvement. An examination of the LM test results did not suggest the addition of any defensible paths. Therefore, no paths were added on the basis of the LM test. The results of the Wald test indicated that certain paths were redundant (i.e., nonsignificant)



and could be removed without appreciably decreasing model fit. The path between school adjustment (F4) and peer drug encouragement (F7) was non-significant for heavy inhalant users but significant for heavy drug users. Conversely, the path between family sanctions (F6) and school adjustment (F4) was significant for heavy inhalant users but nonsignificant for heavy drug users. Although the patterns of significance were inconsistent across groups, the standardized estimates for both paths were roughly equivalent for each group. Therefore, these paths were retained in each model. However, the path between family caring (F5) and school adjustment (F7) was nonsignificant for both groups and was removed. The final structural models for heavy inhalant users and heavy drug users, including standardized path coefficients and factor and error covariances, are presented in Figures 3 and 4, respectively.

The same general primary socialization model of drug use was tested for both recreational inhalant and recreational drug users. The χ^2 statistic for each group was significant, but the fit indices for both recreational inhalant users and recreational drug users were adequate. The results of the LM test did not suggest the addition of any paths. Moreover, the Wald test indicated that the specified model parameters all contributed substantively to the structural model. It should be noted that the sample sizes for recreational inhalant and recreational drug users were three times the size of the heavy inhalant and heavy drug use groups. Therefore, the power for testing parameter significance was much higher in the recreational inhalant and recreational drug use models.

The final structural model for both recreational inhalant and recreational drug use groups mirrored the hypothesized structural model (Figure 2). The squared standardized

Fig. 3. Final primary socialization structural model for heavy inhalant users (n = 325). All regression coefficients are standardized maximum likelihood estimates. All measurement errors and disturbance terms are squared standardized residuals. * $p < .05$; ** $p < .01$; *** $p < .001$; ns = nonsignificant.

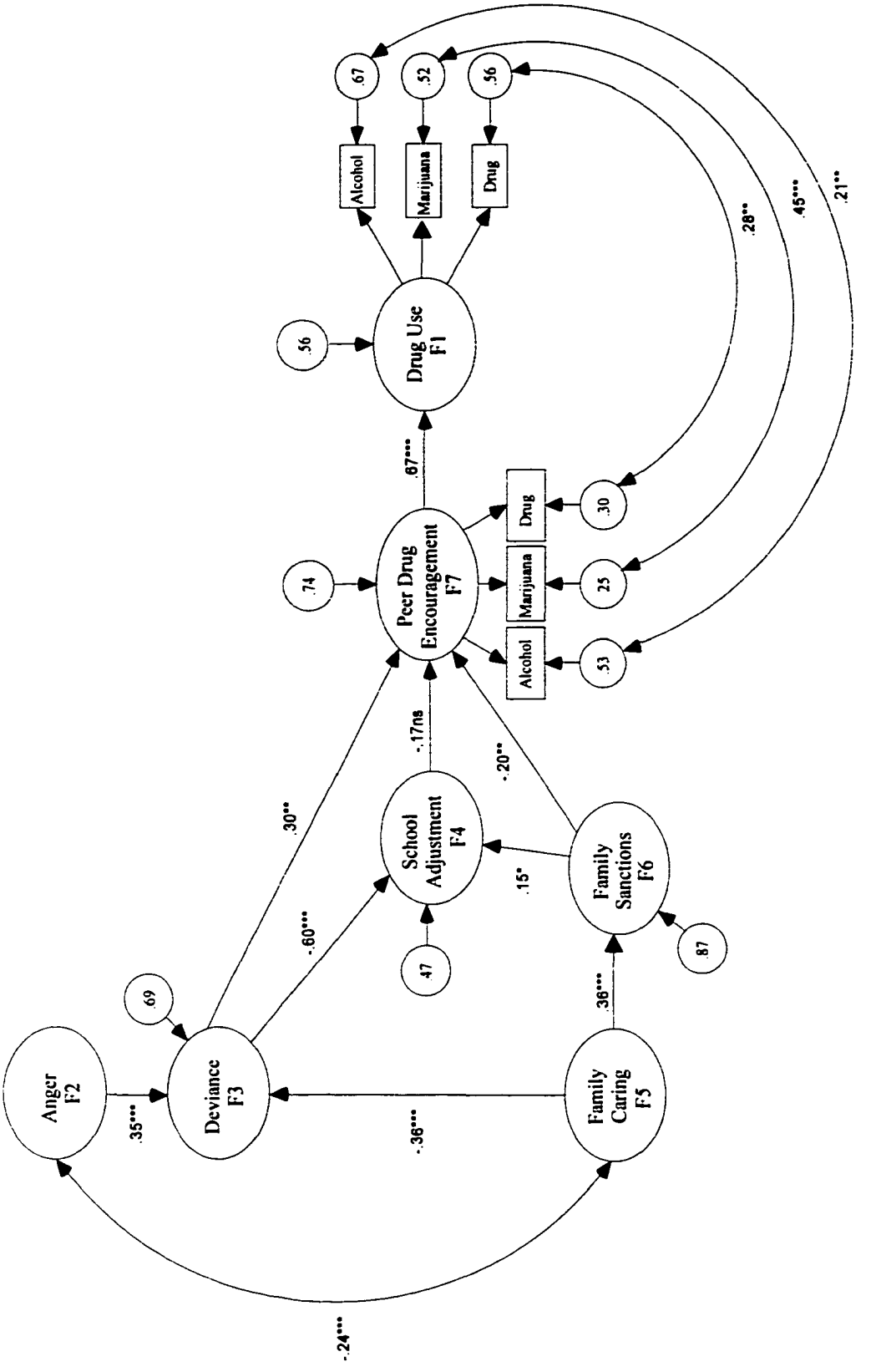
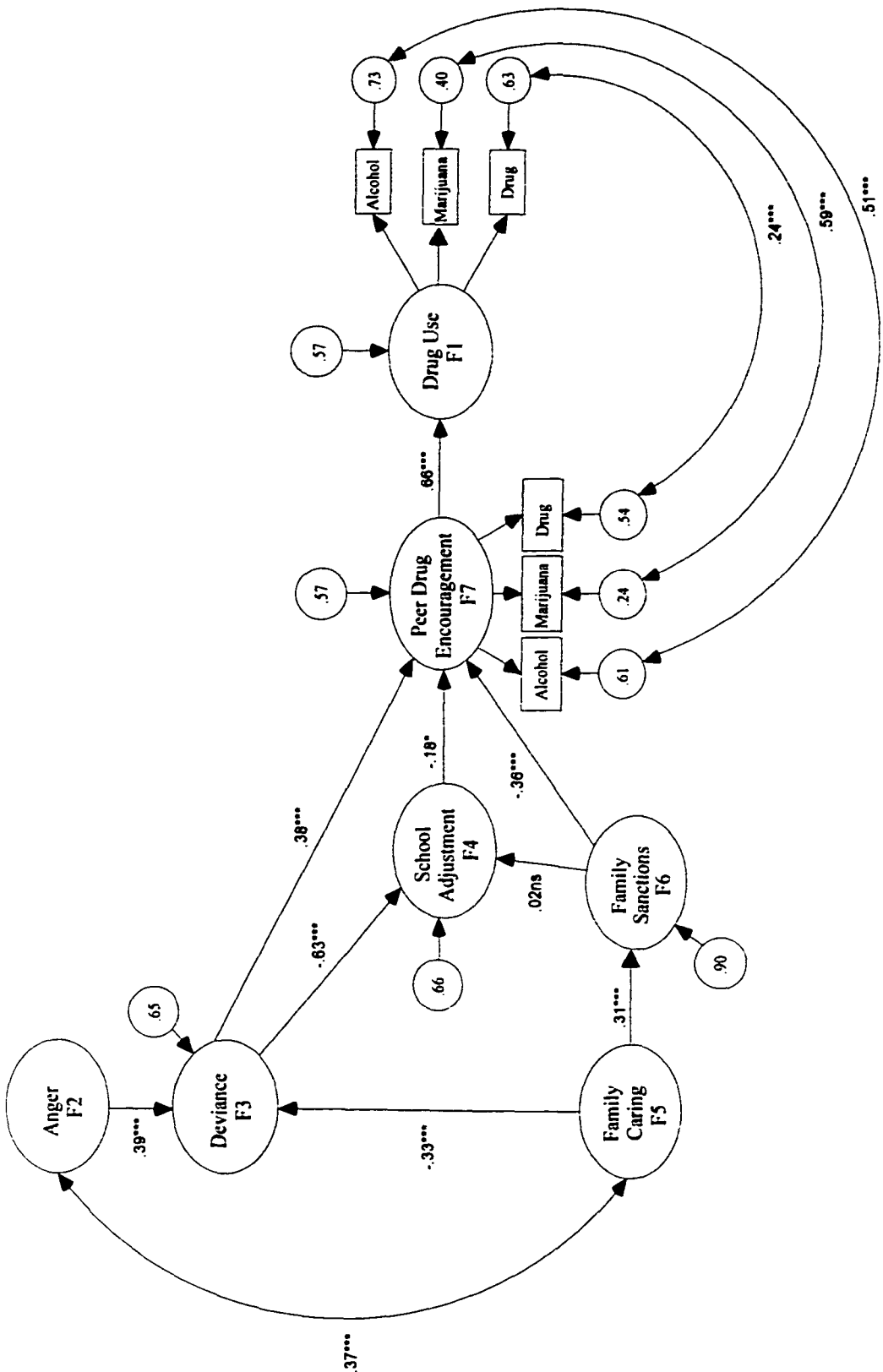


Fig. 4. Final primary socialization structural model for heavy drug users (n = 307). All regression coefficients are standardized maximum likelihood estimates. All measurement errors and disturbance terms are squared standardized residuals. * $p < .05$; ** $p < .01$; *** $p < .001$; ns = nonsignificant.



error terms for drug use indicated that the primary socialization model explained a substantial amount of drug use variance for recreational inhalant and recreational drug users (R^2 = .46 and .49, respectively). The primary socialization models for recreational inhalant and recreational drug users, including standardized path coefficients and factor and error covariances, are shown in Figures 5 and 6.

Multiple group analyses. Two sets of multiple group analyses were conducted. The first set compared heavy inhalant and heavy drug users, and the second compared recreational inhalant and recreational drug users. The multiple group analyses proceeded in a stepwise fashion. The measurement model was initially tested for invariance within pairs of drug use groups. Non-invariant path coefficients from latent factors to indicators were unconstrained in subsequent measurement model comparisons. Once a satisfactory partially constrained measurement model was obtained, the process was repeated for the structural paths

The first multiple group analysis examined the differences in the measurement and structural models between heavy inhalant and heavy drug users. A baseline CFA was conducted simultaneously for both groups. The factor-indicator path coefficients in the baseline model were allowed to vary freely for both heavy inhalant and heavy drug users. The resulting baseline measurement model (Table 7) was used as the standard of reference for all subsequent nested measurement models for these two groups. It may be observed that the baseline χ^2 and df were simply the sums of the χ^2 statistics and df from the CFA for each group (Table 6).

The next step constrained to equivalence the factor-indicator path coefficients for heavy inhalant and heavy drug users to test for measurement model invariance. The

Fig. 5. Final primary socialization structural model for recreational inhalant users (n = 1,001). All regression coefficients are standardized maximum likelihood estimates. All measurement errors and disturbance terms are squared standardized residuals. * $p < .05$; ** $p < .01$; *** $p < .001$; ns = nonsignificant.

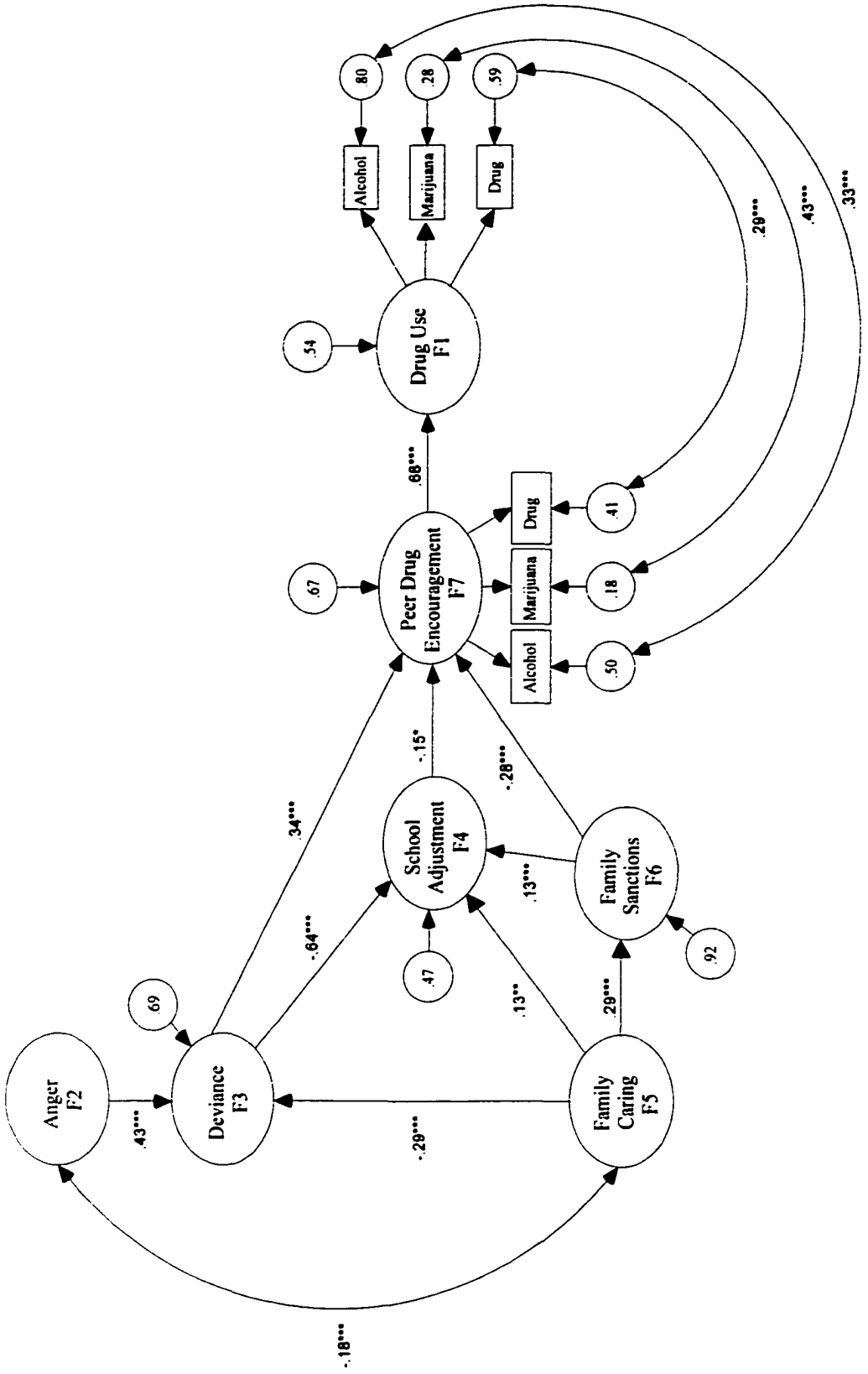


Fig. 6. Final primary socialization structural model for recreational drug users (n = 1,012). All regression coefficients are standardized maximum likelihood estimates. All measurement errors and disturbance terms are squared standardized residuals. * $p < .05$; ** $p < .01$; *** $p < .001$; ns = nonsignificant.

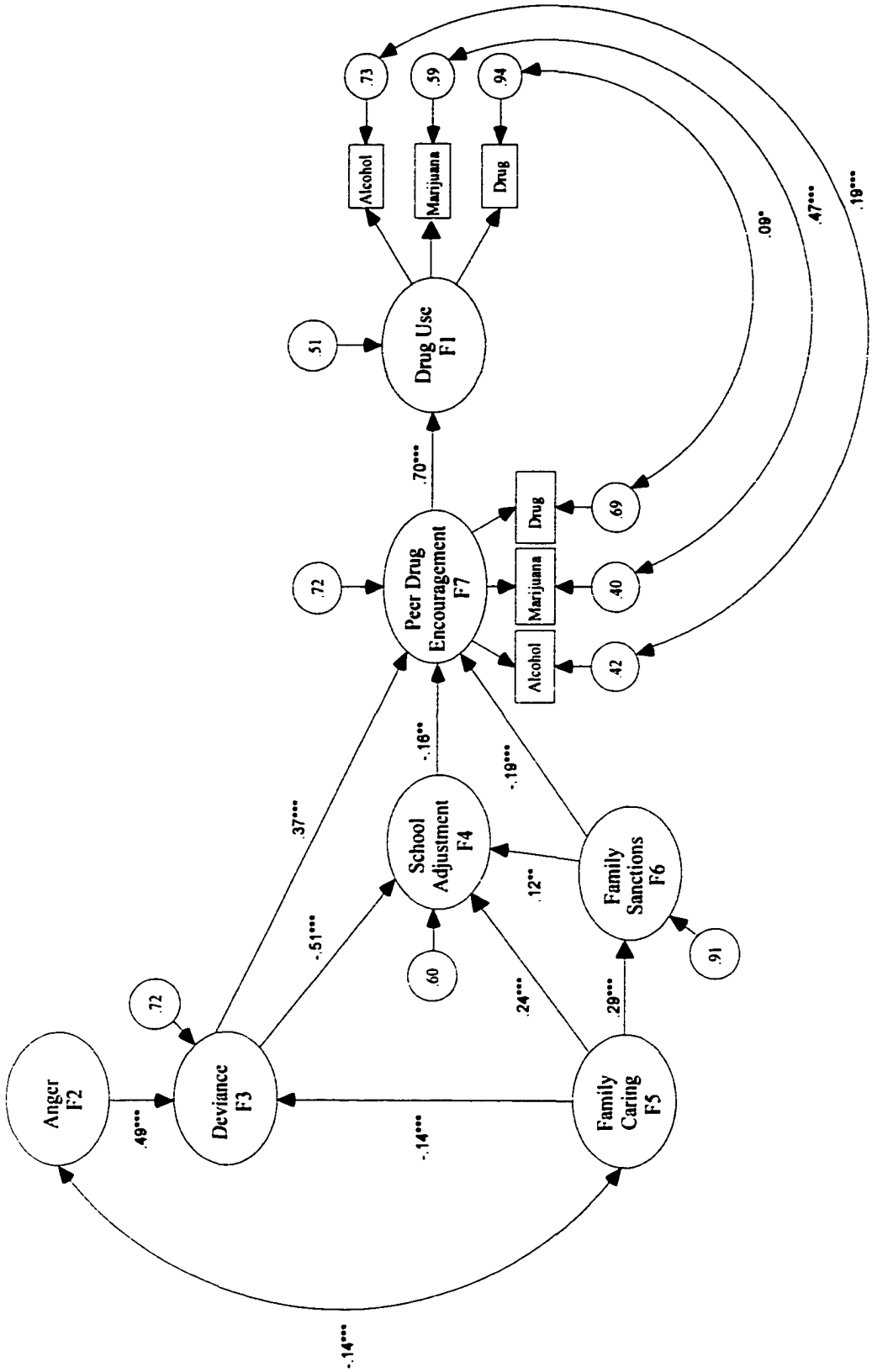


Table 7

Fit Indices and Difference Tests for Multiple Group Comparisons

	χ^2	df	NNFI	CFI	Difference test $\Delta\chi^2$	df	p
Heavy inhalant vs. heavy drug users							
CFA							
Baseline	579.73*	222	0.89	0.92			
Fully constrained	678.80*	240	0.88	0.91	99.07	18	< .001
Partially constrained	592.82*	230	0.90	0.92	13.09	8	.11
SEM							
Baseline	677.54*	246	0.88	0.91			
Fully constrained	692.86*	256	0.89	0.91	15.32	10	.12
Recreational inhalant vs. recreational drug users							
CFA							
Baseline	1,075.47*	222	0.91	0.94			
Fully constrained	1,593.55*	240	0.87	0.90	518.08	18	< .001
Partially constrained	1,091.05*	233	0.92	0.94	15.58	11	.16
SEM							
Baseline	1,235.53*	246	0.91	0.93			
Fully constrained	1,250.52*	257	0.91	0.93	14.99	11	.18

* $p < .001$.

Note. CFA = confirmatory factor analysis; SEM = structural equation model; NNFI = non-normed fit index; CFI = comparative fit index. The partially constrained models lifted constraints only on those paths that were significantly different across groups.

difference test between the baseline and fully constrained models indicated significant differences between groups on the measurement model, χ^2 (18) = 99.07, $p < .001$. The LM test was used to identify path coefficients that differed significantly between heavy inhalant and heavy drug users. The results of the LM test indicated that the hypothesis of invariance was not supported for 10 of the 18 factor-indicator path coefficients (Table 5). That is, the measurement equations for these indicators were significantly different for heavy inhalant and heavy drug users. The multiple group measurement model was then respecified with equality constraints removed for these 10 variables. The resulting partially constrained measurement model was not significantly different from the baseline model, χ^2 (8) = 13.09.

The results from the heavy inhalant/heavy drug use group CFA suggested there were group differences in the measurement of various factors. An examination of the initial measurement models indicated that heavy inhalant users had larger path coefficients than heavy drug users for all significantly different measurement equations. Non-invariant factor-indicator path coefficients for heavy inhalant users and heavy drug users, respectively, were drug use to both marijuana use (1.41, 1.06), and other drug use (2.85, 1.70), anger to temperament (2.43, 2.01), deviance to deviant behavior (2.54, 1.82), school adjustment to teacher liking (1.32, 1.09), family caring to both family cares about you (0.65, 0.36) and you care about family (0.56, 0.44), family drug sanctions to both alcohol sanctions (1.09, 0.85) and other drug sanctions (0.80, 0.54), and peer drug encouragement to other drug encouragement (7.15, 5.23). However, an examination of the factor loadings (Table 5) revealed similar values for both heavy inhalant and heavy drug users on most indicators. That is, the correlations between the factors and their

respective indicators were similar for heavy inhalant and heavy drug users. Although there were significant differences in the magnitude of specific path coefficients, the relative similarity in factor loadings suggested that the factors were measured comparably within both groups.

Having identified a comparable measurement model for both heavy inhalant and heavy drug use groups, the structural model was then tested for invariance. A baseline structural model was created for both groups by adding the structural paths to the partially constrained measurement model. The structural paths were allowed to vary freely in the baseline model, which formed the basis of comparison for subsequent nested models (Table 7). The structural paths were then constrained to equality to test for structural invariance. The nonsignificant difference test between the constrained structural model and the baseline model, χ^2 (10) = 15.32, indicated that the structural model was invariant across heavy inhalant and heavy drug users. In other words, an identical set of path coefficients may be used to describe the structural relationships in the primary socialization model of drug use for both heavy inhalant and heavy drug users.

Structural model invariance suggested that the primary socialization model operated similarly for heavy inhalant and heavy drug users in the prediction of drug use. The common structural model revealed a strong positive link between peer drug encouragement and drug use. The squared standardized path coefficient indicated that peer drug encouragement explained nearly 50% of the variance in drug use for both groups. In addition, the effects of other primary socialization sources (i.e., family and school) on drug use were fully mediated by the peer effects. That is, school adjustment and family drug sanctions had an effect on association with deviant peers which, in turn,

influenced drug use behavior. The common structural model for heavy inhalant and heavy drug users also confirmed that the effect of deviance on drug use was mediated by primary socialization sources, most notably school adjustment and peer drug encouragement.

The second multiple group analysis compared the measurement and structural models of recreational inhalant and recreational drug users. The stepwise examination of measurement model invariance started with a baseline CFA in which the path coefficients were allowed to vary freely for both groups (Table 7). The next step imposed equivalence constraints on the factor-indicator path coefficients. The resulting difference test between the constrained and baseline measurement models suggested measurement differences across groups, χ^2 (18) = 518.08, $p < .001$. The LM test was used to identify those parameters that violated the invariance assumption. Seven of the 18 path coefficients were determined to be different for recreational inhalant and recreational drug users. The equality constraints were lifted from these paths in the subsequent partially constrained model, which was not significantly different from the initial baseline measurement model, χ^2 (11) = 15.58.

An examination of the LM test from the fully constrained model suggested that a single parameter was primarily responsible for the difference test results. The factor-indicator path coefficient between drug use and other drug use was very different across these two groups, χ^2 (1) = 202.47, $p < .001$. For recreational inhalant users, the path coefficient was 1.91, while the path coefficient for recreational drug users was only 0.07. The factor loadings were also highly divergent (0.64 and 0.25, respectively). The remaining non-invariant paths and their respective path coefficients for recreational

inhalant and recreational drugs users were family caring to you care about family (0.59, 1.44), family drug sanctions on both marijuana sanctions (1.01, 0.85) and other drug sanctions (0.67, 0.48), and peer drug encouragement to both marijuana encouragement (3.04, 2.38) and other drug encouragement (5.97, 3.29).

Path coefficients were larger for recreational inhalant users in all cases, except for the path between family caring and the "you care about family" indicator. An examination of the standardized factor loadings (Table 5) indicated similar patterns of factor-indicator correlations for both recreational inhalant and recreational drug users, with the exception of the drug use-other drug use factor loading. The drug use factor accounted for 41% of the variance in the other drug use indicator for recreational inhalant users, but only 6% for recreational drug users. The factor loading disparity indicated that the drug use factor was defined primarily by alcohol and marijuana use in the recreational drug use group. However, for recreational inhalant users, the drug use factor was defined by other drug use, as well as both alcohol and marijuana use. In other words, the drug use factors represented slightly different patterns of substance use for each group. As previously mentioned, all other factor loadings were similar across groups, indicating comparable factor measurement.

Once an acceptable partially constrained measurement model was obtained for recreational drug and recreational inhalant users, the primary socialization structural model was tested for invariance. The structural paths were added to the partially constrained measurement model and were allowed to vary freely within both groups. The resulting baseline model served as the standard for comparing the nested, fully constrained structural model (Table 7). The difference test between the constrained and

baseline structural models was not significant, χ^2 (11) = 14.99, indicating that the structural paths were invariant across groups (Table 7). That is, primary socialization theory operated in the same manner for predicting drug use among recreational inhalant and recreational drug use groups. At this point, it should be noted that drug use represented slightly different constructs in each group. In recreational inhalant users, drug use was comprised of alcohol, marijuana, and other drug use, while in recreational drug users, drug use was defined only by alcohol and marijuana use. However, equivalent patterns of effects explained drug use for both groups.

The common structural model for drug use among recreational inhalant and recreational drug users provided support for primary socialization theory. The relationship between peer drug encouragement and drug use explained approximately 50% of the variance in drug use among both groups. In addition, the only direct effect on drug use was exerted by peers. All other primary socialization effects (i.e., family and school) on drug use were mediated through peer drug encouragement. The common structural model also supported the hypothesis that personal characteristics exert indirect effects on drug use behavior by altering primary socialization relationships. In the case of recreational inhalant and recreational drug users, deviant attitudes were negatively related to school adjustment and family caring, and were positively related to peer drug use. There were no direct effects for deviant attitudes on drug use behavior.

Chapter IV

Discussion

Between-group Differences

A consistent pattern of between-group differences was found. Multivariate interaction effects were nonsignificant or failed to explain at least 1% of the variance across all outcome measures. In addition, gender accounted for very small proportions of variance in all outcome variables. Of the seven MANOVAs, only four (i.e., emotional distress, school adjustment, deviance, and family relations) yielded significant gender effects that explained 1% or more of the outcome variance, and none explained more than 2%.

The lack of interaction and gender effects stands in marked contrast to the consistently strong effects for drug use group. All multivariate and univariate drug use group effects were significant and, in many cases, reached Cohen's (1980) criteria for medium or large effect size (.10 and .25, respectively). Across the board, heavy inhalant users reported the highest levels of psychosocial difficulties, generally followed by recreational inhalant users. Both groups reported more intense psychosocial problems than comparable groups of other drug users. In fact, recreational inhalant users were often worse off than heavy drug users, despite their lower overall level of drug use. These results provide strong evidence for the broad generalizability of past research findings that inhalant use is a marker for a wide range of social, emotional, and family problems.

Past research suggests that inhalant use is related to emotional distress and deviance (De Barona & Simpson, 1984; Jacobs & Ghodse, 1987; Oetting & Webb, 1992; Zur & Yule, 1990). Heavy inhalant users in the present study reported the highest levels of both anger and depression, followed by recreational inhalant users. The same pattern emerged with respect to deviance, with heavy inhalant users reporting the highest levels of deviant behavior, tolerance of deviance, and excitement-seeking. Recreational inhalant users followed closely behind on all three deviance measures. These results provide support for a demonstrable link between inhalant use, emotional distress, and deviance in the population of typical adolescent inhalant users.

Previous studies also suggest that inhalant use is a risk factor for low academic achievement and poor school adjustment (Barnes, 1980; Beauvais, 1988a; Edwards & Oetting, 1985). Heavy inhalant users reported lower academic performance and poorer attitudes toward school and teachers than all other drug use groups. Again, recreational inhalant users were the next most problematic group, reporting more school-related difficulties than all remaining groups, including heavy drug users. In addition, heavy and recreational inhalant users reported the lowest levels of peer school adjustment. Taken together, the results suggest that the poor school adjustment of inhalant users may be a reflection of peer group norms that devalue academics.

The family environment of inhalant users has been characterized as extremely dysfunctional (Beauvais, 1988a; De Barona & Simpson, 1984; Edeh, 1989). In the present study, heavy inhalant users reported significantly lower levels of family caring and significantly higher levels of family conflict than any other group, again followed by the recreational inhalant users. Furthermore, although these effects were small, the present

study was consistent with past research linking adolescent inhalant use to a lack of family sanctions against drug use (Beauvais, 1988a; Oetting & Beauvais, 1987b). It should be noted that the observed relationship between drug use group and family drug sanctions may have been artificially depressed by a "ceiling effect" in family concern about substance use. Most participants, regardless of their drug use group membership, reported that their families were very concerned about drug use. The resulting restriction of range likely limited the magnitude of the observed relationship between drug use group and this measure. However, even within these reduced effects, heavy inhalant users reported the lowest level of family drug sanctions.

Of all the risk factors for inhalant use, the most striking relationships were found between drug use group membership and peer drug involvement. While there is a common conception of inhalant use as a solitary act (Texas Commission on Alcohol and Drug Abuse, 1997), most research confirms that peers play an important role in the initiation and maintenance of inhalant use (Arif & Grant, 1988; Beauvais, 1988a; McBride et al., 1991; Oetting & Beauvais, 1987b). The present study provides strong supporting evidence that peers are the single most important factor in adolescent inhalant and other drug use, with the multivariate effect for drug use group explaining 75% of the variance in peer drug encouragement. To a certain extent, peer effects on drug use were drug-specific. For example, heavy, recreational, and experimental inhalant users reported greater inhalant-specific peer encouragement than all other groups. However, recreational drug users, a group defined primarily by marijuana involvement, reported more peer marijuana encouragement than recreational inhalant users. These findings provide support

for Oetting and Donnermeyer's (1998) contention that peer drug norms tend to be very focused and powerful determinants of individual behavior.

Drug use groups were also compared on physical violence, criminal behavior, and victimization. Inhalant-using youth reported more serious levels of these behaviors and problems than other youth using comparable amounts of different substances. With only a single exception (i.e., having been beaten by someone who was not their age), heavy inhalant users reported higher involvement with violence, crime, and victimization than any other drug use group, often by a large margin. The staggering degree to which heavy inhalant users were involved in criminal activity was especially evident when compared to baseline levels of non/negligible drug users. For example, the proportion of heavy inhalant users that had used a weapon to scare someone was ten times greater than the proportion of non/negligible drug users who had engaged in this behavior. Heavy inhalant users were fifteen times more likely to have taken a gun to school than non/negligible drug users. Moreover, the proportion of heavy inhalant users reporting acts of vandalism - a relatively common adolescent activity - was still seven times greater than non/negligible drug users. Even in comparison to heavy drug users, heavy inhalant users were one and a half to two times more likely to be involved in violent and criminal behaviors (e.g., having scared or hurt someone with a weapon, taken a gun to school, etc.).

In addition to perpetrating violent and criminal acts, inhalant-involved youth also report striking levels of victimization. A greater proportion of heavy inhalant users reported having been victimized than all other groups. Recreational inhalant users reported the second highest proportions across all of the victimization items, except for having been beaten by someone who was not their own age, on which they were highest.

Comparing the proportions of heavy inhalant and non/negligible drug users reporting victimization revealed startling differences. For example, heavy inhalant users were nearly four times as likely to report being hurt by someone with a weapon, and nearly seven times as likely to have been sexually assaulted. Again, heavy inhalant users were one and a half to two times more likely than heavy drug users to report being a victim of assault or violence.

The violence and victimization results paint a disturbing picture of the risks associated with adolescent inhalant use. Overall, it appears that inhalant using youth frequently find themselves in the role of victim, as well as that of perpetrator. These findings may reflect the high level of deviance that characterizes inhalant-using peer groups. Even among drug users, the peers of inhalant users tend to be unusually deviant (Jumper-Thurman & Beauvais, 1992). Within inhalant-using peer groups, there may be a normative climate that encourages violence and criminal behavior. In addition, this peer group atmosphere may simultaneously increase the likelihood of victimization.

Taken together, the results from the present study firmly corroborate past findings relating inhalant use to a number of psychosocial difficulties. The 12-14 year-old, White non-Hispanic inhalant users in the present study reported serious problems in many aspects of their lives. Compared to other drug users, inhalant users reported higher rates of violent and criminal behavior and an increased risk of being victimized by others. Inhalant users also reported higher levels of emotional distress, deviance, and worse academic performance and attitudes toward school. In addition, they reported more family conflict, less family caring, and fewer family sanctions against drug use than their peers. Finally, the inhalant users described their peer groups as more strongly encouraging the

use of inhalants and other drugs. Overall, adolescent inhalant users appear to be considerably worse off than other drug users on a broad range of psychosocial variables.

These results replicate previous findings on inhalant users, most of which were based on youth in detention, drug-treatment facilities, or unique or unusual communities. The present study suggests that the links between inhalant use and psychosocial difficulties are substantive, very serious, and not simply an artifact of sampling atypical, deviant youth. In addition, the results provide research support for the clinical contention that inhalant use poses serious problems above and beyond those associated with the use of other drugs (Jumper-Thurman & Beauvais, 1992). Furthermore, heavy inhalant users were not the only group to report extreme levels of emotional, behavioral, and psychosocial difficulties. Recreational inhalant users also reported disturbing patterns of behavior and social problems, which were almost always more severe than those reported by heavy drug users. This result suggests that moderate inhalant use may be an even greater risk factor for severe behavioral and social problems than heavy drug use.

Structural Equation Modeling

The purpose of the second portion of the present study was to test primary socialization theory (Oetting, Deffenbacher, et al., 1998; Oetting & Donnermeyer, 1998) as an explanation for adolescent drug use among several drug use groups. The objectives were to determine (1) if the model of adolescent drug use based on primary socialization theory would be supported for both inhalant users and other drug users, and (2) if the risk factors for drug use operated the same way for inhalant users and other drug users.

The SEM results support primary socialization theory as an explanation for general drug use within heavy inhalant, heavy drug, recreational inhalant, and recreational drug

use groups. Model fit indices for all four groups were adequate, with CFIs ranging from .91 to .93. Moreover, the primary socialization model explained large amounts of variance in drug use within all four drug use groups (R^2 ranging from .43 to .49). The standardized structural paths between peer effects and individual drug use were strong and comparable across groups (.66 to .70). These results are consistent with past research on primary socialization theory and peer cluster theory that implicates drug using peers as the single greatest risk factor for adolescent substance use (e.g., Oetting & Beauvais, 1987b; Swaim et al., 1998, 1989, 1993). In addition, the present study suggests that peers exert nearly identical effects regardless of the type and severity of drug use. That is, peers affect individual drug use the same way for heavy inhalant, heavy drug, recreational inhalant, and recreational drug use groups.

Primary socialization theory suggests that peer effects mediate the effects of other socialization sources (i.e., family and school) on drug use during adolescence. The results from the present study are consistent with a mediational model. The effects of family and school socialization sources on drug use were mediated by peer drug encouragement in all four groups. In addition, the LM tests did not suggest the presence of any direct socialization effects for family or school factors. In other words, family and school factors did not explain unique variance in drug use above and beyond that accounted for by the presence of peer effects. Past research on primary socialization's predecessor, peer cluster theory, found direct family effects on drug use in specific situations. For example, family sanctions were direct protective factors against drug use in both Mexican American and White non-Latino males but not females (Swaim et al., 1998). In addition, direct links between family sanctions and drug use were found for American Indians (Swaim et al.,

1993). However, the direct family sanction-drug use links from past research have been small in magnitude, especially in comparison to peer effects. Taken together, these results support the general mediational model, with direct socialization effects for family under specific conditions and within certain populations.

The patterns of school adjustment, family drug sanctions, and family caring effects were generally consistent with past findings. For example, the paths from family caring to family drug sanctions, and from family drug sanctions to peer drug encouragement were significant and moderate in size. This suggests that caring families tend to discourage drug use, and that family drug sanctions protect against associations with drug using peers. However, the path between school adjustment and peer drug encouragement was generally weak (standardized path coefficients ranged from -.16 to -.18), and nonsignificant for heavy inhalant users. Previous studies have also reported weak or nonsignificant paths between school adjustment and peer drug use. For example, Swaim and colleagues (1998) reported nonsignificant school adjustment-peer drug association paths for White non-Hispanic males and females (standardized path coefficients = -.07 and -.02, respectively). Even when significant, the relationship between school adjustment and peer drug use has been small in magnitude (e.g., Swaim et al., 1998, 1993). Taken together, these findings suggest that youth who like school and get good grades may not be immune to associating with deviant peers.

While most of the paths specified by primary socialization theory were consistent with past findings, the relationship between family caring and school adjustment deserves mention. Past research has generally found small, positive standardized path coefficients between these two factors (e.g., Oetting & Beauvais, 1987b; Swaim et al., 1998, 1993).

Among recreational inhalant and recreational drug users in the present study, the standardized path coefficient between family caring and school adjustment was small but significant (.13 to .24, respectively). However, for heavy inhalant and heavy drug users, the path was nonsignificant. Moreover, the effect was positive for heavy inhalant users (.15), but negative for heavy drug users (-.12). The relationship between family caring and school adjustment appears to be inconsistent or small at best. However, it is unclear whether the observed relationship between family caring and school adjustment is an accurate estimate of a small "true" effect, or if the effect is underestimated as a result of measurement problems. The consistently weak relationship between family caring and school adjustment may reflect incompatibility in their factor structures. For example, the school adjustment factor is comprised of both subjective (attitudes toward school and teachers) and objective (academic performance) information. Caring families may foster positive attitudes toward school and teachers. However, family concern and encouragement may not have a strong impact on academic performance, especially for children with low academic ability, attention deficit/hyperactivity disorder, or other adjustment difficulties. Therefore, family caring may be related to only a portion of the school adjustment factor as presently measured.

The present study is the first to integrate personal characteristics into the full primary socialization model of drug use. Previous research on peer cluster theory (e.g., Oetting et al., 1989; Swaim et al., 1989) has examined a reduced mediational model of emotional distress, peer drug involvement, and drug use. The present study extended this prior research in two ways. First, family and school socialization sources were included in

addition to peer factors. Second, in additional to emotional distress, deviant attitudes were also examined.

Previous research on peer cluster theory has yielded mixed results regarding the role of emotional distress on drug use. These findings suggest that the effects of depression and self-esteem on drug are mediated by anger which, in turn, is mediated by peer effects. However, specific findings have been inconsistent. For example, the links to anger from self-esteem and depression have been marginal (both less than .11) among White non-Latinos (Oetting et al., 1989; Swaim et al., 1989), but moderate (.42 and .33, respectively) among Native Americans (Oetting et al., 1989). Moreover, the observed relationships between emotional distress (i.e., self-esteem, depression, and anger) and both peer drug associations and drug use have been small. Due to the inconsistency in prior research and the addition of the deviance factor, the personal characteristics portion of the primary socialization model was somewhat exploratory.

Emotional distress was initially specified as a single factor, comprised of anger, depression, and self-esteem. Preliminary CFA results suggested that anger, depression, and self-esteem did not form a coherent emotional distress factor. Subsequent examinations of depression and self-esteem as individual factors revealed weak relationships with anger, drug use, peer drug encouragement and other socialization factors. In the interest of parsimony, self-esteem and depression were omitted from the model, leaving anger as the only emotional distress variable. The general deviance factor was specified as a combination of deviant behavior, tolerance of deviance, and excitement-seeking. Preliminary CFA results indicated poor factor coherence for deviance due to a low amount of overlap with the excitement-seeking indicator.

Therefore, excitement-seeking was omitted from the model, leaving deviant behavior and tolerance of deviance as the indicators of the deviance factor.

The revised measurement model included two personal characteristics: anger and deviance. On the basis of primary socialization theory, it was hypothesized that the effects of both deviance and anger on drug use would be mediated by peer drug encouragement. However, the factor-factor covariances in the measurement model revealed weak relationships between anger and both peer drug encouragement and drug use, but a moderate amount of overlap between anger and deviance. Taken together, this pattern suggested that the marginal effect of anger on peer drug encouragement was likely mediated by deviance. Therefore, the final structural model specified a mediational pattern of relationships between anger, deviance, and peer drug encouragement (Figure 2).

Model tests results provide mixed support for the effects of personal characteristics on drug use within the primary socialization framework. The effect of emotional distress on drug use within the primary socialization model was marginal. Depression and self-esteem were omitted due to negligible overlap with drug use or peer drug encouragement. Even anger, which is generally considered to be the strongest predictor of drug use among the emotional distress variables, failed to explain substantial amounts of variance in either drug use or peer drug encouragement. However, SEM did confirm that the marginal effect of anger on peer drug encouragement was fully mediated by deviance.

Overall, the present results suggest very little relationship, either direct or mediated, between emotional distress and drug use behavior. Furthermore, these findings are consistent with past research (Oetting et al., 1989; Swaim et al., 1989). However, the

small observed relationships between emotional distress and drug use do not preclude the possibility of moderators of the emotional distress-substance use relationship. It is possible that variables not included in the present study interact with emotional distress to influence drug use behavior. For example, anger or depression may be strongly related to substance use among individuals who have no social support network (e.g., family or peers). Future research should examine the possibility of moderators of the emotional distress-substance use relationship. It should also be noted that the weak relationships between emotional distress and other factors in the structural model may signify measurement problems with the emotional distress scales. Psychometric research should continue to ensure the construct validity of these measures.

The indirect effect of deviance on drug use supports primary socialization theory's mediational hypothesis regarding personal characteristics. Deviance had moderate to strong standardized path coefficients with school adjustment (ranging from -.50 to -.63), family caring (ranging from -.14 to -.36), and peer drug encouragement (ranging from .30 to .38). However, the LM test indicated that there were no direct paths between deviance and drug use. Therefore, the effect for deviance on drug use was fully mediated by the socialization sources, primarily peers. These results suggest that deviance influences drug use by interfering with bonding to sources of prosocial norms (i.e., school and family) or increasing the likelihood of bonds to deviant peers.

In general, the separate SEM results for each group support primary socialization theory as a contributing explanation for drug use. However, these results do not necessarily mean that primary socialization theory operates in exactly the same way for each group. Therefore, multiple group analyses examined model equivalence between

heavy inhalant and heavy drug users, and recreational inhalant and recreational drug users. Results suggest that differences between drug use groups were present only at the measurement model level. Measurement model comparisons of heavy inhalant and heavy drug users revealed that 10 of the 18 factor-indicator path coefficients were significantly different between groups, with larger path coefficients for heavy inhalant users in all cases. However, path coefficients contain information about scaling and variance, as well as the strength of the factor-indicator relationship. Factor loadings, on the other hand, reflect only the correlation between factor and indicator. Therefore, it is possible for path coefficients to vary among groups even if the underlying factor-indicator relationship is exactly the same. An examination of the factor loadings for heavy inhalant and heavy drug users (Table 5) revealed similar patterns of correlations between factors and indicators. These results suggest that, despite the differences in path coefficients, the factors were measured the same way among heavy inhalant and heavy drug users.

A similar pattern of results emerged in the measurement model comparison of recreational inhalant and recreational drug users. Seven of the 18 factor-indicator paths were significantly different across groups, with larger path coefficients for heavy inhalant users, except for a single indicator. Once again, the standardized factor loadings were roughly equivalent for both groups, signifying comparable factor measurement. However, there was one notable exception. The factor loading for other drug use on the drug use factor was dissimilar for recreational inhalant users compared to recreational drug users (.64 and .25, respectively). The relatively small standardized factor loading for recreational drug users may have been the result of severe range restriction in the other drug use indicator ($\underline{\sigma}^2 = 8.87$ for recreational inhalant users, $\underline{\sigma}^2 = 0.075$ for recreational

drug users). The magnitude of a correlation coefficient may be attenuated by range restriction, resulting in an underestimation of the actual relationship (Ghiselli, Campbell, & Zedeck, 1981; Nunnally & Bernstein, 1994). As a correlation coefficient, the factor loading may have been artificially depressed by restriction in range in the other drug indicator. The result was that the drug use factor was defined almost entirely by alcohol and marijuana use for the recreational drug use group, whereas the drug use factor also contained information about other drug use for recreational inhalant users. However, as previously mentioned, the measurement models were otherwise equivalent among recreational inhalant and recreational drug users. Therefore, tests of structural model equivalence were justified with a single qualification: the drug use outcome for recreational inhalant and recreational drug users represented slightly different patterns of substance use.

The subsequent multiple group SEM comparisons indicated that the patterns of relationships determining drug use were equivalent for recreational inhalant and recreational drug users, and also for heavy inhalant and heavy drug users. That is, socialization influences operated in the same manner to predict drug use for both inhalant and other drug users. Even though inhalant users tend to experience comparatively greater levels of anger, deviance, family disruption, school maladjustment, and peer drug encouragement than their other drug-using counterparts, these factors combine in the same manner to explain drug use among both inhalant users and other drug users. Specifically, drug using peers are the key determinant in adolescent drug use, while other socialization sources and personal characteristics play an important role in the selection of peer groups.

In general, multiple group analyses indicated structural models equivalence for both heavy inhalant and heavy drug users, and recreational inhalant and recreational drug users. However, a minor inconsistency in the structural models for heavy inhalant and heavy drug users deserves mention. The common path coefficients between family drug sanctions and school adjustment and between school adjustment and peer drug encouragement were relatively weak in these groups. An examination of the specific structural models for each group revealed inconsistency in these relationships. The path between family sanctions and school adjustment was significant for heavy inhalant users but not for heavy drug users. Conversely, the path between school adjustment and peer drug encouragement was significant for heavy drug users but not heavy inhalant users. Even though a common set of path coefficients may be used to describe these relationships for heavy inhalant and heavy drug users, further research should address these findings.

Implications

The present study supports a revised version of Beauvais and Oetting's (1987) taxonomy of inhalant users, suggesting the utility of dividing the *young inhalant users* category into distinct sub-categories. Initially, Beauvais and Oetting proposed that inhalant users fall into one of three broad categories: *young inhalant users, polydrug users*, and *inhalant-dependent adults*. While this classification scheme is useful for understanding gross patterns of inhalant use behavior across different age groups, it does not distinguish between the types or amounts of use that occur within each group. In addition, the original taxonomy obscures the emotional and social differences that accompany various levels of inhalant use. The present study suggests that *young inhalant*

users are not a homogenous group. Rather, distinguishable levels of inhalant use and concomitant psychosocial characteristics exist within this group. The results suggests that Beauvais and Oetting's *young inhalant users* could be further divided into three distinct subgroups of experimental, recreational, and heavy inhalant users. Breaking the *young inhalant users* into these distinct sub-categories affords a more precise understanding of their patterns of use and psychosocial characteristics. Moreover, future research may also support the delineation of sub-categories within the *polydrug users* and *inhalant-dependent adults.*

The direct relationship between psychosocial difficulties and intensity of inhalant use carries considerable implications for prevention and treatment. First, the link between inhalant use and violence, criminal behavior, and other psychosocial problems suggests that it is critical to prevent inhalant use before it begins. Intensive prevention efforts must target elementary school children before they transition to middle school or junior high, where they are more likely to be exposed to inhalant use through peer interactions. In addition, increased attention should be given to prevention efforts with young children who have backgrounds that may predispose them to inhalant use, including emotional problems, family disruption, or a history of violence and victimization.

The pivotal role of peers in inhalant and other drug use raises additional considerations for prevention. Inhalant prevention programs implemented in schools, where peer group members may be targeted simultaneously, may be more effective than less focused community-wide prevention campaigns. School-based prevention efforts that generate or increase peer sanctions against inhalant use may be more effective than simply teaching youth to "just say no" to sniffing inhalants. In fact, persuading peer

groups to adopt strong anti-inhalant norms may be one of the most effective forms of inhalant prevention. However, it is important not to rely solely on school-based prevention efforts, or inhalant users who are not in school will be missed.

Primary socialization structural model equivalence among inhalant users and other drug users has significant implications for treatment approaches. The similarity of drug use models for heavy inhalant and heavy drug users, and recreational inhalant and recreational drug users, suggests that a general comprehensive treatment approach might be useful in all groups. The primary socialization model suggests that treatment approaches should address substance use within the context of family, school, and emotional problems, with a special emphasis on peer relations. The SEM results clearly indicate that targeting peer influences is an extremely important aspect of drug treatment. In addition, fostering positive relationships between individual and family, and to a lesser extent, improving school adjustment, may protect against drug use by discouraging relations with deviant peers.

Model equivalence does not imply that the *same* treatment programs will be successful in treating all levels of inhalant and other drug use. Treatment programs must acknowledge important differences between inhalant users and other drug users. Problems in treating severe inhalant users are likely exacerbated by the many psychosocial problems occurring in this group. Inhalant users may simply require more intense, longer-term drug treatment to address serious psychosocial issues in addition to substance use. Furthermore, chemical effects unique to inhalants may also lengthen the necessary duration of treatment (Texas Commission on Alcohol and Drug Abuse, 1997). Cognitive deficits due to inhalant use (e.g., confusion, sluggishness) may continue for

weeks after cessation of use. These residual effects may interfere with immediate treatment gains and induce frustration in the individual and treatment professional unless a prolonged period of detoxification is employed.

While it is crucial for all drug treatment programs to target peer influences, peer drug norms vary in severity, intensity, and focus. For example, heavy inhalant users report greater inhalant-specific peer encouragement, as well as stronger normative pressures to use marijuana, alcohol, and other drugs compared to all other drug use groups. In order to be successful, drug treatment programs may need to counter the specific peer drug norms associated with different levels and types of substance use.

Moreover, inhalant treatment programs may require additional emphasis on helping youth extricate themselves from inhalant-using peer groups. According to the Texas Commission on Alcohol and Drug Abuse (1997), a major task of inhalant treatment programs is resocializing inhalant users into a new peer environment. However, the psychosocial difficulties that accompany inhalant use may interfere with forming bonds with less deviant peers. Thus, treatment must teach the social skills necessary to enter and remain in a new peer group. Interventions aimed at helping youth develop and maintain a new peer group must continue after formal drug treatment ends, or youth are likely to drift back to deviant peer groups when faced with frustrations or problems. Furthermore, it is important to continually address the individual's needs that were previously met by the drug-using peer group, perhaps through ongoing drug-free activities and family involvement.

Ideally, treatment efforts could target entire peer groups simultaneously, rather than simply extricating one inhalant-using member at a time. Proactive outreach programs

might increase the viability of this strategy by raising awareness about inhalant use and eliciting school and parental support for large-scale prevention and treatment efforts. Comprehensive approaches entail significant expenses. However, it is important to consider the potential costs of failing to prevent and treat inhalant use. Research consistently shows that inhalant use places youth at great risk for emotional distress, criminal behavior, deviance, and victimization. Far-reaching prevention efforts may be less costly at both the individual and societal level in the long term.

Limitations

While the results are compelling and potentially useful, several limitations are acknowledged. First, all data were taken from self-report surveys. No corroborative measures of drug use, peer drug use, or family drug sanctions were gathered. Even though research evidence suggests that self-report data on substance abuse are both reliable and valid (Oetting & Beauvais, 1990a), it is possible that the observed relationships were slightly inflated due to common method variance. In addition, it is possible that some participants' reports of peer and family characteristics may have been inaccurate or distorted to be consistent with their own drug-related attitudes.

A second limitation involves the sample composition, which was limited to White non-Latino youth. Even though the initial sample was very large, breaking down the six drug use groups by ethnicity would have resulted in extremely small cell sizes (and thus very unstable effects and low statistical power) for ethnic groups other than White non-Latino. At the same time, collapsing across ethnicity may have obscured potentially useful and meaningful effects. Rather than inaccurately estimating effect sizes for other ethnic groups or examining a sample from a poorly specified population, the study

focused solely on White non-Latino youth. Thus, the study failed to examine potentially important ethnic group differences and may generalize primarily to White non-Latino youth.

Another potential drawback involves imperfect matching among drug use groups. The original goal in defining the drug use groups was to compare groups that were equivalent on overall levels of substance use, except for inhalant use. By controlling for overall level of substance use, differences between matched groups on the outcome variables could be reasonably attributed to inhalant use. Every effort was made to match the groups on mean levels of alcohol, marijuana, cocaine, and LSD. However, some very small differences remained, most notably that recreational inhalant users reported slightly higher levels of use compared to recreational drug users. Therefore, it is possible that differences between these groups on the outcome variables may partially reflect a difference in their overall level of substance use, and not solely the addition of inhalants. However, this was not the case when comparing recreational inhalant to heavy drug users, where the recreational inhalant users reported lower levels of overall drug use. Yet, they typically experienced equivalent or greater psychosocial difficulties than the heavy drug users.

An additional limitation involves conclusions about causation. Cross-sectional research designs do not allow inferences about the direction of causation. In the present study, there are several relationships in which the direction of causation is unclear. For example, it is possible that inhalant use leads to decreased effort in school, rather than poor academic achievement putting youth at risk for inhalant use. Moreover, increased levels of emotional distress or victimization may result from inhalant use, as opposed to

acting as contributing factors. The results from the first portion of the present study do not verify the direction of causation, but do estimate the magnitude of the relationships between inhalant use and psychosocial variables. Moreover, SEM is often mistakenly referred to as "causal modeling." However, the direction of causality cannot be inferred from SEM procedures based on cross-sectional data. Longitudinal studies are needed to strengthen conclusions about the directionality of the relationships examined in the present study.

Lastly, limitations involving the measurement model for primary socialization theory should be addressed. An initial measurement model was proposed that included expanded emotional distress, deviance, and family relations factors. These factors were subsequently modified due to model-fit problems. As a result, several measures, including excitement-seeking, depression, self-esteem, and family conflict, were omitted from the final model. In addition, the family caring factor was ultimately represented by two single-item indicators. It is unlikely that this representation of family caring provided full construct coverage. It is unclear whether measurement problems (e.g., low scale validity) or conceptual problems (e.g., the composition of the emotional distress factor) contributed to initial measurement model mis-fit. Future research should investigate these issues to arrive at a consistent, general measurement model for the factors proposed by primary socialization theory.

Future research

The results and limitations of this study suggest several potentially fruitful avenues for research. First, studies utilizing multiple sources of data to confirm the accuracy of self-reports regarding peers and family would strengthen the present conclusions. Future

research might triangulate on key variables such as peer drug involvement or family sanctions through different types of data collection or measurement methods.

Because the present sample was limited to White non-Latino youth, large-scale research is needed to replicate current findings within a sample that is more representative of the U.S. population. In addition, it may be important to replicate results within large-scale samples from specific ethnicities. Because inhalant use sometimes occurs as a local outbreak, or "hot spot" (Texas Commission on Alcohol and Drug Abuse, 1997), an examination of community-level characteristics related to inhalant use would also be an important research contribution.

Finally, longitudinal studies are needed to clarify causal direction in the relationships between inhalant use and psychosocial characteristics. It would be beneficial for prevention and treatment professionals to understand the psychosocial problems that precede inhalant use, as well as those that are consequences of use. Once this has been accomplished, future research might further examine how the psychosocial characteristics associated with inhalant use influence prevention and treatment outcomes, thereby increasing the likelihood of success.

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APPENDIX

INHALANT ITEMS

Have you ever 'sniffed' (or 'huffed') glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine.)

Response Options: Yes, No

How often in the last 12 months have you 'sniffed' (or 'huffed') glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine.)

Response Options: None, 1-2 times, 3-9 times, 10-19 times, 20-49 times, 50 or more times

How often in the last month have you 'sniffed' (or 'huffed') glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine.)

Response Options: None, 1-2 times, 3-9 times, 10-19 times, 20 or more times

In using inhalants, are you a...

Response Options: Non User, Very Light User, Light User, Moderate User, Heavy User, Very Heavy User.

EMOTIONAL DISTRESS SCALES

All Response Options: No, Not Much, Some, A Lot

Anger (Temperament)

I am quick tempered.

I feel like hitting someone.

I am hotheaded.

Anger (Reactivity)

I get mad.

I lose my temper.

I get angry.

Depression

I feel low.

I am unhappy.

I am lonely.

I feel bad.

I feel sad.

I am lonesome.

Self-Esteem

I am proud of myself.

I am able to do things well.

I like myself.

Other people my age like me.

I am lucky.

I am good looking.

I am smart.

I am good at games.

Other people my age ask me to do things with them.

DEVIANCE SCALES

All Response Options: No, Not Much, Some, A Lot

Deviant Behavior

I steal things.

I do things my teachers don't want me to do.

I cheat in school.

I lie to people.

I do bad things.

Toleration of Deviance

Is it bad to cheat?

Is it bad to lie?

Is it bad to steal?

Is it bad to skip school?

Excitement-seeking

I like to do dangerous things.

I take chances.

I would like to learn to skydive.

PEER SOCIALIZATION SCALES

Peer School Adjustment

Do your friends like school?

Do your friends like their teachers?

Do your friends think school is fun?

Response Options: No, Not Much, Some, A Lot

What kind of grades do your friends get?

What kind of students are your friends?

Response Options: Poor, Not Too Good, Good, Very Good

Peer Alcohol Encouragement

How much would you try to stop your friends from getting drunk?

How much would your friends try to stop you from getting drunk?

How often have your friends asked you to get drunk?

Response Options: Not At All, Not Much, Some, A Lot

How many of your friends get drunk once in a while?

How many of your friends get drunk almost every weekend?

Response Options: None, One or Two, Some of Them, All of Them

Peer Marijuana Encouragement

How much would you try to stop your friends from using marijuana?

How much would your friends try to stop you from using marijuana?

How often have your friends asked you to use marijuana?

Response Options: Not At All, Not Much, Some, A Lot

How many of your friends...use marijuana?

Response Options: None, A Few, Some of Them, All of Them

Peer Other Drug Encouragement

How much would you try to stop your friends from using uppers?

How much would you try to stop your friends from using downers?

How much would you try to stop your friends from using cocaine?

How much would your friends try to stop you from using uppers?

How much would your friends try to stop you from using downers?

How much would your friends try to stop you from using cocaine?

Response Options: Not At All, Not Much, Some, A Lot

How often have your friends asked you to use uppers?

How often have your friends asked you to use downers?

How often have your friends asked you to use cocaine?

How many of your friends use...uppers?

How many of your friends use...downers?

How many of your friends use...cocaine?

Response Options: None, A Few, Some of Them, All of Them

Peer Inhalant Encouragement

How much would your friends try to stop you from 'sniffing' glue or gas, etc.?

How much would you try to stop your friends from 'sniffing' glue or gas, etc.?

How often have your friends asked you to use 'sniff' glue or gas, etc.?

Response Options: Not At All, Not Much, Some, A Lot

How many of your friends...'sniff' glue or gas, etc.?

Response Options: None, A Few, Some of Them, All of Them

SCHOOL SOCIALIZATION SCALES

School Liking

I like school.

School is fun.

Response Options: No, Not Much, Some, A Lot

Teachers Liking

My teachers like me.

I like my teachers.

Response Options: No, Not Much, Some, A Lot

Academic Performance

What kind of grades do you get?

What kind of student are you?

Response Options: Poor, Not Too Good, Good, Very Good

FAMILY SOCIALIZATION SCALES

All Response Options: Not At All, Not Much, Some, A Lot

Family Alcohol Sanctions

How much would your family care if you got drunk?

How much would your family try to stop you from getting drunk?

Family Marijuana Sanctions

How much would your family try to stop you from using marijuana?

How much would your family care if you used marijuana?

Family Other Drug Sanctions

How much would your family try to stop you from using other drugs?

How much would your family care if you used other drugs?

Family Conflict

Do the members of your family fight with each other?

Do the members of your family argue with each other?

Response Options: No, Not Much, Some, A Lot

Family Caring

Does your family care about you?

Response Options: No, Not Much, Some, A Lot

How much do you care about your family?

Response Options: Not At All, Not Much, Some, A Lot

VIOLENCE/CRIMINAL BEHAVIOR/VICTIMIZATION

All Response Options: Yes, No

Violent Behavior

Have you ever...

beaten up someone?

scared someone with a club, chain, knife, or gun?

hurt someone with a club, chain, knife, or gun?

used force to get money or things from someone?

Criminal Behavior

Have you ever...

been arrested?

taken a gun to school?

stolen a car?

slashed tires or broken something on purpose?

Victimization

Have you ever been...

beaten up by a friend?

beaten up by someone else?

scared with a club, knife or gun?

hurt with a club, knife or gun?

raped or sexually assaulted?