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RISK AND PROTECTIVE FACTORS IN THE NON-MEDICAL USE OF
PRESCRIPTION DRUGS AMONG ADOLESCENTS

BY JAMIE E. VELA

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN
CLINICAL PSYCHOLOGY

UNIVERSITY OF RHODE ISLAND
2016

DOCTOR OF PHILOSOPHY DISSERTATION

OF

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UNIVERSITY OF RHODE ISLAND
2016

Abstract

This study aimed to investigate the Non-Medical Use of Prescription Drugs NMUPD among adolescents. Previously studied risk and protective factors were evaluated across five ecological domains including community, family, individual, peer, and school. These sets of factors were used to help understand the relationship of the constructs that serve as risk or protective in adolescent NMUPD. The Communities that Care Survey was distributed to 9-12th graders on one occasion. For the intents and purposes of this study, NMUPD was assessed by previous 30-day tranquilizer, pain-reliever, or stimulant use. The survey results were used to construct an exploratory factor analysis. Results of the study yielded 9 factors. Confirmatory Factor Analysis was conducted to create a measurement model of five factors drawn from the Exploratory Factor Analysis. Structural equation modeling was then performed to analyze the five latent variable constructs relationships to NMUPD. Each of the five ecological domains had two or more factor indices. The full model of the five ecological domains did not show a good fitting model for the NMUPD; however, the individual, peer, and school direct path models were a good fitting model for the NMUPD. Gender moderation did not occur in the five-factor model, though direct path models did demonstrate good model fit. These findings are discussed as a means for refining future models and developing preventative interventions for future use.

Acknowledgements

Many thanks to those who were part of this journey.

To My Committee:
For your support and dedication.

To Jasmine Mena Ph.D. & Paul Florin Ph.D.:
For your guidance through every step of this process.

To My Grandmother and Aunt:
For providing me with the strength and support to face any challenge.

To Mr. A:
For your unwavering encouragement. You are truly a kindred spirit.

To C & M:
For joining me on this journey and giving me such wonderful memories along the way.

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Chapter 1

INTRODUCTION

Prescription drugs are increasingly abused and misused by adolescents (Boyd et al., 2006; Johnston, O'Malley, Bachman, & Schulenberg, 2015; McCabe, Teter, Boyd, & Guthrie, 2004). The non-medical use of prescription drugs NMUPD among adolescents is a growing concern (Boyd, McCabe, & Teter, 2006; Huang et al., 2006; Johnston, O'Malley, Bachman, Schulenberg, 2005; McCabe, Boyd, & Young, 2007; National Survey on Drug Use and Health, 2010; Sung, 2005). Previous research has shown the non-medical use of prescription medications is related to other substance use and high-risk behaviors among adolescents (Boyd, Young, Grey, McCabe, 2009; Cranford et al., 2013; McCabe, West, Morales, Cranford, & Boyd, 2012; Schepis & Krishnan-Sarin, 2008). According to McCabe et al. (2007) and Zosel, Bartelson, Bailey, Lowenstein, & Dart (2013) adolescents who endorse NMUPD report illicit drug use five to seven times more than those who do not report NMUPD.

Studies have found early onset NMUPD is a significant predictor of lifetime prescription drug abuse and dependence (McCabe et al., 2007). Wu, Pilowsky, & Patkar (2008) found that the initiation of non-medical use of prescription pain relievers occur in early adolescence before 15 years of age. Adolescents who report NMUPD at age 13 or earlier were more likely to report prescription abuse and dependence than those who reported initial non-medical use of prescription drugs at 21 or older (McCabe et al., 2007).

The initiation of substance use during adolescence can influence engagement in other risky behaviors or substances. The early intervention of adolescence may be a critical time point in the prevention of future illicit drug use or misuse of prescription drugs. The findings by Miech, Johnston, O'Malley, Bachman, & Schulenberg (2015) support this argument. This investigation described how positive beliefs and attitudes regarding drug use increases the likelihood of drug use among secondary aged students. Furthermore, certain risk factors such as perceived availability of drugs, norms favorable to drug use, favorable attitudes toward substance use, and peer substance use appear to have an increasing effect with age (Arthur et al., 2002).

Several studies have investigated the NMUPD among adolescents using the Monitoring the Future Survey (Johnston, O'Malley, Bachman, & Schulenberg, 2010). These studies have been helpful in understanding the trends and patterns of NMUPD, particularly in relation to illicit substance use. Still, the scope of NMUPD studies has been limited. Arthur et al. (2002) pointed out that there are gaps in the literature on this topic. The authors argue for more research focusing on the study of the risk and protective factors using the Communities that Care Survey or other means that are cost-effective in order to facilitate the identification of particular geographical risk and protective factors in a population. This study noted how this research is important in assisting preventative intervention efforts.

Many studies have focused on a specific prescription drug instead of a diverse set of prescription drugs (McCabe et al., 2007; McCabe, Knight, Teter, Wechsler, 2005; McCabe, Teter, Boyd, Knight, Wechsler, 2005; Poulin, 2001). Other studies have sought to understand the non-medical use of prescription drugs among

college students (Arria & Wish, 2006; Ford, 2009; McCabe et al., 2005; McCabe et al., 2007). McCabe, West, Morales, Cranford, & Boyd (2007) differed and examined the prescription and non-prescription drug use among high school students in Detroit. This investigation was informative in its study of four categories of prescription use including stimulants, opioids, sleeping and anxiety medications.

Given the research discussing the early initiation of drug use and the relation between NMUPD and other illicit drugs, this study attempts to shed light on the NMUPD among adolescents in high school. As Arthur et al. (2002) noted, research identifying the most salient risk and protective factors in a particular geographical region can assist in understanding this phenomenon. This study seeks to add to the literature and provide a reduced set of risk and protective factors associated with NMUPD among adolescents. Furthermore, in light of investigations being limited to a certain prescription drug type, this study seeks to provide a more comprehensive measure of NMUPD by assessing more than one prescription drug type. Thus, this study attempts to contribute to the literature and capture high school students report of non-medical use of three classes of prescription drugs and the associated risk and protective factors related to engaging in this behavior.

Chapter 2

REVIEW OF THE LITERATURE

Non-Medical Use of Prescription Drugs

The NMUPD ranks as the second most common class of illicit drug use in the United States (NSDUH, 2013). On average, 15.7 million people aged 12 or older report having misused prescription drugs between 2005 and 2011 (SAMHSA, 2013; NSDUH, 2014). Some studies suggest adolescents' perceived preference has changed from illicit drugs to prescription drugs (Johnston et al., 2010). Fleary, Heffer, & McKyer (2013) suggest adolescents' and young adults' perceived risk of prescription drugs misuse differs from their perception of illicit drug use. Moreover, according to the United Nations Office on Drugs and Crime (UNODC), forty percent of adolescents in North America report prescription drugs are much safer to use than illegal drugs, and a third of those adolescents think prescription drugs are non-addictive (UNODC, 2011). Thus, raising awareness and providing evidence-based data on the nature of this phenomenon is informative in developing interventions to target how to change adolescent perceptions of prescription drug use. Such efforts can prevent and reduce adolescent NMUPD.

Gender

There is limited research on the NMUPD relating to potential differences that occur across gender. The National Household Survey on Drug Abuse (NHSDA) found women are more likely to use prescription drugs than males (Simoni-Wastila, Ritter, & Stickler, 2004). Lifetime rates of NMUPD were found to be higher in women than men (Clarke, 2015). Moreover, there has been research suggesting

women are more likely prescribed certain prescription drugs including pain relievers and tranquilizers (Hohmann, 1989; Simoni-Wastila, 1998, 2000, Boyd et al., 2009). Boyd et al. (2009) found gender differences in the NMUPD. The findings showed women were at higher risk than males to use any non-medical prescription drugs, though in particular, narcotic analgesics and tranquilizers. More research is needed to distinguish the potential gender differences associated with the NMUPD. Specifically, there appears to be some relation varying in the means of use for females in comparison to males. More often, males have been found to use recreationally while females have been found to use for pain relief needs (McCabe et al. 2007).

Ecological Domains

Previous research has looked at the community, family, individual, peer, and school dimensions associated with the risk and protective factors of youth behaviors (Youngblade et al., 2007). Hawkins, Catalano, & Miller (1992) study on the precursor risk factors for adolescent drug abuse is instrumental in the creation of risk and protective factors associated with substance use research. Sale, Sambrano, Springer, & Turner (2003) used structural equation modeling to assess risk and protective factors associated with adolescent substance use across ecological domains. A number of factors have been related to adolescent problem behaviors including substance use (King et al., 2013). For instance, weak attachment to parents, low commitment to school, and nonconformity to community laws and norms show an association with drug use (Botvin, 1983; Dryfoos, 1990; Hawkins, Lishner, & Catalano, 1985; Higgins, 1988).

Various theories have developed to help explain adolescent use of substances. The social learning theory explains how peer and family contexts can influence adolescent behavior through learning of attitudes and behaviors (Bahr & Yang, 2005). Adolescents are likely to internalize attitudes and behaviors they encounter from their primary contact groups; namely, friends and family

Hirschi's (1969) social control theory relays how and why individuals conform to moral order (Ford, 2009). The theory posits four dimensions including attachment, commitment, involvement, and belief. Adolescents internalization of conventional beliefs relate to their attachment or relational ties, commitment to nourish those ties via means of participating in activities strengthening these relationships. In relation to family and social bonds, the theory suggests adolescents who have stronger involvement and have stronger family bonds, generally act according to their beliefs and commitments their family and social bonds uphold. Ford (2009), using social control theory predicted the non-medical use of prescription drugs among adolescents with weaker family and school bonds.

Cleveland, Feinberg, Bontempo, & Greenberg (2008) and Youngblade et al. (2007) studied the risk and protective factors across multiple contextual dimensions. Both studies found community factors were salient in predicting negative youth behaviors. However, Cleveland et al. (2008) results indicated family and community factors as more influential among younger middle and high school students and peer and school factors more influential among older adolescents. Students in this study were in grades 6, 8, 10, and 12. Moreover, Bahr, Hoffmann, & Yang (2005) studied how peer and family characteristics interact across drug types and how peer

influences can mediate family characteristics. Several studies note the primary sources adolescents obtain prescription drugs are from their peers and family members often because prescriptions are viewed as safe to use (Boyd et al., 2006; King et al., 2013; McCabe et al., 2007; McCabe et al., 2005; Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2015). Ford (2009) used the National Survey on Drug Use and Health (2005), a nationally representative survey of those aged 12 and older, to examine the impact of social bonds to family and school ties and the nonmedical prescription drug use among adolescents. This study found that adolescents with strong bonds to family and school are less likely to report nonmedical prescription drug use.

Brofenbrenner (1986), Bryant et al. (2003) & Ostaszewski and Zimmerman (2006) discuss the link of adolescent substance use across multiple ecological contexts of family, school, peer, individual and community settings. Ostaszewski and Zimmerman (2006) highlight the importance of studying the additive effects of both risk and protective factors in multiple domains. Researchers are also now focusing more on the positive factors in adolescents' lives as protective factors promoting resiliency among youth (Bryant & Zimmerman, 2002; Hawkins, Catalano, & Miller, 1992; Ostaszewski & Zimmerman, 2006; Resnick et al., 1997).

Individual. There are several factors related to adolescent substance use. Several individual factors, in particular have been linked to problematic behaviors. Some of these factors include sensation seeking and impulsivity (Cleveland, Feinberg, Bontempo, & Greenberg, 2008; Cooper, Wood, & Orcutt, 2003; Boyd, Young, Grey, & McCabe, 2009). Cooper et al. (2003) report a link between

educational underachievement, substance use and adolescent impulsivity characteristics. This study suggests emotionally driven behaviors can heighten problematic behaviors. Specifically, avoidant styles of coping and poor impulse control were factors that predicted adolescents susceptibility to engage in problem behaviors. In Boyd et al. (2009), of four groups analyzed, adolescents endorsing NMUPD for solely sensation seeking purposes had greater tendencies to participate in other problem behaviors in comparison to non-medical prescription drug users, medical-users, and those engaged in nonmedical use for self-treatment incentives.

Early initiation of drug use is another risk factor for subsequent use of drugs (Hawkins et al., 1992). According to Kosterman et al. (2000) earlier age of first substance use places an individual at greater risk for later abuse. Additionally, Sung, Richter, Vaughan, Johnson, & Thom (2005) study found higher risk among adolescents who hold favorable attitudes toward illicit drug use, detached parents, and friends who use illicit drugs. Research suggests deficits in social skills are also implicated in adolescent drug and alcohol use (Hawkins et al., 1992; Petraitis, Flay, & Miller, 1995; Scheier & Botvin, 1998).

Affiliation with a religion and frequency of prayer and positive perception of religion and or spiritual beliefs have been associated with decreased smoking, drinking, and marijuana use among adolescents (Resnick et al., 1997; Scales, P.C., & Leffert, N, 1999; Oman, R. et al., 2004) Moral beliefs and values appear to serve as protective factors in adolescent initiation of substance use (Spooner, C., Hall, W., & Lynskey, M., 2001). Soto et al. (2011) found cultural values in particular may serve as a protective factor against cigarette, alcohol, and marijuana use. In this study,

Hispanic adolescents from Southern California who emphasized a cultural value of *respeto*, meaning youth should obey and respect their parents, served as protective against substance use.

Peer. Peers appear to be both a source for substances and also an influence to engage in problematic behaviors (Bahr et al., 2005; Sale et al., 2003). Peers were found to be one of the primary sources of non-medical opiates among adolescents reporting NMUPD (Boyd et al., 2006; Johnston et al., 2010; McCabe et al., 2005; McCabe, West, Teter, & Boyd 2012). Engagement with antisocial peers is a risk factor associated with negative adolescent behaviors (Cleveland et al., 2008). Some studies have shown adolescents' perceptions of peers; particularly, substance using peers is more strongly associated than other factors in influencing adolescent substance use (Bryant et al., 2003; Hawkins et al., 1992; Urberg, Luo, Pilgrim, Degirmencioglu, 2003). Interestingly, Bryant et al. (2003) & Bryant and Zimmerman (2002) reports the potential for social support to act as more of a protective factor against substance use among girls than boys. In addition, Farrell and White (1998) found family structure moderated the relationship of peer influence on adolescent substance use. Peer influences such as encouragement were predictive of substance use of adolescents at age 14 and increased use over time (Bryant et al., 2003). Peer pro-social behavior also appears to be protective against risk behaviors (Rai et al., 2003).

Family. Boyd et al. (2006) found family members followed by peers were the main sources for prescription drugs among adolescents endorsing non-medical use of prescription pain medication. Parental drug use, family conflict, and family

management have been found to be important risk factors associated with youth drug use (Cleveland et al., 2008; Pine, Cohen, Gurley, Brook, & Ma, 1998). King et al. (2013) found that high-perceived parental disapproval of drug use among youth was a predictor of youth's lifetime NMUPD use. Youth are more likely to get involved in drug use when parents are tolerant of adolescents' use and when there are few or inconsistent rewards for nonuse (Hawkins et al., 1992). Bahr and Yang (2005) found parental attitudes about substance use was an important factor in influencing adolescent substance use advising for attitudinal as well as behavioral interventions in preventative efforts for adolescents.

Furthermore, family conflict has been shown to be predictive of antisocial behavior, illegal drug use, and delinquency (Hawkins et al., 1992). An aspect of parenting that appears as an important link to drug use is negative communication patterns between parents and their adolescents as well as poor parental monitoring (Dryfoos, 1990; Hawkins et al., 1985; Newcomb & Bentler, 1989). Generally, there is research that reveals the risk of drug abuse among adolescents increases depending on poor family management, which consists of factors such as poor monitoring of adolescent behavior and inconsistent family rewards for positive behavior (Hawkins et al., 1992). Parental monitoring was predictive of membership in the non-medical use of prescription drug as well as the alcohol, tobacco, and other drugs group, and excessive use of prescription drugs group (Cranford, McCabe, & Boyd, 2013). Results showed those with less parental monitoring were more likely to engage in more than one of the substance use groups.

According to Ford (2009) studies have shown that parental monitoring or general awareness of adolescents' daily activities impacts substance use among adolescents (Bryant et al., 2003; Hawkins et al., 1992; Johnston et al., 2005; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994; Vitaro et al., 2000). Parental monitoring has been shown to be protective over time and counter the effects of negative peer influence (Rai et al., 2003). Family bonding or attachment has also showed to moderate the deleterious influence of peers (Vitaro, Brendgen, & Tremblay, 2000). There are a number of studies that have investigated family bonds and drug use among adolescents. Sung et al. (2005), Ford (2009), & Resnick et al. (1997) found greater parental involvement as a protective factor in adolescent NMUPD. In addition, Ford (2009) found strong bonds to family and school are protective factors in the NMUPD. This research is in line with previous research providing evidence for family attachment as a protective factor in incubating adolescents from negative behaviors (Benard, 1991; Hawkins et al., 1992). The authors in Sung et al. (2005) suggest prevention and intervention efforts that focus on strengthening family bonds and peer resistance skills could help mitigate the risks associated with drug use.

Youngblade et al. (2007) and Cleveland et al. (2008) highlighted that family management and community engagement corresponded to more positive youth behaviors than family or community conflict. Parental attachment or how close an adolescent feels toward their parents influences adolescents' attitudes and behaviors towards substance use. Consistent with social control theories, stronger attachment to parents implies an adolescents' tendency towards wanting to conform to parental

norms and positive peer selection and away from deviant peers and behaviors (Bahr & Yang, 2005; Sale et al., 2003).

School. Social control theory has examined the influence of school on risky behaviors (Ford, 2009). Bryant et al. (2003) and Hawkins et al. (1992) research suggests school experiences are influential in adolescence engagement in substance use. These school experiences include academic expectations, school attitudes, and witnessing or engaging in truancy and problematic behaviors in the classroom. Hawkins et al. (1985) found that in schools where students perceive there are more drugs available, higher rates of drug use occur. In addition, students who have a low commitment to school are at elevated risk for problems in adolescence (Hawkins et al., 1985). Additionally, students are susceptible to negative effects after experiencing school transitions. These negative effects include poorer academic achievement, lower extracurricular participation, and increasing rates of drug use (Steinberg, 1991; Simmons, Burgeson, Carlton-Ford, & Blyth, 1987). Negative school experiences and poor school bonds increase the likelihood of substance use (Voelkl & Frome, 2000). King et al. (2013) found the common risky factors associated with NMUPD include poor academic performance and other illicit substance use. Poor academic performance is one of the risky behaviors commonly associated with NMUPD as academic failure increases the risk of drug use while drug use may also increase the likelihood of academic failure. (Arria et al., 2010; Hawkins et al., 1992; Hays, Hays, & Mulhall, 2003; King et al., 2013; Schepis & Krishnan-Sarin, 2008).

Research has shown the strength of adolescents' school bonds, or involvement and commitment to school influences on substance use (Scheier & Botvin, 1998;

Voelkl & Frone, 2000). Similar to strong family bonds, adolescents with stronger school bonds are less likely to use substances (Ford, 2009). Sale et al. (2003) notes the importance in positive school connections as well as peer and family connections in preventing substance use. Positive school attitudes were shown to have stronger protective effects negatively related to substance use on low achieving adolescents than high achieving adolescents (Bryant et al., 2003). Voelkl and Frone (2000) observed availability of drugs might act as a risk factor for substance use while close school monitoring may conversely act as a protective factor for adolescent substance use.

Community. Among community-level factors, community norms favorable to drug use, as well as community disorganization, and low neighborhood attachment have been identified to be associated with adolescent substance use (Leventhal & Brooks-Gunn, 2000). Hays et al. (2003) reported community disorganization as the strongest factor in alcohol, tobacco and other drug use among 8th graders. These authors studied the community risk factors including housing vacancies, economic constraints, single female parent family structure as well as community protective factors including child care availability and tobacco regulation. This follows previous lines of research by Petraitis et al. (1995) discussing the theory of social control posited by Elliott, Huizinga, & Ageton (1985) in how factors such as neighborhood disorganization and social values affect involvement with deviant peers and substance use. Hawkins et al. (1992) reflect how neighborhood disorganization influences parental socialization in monitoring and socialization of pro-social values in adolescents in turn relates to notably higher rates of drug use involvement.

Additionally, Hawkins et al. (1992) listed community disorganization as a risk factor for youth substance use. Conversely, King et al. (2013) found youth engaged in prosocial activities were less likely to engage in NMUPD. Strong bonds with prosocial institutions such as religious organizations and other community groups have shown to reduce the likelihood adolescents engaging in substance use (Spooner, C., Hall, W., & Lynskey, M., 2001).

Present Study

This study's main goal is to contribute to the literature in investigating the relationship of risk and protective factors associated with past 30-day NMUPD among adolescents. The goal of this study is to provide a parsimonious set of risk and protective factors related to substance use, specifically to the NMUPD. Kuklinski et al. (2012) advised stakeholders to consider the timeframe the CTC has in achieving changes in youth exposure to risk and protective factors and reducing youth problem behaviors. Hawkins et al. (2009) reported it takes about 2 to 5 years to encounter community level effects on risk and protective factors. These findings are helpful in developing interventions; therefore, a reduced set of aggregated indices can be impactful when encountering a short timeframe to implement change. Thus, adding to the literature on this topic is necessary to inform policy efforts to prevent risk factors associated with prescription drug use and aid efforts to eliminate, reduce, or mitigate the precursors of this adolescent behavior. Additionally, understanding the protective factors associated with this behavior as they relate to multiple ecological spheres can inform researchers in order to better understand this phenomenon.

Previous research has investigated risk and protective factors; however, these studies have examined factors affecting problematic adolescent behaviors related to substance use or other delinquent behaviors (Bowen & Flora, 2002; Ostaszewski & Zimmerman, 2006). These studies have included 12 to up to 20 risk and protective factors. Additionally, previous studies have yet to investigate the risk and protective factors related solely to the NMUPD across ecological domains and a range of prescription drug classes.

In spite of increasingly high rates of prescription drug misuse and abuse among adolescents in the U.S., the translation of the research on this topic is limited. Studies have yet to inform prevention practitioners with a concise set of indices of the risk and protective factors that play a role in adolescents' misuse of prescription drugs, and how they vary across drug choice. Therefore, the extent to which decision makers can inform the development and implementation of preventive interventions from the consequences of the NMUPD merits further research.

Communities that Care Survey. The CTC is often used as a universal school survey to investigate youth use of drug use in addition to alcohol and tobacco use. The survey provides youth perceptions and attitudes toward social behavior at the individual, peer, school, family, and community levels (www.kctcdata.org). The CTC survey is a student self-report survey instrument that measures multiple risk and protective factors across multiple ecological domains (Arthur et al., 2002). Feinberg, Ridenour, & Greenberg (2007) created a reduced set of aggregated risk and protective indices from the CTC survey scales. Kuklinski, Briney, Hawkins, & Catalano (2012) found the CTC to be a cost-beneficial preventative intervention for early adolescence.

The CTC survey is theoretically grounded on the Social Development Model (SDM), which is based from social learning theory. The SDM uses a developmental perspective to relate risk and protective factors for problem behaviors (Catalano, Kosterman, Hawkins, Newcomb, Abbott, 1996). The CTC survey is a Substance Abuse and Mental Health Administration (SAMHSA) survey of current levels of adolescent reported substance use in addition to risk and protective behaviors (SAMHSA, 2014).

King, Vidourek, & Merianos (2013) proposed future research develop and test models in order to understand NMUPD. In an effort to further the literature on this topic, this study investigated the risk and protective factors of the NMUPD among adolescents using archival data of the Communities that Care Youth Survey CTC of a cohort of high school students. Each year, the CTC survey is distributed to students to fill out as part of a state initiative in Rhode Island to assess high school students' substance use.

A student cohort from a high school in Rhode Island was asked 196 questions about their drug use using the CTC survey. The reduced set of aggregated indices Feinberg et al. (2007) reported were used to develop the ecological domains of individual, peer, family, school, and community scales from the CTC survey data; however, due to nuances from the Rhode Island CTC survey used and those found in the Feinberg et al. (2007) Pennsylvania CTC survey, several constructs from the scales differ.

The objective of this study was to compare the relative influence of risk and protective factors across several domains including individual, peer, family,

community, and school domains of adolescent prescription drug misuse in sample of (N=815) Rhode Island youth. The fundamental questions of this investigation were what are the most salient risk and protective factors associated with the misuse of prescription drugs from the Rhode Island CTC survey youth data? Are differential risk and protective factors of the non-medical use of prescription drug behaviors moderated by gender?

Hypotheses

1. The study hypothesizes the risk and protective indices found by Feinberg et al. (2007) will also be reliable with the questionnaire used for this study.
2. Based on previous research by Feinberg et al. (2007), the study hypothesizes that the Exploratory Factor Analysis will result in at least seven factors from the CTC survey used in this investigation.
3. The reduced set of scales found for risk and protective factors of the non-medical use of prescription drugs will have at least 2 factor loadings for each of the five latent ecological domains- individual, community, family, peer, and school.
4. The study hypothesizes that the risk and protective framework will provide evidence that the full 5 factor model is a good fitting model associated with the non-medical use of prescription drugs.
5. Peer risk is hypothesized as the strongest predictor of non-medical use of prescription drugs among youth as the literature has demonstrated that peers' behavior strongly impacts adolescent misuse of drugs (Cleveland, Feinberg, Bontempo, & Greenberg, 2008).

6. Gender is hypothesized to moderate risk and protective factors as evidenced by previous research by McCabe et al. (2007) and Simoni-Wastila et al. (1998) that suggests gender differences exist in patterns of substance use.

Chapter 3

METHODS

Cross-sectional CTC survey data collected from 9th -12th grade students in Rhode Island was analyzed using EQS 6.1, SPSS V23, AMOS V23 software. Structural equation models were estimated for the cohort of students to examine the associations among risk and protective factors across individual, peer, school, family and community domains as they relate to 30-day past non-medical use of prescription drugs.

Participants

A cohort of (N=815) students from one high school in Rhode Island completed this survey, which included items on demographics, lifetime and past 30-day drug use scales. The CTC survey was anonymous with individual student responses de-identified using a participant code. The Rhode Island district from which the students in this cohort were from had 22% of their high school students report taking a prescription drug without a doctor's prescription. This differed from the 14% of Rhode Island high school students in 2012-2013 who reported ever taking a prescription drug without a prescription (rikidscount.org).

The majority of students reported they were in the 9th grade (28.4%), followed by 10th (24.7%), and 11th grade (24.2%). The participant ages' ranged from 10 to 19 or older. Most students were 15-years-old (24.8%). There were more females (52.8%) than male students. The younger and older range of students suggests students inputted their age incorrectly or students from other grades were asked to fill out the survey. This is a limitation of the study. The ethnicity questions were not coded

though they were asked in the survey, therefore this information cannot be provided. Students reported obtaining mostly B's (25.3%) with only (1.5%) reporting obtaining mostly F's. When asked "During the last four weeks, how many whole days have you missed because you skipped or "cut", the majority of students reported not missing any school during the past four weeks (81.5%) and (6.2%) reported they missed one day.

Procedure

The (CTC) survey was administered to those students who were in attendance at a high school in Rhode Island during the academic spring term year of 2012. During a scheduled school session, a total of (N=815) students completed this survey. This was a cross-sectional view of a cohort of students' assessment of their misuse of prescription drugs and other risk and protective factors. A coding template for the CTC survey was created in order to code participant responses. Participant responses were entered into a database and analyzed using SPSS Version 23, Amos Version 23, and EQS 6.1.

Measures

Demographics

Age. Participants were asked how old they were using a scale of 1 to 10 from 10 years of age to 19 years or older (See Table 7).

Gender. Participants were asked whether they were female or male using a scale of 1 to 2 (1=female; 2=male).

Year in School. Participants were asked what grade they were in using a scale of 1 to 7 representing 6th to 12th grade (1=6th; 2=7th; 3=8th; 4=9th; 5=10th; 6=11th; 7=12th) (See Table 8).

Race/Ethnicity. Participants were asked what ethnicity they were with the following question, “What do you consider yourself to be?” However, ethnicity was not coded by the request of the data collectors, therefore this data is not available to disclose in this study.

Grades. Participants were asked what grades they obtain using a scale of 1 to 5 representing grades A to F (1=Mostly F’s; 2=Mostly D’s; 3= Mostly C’s; 4=Mostly B’s; 5=Mostly A’s) (See Table 9).

Missed Days of School. Participants were asked about how many days they missed school during the last four weeks with the following question, “During the LAST FOUR WEEKS, how many whole days have you missed school because you skipped or “cut?” A scale of 1 to 7 was used to denote none were missed to 11 or more school days were missed (1=None; 2=1; 3=2; 4=3; 5=4; 5=6; 6=10; 7=11 or more) (See Table 10).

Ecological Domains. Five ecological domains were constructed based off of the CTC survey question items. (1) Individual Scale included measures on rebelliousness and sensation seeking. (2) Peer Scale included measures on peer drug use, peer behavior, and peer normative beliefs regarding substance use. (3) School Scale included measures on academic failure, commitment to school, and school opportunities. (4) Family Scale included measures on parental approval or beliefs of drug use, family rewards and parental monitoring. (5) Community Scale included measures on low neighborhood attachment, community opportunities for prosocial behavior, favorable norms and laws and community disorganization.

Risk and Protective Factors. Risk and protective factors refer to, in the context of substance misuse, variables associated with increased susceptibility to use drugs (Compton & Volkow, 2006). Protective factors as they relate to drug misuse are factors that reduce or mitigate the risk of misuse (Compton & Volkow, 2006). Whereas risk factors may elevate the likelihood of engaging in problematic behaviors, protective factors can reduce the likelihood of problematic behaviors either directly, or by mediating or moderating the effects of risk factors (Arthur et al., 2002).

For the intents and purposes of this study, risk and protective factors refer to those variables associated with increased susceptibility to misuse prescription drugs. Protective factors as they relate to prescription drug misuse are factors that reduce or mitigate the risk of adolescent prescription misuse. The five latent variables comprising the measured items in the family, peer, community, school, and individual domains were inferred from the theoretically grounded measured constructs in the

CTC survey (See Table 3). These latent variables thus follow the risk and resiliency framework, which relays five parameters of risk and protective features.

Non-Medical Use of Prescription Drugs. The Substance Abuse and Mental Health Service Administration (SAMHSA) defines the nonmedical use of prescription drugs as the use of prescription drugs without a prescription or use that occurs simply for the experience or feeling the drug causes (SAMHSA, 2013). There are four different classes of prescription drugs: opioids, stimulants, sleeping, and sedative or anxiety medications (McCabe et al., 2007). For the intents and purposes of this study, these classes will be referred to as pain relievers, tranquilizers, steroids and stimulants. This study did not collect information regarding steroid use therefore this particular class of prescription drugs was excluded from the analysis.

Latent Variable. A latent variable in this study was defined as those five ecological domains of family, peer, community, school, and individual factors that cannot be observed directly. These latent variables will be inferred from measured variables observed within the context of the constructs developed from the CTC survey.

The individual latent construct was created with ten items. The ten items were 1. Sensation seeking, 2. Early initiation of drug use, 3. Social skills, 4. Rebellious, 5. Belief Moral Order, 6. Favorable Attitudes Toward Anti-Social Behaviors, 7. Future Drug Use, 8. Low Perceived Risk of Drug Use, 9. Religiosity, and 10. Favorable Attitudes Toward ATOD use.

The community latent construct was created with six items. The six items were 1. Community rewards prosocial involvement, 2. Community Opportunities for

Prosocial Involvement, 3. Low Neighborhood Attachment, 4. Laws Norms Favorable Drug Use, 5. Community Disorganization, and 6. Transitions and Mobility.

The family latent construct was created with seven items. The seven items were 1. Poor family management, 2. Family rewards, 3. Family Opportunities for Prosocial Involvement, 4. Family Attachment, 5. Family Conflict, 6. Family Parental Attitudes Favorable toward ATOD use, 7. Parental Attitudes Favorable Toward Antisocial Behaviors.

The peer latent construct was created with three items. The three items were 1. Friends Use of Drugs, 2. Peer Reward Antisocial Behaviors, and 3. Interaction with Prosocial Peers.

The school latent construct was created with four items. The four items were 1. School Opportunities for Prosocial Involvement, 2. School Reward Prosocial Involvement, and 3. Poor Academic Performance.

(See Table 1&2 for questions used to create each measure).

Reliability Testing

There is extensive research supporting the validity and reliability of the CTC Survey measures (Arthur et al. 2002; Arthur et al. 2007; and Glaser et al. 2005). Arthur et al. (2007) found good internal reliability of the CTC survey (See Table 4). Glaser et al. (2005) reported that the CTC survey measures risk and protective factors across gender and ethnic or racial groups equally well. A reliability test for this questionnaire was conducted for the 30 items (See Table 5 for Results). The reliability test yielded a Cronbach's alpha of .738, which is an acceptable alpha value.

Alpha values of ($.9 < \alpha < .8$) are good and those between ($.8 < \alpha < .7$) are acceptable (Peterson, 1994).

Outcome Variable. Non-medical Use of Prescription Drugs NMUPD is the outcome variable for this study. This factor was measured by a latent variable of the non-medical use of prescription drugs assessed from the CTC survey questions that assess past 30-day youth use of non-medical use of prescription drugs. Three constructs comprise this latent variable. These constructs were prescription pain-reliever 30-day use, tranquilizer 30-day use, and stimulant 30-day use. The prescription pain reliever 30-day use construct was developed using the following question, “On how many occasions have you, if any have you used prescription pain relievers, such as Vicodin®, OxyContin® or Tylox®, without a doctor’s orders, during the past 30 days?” The tranquilizer 30-day use construct was developed using the following question, “On how many occasions have you, if any have you used prescription tranquilizers, such as Xanax®, Valium® or Ambien®, without a doctor’s orders, during the past 30 days?” The prescription stimulant question was developed using the following question, “On how many occasions have you, if any have you used prescription stimulants, such as Ritalin® or Adderall®, without a doctor’s orders, during the past 30 days?” Participants’ responses were evaluated using a 1 to 7 scale where (1=0 occasions; 2=1 or 2 occasions; 3=3 to 5 occasions; 4=6 to 9 occasions; 5=10 to 19 occasions; 6=20 to 39 occasions; 7=40 or more occasions). The latent variable (NMUPD) was constructed on students’ responses to these three questions.

Analyses

This was a cross-sectional secondary data investigation using a risk and resiliency framework. The risk and protective model permits the examination of patterns of adolescent increased risk and or protective features influencing adolescent drug use (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Mrazek & Haggerty, 1994). This model categorizes risk and protective factors into community, school, family, peer and individual domains. The assumption underlying this model is that within these categories there are factors that can put youth at risk or provide them protection from problem behaviors such as substance use, delinquency, violence, and academic failure (Arthur, 2002). While there are numerous ways of analyzing the CTC survey, structural equation modeling will be used to allow for aggregated constructs of the multiple effects and interrelatedness of individual, peer, school, family, and community ecological levels assumed by the risk and resiliency framework.

This dissertation attempted to understand and provide reduced set of variables that promote the risk and resilience in NMUPD. Exploratory Factor Analysis (EFA) was performed in order to obtain the most parsimonious set of factors associated with the NMUPD.

Confirmatory Factor Analysis was conducted to ensure factor indices were psychometrically sound and the proposed factor indices were empirically and theoretically associated, an assumption necessary for building a measurement model SEM. A Confirmatory Factor Analysis (CFA) was also conducted to specify how unobserved latent variables derive from a set of observed variables (Bentler & Chou,

1987, Scheier & Botvin, 1998). A CFA constructed a covariance matrix of measured variables from survey data factor indices. This was carried out in order to ensure the measures derived from the CTC survey mapped onto the theoretical constructs of the five proposed ecological domains. Each of the selected measures had factor loadings and error variances.

Bowen and Flora (2002) advise to use latent variables based on multiple indicators for a construct in handling risk and protective variables. Hence, a latent variable Structural Equation Modeling was used to analyze the data because SEM allows for the analysis of complex relationships and models such as CFA. This method allows for drawing estimated relationships among latent variables that are less imbued with measurement error, non-normally distributed data, and missing data (Markus, 2012). This is the best evaluative method to test latent or unobservable variable constructs (i.e., ecological domains) relationship to the observed variables obtained from the data items (i.e., factor indices).

Structural Equation Modeling requires specification of a model based on theoretical assumptions (Markus, 2012). Firstly, a model was specified with measurement constructs. Using structural equation modeling a measurement model was used to estimate the factor analysis model or correlations between the latent variables. Direct models of each of the five latent variables relationship to NMUPD were created to assess the impact of each ecological model on NMUPD. A full model in this study was then constructed to demonstrate the relationships across the five ecological domains informed by their direct measured constructs of risk and

protective factors to NMUPD from the results obtained first by the EFA and then by the CFA.

Assessment of model fit was performed in order to determine how well the model proposed showed a relationship between the risk and protective factors to NMUPD. Model Modification was performed to improve model fit based on the empirical guidelines suggested by model fit indices used in SEM and theoretical assumptions related to the phenomenon in question. The Model Fit was evaluated by the following model fit indices: Bollen Stine Bootstrap Chi Square Statistic, Root Mean Square Error (RMSEA), and Comparative Fit Index (CFI). Model fit was determined to be good if the RMSEA values were $<.10$, model had a small chi square and close to $>.95$ CFI (Leite & Zuo, 2011).

In order to test whether gender moderated the relationship of risk and protective factors and NMUPD, path models were constructed using the measured constructs of risk and protective factors to NMUPD from the results obtained by the CFA. First, the full model of the five latent variables with each measured construct was tested separately for females then for males. Separate path models for each of the five ecological domains were then tested for both females and males separately in order to test for gender moderation effects. Gender moderation effects were evaluated based on whether standardized estimates derived from the path models and full model were significant with $p<.01$. Chi-square difference test for the full factor model was conducted to determine gender differences. Model fit was assessed and model re-specification was determined based on each gender moderation model results.

Chapter 4

RESULTS

Data Cleaning

The data was analyzed for normality, skewness, kurtosis and missing values (See Table 6). The data was shown to have missing values occur at random. The skewness and kurtosis values of the measures mostly fell within the acceptable range of ± 2 (See Table 6). However, parental favorable attitudes toward antisocial behavior higher, parental attitudes toward ATOD use, community disorganization, and family conflict had greater than 2 values. These measures reveal a heavier tailed distribution in comparison to the other more normally distributed measures. SPSS Version 23 was used to conduct preliminary univariate analyses and exploratory factor analysis. Data transformation was conducted to obtain normalized estimates for the factor analysis. Case list-wise deletion was used to handle missing data for the Factor Analysis. This method was chosen instead of the more robust method of Multiple Imputation because multiple imputations would yield different imputation results each time the model was run providing inconsistent results. For instance, Factor 1 in one imputation could be Factor 2 in another imputation, so in order to safeguard against the arbitrary nature of multiple imputations, case list-wise deletion was chosen. Following the Factor Analysis, estimated maximization (EM) was conducted in EQS 6.1 in order to create the factor models in AMOS Version 23 and EQS 6.1 to analyze for best fitting models and test each factor domain. Amos Version 23 and EQS 6.1 were both used in order to complement features each could provide for model fit indices.

Estimated Maximization is a method for handling non-normal missing value data by providing estimations of missing values (Little & Rubin, 1989; Bryant et al., 2003). There is potential bias when using list-wise and pairwise deletion. Therefore, the estimated maximization method, one of the robust methods for non-normal data was used for the structural equation modelling (Little & Rubin, 1989). Estimated Maximization of the data was conducted using EQS 6.1. In sum, the estimated maximization method was used to preserve the relationship among variables and minimize the bias among variables. An estimated maximization analysis revealed values occurred at random.

Exploratory Factor Analysis

An Exploratory Factor Analysis was conducted in order to identify the underlying factor structure of the observed variables in this study without imposing predetermined outcomes on the observed variables. This approach was chosen in an effort to test whether CTC survey items revealed a factor structure related to NMUPD. This was previously explored by Feinberg et al. (2007). From the original 32 CTC items (see Table 3), the exploratory factor analysis extracted 9 factors (See Table 11).

Factor 1 had 10 items including 1. early initiation of drug use, 2. friends use of drugs, 3. favorable attitudes towards ATOD, 4. future drug use, 5. perceived availability of drug use, 6. low perceived risk of drug use, 7. interaction with prosocial peers, 8. social skills, 9. religiosity, and 10. sensation seeking. Factor 2 had 6 items including 1. interaction with prosocial peers, 2. family rewards, 3. family opportunities for prosocial involvement, 4. family attachment, 5. poor family

management, and 6. family conflict. Factor 3 had 10 items including 1. friends use of drugs, 2. favorable attitudes toward ATOD use, 3. future drug use, 4. rebellious, 5. belief moral order, 6. favorable attitudes toward antisocial behaviors, 7. sensation seeking, 8. parental attitudes favorable toward antisocial behaviors, 9. peer reward antisocial behaviors, and 10. poor academic performance. Factor 4 had 3 items including 1. school opportunities for prosocial involvement, 2. school reward prosocial involvement, and 3. low commitment to school. Factor 5 had 6 items including 1. favorable attitudes toward antisocial behaviors, 2. parental attitudes toward antisocial behavior, 3. community disorganization, 4. family parental attitudes favorable toward ATOD use, 5. peer reward antisocial behaviors, and 6. laws norms favorable drug use. Factor 6 had 3 items including 1. community rewards prosocial behavior, 2. community opportunities prosocial involvement, and 3. low neighborhood attachment. Factor 7 had 2 items including 1. laws norms favorable drug use, and 2. perceived availability of firearms. Factor 8 had 4 items including 1. perceived availability of drugs, 2. laws norms favorable to drug use, 3. family conflict, and 4. poor academic performance. Factor 9 had 2 items including 1. transitions mobility and 2. poor academic performance.

The following four criteria were used to determine the number of factors the EFA yielded that made empirical and conceptual sense. 1. Looking at the cutoff of the EFA's scree plot (See Figure 1), 2. assessing whether a factor had two or more factor items loading onto the factor, and 3. Determining if an item had eigenvalues greater than 1 and 4. Factor loadings had a loading value greater than .30

Based on the criteria mentioned above it was determined the EFA results yielded 5 factors (see Table 13).

Factor 1 became the latent individual construct. This factor included items early initiation of drug use, favorable attitudes towards ATOD use, future drug use, lower perceived risk of drug use, social skills, religiosity, and sensation seeking. rebellious, belief moral order, and favorable attitudes toward antisocial behaviors. Rebellious, favorable attitudes towards antisocial behaviors, and belief moral order were moved from Factor 3 because conceptually these items belonged to the individual latent construct. Friends use of drugs, perceived availability of drugs, and interaction with prosocial peers were removed from the Factor 1 construct because conceptually they do not belong with the individual construct (See Figure 4).

Factor 2 became the latent family construct which consisted of family rewards, family opportunities for prosocial involvement, family attachment, poor family management, and family conflict. Family parental attitudes favorable toward ATOD use and parental attitudes favorable toward antisocial behaviors were added from Factor 5 because they made more conceptual sense with Factor 2. Interaction with prosocial peers was removed from Factor 2 because this factor item did not conceptually belong to the latent family construct (See Figure 6).

Factor 3 became the latent peer construct that included friends use of drugs and peer reward antisocial. Interaction with prosocial peer was added to this construct from Factor 1 (See Figure 5).

Factor 4 became the latent school construct that included school opportunities for prosocial involvement, school reward prosocial involvement, and low

commitment to school. Poor academic performance was added to this construct from Factor 3 because this factor item was conceptually more related to this construct than Factor 3 (See Figure 7).

Factor 5 and 8 items were retained; however, the factor items were added to other constructs. Therefore, Factor 5 and 8 were left with no items because their factor items overlapped with other factors.

Factor 6 became the latent community construct that included community rewards prosocial involvement, community opportunities prosocial involvement, and low neighborhood attachment. Laws norms, community disorganization, and transitions mobility were added to Factor 6 from Factors 8 and 9. As a result of moving the factor item, transitions and mobility from Factor 9 to Factor 6 because this item was conceptually a better fit under the community latent construct, Factor 9 was left with one item loading.

Similarly, Factor 7 was left with one factor item, perceived availability of firearms because laws and norms was already loaded onto Factor 5. Given the assumptions for building structural equation models, suggesting factors should have 2 or more items load on to a factor, Factor 7 and 9 were not retained for model building purposes. From the initial 32 variable set, 30 variables loaded to one of the nine factors formed from the exploratory factor analysis.

Confirmatory Factor Analysis

The Communities that Care (CTC) Survey constructs and the variables that comprise the five construct domains were constructed based off of the previously developed CTC scales. These scales are found at:

(http://www.communitiesthatcare.net/userfiles/files/2014CTCYS_Scale.pdf).

Of note, the Feinberg et al. (2007) study found 31 risk and resilience factor indices from the CTC survey to vary to some extent from those in this study. For example, Feinberg et al. (2007) grouped perceived availability of drugs and firearms whereas in this study and in the original CTC survey data these constructs are grouped separately. Similarly, the construct laws and norms favorable to drug use and firearms were grouped together by Feinberg et al. (2007) whereas this study adhered to the original CTC proposed scales construct of having a construct capturing laws and norms favorable to drug use. Feinberg et al. (2007) also did not include the scale future drug use, transitions mobility, or the interaction with pro-social peer construct in their investigation, though they created a gang involvement construct. Moreover, the community opportunities pro-social involvement was included in this study; however, this construct was not included in the Feinberg et al. (2007) study. The poor family management and family conflict construct in this study also differed to the Feinberg et al. (2007) constructs of poor family supervision and poor family discipline.

From the Exploratory Factor Analysis, five constructs were created for the Confirmatory Factor Analysis using AMOS Version 23 (See Figure 2). The following tables (See Table 13) reflect the factors for each of the 5 domains (community, school, peer, individual, and family) based on the Communities that Care original survey constructs. See Table 3 for the list of 32 factor loadings.

From the results of the EFA, the conditional model consisted of five factors. Factor 1 was the community latent construct with 6 indicators including 1.

Community rewards prosocial behaviors, 2. Community opportunities prosocial involvement, 3. Low neighborhood attachment, 4. Laws and norms, 5. Community disorganization, and 6. Transitions and Mobility.

Factor 2 was the individual latent construct with ten indicators including 1. Early initiation of drug use, 2. Favorable attitudes towards ATOD use, 3. Future drug use, 4. Low perceived risk of drug use, 5. Social skills, 6. Religiosity, 7. Sensation seeking, 8. Rebellious, 9. Belief moral order, 10. Favorable attitudes towards antisocial behaviors.

Factor 3 was the family latent construct consisting of seven indicators including 1. Family Rewards, 2. Family opportunities prosocial involvement, 3. Family attachment, 4. Poor family management, 5. Family conflict, 6. Family Parental attitudes favorable toward ATOD use, 7. Parental Attitudes favorable toward antisocial behaviors.

Factor 4 was the peer latent construct consisting of three indicators including 1. Friends use of drugs, 2. Peer reward antisocial behaviors, 3. Interaction with prosocial peers.

Factor 5 was the school latent construct with four indicators including 1. school opportunities for prosocial involvement, 2. School reward prosocial involvement, 3. Low commitment to school, 4. Poor academic performance.

A Confirmatory Factor Analysis model was built based off the pattern matrix from the EFA factors (See Figure 3). The CFA of five factors revealed model fit indices of $p < .01$, CFI=.690, RMSEA=.107 [90% CI .104-.109] (See Table 16 for standardized estimates). Modification indices were then checked to further assess

model fit. Error co-variances were assessed to improve model fit. Large error terms that were linked to a factor or loading onto the same factor were co-varied if they had high error residuals and were found loading onto the same factor. Consequently, error terms were co-varied (See Table 15 for error terms that were co-varied). CFA loadings for laws and norms = .02, community disorganization loading = -.06, and transitions and mobility loading = -.12. were deleted for loadings less than .30. After deleting these items, model fit improved with CFI = .718, RMSEA, .110 and [90% CI .107-.113] (See Table 12).

Structural Equation Modeling

A measurement model was established using Amos Version 23 based on the pattern matrix developed from the confirmatory factor analysis. The specified model was evaluated for overall model fit and parameter estimates. RMSEA values below .05, Bollen-Stine Bootstrap Chi-Square, and Confirmatory Factor Index CFI values of .95 or higher suggested a good fit (Hu & Bentler, 1999). Those values below .90 were considered a poor fitting model (Bentler & Bonnet, 1980). A good model fit provided insignificant chi-square values; however, since the chi-square test is sensitive to large sample sizes, insignificant chi-squares $p > .05$ were not expected (Hooper, Coughlan, & Mullen, 2008). Bollen-Stine Bootstrap was used to assess overall model fit. This was the model fit chi-square deemed appropriate for the analysis of the data in this study.

Full Measurement Model. Following the 5 factor conditional model developed from the Confirmatory Factor Analysis school rewards and poor academic performance were shown to have loadings lower than .30, therefore these items were

deleted to improve model fit (See Figure 9). Modification indices were then assessed to improve model fit. Error co-variances were unidentified from error 12 to error 2 and error 11 to error 13 and so those co-variances paths were deleted. Results revealed improved model fit with CFI =.779, RMSEA= .11 and [90% CI= .108-.115] (See Table 16).

Model re-specification. Following this step, further model improvement efforts were made once again by looking at loadings that were lower than .30 and modification indices with values greater than 1. In this model re-specification effort religiosity, friends use of drugs, and interaction with prosocial peers were found to have loadings lower than .30. After deleting both friends use of drugs and interaction with prosocial peers the peer factor was left with one factor item. SEM posits that each factor has two or more loading items, hence the peer factor was deleted as a result of this criteria. This re-specified model yielded a CFI =.864, RMSEA = .099. [90% CI = .095-.103] (See Figures 10-11). This 4 factor model was deemed the best model fit following further analyses and modifications. The CFI for this model had a lower than good model fit indicator of CFI =.864 rather than CFI >.95; however, the RMSEA yielded a tolerable value of .099 (See Table 15, 24, & 25). Further efforts to improve the five factor model were attempted; however, they are not reported. Modification indices were changed to improve models and in spite of modification improvement attempts and freeing model parameters, models yielded poorer results and did not improve model fit. Measurement models were created, though once modification indices were large for nearly all factor indices further model improvement efforts were stopped. In addition, models whose CFI or other model fit

indices including GFI did not go higher than the best fitting model which yielded a CFI=.864 models were not retained. Therefore, further model improvement efforts were stopped because models did not show improvement in model fit.

Four Factor Models. Community-Family-Individual-Peer Model examined the relationship between the community, family, individual and peer factors. Model fit indices revealed poor model fit with $p < .01$, (CFI) = 0.662, (RMSEA) = 0.121 [90% CI .118, .124].

Community-Family-Individual-School Model examined the relationship between community, family, individual, and school factors. Model indices revealed poor model fit with $p < .01$, (CFI) = 0.657, (RMSEA) = 0.109 [90% CI .106, .112].

Family-Peer-School-Community Model examined the relationship between family, family, individual and community factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.690, (RMSEA)=.124 [90% CI .121-.127].

Individual-Peer-School-Community Model examined the relationship between individual, peer, school, and community factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.721, (RMSEA)=.108 [90% CI .105-.112].

Family-Peer-School-Community Model examined the relationship between family, peer, school, and community factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.660, (RMSEA)=.124 [90% CI .120-.128].

Three Factor Models. Community-Family-Peer examined the relationship between community, family, and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.698, (RMSEA)=.139 [90% CI .134-.144].

Family-Peer-School Model examined the relationship between family, peer, and school factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.743, (RMSEA)=.144 [90% CI .139-.149].

Family- Individual-Peer Model examined the relationship between family, individual and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.700, (RMSEA)=.138 [90% CI .134-.141].

Community-Family-Individual Model examined the relationship between community, family, and individual factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.716, (RMSEA)=.118 [90% CI .114-.121].

Community- Individual-School Model examined the relationship between community, individual and school factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .802, (RMSEA)=.096 [90% CI .092-.10].

Community- Individual-Peer Model examined the relationship between community, individual and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .739, (RMSEA)=.117 [90% CI .113-.121].

Individual-School-Peer Model examined the relationship between individual, school and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)=.771, (RMSEA)=.121 [90% CI .116-.125].

Two Factor Models. Community-Family Model examined the relationship between the community and family factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .737, (RMSEA)=.147 [90% CI .141-.152].

Community-individual Model examined the relationship between the community and individual factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .833, (RMSEA)=.101 [90% CI .096-.106].

School-Community Model examined the relationship between the school and community factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .862, (RMSEA)=.105 [90% CI .098-.113].

Community-Peer Model examined the relationship between the community and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .834, (RMSEA)=.123 [90% CI .115-.131].

Family-Peer Model examined the relationship between the family and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .763, (RMSEA)=.172 [90% CI .165-.179].

School-Peer Model examined the relationship between the school and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .891, (RMSEA)=.125 [90% CI .115-.135].

Individual-Peer Model examined the relationship between the individual and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .793, (RMSEA)=.137 [90% CI .131-.142].

Family-Individual Model examined the relationship between the family and individual factors. Model indices revealed poor model fit with $p < .01$, (CFI)= .764, (RMSEA)=.133 [90% CI .129-.138].

Individual-School Model examined the relationship between the individual and school factors. Model indices revealed poor model fit with $p < .01$, (CFI) = .873, (RMSEA) = .099 [90% CI .094-.105].

Family-School Model examined the relationship between the family and peer factors. Model indices revealed poor model fit with $p < .01$, (CFI) = .796, (RMSEA) = .148 [90% CI .141-.155] (See Table 14).

Direct Community Model. The latent variable community model had six constructs community rewards pro-social behavior, community opportunities pro-social involvement, low neighborhood attachment, laws norms, community disorganization, and transitions mobility (See Figure 8). This model examined the direct relationship between the community scale factors and NMUPD three factor latent variable. Model fit indices revealed poor model fit with $p < .01$, (CFI) = 0.895, (RMSEA) = 0.123 [90% CI .112, .135] (see Table 19 for standardized path coefficients).

Direct Family Model. The latent variable family model had seven factors poor family management, family rewards, family opportunities pro-social involvement, family attachment, family conflict, parental attitudes favorable toward ATOD use, and parental attitudes favorable toward antisocial behaviors (See Figure 6). This model examined the direct relationship between the family scale factors and NMUPD three factor latent variable. Model fit indices revealed poor model fit with $p < .01$, (CFI) = 0.813, (RMSEA) = 0.192 [90% CI .182, .202] (see Table 20 for standardized path coefficients).

Direct Individual Model. The latent variable individual model had ten factors rebellious, belief moral order, sensation seeking, and favorable attitudes toward antisocial behavior, early Initiation of drug use, favorable attitudes towards ATOD use, future drug use, low perceived risk of drug use, social skills, religiosity (See Figure 4). This model examined the direct relationship between the individual scale factors and NMUPD three factor latent variable. Model fit indices reveal good model fit with $p < .01$, (CFI) = 0.910, (RMSEA) = 0.103 [90% CI .096, .111] (see Table 21 for standardized path coefficients).

Direct Peer Model. The latent variable peer model had three factors friends use of drugs, peer reward antisocial behaviors, interaction with prosocial peers (See Figure 5). This model examined the direct relationship between the peer scale factors and NMUPD three factor latent variable. Model fit indices revealed good model fit with $p < .01$, (CFI) = 0.965, (RMSEA) = 0.122 [90% CI .102, .143] (see Table 22 for standardized path coefficients).

Direct School Model. The latent variable school model had four factors school opportunities pro-social involvement, school reward pro-social involvement, low commitment to school and poor academic performance (See Figure 7). This model examined the direct relationship between the school scale factors and NMUPD three factor latent variable. Model fit indices revealed good model fit with $p < .01$, (CFI) = 0.979, (RMSEA) = 0.079 [90% CI .062, .096] (see Table 23 for standardized path coefficients).

Gender Moderation.

The measurement model developed from the Confirmatory Factor Analysis was used to test for gender moderation effects. (See Table 25). In order to test whether gender moderates the use of NMUPD across the five ecological domains, Gender (Females=1 and Males=2) path models were analyzed separately across each domain and also for the full specified model using AMOS Version 23. The females group consisted of (N=428) and the Males Group of (N= 387). Gender moderation yielded nonsignificant standardized estimates across the five factor full specified model derived from the Confirmatory Factor Analysis (See Figures 12-13). When analyzing specific domains separately, the male group had a significant standardized estimate of (males $p=-.015$) from the individual factor to NMUPD path. Males showed good model fit for the peer factor with CFI= .970, RMSEA=.109 and [90%CI .079-.141]. Both for males and females had good model fit in the School Factor with males yielding CFI= .986, RMSEA=.063, [90%CI=.036-.090] and females CFI= .979, RMSEA= .076 [90%CI=.053-.101]. Nevertheless, results did not yield strong enough evidence for gender moderation effect for either full five factor model or for the separate ecological domains (See Tables 26-33).

Chapter 5

DISCUSSION

This study used cross-sectional design to analyze the risk and protective factors associated with adolescent NMUPD. Several of the research questions were confirmed through this investigation. The reliability test performed resulted in an acceptable internal consistency (Cronbach alpha=.738) of the CTC questionnaire used in this investigation. This study was also able to reconstruct Feinberg et al.'s (2007) factor analysis of risk and protective factors with at least 7 indices. This finding followed suit with the study's initial hypothesis. The exploratory factor analysis of this study revealed 9 indices. From the initial 32 factor constructs inputted in the Confirmatory Factor Analysis, 30 factor constructs were found to load to one of the five ecological domains relating to NMUPD. Each of the five factors had two or more factor items as hypothesized. The Confirmatory Factor Analysis developed had five latent variable factors: the community factor had six items, the family factor had seven items, the individual factor had ten items, the peer factor had three items, and the school factor had four items.

Results showed that the 5 factor model was not a good fitting model in the association of ecological domains and NMUPD. However, the 5 factor model was the best fitting model compared to any of the 4, 3, 2, or direct path models initially examined. Once the 5 factor structural equation model was re-specified, the 5 factor model fit was improved. The best fitting model was a 4 factor model without the peer factor and additional improvements.

The peer factor may have dropped out of the 5 factor model possibly due to the likelihood the factor indices created with the peer factor latent variable did not adequately explain the observed covariation among peer factor indices and the NMUPD. Another explanation for why the model was improved without the peer factor is that the peer factor had less factor indices than other domains. Feinberg et al. (2007) and the original CTC survey joined the individual and peer latent variables. This study created a separate peer and individual latent factor. The peer factor indices also could have higher reliability and so, the indices use may not have been the most valid or reliable in creating a peer factor.

Efforts were made for model improvement. First, re-specification of the model was conducted in order to provide the most parsimonious best fit model. Modification indices and error terms were co-varied in order to improve model fit. Second, two school factor items, school rewards and poor academic performance were deleted because their factor loading items were lower than .30. This resulted in better model fit with CFI = .779 and lower RMSEA of .11. Following this, further model re-specification resulted in deleting the following factor items religiosity, friends use of drugs, and interaction with prosocial peers. The peer factor was then deleted because it was left with one factor and SEM requires at least two factor items per factor. The best fitting model described had a CFI = .864, still not meeting the good model fit criteria of CFI > .90; however, the RMSEA became acceptable with a value of .099, less than < .10.

The individual, peer, and school direct path models were the three factors that demonstrated a relationship with NMUPD. Family and community direct structural

models did not reveal good fitting models for NMUPD. This is similar to findings put forth by Cleveland et al. (2008) indicating family and community factors as more influential among younger middle and high school students and peer and school factors more influential among older adolescents. The findings in this study as previous research suggests is that peer and school domains are possibly the most influential in preventing substance use. With regards to NMUPD, friends use of drugs had the highest factor loading in the peer direct path model with a loading of .821. In spite of different findings in the overall 5 factor model, this item may be helpful in developing selective interventions for preventing NMUPD among adolescents. School opportunities and school rewards for prosocial involvement were the highest loading factors for the school direct path model with respective loadings of .853 and .761. Sale et al. (2003) findings support pro-social connections across ecological domains for future efforts to prevent substance use. Findings from this study reveal the factor loadings with the highest relation to NMUPD were those involving pro-social connections to school supporting Sale et al.'s (2003) recommendations. This is informative for decision making efforts regarding what risk and protective factors are the most salient and possibly most likely to impact substance use behaviors. Universal implementation of school based opportunities and methods for rewarding participation can potentially buffer the effects of positive perceptions of friends use of drugs and engagement in NMUPD. Alternatively, selective interventions can be applied to target peer interactions and perceptions of use in preventing NMUPD among adolescents. Future studies can help further draw implications from the findings in this study.

Gender moderation effects were not found for the full factor model. More research should tease apart the findings to perhaps link previous research by McCabe et al. (2007) and Simoni-Wastila et al. (1998) that suggests gender differences exist in patterns of substance use. Both males and females were found to have good fitting school path models. This again denotes the importance of targeting school domains in preventative NMUPD efforts. For males, the peer path model showed a good fitting model. This poses potential questions regarding whether peers, as research has suggested are more instrumental in facilitating substance use and whether peer influence is more influential for males than females. The findings from the gender moderation effects suggest further investigations on the relationship between factors relating to the NMUPD.

The results of the poor fitting 5 factor model are possibly due to the constructs deviating from original theoretical constructs of the Communities that Care Survey CTC. Feinberg et al. (2007) did not include four scales religiosity, academic performance, transitions and mobility, and early initiation of drug use and antisocial behavior. These factors may have mitigated the potential for a better fitting model.

Limitations

A more robust design could have minimized the potential for bias and inferences of the results. Poulin (2001) used cluster sampling of randomly selected classes stratifying by grade and school district in Canada. The design described might yield more accurate results in future studies.

This model also relied on self-report survey data hence, misinformation from students is possible. Johnston et al. (2005) and Poulin (2001) mention the issue of

using school-based surveys. Students are likely to underreport risk behaviors when asked to fill out a school-based survey. In addition, school-based surveys fail to capture the population of absentee youth and the youth population who are engaging in drug use.

While the internal consistency of the CTC questionnaire used in this study deemed an acceptable alpha of .738, improvements can be made to increase reliability. Specifically, Arthur et al. (2002) advise that future work should improve the internal consistency and psychometric properties of the family conflict, opportunities for school involvement and rewards for school involvement scales.

The Communities that Care Survey offers only a subset of one question for past 30-day non-medical use of prescription drugs. In light of this limitation, the sensitivity to capture non-medical use of prescription drugs is limited and the prevalence of NMUPD could very well be underestimated. Similar to the limitations expressed by Cooper et al. (2003), the latent variable model in this study may not capture other observed variables that share the latent variable. In sum, models can be improved through more targeted and comprehensive survey measures of NMUPD.

Common observed variables outside of the study such as mental health, for example, were also excluded. Future studies might incorporate other common factors representative of adolescent non-medical use of prescription drugs too. Essentially, the results in this study reveal poor fitting models, perhaps because other variables outside of those informed by the Factor Analysis were not included in the structural equation model.

The results of this study as Bentler et al. (1987) advise that a large study sample may yield large chi-squares. This study had a large 800+ number of observations. A future longitudinal latent growth model that assesses effects of time and invariant covariates may help garner less problematic results. Furthermore, other investigations might improve this study's generalizability, as the proposed investigation was cross-sectional. The study encompassed solely participants from one Northeast high school, thus discounting the generalizability of this model, in spite of the sample size of the students surveyed being large.

Another limitation that Ford (2009) shared with this study is how research on the non-medical use of prescription drugs among adolescents is often conducted using either Monitoring the Future or other school-based surveys such as the Communities that Care Survey. McCabe et al. (2007) suggest for secondary schools to collect school data so that differences across schools can be reported and used to compare national school trends. Future studies investigating the non-medical prescription drugs should use a nationally representative sample of adolescents as these studies are still much needed to further research on this topic. More importantly, national data can be more representative in validating the models developed in this and other investigations.

Future Recommendations

Interestingly, similar to findings in this study, Ford (2009) found school bonds are a stronger correlate than family bonds in the non-medical use of prescription drugs. In light of these findings, designing interventions that focus more on strengthening school ties can be a point of departure.

The strongest predictor of the nonmedical use of prescription opioids among adolescents in the Sung et al. (2005) study was other illicit drug use. Future investigations should note these findings and attempt to tease the associations among the misuse of illicit drugs and prescriptions drugs.

There is still much to uncover in understanding the implications of adolescents and the risk and protective factors relating to the nonmedical use of prescription drugs. Efforts to promote the study of the risk and protective factors for early interventions are apparent and merit future research. Further practical implications were not made from the results of this study. Future model improvements can provide more empirical evidence in order to draw more accurate implications. Researchers can attempt to re-create these models and improve model fit in an effort to expand and draw more valid conclusions from this study's findings. This study while informative is fraught with limitations in the way the models were built, thus drawing treatment or clinical implications are withheld until further model-building and model reliability testing are conducted to secure more research to inform the literature.

Appendix

Table 1: Additional 2 Measures Used in Factor Analysis

Perceived Availability Firearms 1 Question <i>alpha=N/A</i>
1. If you wanted to get a handgun, how easy would it be for you to get one? Very Hard (1) Sort of Hard (2) Sort of Easy (3) Very Easy (4)
Perceived Availability of Drugs 4 Questions <i>alpha= .867</i>
1.If you wanted to get some cigarettes, how easy would it be for you to get some? Very Hard (1) Sort of Hard (2) Sort of Easy (3) Very Easy (4)
2. If you wanted to get some beer, wine or hard liquor (for example, vodka, whiskey or gin) how easy would it be for you to get some? Very Hard (1) Sort of Hard (2) Sort of Easy (3) Very Easy (4)
3. If you wanted to get some marijuana, how easy would it be for you to get some? Very Hard (1) Sort of Hard (2) Sort of Easy (3) Very Easy (4)
4. If you wanted to get a drug like cocaine, LSD, or amphetamines, how easy would it be for you to get some? Very Hard (1) Sort of Hard (2) Sort of Easy (3) Very Easy (4)

Table 2: Measures used to construct 5 Factor Model

Individual: Individual was a latent variable with ten indicators:
<i>(1). Rebellious. (Alpha=).</i> Three questions were used to create this scale.   The three questions comprising this construct were (1) “I do the opposite of what people tell me, just to get them mad” was and (2) “I ignore that rules get in my way” and (3) “I like to see how much I can get away with.” Participants’ responses were evaluated using a scale of 1 to 4 where (1= Very false; 2=Somewhat false; 3= Somewhat true; 4= Very true).
<i>(2). Belief Moral Order.</i> Four questions were used to create this scale.   The four questions comprising this construct were (1) “I think it is okay to take something without asking, if you can get away with it”, (2) “I think sometimes it’s okay to cheat at school”, (3) “It is all right to beat up people if they start the fight”, (4) “It is important to be honest with your parents, even if they become upset or you get punished.” Participants’ responses were evaluated using a scale of 1 to 4 where (1=No!; 2=no; 3=yes; 4=Yes!).
<i>(3). Sensation Seeking.</i> Three questions were used to create this scale.   The three questions comprising this construct were (1) “How many times have you done the following things? Done what feels good no matter what”, (2) “How many times have you done the following things? Done something dangerous because someone dared you to do it”, (3) “How many times have you done the following things? Done crazy things even if they are a little dangerous.” Participants’ responses were evaluated using a scale of 1 to 6 where (1=Never; 2= I’ve done it, but not in the past year; 3= Less than once a

month; 4= About once a month; 5=2 or 3 times a month; 6=Once a week or more).

(4). *Favorable Attitudes Toward Anti-Social Behaviors.* **Five questions** were used to create this scale. The five questions comprising this construct were (1) “How wrong do you think it is for someone your age to take a handgun to school?”, (2) “How wrong do you think it is for someone your age to steal anything worth more than \$5?”, (3) “How wrong do you think it is for someone your age to pick a fight with someone?”, (4) “How wrong do you think it is for someone your age to attack someone with the idea of seriously hurting him or her?”, (5) “How wrong do you think it is for someone your age to stay away from school all day when their parents think they are at school?” Participants’ responses were evaluated using a scale of 1 to 4 where (1=Very wrong; 2=Wrong; 3=A little bit wrong; 4=Not wrong at all).

(5). *Early Initiation of Drug Use.* **Four questions** were used to create this scale. The four questions comprising this scale were (1) “How old were you when you first: smoked marijuana?”, (2) “How old were you when you first: smoked a cigarette, even just a puff?”, (3) “How old were you when you first: had more than a sip or two of beer, wine or hard liquor (for example, vodka, whiskey, or gin)?”, (4) “How old were you when you first: began drinking alcoholic beverages regularly, that is, at least once or twice a month?” Participants’ responses were evaluated using a 1 to 9 scale where (1=Never have; 2=10 or younger; 3=11; 4=12; 5=13; 6=14; 7=15; 8=16; 9=17 or older).

(6). Future Drug Use. Three questions were used to create this scale.

The three questions comprising this scale were “Sometimes we do not know what we will do as adults, but we may have an idea. Please tell me how true these statements may be for you. (1) “I will smoke cigarettes”, (2) “I will drink beer, wine, or liquor”, (3) “I will smoke marijuana.” Participants’ responses were evaluated using a 1 to 4 scale where (1=No!, 2=no, 3=yes, 4=Yes!).

(7). Low Perceived Risks of Drug Use. Four questions were used to create

this scale. The four questions comprising this scale were “How much do you think people risk harming themselves (physically or in other ways) if they (1) “smoke one or more packs of cigarettes per day?, (2) “try marijuana once or twice?, (3) “smoke marijuana regularly (once or twice a week)?, (4) “take one or two drinks of an alcoholic beverage (beer, wine, or liquor) nearly every day?” Participants’ responses were evaluated using a 1 to 4 scale where (1= Great risk, 2= Moderate Risk, 3= Slight Risk, 4=No risk).

(8). Social Skills. Four questions were asked to create this scale. The

four questions comprising this scale were (1) “You’re looking at DVD in a store with a friend. You look up and see her slip a DVD under her coat. She smiles and says “Which one do you want? Go ahead, take it while nobody’s around.” There is nobody in sight, no employees and no other customers. What would you do now?” Participants’ responses were evaluated using a 1 to 4 scale where (1=Grab a DVD and leave the store, 2=Ignore her, 3=Act like it’s a joke, and ask her to put the DVD back, 4=Tell her to put the DVD back. The second question in this scale was “It’s 8:00 on a weeknight and you are about

to go over to a friend's home when your mother asks you where you are going. You say "Oh, just going to go hang out with some friends." She says, "No, you'll just get into trouble if you go out. Stay home tonight." What would you do now?" Participants' responses were evaluated using a 1 to 4 scale where (1= leave the house anyway, 2=Get into argument with your mom or dad, 3=Not say anything and start watching TV, 4=Explain what you are going to do with your friends, tell your mom or dad when you'd get home, and ask if you can go out). The third question in this scale was "You are visiting another part of town, and you don't know any of the people your age there. You are walking down the street, and some teenager you don't know is walking toward you. He is about your size, and as he is about to pass you, he deliberately bumps into you and you almost lose your balance. What would you say or do?" Participants' responses were evaluated using a 1 to 4 scale where (1= Push the person back, 2= Swear at this person and walk away, 3= Say "Watch where you're going and keep on walking, 4= Say "Excuse me" and keep on walking). The fourth question in this scale was "You are at a party at someone's house, and one of your friends offers you a drink containing alcohol. What would you say or do?" Participants' responses was evaluated using a 1 to 4 scale where (1=Drink it, 2=Make up a good excuse, tell your friend you had something else to do, and leave, 3=Just say "No thanks" and walk away, 4= Tell your friend "No thanks, I don't drink" and suggest that you and your friend go and do something else).

(9). Religiosity. One question was used to create this scale. The one question comprising this scale was “How often do you attend religious services or activities?” Participants’ responses were evaluated using a 1 to 4 scale where (1=Never, 2=Rarely, 3= 1-2 Times a Month, 4= About Once a Week or More).

(10). Favorable Attitudes Toward Alcohol Tobacco and Other Drugs (ATOD). Four questions were used to create this scale. The four questions comprising this scale were “How wrong do you think it is for someone your age to (1) drink beer, wine or hard liquor (for example, vodka, whiskey or gin) regularly, that is, at least once or twice a month? (2) smoke cigarettes? (3) smoke marijuana? (4) use LSD, cocaine, amphetamines or another illegal drug? Participants’ responses were evaluated using a 1 to 4 scale where (1=Very wrong, 2=Wrong, 3=A Little Bit Wrong, 4=Not Wrong at All).

Community: Community was a latent variable with six indicators.

(1). Community Rewards Pro-Social Behaviors. Three questions were used to create this construct. The three questions comprising this construct were (1) “My neighbors notice when I am doing a good job and let me know”, (2) “There are people in my neighborhood who encourage me to do my best”, (3) “There are people in my neighborhood who are proud of me when I do something well.” Participants’ responses were evaluated using a scale of 1 to 4 where (1=No!; 2=no; 3=yes;4=Yes!).

(2). Community Opportunities Pro-Social Involvement. **Six questions were used to create this construct. Five of the questions comprising this construct were (1) “Which of the following activities for people your age are available in your community: sports teams”, (2) “Which of the following activities for people your age are available in your community: scouting”, (3) “Which of the following activities for people your age are available in your community: boys and girls clubs”, (4) “Which of the following activities for people your age are available in your community: 4-H clubs”, (5) “Which of the following activities for people your age are available in your community: service clubs”, and Participants’ responses on these questions were evaluated using a scale of 1 to 2 where (1= No; 2=Yes). The sixth question comprising this scale was (6) “There are lots of adults in my neighborhood I could talk to about something important.” This question was evaluated using a scale of 1 to 4 where (1=No!; 2=no; 3=yes; 4=Yes!).**

(3). Low Neighborhood Attachment. **Three questions were used to create this construct. The three questions comprising this construct were (1) I’d like to get out of my neighborhood, (2) If I had to move, I would miss the neighborhood I now live in, (3) I like my neighborhood. Participants’ responses were evaluated using 1 to 4 scale where (1=YES!, 2= yes, 3=no, 4=NO!).**

(4). Laws and Norms Favorable to Drug Use. **Six questions were used to create this construct. The six questions were (1) If a kid drank some beer, wine or hard liquor (for example, vodka, whiskey or gin) in your neighborhood**

would he or she be caught by the police? (2) If a kid smoked marijuana in your neighborhood would he or she be caught by the police? (3) IF a kid carried a handgun in your neighborhood would he or she be caught by the police? How wrong would most adults (over 21) in your neighborhood think it is for kids your age (4) to use marijuana? (5) to drink alcohol? (6) to smoke cigarettes? Participants' responses were evaluated using a 1 to 4 scale where (1=Very Wrong, 2= Wrong, 3= A little bit wrong, 4= Not wrong at all).

(5). Community Disorganization. Five questions were used to create this construct. The five questions were (1) I feel safe in my neighborhood, "How much do each of the following statements describe your neighborhood?" (2) Crime and/or drug selling. (3) Fights. (4) Lots of empty or abandoned buildings. (5) Lots of graffiti. Participants' responses were evaluated using a 1 to 4 scale where (1= No!, 2= no, 3= yes, 4= YES!).

(6). Transitions and Mobility. Four questions were used to create this scale. The four questions were (1) Have you changed homes in the past year? (2) Have you changed schools including changing from elementary to middle school to high school in the past year? (3) How many times have you changed schools (including changing from elementary to middle to high school) since kindergarten? (4) How many times have you changed homes since kindergarten? Participants' responses were evaluated using a 1 to 5 scale where (1= Never, 2= 1 or 2 times, 3= 3 or 4 times, 4= 5 or 6 times, 5= 7 or more times).

Family: Family was a latent variable with seven indicators.

(1). Poor Family Management. **Eight questions were used to create this construct. The eight questions comprising this construct were (1) “My parents ask if I’ve gotten my homework done”, (2) “Would your parents know if you did not come home on time?”, (3 “When I am not at home, one of my parents knows where I am and whom I am with”, (4) “The rules in my family are clear”, (5) “My family has clear rules about alcohol and drug use”, (6) “If you drank some beer or wine or liquor (for example, vodka, whiskey, or gin) without your parents’ permission, would you be caught by your parents?”, (7) “If you skipped school, would you be caught by your parents?”, and (8) “If you carried a handgun without your parents’ permission, would you be caught by your parents?”** Participants’ responses were evaluated using a 1 to 4 scale where (1=No!; 2=no; 3=yes;4=Yes!).

(2). Family Rewards. **Four questions were used to create this scale. The two questions (1) “My parents notice when I am doing a good job and let me know about it” and (2) “How often do your parents tell you they’re proud of you for something you’ve done?” were evaluated using a 1 to 4 scale where (1= Never or almost never; 2= Sometimes; 3=Often; 4= All the time). The other two questions comprising this construct included (3) “Do you enjoy spending time with your mother?” and (4) “Do you enjoy spending time with your father?” were evaluated using a 1 to 4 scale where (1=No!; 2=no; 3=yes; 4=Yes!).**

(3). Family Opportunities Pro-Social Involvement. **Three questions were used to create this scale. The three questions comprising this construct were (1) “My parents give me lots of chances to do fun things with them”, (2) “My parents ask me what I think before most family decisions affecting me are made”, (3) “If I had a personal problem, I could ask my mom or dad for help.” Participants’ responses were evaluated using a 1 to 4 scale where (1=No!; 2=no; 3=yes; 4=Yes!).**

(4). Family Attachment. **Four questions were used to create this scale. The four questions comprising this scale were (1) “Do you feel very close to your mother?”, (2) “Do you share your thoughts and feelings with your mother?”, (3) “Do you feel very close to your father?”, and (4) “Do you share your thoughts and feelings with your father?” Participants’ responses were evaluated using 1 to 4 scale where (1=No!; 2=no; 3=yes; 4=Yes!).**

(5) Family Conflict. **Three questions were used to create this scale. The three questions were (1) We argue about the same things in my family over and over. (2) People in my family have serious arguments. (3) People in my family often insult or yell at each other. Participants’ responses were evaluated using a 1 to 4 scale where (1= NO!, 2= no, 3= yes, 4= YES!).**

(6) Parental Attitudes Favorable Toward Alcohol, Tobacco and Other Drugs. **Three questions were used to create this scale. The three questions were “How wrong do your parents feel it would be for you to (1) drink beer, wine or hard liquor (for example, vodka, whiskey or gin) regularly (at least once or twice a month)? (2) smoke cigarettes? (3) smoke marijuana? Participants’**

responses were evaluated using a 1 to 4 scale where (1= Very Wrong, 2= Wrong, 3= A little bit wrong, 4= Not wrong at all).

(7) Parental Attitudes Favorable to Antisocial Behavior. Three questions were used to create this scale. The four questions were “How wrong do your parents feel it would be for you to (1) steal something worth more than \$5? (2) draw graffiti, or write things or draw pictures on buildings or other property (without the owner’s permission)? (3) pick a fight with someone? Participants’ responses were evaluated using a 1 to 4 scale where (1= Very wrong, 2= Wrong, 3= A little bit wrong, 4= Not wrong at all).

Peer: Peer was a latent variable with three indicators.

(1). Friends Use of Drugs. Four questions were used to create this scale. The four questions comprising this scale were (1) “Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have smoked cigarettes?”, (2) “Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have tried beer, wine or hard liquor (for example, vodka, whiskey or gin) when their parents didn’t know about it?”, (3) “Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have used marijuana?”, (4) “Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have used LSD, cocaine,

amphetamines, or other illegal drugs?” Participants’ responses were evaluated using 1 to 4 scale where (1=None; 2=1; 3=2; 4=3 or 4).

(2). *Peer reward antisocial behaviors.* Four questions were used to create this scale. The four questions comprising this scale were “What are the chances you would be seen as cool if you” (1) smoked cigarettes (2) began drinking alcoholic beverages regularly, that is, at least once or twice a month? (3) smoked marijuana (4) carried a handgun. Participants’ responses were evaluated using a 1 to 5 scale where (1= No or very little chance, 2= Little Chance, 3= Some chance, 4= Pretty Good Chance, 5= Very Good Chance).

(3). *Interaction with Prosocial Peers.* Five questions were used to create this scale. The five questions comprising this scale were “In the past (12 months), how many of your best friends have (1) participated in club, organizations or activities at school? (2) made a commitment to stay drug free? (3) liked school? (4) regularly attended religious services? (5) tried to do well in school? Participants’ responses were evaluated using a 0 to 4 scale where (0= none of my friends, 1= 1 of my friends, 2= 2 of my friends, 3= 3 of my friends, 4= 4 of my friends).

School: School was a latent variable with four indicators.

(1). *School Opportunities Pro-Social Involvement.* Five questions were used to create this scale. The five questions comprising this scale were (1) “In my school, students have lots of chances to help decide things like class activities and rules”, (2) “There are lots of chances for students in my school to talk with a teacher one-on-one”, (3) “Teachers ask me to work on special

classroom projects”, (4) “There are lots of chances for students in my school to get involved in sports, clubs, and other school activities outside of class”, and (5) “I have lots of chances to be part of class discussions or activities.”

Participants’ responses were evaluated using 1 to 4 scale where (1=No!; 2=no; 3=yes; 4=Yes!).

(2). *School Reward Pro-Social Involvement.* Four questions were used to create this scale. The four questions comprising this construct were (1) “My teacher(s) notices when I am doing a good job and lets me know about it”, (2) “The school lets my parents know when I have done something well”, (3) “I feel safe at my school”, and (4) “My teachers praise me when I work hard in school.” Participants’ responses were evaluated using a 1 to 4 scale where (1=No!; 2=no; 3=yes; 4=Yes!).

(3). *Poor Academic Performance.* One question was used to create this scale. The question “Are your school grades better than the grades of most students in your class?” assessed poor academic performance. Participants’ responses were evaluated using a 1 to 4 scale where (1=No!; 2=no; 3=yes; 4=Yes!).

(4) *Low Commitment to School.* Seven questions were used to create this scale. The six questions were (1) During the last four weeks how many whole days of school have you missed because you skipped or “cut”? Participants’ responses were evaluated using a 1 to 7 scale where (1= None, 2=1, 3=2, 4=3, 5=4, 6=6-10, 7=11 or more). The second question was “How often do you feel that the schoolwork you are assigned is meaningful and important?”

Participants' responses were evaluated using a 1 to 5 scale where (1= Almost always, 2= Often, 3= Sometimes, 4= Seldom, 5= Never). The third question was "How interesting are most of the courses to you?" Participants' responses were evaluated using a 1 to 5 scale where (1=Very interesting and stimulating, 2=Quite interesting, 3=Fairly interesting, 4=Slightly boring 5=Very boring). The fourth questions was "How important do you think the things you are learning in school are going to be for your later life? Participants' responses were evaluated using a 1 to 5 scale where (1=Very important, 2= Quite important, 3= Fairly Important, 4= Slightly Important, 5= Not at all important. The fifth to seventh questions were "Now thinking back over the past year in school, how often did you" (5) enjoy being in school? (6) hate being in school? (7) try to do your best work in school? Participants' responses were evaluated using 1 to 5 scale where (1= Never, 2= Seldom, 3= Sometimes, 4= Often, 5= Almost Always).

Table 3: List of 32 Indices from Communities that Care Rhode Island (2012) Survey

Low Commitment to School
School Prosocial Involvement
School Reward Prosocial Involvement
Poor Academic Performance
Friends Use of Drugs
Peer Reward Antisocial behavior
Early Initiation Drug Use
Religiosity
Rebellious
Belief Moral Order
Sensation seeking
Future Drug Use/ Intentions to Use
Social Skills
Favorable Attitudes Toward Antisocial Behaviors
Favorable Attitudes Toward Alcohol Tobacco and Other Drug Use (ATOD)
Low Perceived Risk of Drug Use
Perceived Availability of Drugs
Perceived Availability Firearms
Laws Norms Favorable Drug Use
Low Neighborhood Attachment
Community Reward Prosocial Behavior
Community Opportunities Prosocial Involvement
Community Disorganization
Family Parental Attitudes Favorable Toward ATOD use
Parental Attitudes Favorable Toward Antisocial Behavior
Transitions Mobility
Poor Family Management
Family Conflict
Family Rewards
Family Opportunities Prosocial Involvement
Family Attachment
Interaction with Prosocial Peers

Table 4: Reliability for Original CTC Measures

Reliability Scale Item	Reliability (alpha)
Community	
Low Neighborhood Attachment	.842
Community Disorganization	.828
Transitions and Mobility	.636
Perceived Availability of Drugs	.867
Laws and Norms Favorable to Drug Use	.823
Opportunities for Prosocial Involvement	.729
Rewards for Prosocial Involvement	.840
Family	
Family History of Antisocial Behavior	.825
Poor Family Management	.857
Family Conflict	.804
Parental Attitudes Favorable Toward Drug Use	.799
Parental Attitudes Favorable to Antisocial Behavior	.733
Family Attachment	.763
Opportunities for Prosocial Involvement	.794
Rewards for Prosocial Involvement	.765
School	
Academic Failure	.698
Low Commitment to School	.793
Opportunities for Prosocial Involvement	.650
Rewards for Prosocial Involvement	.734
Peer-Individual	
Rebelliousness	.757
Gang Involvement	.873
Perceived Risks of Drug Use	.820
Early Initiation of Drug Use	.801
Early Initiation of Antisocial Behavior	.603
Favorable Attitudes toward Drug Use	.864
Favorable Attitudes Toward Antisocial Behavior	.829
Rewards for Antisocial Involvement	.841
Friends' Use of Drugs	.853
Interaction with Antisocial Peers	.784
Initiations to Use	.688
Interaction with Prosocial Peers	.703
Belief in Moral Order	.716
Prosocial Involvement	.699
Rewards for Prosocial Involvement	.798
Social Skills	.649

1. Religiosity, Future Drug Use and Perceived Availability of Handguns had N/A (no alpha indicated).
2. Communities that Care 2014 Youth Survey Scale Dictionary University of Washington.
Sdg.org/ctcresource/Risk_and_Protective_Factor_Scale.pdf

Table 5: Results Reliability Test CTC Survey (2012)

	Intraclass Correlation ^b	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.072 ^a	.064	.082	3.811	814	28490	.000
Cronbach's Alpha for 36 items	.738	.711	.763	3.811	814	28490	.000

Table 6: Descriptive Statistics

Construct N=815	Skewness	Kurtosis
Low Commitment to School	.586	.593
School Opportunities Prosocial Involvement	-.719	1.518
School Reward Prosocial Involvement	-.217	.292
Poor Academic Performance	-.200	-.529
Peer Reward Antisocial Behavior	1.439	1.675
Early Initiation Drug Use	.880	-.280
Religiosity	.459	-1.274
Rebelliousness	.808	-.136
Belief Moral Order	.341	.449
Sensation Seeking	.759	-.293
Future Drug Use	.876	.389
Social Skills	-.312	.071
Favorable Attitudes Toward Antisocial Behaviors	1.489	2.647
Favorable Attitudes Toward ATOD use	1.031	.121
Low Perceived Risk of Drug Use	-.344	-.664
Perceived Availability of Drugs	.197	-.487
Perceived Availability of Firearms	.191	.766
Laws Norms Favorable Drug use	.507	.295
Low Neighborhood Attachment	-.631	1.281
Community Rewards Prosocial Behavior	.393	-.681
Community Opportunities Prosocial Involvement	.138	-.657
Community Disorganization	1.521	3.434
Family Parental Attitudes Favorable toward ATOD use	1.864	3.226
Parental Attitudes Favorable toward antisocial behavior	2.281	5.672
Transitions Mobility	1.027	1.231
Poor Family Management	-.667	1.246
Family Conflict	4.468	66.396
Family Rewards	-.537	-.072
Family Opportunities Prosocial Involvement	-.397	-.063
Family Attachment	-.271	-.932
Interaction with Prosocial Peers	-.060	-.704
Friends Use of Drugs	.958	-.225
Gender	.106	-1.994
Stimulant Use	4.640	21.318
Tranquilizer Use	5.989	35.832
Pain Reliever Use	5.397	29.786

Table 7: *Age Demographics*

<i>Age</i>	<i>Frequency</i>	<i>Percent</i>
10	5	.6
11	0	0
12	0	0
13	2	.2
14	161	19.8
15	202	24.8
16	196	24.1
17	181	22.3
18	61	7.5
19 or older	5	.6

Table 8: *Grade*

<i>Grade</i>	<i>Frequency</i>	<i>Percent</i>
6th	4	.5
7th	2	.2
8th	1	.1
9th	231	28.4
10th	201	24.7
11th	197	24.2
12th	177	21.8

Table 9: *Grades in School*

Grades	Frequency	Percent
Mostly A's	145	9.6
Mostly B's	382	25.3
Mostly C's	210	13.9
Mostly D's	40	2.6
Mostly F's	22	1.5

Table 10: *Missed Days of School During Past 4 Weeks*

During last 4 weeks missed school days (skipped/cut)	Frequency	Percent
None	661	81.5
1	50	6.2
2	29	3.6
3	25	3.1
4-5	16	2.0
6-10	7	.9
11 or more	23	2.8

Table 11: Prevalence of Substance use by gender

Gender	Stimulant Use	Tranquilizer	RX
Males N=387	1.9%	1.6%	2.2%
Females N=428	2.7%	2.2%	2%

Table 12: EFA Results N=428

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
Early initiation of drug use .799	Interaction with prosocial peers .367	Friends use of drugs .311	School opportunities for prosocial involvement .808	Favorable attitudes toward antisocial behaviors .380	Community rewards prosocial behavior .819	Laws norms favorable drug use .310	Perceived availability of drugs .360	Transitions and mobility .846
Friends use of drugs .748	Family Rewards .842	Favorable attitudes toward ATOD use .470	School reward prosocial involvement .803	Parental attitudes favorable toward anti-social behavior .713	Community opportunities prosocial involvement .762	Perceived availability of firearms .825	Laws norms favorable to drug use -.342	Poor academic performance -.356
Favorable attitudes towards ATOD use .682	Family opportunities prosocial involvement .824	Future drug use .443	Low commitment to school -.590	Community disorganization .637	Low neighborhood attachment .594		Family conflict .695	
Future drug use .672	Family attachment .751	Rebellious .749		Family parental attitudes favorable toward ATOD use .618			Poor academic performance .322	
Perceived availability of drugs .604	Poor family management .692	Belief Moral order .699		Peer reward antisocial behaviors .415				
Low perceived Risk of drug use .544	Family conflict -.313	Favorable attitudes towards antisocial behaviors .681		Laws norms favorable drug use .371				
Interaction with prosocial peers -.454		Sensation seeking .655						
Social skills -.450		Parental Attitudes favorable toward antisocial behaviors .375						
Religiosity -.368		Peer reward antisocial behaviors .347						
Sensation seeking .331		Poor academic performance -.330						

Table 13: Confirmatory Factor Analysis 5 Factors

<i>Factor</i>	<i>Factor Constructs</i>	<i>Factor Loadings</i>
Factor 1	Rebellious	.749
	Belief Moral Order	.699
	Sensation-Seeking	.331
	Favorable Attitudes Toward Antisocial Behaviors	.681
	Early Initiation of Drug Use	.799
	Future Drug Use	.672
	Low Perceived Risk of Drug Use	-.544
	Social Skills	-.450
	Religiosity	-.368
	Favorable Attitudes Toward ATOD use	.682
	Friends Use of Drugs	.311
	Peer Reward antisocial behaviors	.347
Factor 2	Interaction with Prosocial Peers	-.454
	Poor Family Management	.692
Factor 3	Family Rewards	.842
	Family Opportunities Prosocial Involvement	.824
	Family Attachment	.751
	Family Conflict	.313
	Family Attitudes Favorable Toward ATOD use	.618
	Family Attitudes Favorable Toward Antisocial Behaviors	.713
	School Opportunities Prosocial Involvement	.808
	School Reward Prosocial Involvement	.803
Factor 4	Poor Academic Performance	-.322
	Low Commitment to School	-.590
	Laws Norms Favorable Drug Use	-.310
	Low Neighborhood Attachment	.594
Factor 5	Community Rewards Pro-Social Involvement	.819
	Community Opportunities Pro-Social Involvement	.762
	Transitions Mobility	.846
	Community Disorganization	-.055

Table 14: Constructs for Latent Variable

<i>Construct</i>	<i>Latent Variable</i>
Rebellious	Individual
Belief Moral Order	Individual
Sensation Seeking	Individual
Favorable Attitudes Toward Anti-Social Behaviors	Individual
Early Initiation of Drug Use	Individual
Future Drug Use	Individual
Low Perceived Risk of Drug Use	Individual
Social Skills	Individual
Religiosity	Individual
Favorable Attitudes Toward Alcohol and Other Drugs	Individual
Friends Use of Drugs	Peer
Peer reward antisocial behaviors	Peer
Interaction with Prosocial Peers	Peer
Poor Family Management	Family
Family Rewards	Family
Family Opportunities Pro-Social Involvement	Family
Family Attachment	Family
Family Conflict	Family
Parental Attitudes Favorable Toward Alcohol and Other Drug Use	Family
Parental Attitudes Favorable Toward Antisocial Behaviors	Family
School Opportunities Pro-Social Involvement	School
School Reward Pro-Social involvement	School
Poor Academic Performance	School
Low Commitment to School	School
Community Rewards Pro-Social Behavior	Community
Community Opportunities Pro-Social Involvement	Community
Low Neighborhood Attachment	Community
Laws Norms Favorable Drug Use	Community
Community Disorganization	Community
Transitions and Mobility	Community
Stimulant Use	NMUPD
Pain Reliever Use	NMUPD
Tranquilizer Use	NMUPD

Table 15: 1,2,3,4,5 Factor Models

One Factor Model
Community
Family
Individual
Peer
School

2 Factor Model
Community-Family
Community-Individual
Community-Peer
Community-School
Family-Individual
Family-Peer
Family-School
Individual-Peer
Individual-School
School-Peer

3 Factor Model
Community-Family-Individual
Community-Individual-Peer
Community-Family-Peer
Community-Individual-School
Family-Individual-Peer
Family-Peer-School

4 Factor Model
Community-Family-Individual-Peer
Community-Family-Individual-School
Family-Individual-Peer-School
Individual-Peer-School-Community
Family-Peer-School-Community

5 Factor Model
Community-Family-Individual-Peer-School

Table 16: Error Co-variances Modified for Measurement CFA Model

E35-Factor 3	E11-Factor 2
E34-Factor 3	E11-E13
E34-E35	E9-E10
E27-F6	E9-E3
E25-E26,	E10-Factor 1
E24-E25	E8-Factor 1
E20-E21	E8-E9
E18-E34	E8-E10
E17-Factor 3	E7-E10
E17-E34	E7-E9
E17-E35	E7-E8
E17-E18	E6-Factor 1
E16-E17	E6-E8
E15-Factor 3	E5-E9
E15-E34	E5-E6
E15-E35	E4-E10
E14-Factor 3	E4-E9
E14-E34	E4-E7
E14-E35	E4-E6
E14-E15	E4-E5
E14-E16	E3-E10
E12-Factor 2	E3-E8
E2-E9	E2-E8
E2-E7	E2-E4
E2-E3	E1-Factor 1
E1-E10	E1-E9
E1-E8	E1-E5
E1-E4	E1-E3
E1-E2	

Table 17: Standardized Estimates to Path Coefficients for 5 Factor CFA Model

Standardized Estimates CFA	Estimate
Early initiation drug use→ Individual Factor	.594
Favorable attitudes toward ATOD use → Individual Factor	.902
Future drug use→ Individual Factor	.817
Low perceived risk of drug use→ Individual Factor	-.617
Social skills→Individual Factor	-.420
Religiosity→ Individual Factor	-.194
Sensation seeking→Individual Factor	.682
Rebellious→ Individual Factor	.678
Belief moral order→ Individual Factor	.586
Favorable attitudes toward antisocial behaviors→ Individual Factor	.788
Stimulant use→ NMUPD	.812
Tranquilizer use→ NMUPD	.951
Rx pain reliever use→ NMUPD	.931
Family rewards→ Family Factor	.902
Family opportunities prosocial involvement→ Family Factor	.867
Family attachment→ Family Factor	.671
Poor family management→ Family Factor	.773
Family conflict→ Family Factor	-.270
Parental attitudes favorable toward antisocial behavior→ Family Factor	-.378
Family parental attitudes favorable toward ATOD use→Family Factor	-.362
Peer reward antisocial behavior→ Peer Factor	.526
Interaction with prosocial peers→ Peer Factor	-.521
School opportunities prosocial involvement→ School Factor	.798
School reward prosocial involvement→ School Factor	.738
Low commitment to school→ School Factor	-.576
Poor academic performance→ School Factor	.376
Community rewards prosocial behavior→ Community Factor	.921
Community opportunities prosocial involvement→ Community Factor	.603
Low neighborhood attachment→ Community Factor	.561
Laws norms favorable drug use→ Community Factor	.017
Community disorganization→ Community Factor	-.054
Transitions mobility→ Community Factor	-.112

Table 18: Model Fit Indices 5, 4, 3, 2 Factor Models

Factor (N=815)	Fit Indices (Chi-square;df;p)	RMSEA	CI 90%	RHO	CFI
5 order→NMUPD					
C-F-I-P-S	5522;492;.01	.112	.109-.115	.606	.653
4 order→NMUPD					
C-F-I-P	4830;374;.01	.121	.118-.124	.614	.662
C-F-I-S	4260;401;.01	.109	.106-.112	.657	.704
F-I-P-S	4335;320;.01	.124	.121-.127	.643	.690
I-P-S-C	3115;295;.01	.108	.105-.112	.671	.721
F-P-S-C	3067;226;.01	.124	.120-.128	.631	.666
3 order→NMUPD					
C-F-P	2497;149;.01	.139	.134-.144	.640	.698
F-P-S	2071;116;.01	.144	.139-.149	.686	.743
F-I-P	3723;227;.01	.138	.134-.141	.652	.700
C-F-I	3628;296;.01	.118	.114-.121	.670	.716
C-I-S	1941;227;.01	.096	.092-.100	.757	.802
C-I-P	2506;206;.01	.117	.113-.121	.689	.739
2 order→NMUPD					
C-F	1886;102;.01	.147	.141-.152	.678	.737
C-I	1388;150;.01	.101	.096-.106	.791	.833
S-C	630; 63;.01	.105	.098-.113	.814	.862
C-P	691;52;.01	.123	.115-.131	.775	.834
F-P	1579; 63;.01	.172	.165-.179	.698	.763
S-P	450;33;.01	.125	.115-.135	.842	.891
I-P	1651;102;.01	.137	.131-.142	.745	.793
F-I	2590;168;.01	.133	.129-.138	.720	.764
I-S	1050;117;.01	.099	.094-.105	.836	.873
F-S	1414;75;.01	.148	.141-.155	.742	.796

Table 19: Direct Path Model Fit

Factor-> NMUPD	Fit Indices (Chi-square;df;p)	RMSEA	CI 90%	RHO	CFI
Community	346;26;.01	.123	.112-.135	.845	.895
Family	1055;34;.01	.192	.182-.202	.746	.813
Individual	618;64;.01	.103	.096-.111	.879	.910
School	78;12;.01	.079	.062-.096	.959	.979
Peer	104;8;.01	.122	.102-.143	.929	.965

Table 20: Direct Community Model Fit

Latent Variable Community→NMUPD	Indices	Standardized Estimate
Community	Community Rewards Pro-Social Involvement	.893
Community	Community Opportunities Pro-Social Involvement	.616
Community	Low Neighborhood Attachment	.577
Community	Laws Norms Favorable Drug Use	.006
Community	Community Disorganization	-.072
Community	Transitions Mobility	-.120

Table 21: Direct Family Model Fit

Latent Variable Family→NMUPD	Indices	Standardized Estimate
Family	Poor Family Management	.777
Family	Family Rewards	.918
Family	Family Opportunities Pro-Social Involvement	.881
Family	Family Attachment	.690
Family	Family Conflict	-.277
Family	Parental Attitudes Favorable to ATOD use	-.352
Family	Parental Attitudes Favorable toward Antisocial Behaviors	-.371

Table 22: Direct Individual Model Fit

Latent Variable Individual→NMUPD	Indices	Standardized Estimate
Individual	Rebellious	.671
Individual	Belief Moral Order	.586
Individual	Sensation Seeking	.681
Individual	Favorable Attitudes Toward Antisocial Behaviors	.782
Individual	Early initiation of drug use	.600
Individual	Future Drug Use	.824
Individual	Low perceived risk of drug use	-.610
Individual	Social Skills	-.417
Individual	Religiosity	-.186
Individual	Favorable Attitudes toward ATOD use	.905

Table 23: Direct Peer Model Fit

Latent Variable Peer→NMUPD	Indices	Standardized Estimate
Peer	Friends Use of Drugs	.821
Peer	Peer reward antisocial behaviors	.529
Peer	Interaction with Prosocial Peers	-.466

Table 24: Direct School Model Fit

Latent Variable	Indices	Standardized Estimate
School→NMUPD		
School	School Opportunities Pro-Social Involvement	.853
School	School Rewards Pro-Social Involvement	.761
School	Poor Academic Performance	.353
School	Low commitment to school	-.568

Table 25: Re-specified Model Fit Indices

Factor	Fit Indices (Chi-square;df;p)	RMSEA	CI 90%	RHO	CFI
1st Re-Spec.	31208; 289; p<.01	.111	.108-115	.690	.779
2nd Re-Spec.	1790;199; p<.01	.099	.095-.103	.792	.864

Table 26: Gender Moderation Full Model

Latent Variable	Indices	Standardized Estimates Females N=428	Standardized Estimates Males N=387
Individual	Rebellious	.681	.639
Individual	Belief Moral Order	.564	.585
Individual	Sensation Seeking	.734	.624
Individual	Favorable Attitudes Toward Anti-Social Behaviors	.904	.765
Individual	Social Skills	-.455	-.363
Individual	Favorable Attitudes toward ATOD use	.904	-.178
Individual	Early Initiation of Drug use	.578	.626
Individual	Future Drug Use	.822	.822
Individual	Low Perceived Risk of Drug Use	-.588	-.591
Individual	Religiosity	-.313	-.027
Peer	Friends Use of Drugs	1.001	.988
Peer	Peer Reward Antisocial Behavior	.407	.322
Peer	Interaction with Prosocial Peers	-.311	-.235
Family	Poor Family Management	.834	.799
Family	Family Rewards	.902	.929
Family	Family Opportunities Pro- Social Involvement	.897	.900
Family	Family Attachment	.707	.719
Family	Family Conflict	-.252	-.116
Family	Parental Attitudes Favorable Toward ATOD use	-.227	-.178
Family	Parental Attitudes Favorable Toward Antisocial Behavior	-.219	-.186
School	School Opportunities Pro- Social Involvement	.790	.844

School	School Rewards Pro-Social Involvement	.689	.690
School	Low Commitment to School	-.578	-.636
School	Poor Academic Performance	.320	.375
Community	Community Rewards Pro-Social Involvement	.893	.979
Community	Community Opportunities Pro-Social Involvement	.678	.588
Community	Low Neighborhood Attachment	.583	.578
Community	Community Disorganization	.114	-.024
Community	Laws Norms Favorable Drug Use	.072	.089
Community	Transitions Mobility	.032	-.039
NMUPD	Stimulant Use	.785	.861
NMUPD	Rx Pain Reliever Use	.938	.926
NMUPD	Tranquilizer Use	.953	.948
NMUPD	Family Factor	.165	-.024
NMUPD	Individual Factor	.310	.284
NMUPD	School Factor	-.244	-.124
NMUPD	Peer Factor	.259	.151
NMUPD	Community Factor	.097	.081

Table 27: Direct Community Moderation Model Fit

Latent Variable Community→NMUPD	Indices	Standardized Estimates	
		Females	Males
Community	Community Rewards Pro-Social Involvement	.896	.965
Community	Community Opportunities Pro-Social Involvement	.675	.596
Community	Low neighborhood attachment	.583	.586
Community	Laws Norms Favorable Drug Use	.074	.090
Community	Community Disorganization	.115	-.025
Community	Transitions Mobility	.031	-.037

Table 28: Direct Family Moderation Model Fit

Latent Variable Family→NMUPD	Indices	Standardized Estimates	
		Females	Males
Family	Poor Family Management	.802	.758
Family	Family Rewards	.923	.945
Family	Family Opportunities Pro-Social Involvement	.889	.893
Family	Family Attachment	.709	.720
Family	Family Conflict	-.257	-.123
Family	Parental Attitudes Favorable ATOD use	-.229	-.180
Family	Parental Attitudes Favorable toward Antisocial Behavior	-.222	-.188

Table 29: Direct Individual Moderation Model Fit

Latent Variable Individual→NMUPD	Indices	Standardized Estimates	
		Females N= 428	Males N=387
Individual	Rebellious	.684	.640
Individual	Belief Moral Order	.570	.585
Individual	Sensation Seeking	.737	.624
Individual	Favorable Attitudes Toward Anti-social Behaviors	.769	.766
Individual	Early Initiation of Drug Use	.573	.625
Individual	Favorable Attitudes toward ATOD use	.900	.907
Individual	Future Drug Use	.825	.822
Individual	Low perceived risk of drug use	-.586	-.590
Individual	Religiosity	-.312	-.027
Individual	Social Skills	-.455	-.364

Table 30: Direct Peer Moderation Model Fit

Latent Variable Peer→NMUPD	Indices	Standardized Estimates	
		Females	Males
Peer	Friends Use of Drugs	.677	.723
Peer	Peer Reward Antisocial Behavior	.627	.444
Peer	Interaction with Prosocial Peers	-.197	-.284

Table 31: Direct School Moderation Model Fit

Latent Variable School→NMUPD	Indices	Standardized Estimates	
		Females	Males
School	School Opportunities Pro- Social Involvement	.769	.846
School	School Rewards Pro- Social Involvement	.683	.685
School	Poor Academic Performance	.339	.379
School	Low Commitment to School	-.601	-.646

Table 32: Moderation Fit Indices

Factor	Fit Indices (Chi-square;df;p)	RMSEA	CI 90%	RHO	CFI
5 Factor					
Females	3504;492;p<.01	.120	.116-.123	.556	.621
Males	2922;492;p<.01	.113	.109-.117	.569	.640

Table 33: Moderation Fit Indices for Direct Path Models

Factor	Fit Indices (Chi-square;df;p)	RMSEA	CI 90%	RHO	CFI
Community					
Females	274;26;p<.01	.150	.134-.166	.783	.855
Males	146;26;p<.01	.110	.093-.127	.868	.919
Family					
Females	771;34;p<.01)	.225	.212-.239	.669	.758
Males	463;34;p<.01	.181	.167-.196	.764	.832
Individual					
Females	363;64;p<.01	.105	.094-.115	.868	.908
Males	323;64;p<.01	.103	.02-.114	.864	.908
School					
Females	45;13;p<.01	.076	.053-.101	.952	.979
Males	32;13;p<.01	.063	.036-.090	.964	.986
Peer					
Females	82;8;p<.01	.148	.120-.177	.894	.948
Males	44;8;p<.01	.109	.079-.141	.933	.970

Figure 1: Scree Plot for EFA

Figure 2: Measurement Model

Figure 3: Measurement Model Fit

Figure 4: Individual Direct Model

Figure 5: Peer Direct Model

Figure 6: Family Direct Model

Figure 7: School Direct Model

Figure 8: Community Direct Model

Figure 9: 1st Re-specified Model

Figure 10: 2nd Re-specified Model

Figure 11: 2nd Re-specified Model Fit Estimates

Figure 12: Moderation Model Fit Females

Figure 13: Moderation Fit Males

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