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The purpose of this study was to develop and test two competing theoretical models for how contextual factors influence adolescent substance use. Models were derived based on peer cluster theory and primary socialization theory and evaluated across White, African American, Latino, Asian, and Southeast Asian adolescents, to examine race/ethnic variations in associations between peer, parental, school, and neighborhood influences and adolescent substance use. The sample included 5,992 adolescents (5,185 White, 330 African American, 160 Latino, 179 Asian, and 138 Southeast Asian) from Dane county, Wisconsin, and all data were collected via adolescent-report surveys. Results from Structural Equation Modeling analyses indicated that the peer cluster model only demonstrated adequate fit in the Asian and Southeast Asian subsamples, whereas the primary socialization model fit well in each ethnic group. When compared, the primary socialization model demonstrated superior fit to the data in all groups than did the peer cluster model except for Southeast Asian adolescents. Results also revealed significant moderation effects of ethnicity in associations between contextual influences and adolescent substance use. Results contributed to previous research by considering multiple contextual influences simultaneously to understand processes related to substance use of adolescents from multiple ethnic groups.

PEERS, PARENTS, SCHOOL, AND NEIGHBORHOOD INFLUENCES ON
ADOLESCENT SUBSTANCE USE ACROSS ETHNIC GROUPS:
AN APPLICATION OF PEER CLUSTER AND PRIMARY
SOCIALIZATION THEORIES

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CHAPTER I

INTRODUCTION

Adolescent substance use continues to be a significant public health concern in American society. Use of alcohol, tobacco and illicit drugs by adolescents is a concern due to associations between substance use and a host of negative developmental outcomes. For example, substance use during adolescence is related to increased risk of involvement in delinquent behaviors (Barnes, Welte, & Hoffman, 2002), lowered academic achievement and higher risk of school dropout (McCluskey, Krohn, Lizotte, & Rodriguez, 2002) and also associated with greater anxiety, affective disorders and psychological distress (Degenhardt & Hall, 2001).

Adolescence is a critical developmental period to study substance use because relatively normative increases in risk taking during this developmental stage (Steinberg, 2007) may lead to experimentation with substance use. However, frequency and severity of use varies across substances and across adolescents. In general, alcohol and tobacco are most likely to be used among adolescents, followed by marijuana, which is much more prevalent than the use of other illicit drugs like cocaine, heroin, or stimulants (Johnston, O'Malley, Bachman, & Schulenberg, 2009). In their report of results from the national Monitoring the Future (MTF) study of American youth, Johnston and colleagues (2009) showed that nearly half (45%) of American youth had tried cigarettes by 12th grade and 20% of 12th graders were current smokers. Nearly three quarters (72%) of

students have consumed alcohol by 12th grade and 39% have done so by 8th grade. 43% of students have tried marijuana and 25% have tried some illicit drug other than marijuana by the end of high school. Although trend analyses of substance use have shown that adolescents' substance use has generally decreased over the past two decades (Johnston et al., 2009), it is clear that substance use remains widespread among American adolescents.

Research has shown differences in rates of adolescent substance use across ethnic groups. White adolescents have been found to have the highest rates of substance use including use of alcohol, tobacco, and illicit drugs, whereas Asian adolescents are typically found to have the lowest rates of substance use (Johnston et al., 2009; Stagman, Schwarz, & Powers, 2011). African American adolescents have substantially lower rates of use of most licit and illicit drugs than do Whites, while Latino adolescents tend to have rates of substance use that fall between the Whites and the African American groups. As such, race/ethnicity may be a significant factor associated with risk for substance use across adolescents.

Much research has been done to understand predictors of adolescent substance use and a wide range of risk and protective factors have been identified. In their review of the substance use literature, Hawkins, Catalano, and Miller (1992) suggested that adolescents' substance use results from multi-systematic influences including those of the family, peer groups, social environments (e.g., school, neighborhood), as well as individual factors such as age, temperament, and psychopathology. These multiple sources of influences function together in influencing adolescent substance use, instead of

one particular risk factor conferring the greatest risk for substance use on its own (Hawkins et al., 1992; Bry, McKeon, & Pandina, 1982). How different sources of influences function together, for example, the direct versus indirect effects of certain risk or protective factors, however, has not been given sufficient research attention.

Research has pointed to peers, family, school, and neighborhood as four major sources of contextual influences on adolescent substance use (Cleveland, Feinberg, Bontempo, & Greenberg, 2008; Hawkins et al., 1992). Given the heightened sensitivity of adolescents to peers (Steinberg, 2004, 2007), peer influences can exert strong influences on adolescents' substance use. Specific aspects of peer influence may include peer substance use, peer pressure or encouragement to use drugs or alcohol, and are often implicated as a key factor that places adolescents at risk for substance use (Henry, 2008; Nash, McQueen, & Bray, 2005). Parents also serve as a risk or protective factor for adolescent substance use. For example, adolescent substance use may be higher in the context of ineffective parenting practices, parental substance use, high levels of family conflict, and lack of attachment to parents (Hawkins et al., 1992). On the other hand, the risk of substance use in adolescence decreases with parenting practices characterized by high involvement in the adolescent's activities, sufficient monitoring of adolescents' behaviors, and high levels of warmth and support (Hawkins et al., 1992) and, as such, these latter parental influences are viewed as protective factors for adolescent substance use.

School represents another context that influences adolescent substance use. For example, school level of substance use (i.e., substance using behaviors of other students

in school) might increase adolescents' risk of substance use, whereas school rules and norms against substance use, as well as a supportive, warm school climate can function as protective factors that decrease adolescent substance use (Kumar, O'Malley, Johnston, Schulenberg, & Bachman, 2002; Reid, Peterson, Hughey, & Garcia-Reid, 2006).

Neighborhoods also may influence adolescents' substance use, although the neighborhood influences are likely to be indirect via other contextual influences. For example, neighborhood structures (e.g., SES, race composition) and social cohesion have been shown to be associated with adolescent cigarette and alcohol use (Duncan, Duncan, & Strycker, 2002), however, these neighborhood influences were found to be only indirect through more proximal influences such as parenting and peer influences (Chuang, Ennett, Bauman, & Foshee, 2005).

While the rates of adolescent substance use vary across ethnic groups, some researchers have suggested that the contextual influences on substance use are also different for adolescents from different ethnic groups. Thus while one risk or protective factor strongly influence adolescents' substance use in one ethnic group, it might not be as salient in influencing substance use of adolescents from another group. To date few studies have considered such questions. The limited available evidence has suggested, however, that peer influences on substance use may be weaker for African American than for White adolescents (Brown, Miller, & Clayton, 2004; Newcomb & Bentler, 1986), whereas parenting may have stronger influences on substance use of Latino adolescents compared to White and African American adolescents (Broman, Reckase, & Freedman-Doan, 2006).

Although researchers have suggested that studies are needed to simultaneously consider multiple contextual influences on adolescent substance use in the same study (Farrell, & White, 1998), very few studies have actually done so. Moreover, processes (i.e., direct or indirect effects) of multiple contextual influences have rarely been examined with multi-ethnic samples. The current study aimed at filling this gap in the literature by examining the processes of multiple contextual influences (i.e., peers, parents, school, and neighborhood) with a sample of adolescents from multiple ethnic groups such as Whites, African American, Latino, Asian, and Southeast Asian.

While there is limited research focusing on how multiple contextual influences simultaneously influence adolescent substance use (including both directly and indirect influences), theories of adolescent substance use have proposed specific links. Among these theories, two that are notable for including peer, family, school, and neighborhood context are peer cluster theory and primary socialization theory. Peer cluster theory proposes that peers have the strongest influence on substance use during adolescence. Other influences including parental, school, and neighborhood influences are relevant, but proposed to only affect adolescents' substance use indirectly through peer influence (Oetting & Beauvais, 1986). Primary socialization theory (Oetting & Donnermeyer 1998), on the other hand, proposes that peer, family, and school are all primary socialization factors that directly influence adolescents' substance use. In addition to the direct effects of family and school, primary socialization theory also proposes that family and school can influence adolescents' peer associations which in turn can influence their substance use. In reference to neighborhood influences, primary socialization theory

suggests that neighborhood only influence adolescent substance use indirectly through its influence on the contexts of peers, family, and school. While peer cluster theory and primary socialization theories were developed by the same researcher (Oetting), primary socialization theory represents a more recent iteration of the theoretical links between contexts and adolescent substance use. Because studies have not compared the relative validity of each theory, it is unknown whether peer cluster theory or primary socialization theory provides a better explanation for how contextual influences are related to adolescent substance use.

Consequently, the current study extended the existing literature by evaluating both peer cluster theory and primary socialization theory with a sample of adolescents from multiple ethnic groups. Specifically, two theoretical models (i.e., peer cluster model and primary socialization model, see Figure 1 and Figure 2) were developed according to peer cluster theory and primary socialization theory. These two theoretical models were tested and compared in different ethnic groups, to understand the processes of peer, parental, school and neighborhood influences on adolescent substance use across ethnic groups.

CHAPTER II

REVIEW OF LITERATURE

Peer Cluster and Primary Socialization Theories

Peer Cluster Theory

Peer cluster theory is a psychosocial theory developed to explain substance use in adolescents, particularly adolescents in Western societies who are often characterized as spending relatively high amounts of unsupervised time with peers and less time with parents (Oetting & Beauvais, 1986). According to Oetting and Beauvais, a wide range of psychosocial characteristics are associated with adolescent substance use, including adolescents' social structure (e.g., age, gender, ethnic group, socioeconomic status, family structure, religion, etc.), socialization links (e.g., family relationships, school success and liking for school, peer sanctions against or encouragement to use drugs, etc.), attitudes and beliefs (e.g., tolerance of deviance, belief in drug dangers, etc.), rationales for drug use (e.g., excitement, reducing social anxiety, use with friends, etc.), and behaviors (e.g., deviant behaviors).

Although a wide range of psychosocial characteristics are considered as important influences on adolescent substance use, the central principle of the peer cluster theory is that peers, especially peer clusters—small, cohesive and tight subgroups of peers such as close friends—are the strongest and only direct influence on substance use during adolescence. Oetting and Beauvais believed that peer clusters determine where, when,

and how substance are used and that these clusters specifically help shape attitudes and beliefs about drugs. Adolescents' substance use is often a reflection of the peer cluster, and those who have substance using friends are likely to also involve in substance use because within the same peer cluster they tend to share common attitudes and behaviors toward substance use.

Other psychosocial characteristics also play important roles in influencing adolescent substance use. However, a key principle of peer cluster theory is that contexts and characteristics other than peer clusters, for example family relationships, school experiences, and personal beliefs toward substance use, only influence adolescent substance use indirectly through their effects on peer clusters (Oetting & Beauvais, 1986; 1987). These psychosocial characteristics are considered to be important because they influence adolescents' susceptibility to associate with peer clusters that involve drugs. For example, adolescents who experience high level of conflict with parents, suffer school failure, and perceive low level of danger of using drugs are more vulnerable to involve in substance using peer clusters, which further influence their substance use behaviors.

Primary Socialization Theory

A related theoretical approach to understanding adolescent substance use is primary socialization theory. Primary socialization theory was developed by Oetting and Donnermeyer (1998) many years after the development of peer cluster theory (also by Oetting). Instead of emphasizing that only peers exert a direct influence on substance use,

this latter theory considers the socializing influences of family and school as additional, directly related, primary socialization sources.

According to primary socialization theory, social behaviors such as substance use are learned predominately from adolescents' interactions with primary socialization sources. Primary socialization sources including peer clusters, family, and school have direct influence on adolescent substance use through the socialization processes. These processes involve creating close connections with the adolescent, direct communication of norms toward substance use, and direct monitoring, encouragement, and sanction of substance using norms and behaviors (Oetting & Donnermeyer, 1998). For example, parents might influence their adolescents' substance use through maintaining a warm, involved relationship with adolescents, conveying their attitudes toward substance use, and monitoring adolescents' behaviors. Two postulates of the primary socialization theory are: 1) Any socialization sources can transmit deviant norms, but healthy family and school systems are more likely to transmit prosocial norms; 2) Peer clusters can transmit either prosocial or deviant norms, but the major source of deviant norms is usually peer clusters. Thus while bonding with parents and school usually serve as protective factors against adolescent substance use, associations with substance using peer clusters increase the risk of adolescents' substance use.

Primary socialization theory also suggests that family and school contexts can influence adolescents' peer associations. When there is a high degree of connection, support, and involvement between adolescents and positive adults in the family and school, there is lowered likelihood that an adolescent would become involved with a

deviant group of peers. In addition, when norms against substance use are transmitted in family and school, adolescents are less likely to associate with substance-using peers. Thus, consistent with peer cluster theory, family and school contexts can influence adolescent substance use indirectly via adolescents' peer associations.

Primary socialization theory considers contexts other than peer clusters, family, and school as secondary socialization sources (Oetting, Donnermeyer, & Deffenbacher, 1998). For example, neighborhoods can be viewed as secondary socialization sources that can affect adolescents' substance use. One principle of the primary socialization theory is that secondary socialization sources only affect individuals' behaviors indirectly because they either strengthen or weaken adolescents' bonding with peers cluster, family and school, or affect the norms that are transmitted through these three primary socialization sources. Thus, neighborhood context affects adolescents' substance use only indirectly, perhaps through its influence on the norms toward substance use transmitted in the family and school, adolescents' relationship with their parents, connection to school, and association with substance-using peers.

Primary socialization theory also proposes that socialization sources are imbedded in the large cultural context such that culture influences the socialization processes related to adolescent substance use (Oetting, Donnermeyer, Trimble, & Beauvais, 1998). According to primary socialization theory, culture influences what primary socialization sources are as well as the norms for substance use transmitted through socialization processes. Although in general primary socialization theory proposes that peer clusters, family and school are three primary socialization sources that influence adolescent

substance use, it is possible that for adolescents in some ethnic groups peer clusters have stronger influence than family and school, while in other groups peer influence is less salient. For example, for Latino adolescents who are generally considered as having stronger familism attitudes compared to Whites (Sabogal, Marín, Otero-Sabogal, & Marín, 1987), family factors such as parental involvement and parental disapproval of substance use might be more influential for substance use than peer influence. Consequently, some of the key propositions of peer cluster theory that peer influences on substance use are stronger than family influences may have questionable generalizability across cultural groups.

Although both peer cluster theory and primary socialization theory were developed by Oetting and colleagues to understand adolescent substance use, the underlying processes of influences suggested by these two theories are different. Peer cluster theory specifies that peer clusters are the only direct and strongest influence on adolescent substance use and that other contextual and psychosocial influences only indirectly influence substance use via peer influence. However, primary socialization theory suggests direct effects of peer clusters as well as family and school on adolescent substance use. Moreover, primary socialization theory posits that the influence of neighborhood on adolescent substance use is indirect via primary socialization sources including peer clusters, family and school, instead of only indirect via peer influence as suggested by peer cluster theory.

Given that peer cluster theory and primary socialization theory have different propositions, it is important to empirically examine which theory is better at representing

the processes of contextual influences on adolescent substance use. Moreover, although peer cluster theory does not address ethnic or cultural differences, it is possible that its proposition that peer clusters are the strongest influence on adolescent substance use do not apply to all ethnic groups based on the cultural influence suggested by primary socialization theory.

Contextual Influences on Adolescent Substance Use

Peer Influences on Adolescent Substance Use

Consistent with peer cluster theory and primary socialization theory, research has demonstrated that peers play an important role in influencing adolescents' substance use. Peer influences are usually considered as risk factors that directly linked to increased adolescent substance use. For example, research suggests that peer substance use is related to adolescent substance use, such that adolescents who affiliate with substance-using peers and who perceive that their friends use substances are at risk to use drugs and alcohol themselves (Henry, 2008; Prinstein, Boergers, & Spirito, 2001). Adolescents who primarily associate with substance-using peers might experience pressure to be involved in substance use themselves in order to fit in the peer group or maintain their peer relationships. Moreover, adolescents are also more likely to use substances when they perceive that their friends approve of using drugs and alcohol (Nash et al., 2005).

Although typically peer influences are viewed as risk factors for adolescent substance use, some research suggests that peers can also function as protective factors that serve to reduce adolescent involvement in substance use behaviors. For example, Buckley, Sheehan, and Chapman (2009) found that more than half of adolescents who

participated in their study indicated that they would try to protect their friends from substance use and drug related risk behaviors. Moreover, friends' intervening and disapproval of substance use was found in this same study to be associated with decreased adolescent substance use.

Peer influence on adolescent substance use has been established in the literature; however, some researchers argue that the magnitude of peer influence might be overestimated because of peer selection effects (Bauman & Ennett, 1996). That is, some adolescents who use drugs or alcohol (regardless of the etiology of use) may overestimate their peers' actual substance use or seek out similar peers who also use drugs or alcohol. While the question of peer influence versus peer selection raises questions regarding the validity of linking adolescent self-reports of peers use to one's own use, the limited empirical research available provides greater evidence of peer influence effects rather than selection effects in explaining associations between peer use and adolescents' own use. For example, Wills and Cleary (1999) analyzed peer-influence versus peer-selection mechanisms in adolescent tobacco, alcohol, and marijuana use among 6th to 9th graders in a longitudinal study. They found that initial peer use was positively related to change in adolescent substance use over time; however, initial adolescent use was not related to change over time in reports of peer use. Wills and Cleary (1999) argued that these findings suggest that peer influences (rather than peer selection) is the primary mechanism during adolescence linking peer use to adolescent substance use.

Besides its direct effects, research has shown that peer influence partially mediates family and school influences on adolescent substance use (Lopez et al., 2008;

Nash et al., 2005; Rose, 1999). In their study of 2,573 ethnically diverse high school students, for example, Nash et al. (2005) found that parental acceptance, monitoring, and parent–adolescent communication were associated with peer use and approval of use, which in turn related to adolescents’ own substance use (although family environment also had a direct association). Similarly, Lopez et al. (2008) and Rose (1999) found that parental involvement, parental monitoring and relationship with adolescents, and school functioning (indicated by adolescents’ conduct and academic performance at school, and adolescents’ bonding to school) influence adolescent substance use, partially through their indirect effects on adolescents’ peer associations.

Parental Influences on Adolescent Substance Use

Although research has suggested that peers play the strongest role in predicting substance use during adolescence (Hawkins et al., 1992; Oetting & Beauvais, 1987; Rose, 1999), and that peer influences on substance are specifically stronger than parental influence (Chuang, Ennett, Bauman, & Foshee, 2009), parents remain an important factor to consider regarding adolescents’ substance use. Theoretically, researchers often viewed family as a prosocial primary socialization unit that influence adolescents’ substance use with the focus on positive aspects of the parent-adolescent relationship that reduce risk for substance use (Catalano & Hawkins, 1996; Oetting & Donnermeyer, 1998). For example, adolescents’ attachment to family has been shown to link with lowered substance use and association with friends who use substance (Henry, 2008).

Consistent with the perspectives that family serves as a prosocial socialization unit, research has demonstrated that parents can play protective roles in reducing

adolescent substance use. Parenting behaviors, such as parental monitoring, parental control, parental knowledge, parental warmth and support, and parental involvement are suggested as protective factors that associate with lower adolescent substance use (Barnes, Reifman, Farrell, & Dintcheff, 2000; Bogenschneider, Wu, Raffaelli, & Tsay, 1998; Broman et al., 2006; Fletcher, Steinberg, & Williams-Wheeler, 2004; Murguia, Chen, & Kaplan, 1998; Pilgrim, Schulenberg, O'Malley, Bachman, & Johnston, 2006). The extent to which parents monitor and control their adolescents' free-time activities (e.g., parents try to attain information regarding adolescents' activities, parents make decisions or set rules concerning adolescents behaviors) has been linked to lowered adolescent use of substances (Bogenschneider et al., 1998; Fletcher et al., 2004; Nash et al., 2005). In addition, parents' monitoring and controlling behaviors are related to parental knowledge which is also related to adolescent substance use (Fletcher et al., 2004). The extent to which parents actually know about their adolescents' whereabouts and activities not only associated with adolescents' use of cigarette, alcohol, marijuana and other drugs concurrently and prospectively, but also mediated the influence of parental warmth, parental monitoring and parental control on adolescent substance use (Fletcher et al., 2004).

Parenting behaviors that provide warmth and support to adolescents also have protective effects that reduce adolescents' use of alcohol and drugs. Parental support, indicated by parents' behaviors such as praising, encouraging, and hugging that make adolescents feel accepted and loved, have been shown to be associated with decrease in adolescent alcohol use over time (Barnes et al., 2000). Research has also indicated that

adolescents who perceived that their parents are warm and loving, that they are close to their parents and that their parents care about them, had lower levels of substance use than those who perceived lower levels of parental warmth (Bronman et al.,2006). In addition, Parental involvement (e.g., parents' provide help with homework when needed) has also been shown to be negatively associated with adolescents' use of substances (Pilgrim et al., 2006).

Parental attitudes against substance use also may have a protective influence on adolescent substance use. Research has indicated that perceived parental disapproval of substance use was associated with decreased adolescent substance use both concurrently and prospectively. For example, using a sample of 14,548 high school students, Mayberry, Espelage, and Koenig (2009) found that adolescents who perceived that their parents disapprove of smoking and using drugs and alcohol were less likely to use those specific substances. In their longitudinal study, Sargent and Dalton (2001) found that adolescents who perceived strong parental disapproval of smoking at baseline were less than half as likely to become established smokers over time as those who did not perceived strong parental disapproval.

In addition to the putative positive role of parents in adolescent substance use, some research has suggested that parents can also function as risk factors that increase adolescents' substance use. While parental monitoring, support and involvement reduces adolescent substance use, parents who disengage in monitoring and interacting with their adolescents, who fail to maintain a good relationship with their adolescents, can place adolescents at risk for being involved in substance use (Dishion, Nelson, & Bullock, 2004;

Farrell & White, 1998). Moreover, parents who smoke, drink alcohol, or use drugs themselves might serve as negative models that also increase their adolescents' risk for substance use (Chuang et al., 2009; Wood, Read, Mitchell, & Brand, 2004), particularly in contexts of close parent-adolescent relationships (Andrews, Hops, & Duncan, 1997).

In addition to the direct links between parental influence to adolescent substance use (Chuang et al., 2009; Nowlin & Colder, 2007), research has shown that parents also influence adolescent substance use indirectly through peer influences (e.g., Lopez et al., 2008). For example, Ary, Duncan, Duncan, and Hops (1999) found that inadequate parental monitoring not only directly associated with adolescents' problem behaviors including use of alcohol, tobacco, and marijuana, but also linked to adolescents' association with deviant peers, which in turn related to adolescents' own problem behaviors. Mothers' responsiveness (i.e., expressed warmth toward the child, contingent responses and availability) were found to be associated with lowered adolescents' orientation to peers, which in turn reduced adolescent substance use (Bogenschneider et al., 1998). Parental involvement has also been shown to not only negatively, directly linked to adolescent substance use, but also lessened adolescents' time spent with peers, which in turn associated with decreased adolescent substance use (Pilgrim et al., 2006). These empirical findings suggest that parents exert influence on adolescent substance use both directly and indirectly via peer associations. However, given that studies on ethnic minority groups regarding these direct versus indirect processes are limited, it is mostly unknown whether that parental influences on adolescent substance use are both direct and indirect (via peer influences) is generalizable across ethnic groups.

School Influences on Adolescent Substance Use

Schools represent an additional context that plays a role in adolescent substance use. Like family, schools are usually viewed as prosocial socialization units that have protective effects on adolescents' substance use (Catalano & Hawkins, 1996; Oetting & Donnermeyer, 1998). The primary means by which schools are expected to protect adolescents from risk behaviors are by promoting a sense of connection or bonding to the school, usually via supportive school personnel, a safe environment, and promoting norms and attitudes against risk behaviors such as substance use (Ennett & Haws, 2010). School bonding or connection, characterized as close, affective relationships with adults and students at school, investment in school, and doing well in school, are considered to be of essential importance for adolescent development, especially in the sense that connection to school protects adolescents from being primarily influenced by antisocial entities (e.g., substance-using peers) and becoming involved in risk and antisocial behaviors (Catalano, Haggerty, Oesterle, Fleming & Hawkins, 2004). For example, greater connection to school was associated with lower levels of adolescents' use of cigarette, alcohol, and marijuana (Catalano et al., 2004; Henry, 2008).

More specifically, research showed that adolescents' academic achievement (Bryant, Schulenberg, Bachman, O'Malley, & Johnston, 2000) and perceptions of teacher acceptance (Murguia et al., 1998) were associated with lowered adolescent substance use, whereas adolescents' misbehaviors at school (Bryant et al., 2000), disengagement in school, and poor relationships with teachers (Fletcher, Bonell, & Hargreaves, 2008) were related to higher level of substance use. In addition to adolescents' feeling connected to

school, schools also play a role in adolescent substance use to the extent that students feel safe at school, teachers convey disapproval of drug use, and the norms regarding substance use in the school (Fletcher, Bonell, Sorhaindo, & Strange, 2009; Kumar et al., 2002; Reid, Peterson, Hughey, & Garcia-Reid, 2006).

Schools also might exert influence on adolescent substance use indirectly via peer associations. For example, research has shown that adolescents' poor school functioning and misconduct at school increased their association with substance-using peers, which in turn linked to involvement in substance use (Lopez et al., 2008, Rose, 1999). Low attachment to school has also been found to predict involvement with friends who use substances, which in turn associate with adolescent substance use (Henry, 2008). Thus, like parental influence, school might also influence adolescent substance use both directly and indirectly through its effect on adolescents' peer associations. Such a proposition is consistent with primary socialization theory, but does not fit well with the main propositions of peer cluster theory.

Neighborhood Influences on Adolescent Substance Use

Compared to peer, parental and school influences, neighborhood influences have been less studied as a central influence on adolescent substance use. However, recent studies have shown that neighborhood demographic and structural factors, as well as neighborhood social cohesion are related to adolescent substance use (Duncan et al., 2002; Mayberry et al., 2009; Winstanley et al., 2008). In their multilevel analysis of neighborhood context in influencing adolescent substance use, Duncan and colleagues found that neighborhood poverty, presence of stores selling drugs, and neighborhood

social cohesion were associated with substance use. However, examination of the process of influences showed that neighborhood poverty and presence of stores selling drugs influenced adolescent substance use indirectly through neighborhood social cohesion. The importance of neighborhood cohesion in reducing adolescent substance use was also evidenced in Winstanley and colleagues' (2008) study. In their analysis of the National Survey on Drug Use and Health, Winstanley et al. found that neighborhood social capital, as an indicator of social integration, was associated with lower substance use, even after controlling for individual and family-level factors. While neighborhood social cohesion is shown to associate with lowered substance use, neighborhood disorganization has consistently been found to place adolescents at risk for substance use. Research indicated that adolescents' perceived neighborhood disorganization, as indicated by exposure to violence and drug activity and perceiving the neighborhood as unsafe, was associated with increased tobacco, alcohol, and marijuana use concurrently and prospectively (Lambert, Brown, Phillips, & Jalongo, 2004; Winstanley et al., 2008). These studies, while suggesting a direct effect of neighborhood characteristics, failed to consider the potential mediators (e.g., peer and parental influences) and as such, might be attributing a neighborhood effect to factors that weren't considered.

Researchers have argued that neighborhood influences on adolescent substance use might be indirect (rather than direct) through neighborhoods' influences on more proximal contexts such as family, peer, and school (Oetting, Donnermeyer, & Deffenbacher, 1998), however, few studies have examined such a proposed indirect pathway. Those studies that have considered the indirect effects argument have

supported Oetting and colleagues' assertions. Chuang and colleagues (2005), for example, found that neighborhood socioeconomic status indirectly influenced adolescent cigarette and alcohol use through its influence on parenting and parent and peer use of cigarette and alcohol. Other studies have considered neighborhood as a moderator and found that neighborhood socioeconomic disadvantage (Snedker, Herting, & Walton, 2010) and neighborhood social cohesion (e.g., Mayberry et al., 2009) moderate peer and parental influences on adolescent substance use, such that peer influence has a greater influence on whether adolescents will use substances when adolescents live in socioeconomically disadvantaged neighborhoods and do not feel a strong sense of social cohesion in the neighborhood. In sum, neighborhood characteristics seem to play a significant role in influencing adolescent substance use although the influence may be best described as indirect. As such, the current study included neighborhood cohesion in the examination of processes of multiple contextual influences and examined its indirect effects on adolescent substance use.

Race/Ethnicity Variations in Contextual Influences

Although many studies have examined peer, parental, school, and neighborhood influences on adolescent substance use, noticeably most of the studies were conducted with samples of predominantly White adolescents. Moreover, there are very few studies that have included multiple subsamples of adolescents from diverse cultural groups in the same study. Consequently, the extent to which peers, family, and school (and neighborhood indirectly) are central factors linked to substance across diverse groups of adolescents is mostly unknown. The omission of diverse samples is noteworthy given

that, according to primary socialization theory, socialization processes related to adolescent substance use are imbedded in culture and thus contextual influences on adolescent substance use might vary across cultures or ethnic groups (Oetting, Donnermeyer, Trimble, & Beauvais, 1998).

Existing studies have pointed to variation in how contextual influences related to adolescent substance use. Griesler and Kandel (1998) examined correlates of cigarette use among White, African American, and Hispanic adolescents and found that adolescents of different ethnicity shared some common correlates of cigarette use such as youth age, problem behavior and delinquency, and peer pressure to smoke. However, maternal smoking and low scholastic attitudes were unique risk factors for White adolescents' smoking, whereas positive parenting was only a protective factor related to smoking among African American adolescents. In addition, Broman et al. (2006) found that while parental warmth and acceptance was negatively associated with substance use for adolescents across ethnic groups, the association was stronger for Latino adolescents than for Whites and African Americans. This indicated that parenting might exert a stronger impact in reducing substance use for Latino adolescents than for White and African American adolescents.

Using a sample of White and African American adolescents, Nowlin and Colder (2007) found that ethnicity moderated the influence of parenting and neighborhood poverty on adolescent cigarette use. Specifically, positive parenting behaviors such as high parental monitoring and high-quality relationship were related to lower level of smoking for both White and African American adolescents, however, the relation was

stronger for White adolescents than for African Americans. In addition, neighborhood poverty was found to be associated with increased smoking for White but not African American adolescents. Also using a sample of White and African American adolescents, Brown et al. (2004) showed that associations between peer substance use, peer pressure resistance and substance use were stronger for White than for African American adolescents. Findings from this latter study may suggest that peer influence might be less salient for substance use of African American adolescents than it is for Whites.

Other studies point more to similarities in contextual influences on adolescent substance use across ethnic groups. For example, Pilgrim et al. (2006) found that across White, African American, and Hispanic adolescents, school success and time spent with friends partially mediated the influence of parental involvement and risk taking on adolescent substance use. The pattern of processes of influences was similar across ethnic groups, although minor differences in magnitude of influences were also identified (i.e., the indirect effects were small for African American girls).

While extant research provided support for ethnic variations or similarities in contextual influences on adolescent substance use, it is noticeable that most of the comparison studies were limited to White, African American, and Latino samples. Studies on Asian American adolescents also revealed a wide range of risk and protective factors for substance use, including individual factors (e.g., age, psychopathology), family factors such as parenting and parent-adolescent relationship, peer influences, academic functioning, and cultural influences (e.g., acculturation) (Hong, Huang, Sabri, & Kim, 2011). Kim, Zane, and Hong (2002) used a sample of Asian American

adolescents and found that while peer pressure was significantly associated with increased adolescent substance use, parent–child relations (indicated by parental involvement, warmth, and low parent–child conflict) was associated with both peer influence and adolescent substance use. However, school was found to have neither direct nor indirect effects on substance use of Asian American adolescents in this study. Using the Asian American sample from National Longitudinal Study of Adolescent Health, Thai, Connell, and Tebes (2010) found that both peer substance use and academic achievement were associated with adolescent substance use, as well as mediating the effects of acculturation level (indicated by English use at home, place of birth and length of residency in the United States). Moreover, when compared to White adolescents, peer influences may be less relevant for Asian American adolescents’ substance use (Au & Donaldson, 2000). However, comparison studies that included Asian American adolescents are so limited that clearly more research is needed to understand variations in influences on substance use between Asian American adolescents and adolescents of other ethnicity.

More limited is research on substance use of Southeast Asian adolescents. Although research indicated that Southeast Asians’ rates of substance use approximated the national percentage (Wong et al., 2007), research on contextual influences on Southeast Asian adolescents’ substance use is sparse. In a study of Hmong college students (Lee, Jung, Su, Tran, & Bahrassa, 2009), family conflict was found to be associated with increased substance use. However, no study to date has examined multiple contextual influences on adolescent substance use with Southeast Asian samples,

and no study has tested variations in influences on adolescent substance use between Southeast Asian adolescents and adolescents of other ethnicity.

Current Study

The current study aimed at understanding processes of multiple contextual influences (i.e., peer, parents, school, and neighborhood) on adolescent substance use across multiple ethnic groups. By doing so, this study will provide insight into variations or similarities in processes of contextual influences on substance use of adolescents from relatively well studied groups such as White, African American, and Latino adolescents, as well as understudied groups such as Asians and Southeast Asians. Specifically, influences of peer substance use, parental involvement, parental disapproval of substance use, perceived school connection and neighborhood cohesion were considered in the current study.

Two conceptual models derived from peer cluster theory and primary socialization theory were developed and tested across ethnic groups to: (1) first compare the relative applicability of peer cluster theory and primary socialization theory in explaining adolescent substance use and (2) to ascertain if the superiority of one model over the other generalized across ethnic groups. The current study also included multi-group analyses to compare the magnitude of associations between contextual influences and substance use between ethnic minority groups and the White group.

The peer cluster model (see Figure 1) proposed that peer substance use would be directly associated with adolescent substance use and would fully mediate the influence of parental involvement, parental disapproval, school connection, and neighborhood

cohesion. Parental, school, and neighborhood influences, according to this conceptual model, would not be directly linked to adolescent substance use but would be associated with peer substance use, which in turn influenced adolescent substance use. The primary socialization model (see Figure 2) also proposed that peer substance use would be directly associated with adolescent substance use. However, instead of suggesting that parental and school influences would be only indirectly associated with adolescent substance use via peer substance use (as proposed by peer cluster model), the primary socialization model proposed that parental involvement, parental disapproval of substance use and school connection would be associated with adolescent substance use both directly and indirectly via peer substance use. Similar to the peer cluster model, the primary socialization model also proposed that neighborhood cohesion would have no direct association with adolescent substance use. However, in addition to the indirect association of neighborhood cohesion via peer substance use suggested by the peer cluster model, the primary socialization model proposed that neighborhood cohesion would also influence adolescent substance use indirectly via parental and school influences.

Given that the existing literature generally supports both direct and indirect effects of not only peers, but also family and school contexts, it was hypothesized that the primary socialization model would demonstrate a superior fit to the data than would the peer cluster model. Although research on ethnic variations in contextual influences on adolescent substance use is limited, extant comparison studies seem to suggest stronger parental influence for Latino adolescents compared to White adolescents, and weaker

peer influence for African American adolescents than for White adolescents. Thus, the current study hypothesized that association between parental involvement, parental disapproval and adolescent substance use is stronger for Latino than for White adolescents and that the association between peer substance use and adolescent substance use is weaker for African American than for White adolescents. However, no specific hypotheses were derived for the differences in contextual influences between the Asian, Southeast Asian and the White adolescents because of the lack of previous research regarding these issues.

CHAPTER III

METHOD

Design and Data

This study is a secondary data analysis of the year 2000 Dane County Youth Assessment (DCYA), a countywide survey administrated in Dane County, Wisconsin. The survey was administered to all students in grades 7th through 12th present on the day of survey administration in all middle and senior high schools in the county. A total of 18,572 students were surveyed with six percent (n=1,107) of the surveys judged invalid and thus eliminated by the researchers who originally collected the data. Because the census survey strategy (surveying all students in all schools) has a tendency to lead to underreports of students in Madison, Wisconsin (the largest city in the county), the public-use version of this data set were reduced to a stratified sample (based on school and grade) of 6,695 students randomly selected post-survey that are used to represent the total population of students in the county. For the present study, only students age 12 to 18 who indicated that they were racially or ethnically White, African American, Latino, Asian-not Hmong, and Hmong/Southeast Asian were included, resulting in a final sample for this study of 5,992 students (Native American and mixed race or other students were dropped due to low overall sample sizes in these groups).

Participants and Procedures

The participants in this study were 5,992 students who participated in the DCYA 2000 in Wisconsin. In terms of race/ethnicity 86.5% of the students identified themselves as White-non Hispanic (n=5,185), 5.5% were African American (n=330), 2.7% were Latino (n=160), 3.0% were Asian-not Hmong (n=179), and 2.3% were Hmong/Southeast Asian (n=138). The Latino group in Dane County, according to census data, was predominantly Mexico origin, followed by mixed groups of Central Americans, with smaller numbers of Puerto Ricans and Cubans (Gleason, 2005). Asian students in this survey could either indicate that they were Hmong/Southeast Asian or Asian-not Hmong. Most adolescents who indicated they were Hmong/Southeast Asian were most likely in refugee families (Gleason, 2003a) with a majority being Hmong (around 56%), and the rest being either Cambodian, Thai, or Laotian (this group were referred as Southeast Asian from this point forward). The Asian-not Hmong group, according to the DCYA and local Census data (Gleason, 2003), was mostly comprised of individuals with parents who are Chinese, Indian, Korean, and Japanese. This group was also relatively high in reference to parental education compared to other ethnic minority groups. The average age of respondents in the overall sample was 14.8 and 51% of respondents were female. Descriptive statistics of the demographic characteristics were presented in Table 1.

Surveys were administered to students in school by trained research assistants. Parents were notified of the survey in writing several weeks prior to its administration and were given the option to withhold their consent if they did not wish their child to be surveyed. This survey is conducted every 5 years by the Dane County Youth

Commission (DCYA) which is an organization comprised of representatives from local school and community agencies. The commission also has consultation from researchers from the University of Wisconsin to develop the survey. Prior to survey administration the DCYA holds a series of meetings to evaluate the survey instrument and make any modifications that are deemed necessary. The committee that reviews the survey includes some academic researchers but mostly is made up of school district personnel and representatives of various community agencies (law enforcement, United Way). As such, the overall survey instrument results from community participation. The final survey for the 2000 data collection included 173 items that assessed a variety of health-related outcomes and contextual influences on development. The public-use version of these data is provided in a de-identified format.

Participating students reported on their demographic and family background characteristics, psychosocial well-being, substance use and other health related and risk-taking behaviors, relationship with parents, and neighborhood and school related perception and experiences. Data from student reports on parental monitoring and support, parental disapproval of adolescent substance use, school connection, neighborhood cohesion, peer drug use, and their own substance use were used for the present study. Survey items were, in some cases, single items that the committee designed to assess a particular developmental issue and, in other cases, may be indicators of a broader construct. As such, it is necessary when using this data set to first evaluate survey items and do preliminary analyses to develop summary measures to represent key study constructs.

Measures

Exploratory factor analyses (EFA) were conducted as a means to construct summary measures to represent adolescent reports of peer substance use, parental involvement, parental disapproval of adolescent substance use, school connection, neighborhood cohesion, and adolescent substance use. The first EFA focused on creating measures for the contextual influences of peers, parents, school and neighborhood with related items that were selected from the survey. A separate EFA was also conducted with a total of nine substance use items to form the measure for adolescent substance use.

All survey items relevant to target constructs of the current study were reviewed and those items that were related to adolescents' peer, parental, school, and neighborhood related perceptions and experiences were selected for the EFA. EFA with varimax rotation was conducted with a total of 31 selected items. Rotated factor loadings were then examined to guide the construction of summary variables. A factor loading of .40 or above was considered as indicating that an item loaded onto a specific factor and, consequently, any items failing to demonstrate a .40 or above factor loading were dropped as were items demonstrating cross-loadings across multiple factors. This strategy resulted in dropping four items that likely represented communication with parents about risks related to substance use, communication with adults at school about future plans, whether the police are reliable for help, and whether there are opportunities for interaction among youth of different races and ethnicity in the community. These four items neither closely related to the constructs in the proposed conceptual model, nor did they clearly load with other items on any factors extracted by the EFA. Exploratory

factor analysis with the remaining 27 items yielded seven factors, with the results presented in Table 2.

Based on the results of the factor analysis, there were five possible factors that could be retained that would represent the constructs of peer substance use, parental involvement, parental disapproval of adolescent substance use, school connection, and neighborhood cohesion. There were two other possible factors that included items that are best described as indicating adolescents being treated unfairly due to race and ethnicity at school, being treated unfairly due to race and ethnicity in their neighborhood, and experiences of harassment from student at school. Because such possible factors were not related to the constructs necessary to assess the proposed conceptual models, these items were excluded from subsequent substantive analysis.

Peer substance use. Based on the results of the EFA, two items were selected to represent (see Factor 5 in Table 2) peer substance use: (1) Most of my friends do not drink or do drugs, and (2) Most of my friends do not smoke cigarettes or chew tobacco. Responses to these two items ranged from 0 (strongly agree) to 3 (strongly disagree) and the Pearson correlation between the two items was .78. Mean scores for each respondent were created by averaging across the two items, and higher scores indicate greater peer substance use.

Parental involvement. Parental involvement was comprised of six items assessing adolescents' perceptions that their parents monitor their free-time behaviors and are supportive and caring (see Factor 1 in Table 2). The six items were: (1) I tell my parent(s) who I am going to be with when I go out, (2) I talk to my parent(s) about the

plans I have with my friends, (3) when I go out my parent(s) ask me where I am going, (4) my parent(s) usually know what I am doing after school, (5) my parent(s) are there when I need them, and (6) my parent(s) care about me. Students responded to each item based on a scale ranging from 0 (never) to 4 (very often). Mean scores for each respondent were created by averaging across six items, and higher scores indicate higher levels of parental involvement. Cronbach's alpha for this six item scale was .83 in the present sample.

Parental disapproval of substance use. Two items were selected (see Factor 6 in Table 2) to represent adolescents' perceptions of their own parents' attitude toward substance use by teenagers: (1) my parent(s) think it is wrong for teens my age to drink alcohol, (2) my parent(s) think it is wrong for teens my age to smoke/chew tobacco. Adolescents responded to these two items on a five point scale ranging from 0 (strongly agree) to 4 (strongly disagree). Pearson correlation between these two items was .72. Mean scores were created after scores on each item being reversed, such that higher scores indicate higher levels of adolescents' perception of parental disapproval of substance use.

School connection. According to the results of the EFA, six items loaded on a factor (see Factor 2 in Table 2) representing adolescent perceptions of their connection to school. The six items were: (1) I enjoy going to school; (2) The rules at my school are enforced fairly; (3) I am getting the education and skills I need to be successful after I graduate from high school; (4) I believe I am getting a good, high quality education at my school; (5) My teachers care about me and how well I do in school; and (6) Generally,

counselors, nurses, social workers, and psychologists at my school are helpful when I need them. Students indicated the extent to which they agree on each of the six statements based on a five point scale ranging from 0 (strongly agree) to 4 (strongly disagree). Responses were reverse coded so that higher scores indicate higher perceptions of school connection. Cronbach's alpha for this six item scale was .77.

Neighborhood cohesion. Five items (see Factor 4 in Table 2) were considered as indicating adolescents' perceptions of their neighborhood as a cohesive and safe environment and thus were selected to represent the construct of neighborhood cohesion. Adolescent responded to the 5 items: (1) Adults in my community keep an eye on what teens are up to; (2) If I had a problem, there are neighbors whom I could count on to help me; (3) If I were doing something wrong, adults in my community would probably tell my parent(s); (4) People in my community know and care about each other; (5) My neighborhood is a safe place to live. Responses for each item ranged from 0 (strongly agree) to 3 (strongly disagree). Responses were coded so that higher scores indicate higher perceptions of neighborhood cohesion. Cronbach's alpha for this scale was .70.

Adolescent substance use. An additional EFA was conducted with a total of nine items taken from the survey regarding adolescents' reports on their own use of smoking tobacco (cigarettes, cigar, pipe), beer and wine, hard liquor, marijuana, inhalants, hallucinogens, cocaine, stimulants, and unauthorized prescription in the past year. Adolescents' responses to these nine items were: (1) not at all, (2) once or twice, (3) 1-3 times per month, (4) 1-3 times per week, (5) 4-6 times per week, and (6) daily. Results of the factor analysis for substance use items were presented in Table 3. According to the

results, the EFA with varimax rotation yielded two factors, with one factor comprised of four items regarding use of smoking tobacco, beer and wine, hard liquor, and marijuana, and a second factor composed of the other five items regarding use of inhalants, hallucinogens, cocaine, stimulants and unauthorized prescription drugs. The first factor was considered as an indicator of adolescent involvement in relatively normative drug use as tobacco, alcohol and marijuana are widely used by adolescents in the U.S. when compared to harder drugs like cocaine or hallucinogens. The second factor was labeled illicit drug use and represented involvement in the use of more serious and less widely used drugs. Mean scores were created separately for both normative drug use and illicit drug use items as indicators of normative drug use and illicit drug use.

A preliminary examination of the distributive properties of these two measurement scales (i.e., normative drug use and illicit drug use) suggested that both measures were highly skewed. Given that Maximum Likelihood estimation (the estimation procedure underlying Structural Equation Modeling) assumes normally distributed variables, this was problematic. Since square root transformation has been suggested to be useful for stabilizing variances and decreasing skewness (Howell, 2007), each drug use summary variable was transformed by multiplying individual scores by their square root. While this procedure successfully reduced the skewness of normative drug use to an acceptable level, the illicit drug use measure remained highly skewed. Moreover given that the percentage of adolescents engaging in more illicit drug use was relatively low in these data, I elected to only include the normative drug use measure (square root of the mean score of four normative drug use items) in the substantive

analysis as an indicator of adolescent substance use. Cronbach's alpha for this scale was .85.

Plan of Analysis

Structural equation modeling (SEM) using Amos 18 was used to address the specific research questions in the present study. SEM is a powerful statistical tool to analyze complex relationships among multiple variables. One of the main strengths of SEM compared to multiple regression is that it allows all variables to be examined simultaneously to test an entire hypothesized multivariate model, including indirect pathways, such as how a distal influence (e.g., neighborhood cohesion) could impact adolescent substance use via more proximal influences (e.g., family and peers). Thus for the current study, SEM allowed the examination of contextual influences of peers, parents, neighborhood, and school simultaneously to understand the processes of these influences on adolescent substance use.

Another main strength of SEM analyses is the ability to evaluate and compare alternative models as a means to provide support to *a priori* theoretical questions and infer the most theoretically and empirically plausible model. For example, peer cluster theory suggests that parents only exert an indirect influence on adolescent substance use via adolescents' association with substance using peers. An alternative possibility would be that parental influence has a direct association with adolescent substance use as suggested by primary socialization theory. SEM analyses allowed for the comparison of the fit of alternative models by evaluating and comparing fit indexes of the models.

In addition, SEM is a good statistical tool for the analysis of moderated effects across groups. Multi-group analyses, for example, allow for an examination of whether certain associations within a model differ across groups. This type of analysis can be accomplished by comparing nested SEM models, where the nested model includes constraints that specify that coefficients associated with focal paths are equal across groups. This approach allowed the current study to examine ethnic differences in associations among contextual influences and adolescent substance use (i.e., moderated effects). An additional strength specific to AMOS is the ability to run analyses using full information maximum likelihood (FIML) which is the recommended approach to analyses with data sets that include missing values (Acock, 2005)

Model testing. One goal of the current study was to evaluate the applicability of the peer cluster model and the primary socialization model to different ethnic groups in representing the processes of contextual influences on adolescent substance use. To address this goal, SEM analyses were conducted 1) to test whether the peer cluster model and the primary socialization model fit well in each ethnic sample and 2) to compare which of the two models fit better in each ethnic group.

Model fit indexes were employed to evaluate the fit of the peer cluster model and the primary socialization model separately for each group. Several fit indexes, including χ^2 , the Comparative Fit Index (CFI; acceptable values greater than .90, good fit greater than .95; Kline, 2011), the Root Mean Square Error of Approximation (RMSEA; acceptable < .08, good fit < .05), and the Akaike's Informational Criteria (AIC, lower values indicate better fit) were used to evaluate model fit. A comparison of fit indexes

across models provides evidence to conclude which of the two theoretical models provided a specification that best fits the observed data. That is, if the primary socialization model was found to demonstrate a superior fit compared to the peer cluster model, then there would be evidence to support that parental involvement, parental disapproval, and school connection are best described as not only having indirect effect on adolescent substance use via peer substance use but also having direct effects. On the other hand, if the peer cluster model demonstrated better fit compared to the primary socialization model, then the proposition that peer influence is the only direct effect on adolescent substance use would be supported.

Multi-group analyses. Multi-group analyses were next considered to address questions related to moderation. For example, the expectation was that peer substance use would demonstrate a stronger positive association with adolescent substance use for the sample of White adolescents, particularly when compared to Latinos and African Americans. Multi-group analyses in SEM were conducted for group comparisons of parameters estimating the associations among contextual influences and adolescent substance use and involved the comparison (using a chi-square difference test) of two nested models. The first model specifies that predicted paths between variables are freely estimated across groups. The second model then specifies that all paths in the model are constrained to be equal across the groups. To the extent that specifying equality constraints leads to a decrement in fit (the chi-square increases by a significant amount relative to the change in degree of freedoms), there is the suggestion that a moderation effect exists. That is, if a specific path is significantly different across groups, specifying

that path as equal across groups, leads to misfit. On the other hand, if constraining paths to equality across groups does not adversely impact model fit, then the conclusion is that those paths are equal across groups (i.e., the group variable does not moderate that association).

Because the primary socialization model was more comprehensive in containing all the paths in both the peer cluster model and the primary socialization model that can be constrained, it served as the baseline model for the multi-group analysis. A model nested to the primary socialization model was specified with all path coefficients constrained to be equal across the comparison groups (e.g., racially White adolescents versus Latinos). In the cases where $\Delta \chi^2$ was significant—indicating that group differences existed in certain path coefficients examined—critical ratios statistics for differences between parameters in the AMOS output were examined to evaluate which specific paths or associations in the primary socialization model statistically differed between the comparison groups, that is, to examine which specific associations between contextual influences and adolescent substance use were moderated by ethnicity. A critical ratio greater than 1.96 or less than -1.96 indicated significant difference in coefficients or parameters between the comparison groups.

CHAPTER IV

RESULTS

Preliminary Measurement Equivalence Tests

Prior to considering associations between contextual influences and adolescent substance use, preliminary analyses were conducted to consider cross-group measurement equivalence for all the key study constructs. Cross-group equivalence is a general term (also sometimes referred to as *measurement invariance*) that considers whether or not items representing study constructs operate in a similar manner across cultural groups. A lack of equivalence or invariance is problematic because measurement bias might reduce the accuracy of inferences made from results of group comparisons. For example, if the measure of parental involvement in this study was not invariant, the overall study construct may have different meanings across groups and, as a result, findings of group differences in associations between key constructs (e.g., variation in the association between parental involvement and adolescent substance use across Latinos and Whites) may result not from actual differences in how parenting relates to substance use, but instead are due to measurement bias. Thus it was important to establish measurement equivalence (the degree to which a measure assesses the same construct in the same way across groups) across ethnic groups before the substantive analysis regarding race/ethnicity as a moderator (Knight, Roosa, & Umana-Taylor, 2009).

The typical approach to address measurement equivalence in AMOS involves multi-group examination of nested measurement models with a baseline model indicating that (in the case of neighborhood cohesion, for example) 5 items load onto a single latent factor, and that those factor loadings are freely estimated in each group. The fit of the baseline model can then be compared to the fit of a nested model where these same factor loadings are constrained to be equal across groups. A significant difference in model fit between the baseline model and the constrained model (i.e., constraining factor loading to be equal across groups lead to a decrement in model fit) would suggest a lack of measurement equivalence (Byrne, 2001). On the other hand, measurement equivalence would be supported and indicate that factor loadings are equal across groups if imposing the equality constraints on factor loadings across groups did not lead to a worsened fit.

The most popularly used index to test measurement equivalence involves a comparison in chi-square values across the nested models—a significant difference of chi-square ($\Delta \chi^2$) between the constrained model and the baseline model indicates a lack of measurement equivalence across groups, or that the factor loadings are unequal. Chi-square difference testing was not appropriate for this study, however, because with very large samples the chi-square difference test points to trivial differences in factor loadings as evidence of statistically significant $\Delta \chi^2$ (Kline, 2011). To address this issue Cheung and Rensvold (2002) and others (Kline, 2011) recommend relying on changes in the CFI because the CFI is not as easily affected by sample sizes and model characteristics. For measurement equivalence tests, a difference in CFI values across two models (one specifying factor loadings as freely estimated and one with factor loadings specified as

equal across groups) less than or equal to .01 (i.e., $\Delta\text{CFI} \leq .01$) indicates that the null hypothesis of invariance should not be rejected, which suggests that the measurement operates similarly for the comparing groups (Cheung & Rensvold, 2002).

Multi-group analyses of measurement models were analyzed to compare White respondents to respondents from each of the ethnic minority subsamples (i.e., white versus African American, white versus Asians, etc.). Measurement models were tested to establish that individual measurement items had similar factor loadings across ethnic groups for the measures of parental involvement, school connection, neighborhood cohesion and adolescent substance use. The measures of parental disapproval and peer substance use were not tested since these two measures only have two items and are not amenable to SEM analyses as stand-alone measures (models would not be identified; Kline, 2011). Overall, the constrained model and the baseline model fit equally well ($\Delta\text{CFI} \leq .01$) when testing all the measurement models of parental involvement, school connection, neighborhood cohesion, and adolescent substance use across the White subsample and each minority sample. This indicated equivalence of these measures across White and the other groups and suggested that across-group differences in associations between these measures and adolescent substance use are not biased due to group differences in measurement.

Evaluation of Peer Cluster and Primary Socialization Models

The first set of analyses tested the applicability of the peer cluster model and the primary socialization model to different ethnic groups (i.e., White, African American, Latino, Asian, and Southeast Asian). As such, the first set of analyses is designed to

assess how well each theoretical model fits the observed data in each ethnic group. The subsequent step in these analyses included a comparison of alternative models (primary socialization versus peer cluster) and an empirical evaluation of which model demonstrates the best fit to these data. These latter analyses were also conducted separately by each ethnic group. The alternative models represent different theoretical specifications for how the study variables relate to one another and the most well-fitting model provides evidence regarding which theoretical model is best supported by the data.

As shown in Table 4, fit indexes from the SEM analyses indicated that the peer cluster model had a poor fit in the White, African American, and Latino samples, whereas it demonstrated good fit in the Southeast Asian sample and acceptable fit in the Asian sample. This suggested that the proposed processes (that parenting, neighborhood cohesion and school connection influence adolescent substance use only indirectly via peer substance use) of the peer cluster model did not adequately represent the data for the White, African American, and Latino samples but did represent the data for the Southeast Asian and Asian samples in the current study. All fit indexes suggested a good or acceptable fit of the primary socialization model in all of the five ethnic groups, suggesting that the associations between contextual influences and adolescent substance use proposed by the primary socialization model adequately represented the data of all ethnic groups in the current sample.

An examination of the difference in chi-square ($\Delta \chi^2$) and Δ CFI between the peer cluster model and primary socialization model indicated that the primary socialization model demonstrated a superior fit in the White, African American, Latino, and Asian

groups, with $\Delta \chi^2$ being significant and ΔCFI greater than .01 (see Table 4). However, the two models demonstrated a statistically equivalent fit for the Southeast Asian group ($\Delta \chi^2$ was not significant and ΔCFI was equal to .01). The better fit of the primary socialization model compared to peer cluster model in the White, African American, Latino, and Asian groups suggested that contextual influences on adolescent substance use were better described as both direct and indirect than only indirect via peer influence in these groups. Specifically, for adolescents from these ethnic groups, parenting and school connection should be specified as directly linked to adolescents' substance use, as well as associated with peer substance use, which relate to adolescent substance use. For Southeast Asian adolescents, comparable fit for the peer cluster model and the primary socialization model indicated that whether having the direct links from parental and school influence to adolescent substance use in the model or not did not affect the model fit. This suggested that direct influence of parenting and school connection might exist but were trivial, compared to the indirect influences.

Moderation Effects of Ethnicity on Contextual Influences

The second goal of this study was to examine whether ethnicity moderated the associations between contextual influences and adolescent substance use. The current study considered the White group (since it had the largest sample size) as the reference category to examine differences in path coefficients by comparing the White to each ethnic minority group. This was reasonable given that White adolescents are most likely to be the adolescents whose behaviors that peer cluster theory and primary socialization theory were developed to explain, and that the White group has been studied more than

each of the other groups.

SEM multi-group analyses with nested models were conducted to consider the differences in contextual influences between the White group and each of the ethnic minority groups. Results revealed that there were significant $\Delta \chi^2$ for the comparison of the constrained model and the baseline model when comparing the African American, Latino, and Southeast Asian groups to the White group, indicating that there were statistically significant differences in path coefficients between each of these minority groups and the White group. However, the $\Delta \chi^2$ was not significant between the constrained model and the baseline model when comparing the Asian group with the White group ($\Delta \chi^2 = 19.351$, $df = 11$, $p = .055$). This suggested that all of the path coefficients in the baseline model were similar or not statistically different for Asian and White adolescents.

Critical ratios statistics (available in Amos output) were examined to evaluate the statistical significance of differences in specific paths when comparing White adolescents and African American, Latino, Southeast Asian adolescents to determine which specific associations differed between the White and each of the ethnic minority groups. Critical ratios tests in AMOS provide information regarding whether or not two unstandardized coefficients (in this case the regression coefficients across groups) are statistically significantly different (critical ratios [C.R.] should be more extreme than 1.96 or -1.96). As shown in Table 5, results revealed that there were significant differences between the African American and the White groups in the paths from neighborhood cohesion to parental involvement ($B = .42$ for White, $B = .19$ for African American, C.R.

= -2.43) and school connection ($B = .44$ for White, $B = .32$ for African American, $C.R. = -2.32$), from school connection to peer substance use ($B = -.35$ for White, $B = .05$ for African American, $C.R. = 3.68$), and from peer substance use to adolescent substance use ($B = .35$ for White, $B = .19$ for African American, $C.R. = -4.33$). These results suggest that the associations between neighborhood cohesion and parenting and school connection, the association between school connection and peer substance use, and the influence of peer substance use on adolescent substance use appeared to be stronger for Whites compared to African American adolescents.

Findings also pointed to significant differences in path coefficients when comparing the Latino and the White group. The negative association between parental disapproval and peer substance use was less strong for Latino adolescents compared to White adolescents ($B = -.24$ for White, $B = -.05$ for Latino, $C.R. = 2.79$). Similarly, peer substance use was more strongly positively associated with adolescent substance use for the White compared to the Latino group ($B = .35$ for White, $B = .19$ for Latino, $C.R. = -3.35$). However, the influence of parental involvement on adolescent substance use was stronger for Latino than it was for White adolescents ($B = -.08$ for White, $B = -.25$ for Latino, $C.R. = -3.56$). Taken together, these results indicated that peer influences on adolescent substance use were stronger for White adolescents compared to the Latinos. However, variations in parental influences between the White and Latino adolescents were somewhat inconsistent. While the influence of parental disapproval was stronger for the Whites, the influence of parental involvement was stronger for Latinos, suggesting that ethnic difference in parental influence might depend on the aspect of parenting

examined.

When comparing the Southeast Asian to the White group, critical ratios indicated that the association between parental disapproval and peer substance use was stronger for Whites than for Southeast Asian adolescents ($B = -.25$ for White, $B = -.06$ for Southeast Asians, $C.R. = 2.35$). Similarly, the association between peer substance use and adolescent substance use was also stronger for White adolescents compared to the Southeast Asians ($B = .35$ for White, $B = .23$ for Southeast Asians, $C.R. = -2.60$).

Overall, the findings of multi-group analyses indicated that peer substance use was significantly associated with greater adolescent substance use across all ethnic groups; however, the influence of peer substance use was not as strong for African American, Latino, and Southeast Asian adolescents compared to Whites. In general, parental involvement and parental disapproval of substance use were negatively associated with peer and adolescent substance use. However, these associations varied across ethnic groups. Parental disapproval was significantly associated with lower peer substance use for White, African American, and Asian adolescents, but not for Latinos and Southeast Asians. Parental involvement was more strongly associated with adolescent substance use for Latinos compared to Whites. School connection was associated with lower peer and adolescent substance use for adolescents from all groups except the African American group. Neighborhood cohesion was negatively associated with peer substance use and positively related to parental involvement, parental disapproval, and school connection across all ethnic groups. However, these neighborhood influences were weaker for African Americans than for White adolescents.

CHAPTER V

DISCUSSION

Summary of Results

The overarching goals of the current study were 1) to develop, evaluate, and compare the applicability of the peer cluster model and the primary socialization model to different ethnic groups and 2) to examine the moderation effects of ethnicity in associations between contextual influences (i.e., parents, peers, school, and neighborhood) and adolescent substance use. Results from this study indicated that both the peer cluster model and the primary socialization model fit well in the Southeast Asian and Asian groups, but only the primary socialization model demonstrated a good fit for the White, African American, and Latino samples. When compared, the primary socialization model demonstrated better fit than the peer cluster model for all ethnic groups except for the Southeast Asian group.

Peer cluster theory and primary socialization theory are frequently used to explain the processes of multiple contextual influences on adolescent substance use. Given that these theories were originally developed and validated with relatively homogenous White sample, it is mostly unknown whether they are applicable to other ethnic groups. Moreover, few studies have included both theories within the same study to evaluate which theory provides a better explanation for the processes of influences on adolescent substance use. To bridge this gap in the literature, the current study developed two

theoretical models with relevant measures of contextual influences based on peer cluster theory and primary socialization theory, and evaluated both models with a multi-ethnicity sample.

In terms of moderation effects of ethnicity, results revealed differences in associations between contextual influences and adolescent substance use when comparing the White group and each other ethnic group. Specifically, findings indicated that the positive association between peer substance use and adolescent substance use was stronger for Whites compared to African American, Latino, and Southeast Asian adolescents. The negative association between parental involvement and adolescent substance use appeared to be stronger for Latino adolescents compared to Whites. Parental disapproval was more negatively associated with peer substance use for White adolescents than for Latino and Southeast Asian adolescents. In addition, results suggested that negative association between neighborhood cohesion, school connection and peer substance use, and the positive association between neighborhood cohesion and parental involvement, were weaker for African American adolescents than for Whites.

Although peer cluster theory does not specify ethnic variations in the processes of contextual influences on adolescents, primary socialization theory posits that socialization processes are imbedded in cultural context. Thus, culture and ethnicity may influence the processes related to adolescents' substance use according to this latter theory. For example, peer influence on adolescent substance use might be salient in one ethnic group but not as salient in other groups. The findings of ethnic variations in associations among parental, peer, school, and neighborhood influences and adolescent

substance use in the current study provided support for this proposition specifically associated with primary socialization theory, and consequently, demonstrated the importance of examining ethnic variations using multi-ethnicity sample in studies of contextual influences on adolescent substance use.

Comparing the Peer Cluster and Primary Socialization Models

While the primary socialization model demonstrated good fit in all ethnic groups, the peer cluster model was only found to fit in the Southeast Asian and Asian subsamples. These findings demonstrated that the primary socialization model better represented the processes of contextual influences on adolescent substance use with the data in the current study. One important implication of these results is that peer influence is probably not the only direct influence on adolescent substance use as peer cluster theory suggested. Also, contextual influences other than peer influence not only influence adolescent substance use indirectly via peer influence, but also have direct effects. That is, rather than suggesting that parental, school, and neighborhood influences are only indirect (and peers are the only direct influence), findings from this study suggest that other contextual influences (i.e., parental and school influences), rather than only having an impact through peers, also should be considered as direct influences.

When compared to the primary socialization model, the peer cluster model demonstrated a poorer fit for White, African American, Latino, and Asian adolescents but demonstrated a superior fit for Southeast Asian adolescents, suggesting that peer cluster theory may be most applicable when describing processes of contextual influences on substance use for Southeast Asian adolescents specifically. Such a conclusion contradicts

the expectation that peer cluster theory is most applicable to White adolescents, however. One possible explanation for this unexpected findings is that the parenting factors considered in this study may capture elements of the parenting or parent–adolescent relationship that are not as salient for Southeast Asian adolescents. For example, parental support, parental knowledge, and authoritative decision making have been shown to be less salient parenting constructs for Hmong adolescents than for European American adolescents (Supple & Small, 2006). For Southeast Asian adolescents, parenting practices such as ethnic identity socialization, respect for parental authority, and filial obligation socialization might be more relevant in influencing adolescent development. As such, relying on limited aspect of parental involvement and disapproval might have resulted in trivial direct associations between these constructs and adolescent substance use, which in turn lead to support (adequate fit) of the peer cluster model (which specifies no direct associations between parental influence and substance use).

The finding that peer cluster model did not fit well in the White group may strike some as surprising given that this theory was originally developed to apply to majority culture U.S. adolescents. These findings are generally consistent with the empirical literature and lend further support to primary socialization theory and also suggest that direct effects are likely from parental and school influences as well as from peers. For example, parental monitoring, parental support, parental involvement, and parental disapproval of substance use have been shown to be directly associated with adolescent substance use (Barnes et al., 2000; Mayberry et al., 2009; Pilgrim et al., 2006) while

perceived connection to school has also been shown to have direct associations (Catalano et al., 2004).

Race/Ethnicity Differences in Contextual Influences on Adolescent Substance Use

Findings of the current study indicated that there were significant differences in associations between contextual influences and adolescent substance use across the White and ethnic minority groups. Moderation effects by ethnicity may result from different cultural values and beliefs that adolescents are both exposed to and possess and point to experiences unique among ethnic groups that modify the impact of socialization sources. As primary socialization theory suggested, culture shapes the primary socialization processes. Thus although peer clusters, parents, and school are all considered as primary socialization sources, which of these primary socialization sources is most influential on adolescent substance use might be different across cultures.

Peer and Parental Influences on Adolescent Substance Use across Ethnic Groups

Findings indicated that the association between peer substance use and adolescent substance use was stronger for White adolescents than for African American, Latino, and Southeast Asian adolescents. Findings also suggested that the negative association between parental involvement and adolescent substance use was stronger for Latino adolescents than for Whites, whereas the association did not differ between the Whites and African American, Asian, and Southeast Asian adolescents. The first implication of these findings are that, in reference to peer influences on adolescent substance use, the notion that peers exert the strongest (or a stronger) influence on substance use may be

most applicable to White adolescents (and possibly Asians), but not necessarily to African Americans, Latinos, and Southeast Asians.

The moderation effects of ethnicity suggested that while peers play strong roles in influencing White adolescents' substance use, the influence of peers are less salient for African American, Latino, and Southeast Asian adolescents. These findings are consistent with previous research that has also suggested that peer influences (peer use, associating with drug using peers) are more strongly associated with substance use among White adolescents and less strongly related for African Americans (Brown et al., 2004; Newcomb & Bentler, 1986). One possible explanation for such findings is that African Americans are less vulnerable to modeling effects of peers (Griesler & Kandel, 1998; Newcomb & Bentler, 1986). Also, for African American adolescents, exposure to substance-using models might have occurred at a younger age, as such they might have developed a coping response to peer substance use prior to the critical period of risk for substance use during their adolescence (Newcomb & Bentler, 1986).

The finding that parental involvement is more negatively associated with adolescent substance use for Latinos than for Whites was also consistent with previous empirical findings. For example, using data from the National Longitudinal Study of Adolescent Health, Bronman et al. (2006) found that the relationship between parenting and substance use was more strongly negative for Latino adolescents, than for African American and White adolescents. Parental monitoring, warmth, support and acceptance seemed to exert a stronger impact in reducing substance use for Latino adolescents than for adolescents from other ethnic groups. The particularly strong influence of parenting

in reducing substance use for Latino adolescents could be explained by the unique cultural values of the Latinos. Familism, as defined by Harris (1980), refers to “the overriding importance of one’s family over and above individual needs and concerns”. Latinos are generally found to have higher levels of familism attitudes when compared to Whites, and strong family ties are particularly important for Latinos (Harris, 1980; Sabogal et al., 1987). As such, for Latino adolescents, a strong connection to parents (perceiving parents as supportive, warm, and monitoring) might have a stronger impact on their behaviors generally and also may make Latino adolescents particularly influenced by parenting that reduces risk of substance use.

The weaker influence of peer substance use on Latino adolescents might be explained, at least partially, by the relatively stronger influence of parents. Research has suggested that immigrant Latino parents living in the United States try harder to endorse their cultural values to their adolescents, compared with Latino parents who live in their countries of origin (Halgunseth, Ispa, & Rudy, 2006). To better endorse cultural values, Latino parents in the United States may enforce higher level of monitoring and control, and more restrictions on their children’s extra-familial contact (e.g., limit children’s time spent with peers) (Bacallao & Smokowski, 2007; Halgunseth et al., 2006). As such Latino parents might protect their adolescents from peer influences that would otherwise promote problem behaviors including substance use. Moreover, the familism value in Latino culture has been suggested as a protective factor against negative peer influence such that the influence of associating with deviant peers on adolescents’ problem behaviors became weaker when adolescents had higher levels of familism (Roosa et al.,

2011). Thus, the cultural value of familism might help explain why Latino adolescents are not as strongly influenced by associating with substance-using peers.

Results also indicated that the association between parental disapproval and peer substance use was weaker for Latino and Southeast Asian adolescents than for White adolescents. This association being weaker for Latino adolescents might seem contradictory to the prior argument that parental influence is stronger for this group. However, perhaps for the Latinos who emphasize so much on family ties and connections, the process that parents socialize their children against substance use lies mainly on maintaining a close, warm, and supportive relationship with them, instead of conveying their attitudes of disapproval of substance use directly. As for the Southeast Asian adolescents, research has suggested that parent–adolescent relationships may be more typically characterized by less open communication and also less parental awareness of substance use as a relatively normative aspect of adolescence (Supple, McCoy, & Wang, 2010; Xiong, Tuicompee & Rettig, 2008). Consequently, viewed through a cultural lens, many Southeast Asian parents would be unlikely to convey disapproval of substance use both because of relatively low open communication and also because of a lack of familiarity with drug use as a problem of adolescence. Moreover, previous studies with Hmong adolescents (who comprise the majority of the Southeast Asian sample in this study) have suggested that Hmong parents tend to avoid outward expressions of love and affection and also are less aware of their child’s free-time activities and, as a result, parenting tends to be less strongly related to developmental outcomes for that group (Supple & Small, 2006; Xiong, Detzner, & Cleveland, 2004). Southeast Asian

adolescents in the current study reported a significant lower level of parental involvement than their White counterparts (see Table 1) and without a high level of parental involvement, it is not surprising that parental disapproval was not influential in protecting Southeast Asian adolescents from associating with substance-using peers.

Race/ethnicity Differences in School Influences

No moderation effect of ethnicity was found on the direct influence of school connection on adolescent substance use. Consequently, it appears that across ethnic groups, a positive sense of connection to school functions similarly as a protective factor in reducing adolescent substance use. There were moderation effects suggesting that the association between school connection and peer substance use was weaker for African American adolescents than for Whites. While school connection has similar associations with adolescents' own substance use behaviors, there may be differences across African Americans and White students in how school connection influences associating with drug-using peers. These results suggest that for adolescents who feel a strong connection to school, trust teachers, and feel safe at school there is a lower likelihood of associating with drug using peers, however, this association does not seem to hold for the African Americans in this sample.

Overall, for most of the adolescents in this sample, findings suggest that a positive sense of school is related to less association with drug-using peers, and may point to a possible indirect pathway for a school influence on drug use. That is, the direct associations from school connection to individual use were very small; however, school connection may play a role in shaping who the adolescent socializes with. For example,

an adolescent who feels disconnected and lacks supports in school may associate with more deviant peers who use drugs and alcohol and, in turn, those associations may increase one's own use. Such a line of reasoning, however, does not apply to African Americans. Because such a finding (linking school connection to peer drug use) is rare in the literature, there are only speculative arguments for why African Americans' associations with drug-using peers are less strongly influenced by school connections. One possible explanation is that African American adolescents may develop norms around substance use in their neighborhoods and not necessarily at school. Compared to White adolescents, African American adolescents are more likely to live in neighborhoods where there are lower levels of neighborhood cohesion (which is consistent with the data in the current study, see table 1), lower socioeconomic status, and more problem behaviors such as substance use. Residing in relatively disadvantaged neighborhoods, African American adolescents may have more exposure to peers who use substance and thus are more likely to associate with substance-using peers in the neighborhoods. While there is little previous literature to explain this moderator effects, it appears that the protective aspect of school connection in reducing associations with deviant peers, did not apply to the African Americans in this sample.

Race/ethnicity Differences in Neighborhood Influences

In this study, neighborhood cohesion was specified as only have indirect association with adolescent substance use via peer substance use, parental involvement, parental disapproval of substance use, and school connection. Results indicated that neighborhood cohesion was negatively related to peer substance use and positively

associated with parenting and school connection across ethnic groups. Adolescents' positive sense of neighborhood cohesion functioned as a protective factor against substance use through its effects on reducing adolescents' associations with substance-using peers, and enhancing parenting and adolescents' sense of connection to school. Consistent with the tenets of primary socialization theory, neighborhood cohesion can play a role in adolescent outcomes, by either supporting or undermining the quality of school and family supports. While no difference in neighborhood influences were found between the White and the Latino, Southeast Asian, and Asian groups, differences existed between White and African American adolescents. The association between neighborhood cohesion and parental involvement, as well as the association between neighborhood cohesion and school connection, were stronger for the Whites than for African American adolescents.

Previous research has suggested that White adolescents and parents are more vulnerable to neighborhood risk and that the relationship between neighborhood quality and adolescent outcomes is stronger for White adolescents than for African American adolescents (Nowlin & Colder, 2007). One possible explanation for these previous findings (and those in the current study) is that due to racial differences in socioeconomic status and in residential segregation, African American families may reside more often in high-risk neighborhoods and, as a result, have less sensitivity to positive aspects of the neighborhood (such as cohesion). Compared to their White counterparts, African American adolescents are more likely to live in neighborhoods marked with low levels of cohesion and high levels of risk. This is particularly true of the metropolitan area from

which these data were generated. That is, the African American students are much more likely to live in low-income families and to be residentially segregated. As such, African American families may rely less on neighborhoods as a source of support and, consequently, while significant, the association between neighborhood cohesion and better parenting behaviors, is not as strong.

Strengths and Limitations

The current study makes significant contributions to the literature in several aspects. First of all, the current study is the first to evaluate and compare peer cluster theory and primary socialization theory across multiple ethnic groups within the same study. This approach provided insights regarding the applicability of the two theories in multiple ethnic groups, especially to typically understudied groups of Asians and Southeast Asians. Results indicated that processes associated with contextual influences on adolescent substance use might be better explained by primary socialization theory compared to peer cluster theory and that such a conclusion generalized across ethnic groups (probably except for the Southeast Asian group).

Secondly, including peers, parental, school, and neighborhood influences in one model provides a more comprehensive examination of how contextual influences impact adolescent substance use. This is unique given that most previous studies failed to consider multiple contexts simultaneously within the same study to understand adolescent substance use (Flannery, Vazsonyi, & Rowe, 1996).

In addition, the examination of moderation effects of ethnicity on the associations between contextual influences and adolescent substance use provided further insights into

understanding ethnic variations in adolescents' substance use. Results revealed stronger peer influence on substance use for Whites than for African American, Latino, and Southeast Asian adolescents, stronger neighborhood and school influence for Whites than for African American adolescents, weaker influence of parental involvement for Whites than for Latinos, and a stronger association between parental disapproval and peer substance use for Whites than for Latinos and Southeast Asians. These findings highlighted the importance of considering ethnic variations when examining processes influencing adolescents' substance use behaviors.

There are several important limitations of the current study. First, this study used a cross-sectional design which prevents drawing conclusions regarding directions of effects. For example, some research has suggested that rather than peers influencing drug use, drug using adolescents seek out similar peers (Farrell & Danish, 1993). Moreover, parenting behaviors may be an outcome of adolescent substance use rather than a predictor. Parents who find out that their children are using drugs may adjust their parenting practices (or start to convey their disapproval) as a reaction to this drug use. The current study is not able to address such issues and, consequently, future studies using longitudinal designs are warranted to address this issue.

Second, that the sample was a regional sample recruited from only one county (Dane county, Wisconsin) limited the generalizability of the results. Although these data were representative of adolescents from Dane county and includes relatively large subsamples of ethnic minority adolescents, it might not be appropriate to generalize the results to other parts of the country which have different social-economic status and

ethnicity or race compositions. In particular, the large Hmong population in Wisconsin generally and in Dane County specifically means that findings related to Southeast Asians are skewed towards this particular cultural group. The African American sample in this study is also likely high risk given high rates of family poverty, school dropout, and incarceration of African American males in this county overall (Gleason, 2003b).

Third, data were collected exclusively via adolescent reports, which might result in common method variance. This issue might be especially salient for adolescent report of peer substance use, given that adolescents who use drugs might be more likely to perceive their peers as using drugs (Bauman & Ennett, 1996). However, research has provided greater evidence of peer influence effects rather than selection effects in explaining associations between peer use and adolescents' own use (Wills & Cleary, 1999) and thus the use of adolescent report of peer substance use in the current study is justified. It is also possible that other studies linking parenting (i.e., parental involvement, parental disapproval of substance use) reported by parents themselves might present different patterns of associations with substance use reported by adolescents, compared with the results obtained in the current study where both parenting and substance use were reported by adolescents.

Fourth, some of the measures used in the current study might lack validity and reliability. The current study was a secondary data analysis and all the measurement scales were developed based on exploratory factor analysis with relevant items selected from the larger study. All the multi-item measures (measures of parental involvement, neighborhood cohesion, school connection, and adolescent substance use) demonstrated

adequate reliability with Cronbach's alphas ranging from .70 to .85. However, the measures of peer substance use and parental disapproval both had only two items. With two-item scales we might not have measured these two constructs well with adequate validity and reliability. For example, the current measurement strategy (if it does not assess peer influence adequately) may have underestimated the effect size related to peer influences on substance use (Oetting, personal communication, 2010). Although this issue was constrained by the nature of the current study (being a secondary data analysis), future studies with refined measures, especially for these two constructs, are warranted to replicate the models in the current study.

Fifth, while subsamples of White, African American, Latino, Southeast Asian, and Asian adolescents were included to examine race/ethnicity variations in contextual influences on adolescent substance use, it should be noted that there were probably also variations within each of the subsample, especially the Latino, Southeast Asian and Asian samples. Latinos from different countries of origin, for example, Mexicans and Puerto Ricans, might have different cultures and thus contextual influences on substance use might vary for Mexican and Puerto Rican adolescents. The current study was not able to examine such variations within ethnic groups because country of origin was not reported in the survey.

Finally, although the focus of the current study was in the direct versus indirect effects of contextual influences on adolescent substance use, it should be noted that this study did not consider other potential associations between contextual influences and adolescent substance use. For example, research has suggested that associations between

peer substance use and adolescent substance use increased with high level of parent-adolescent distress (Farrell & White, 1998). Adolescents' positive sense of neighborhood cohesion was also found to moderate the association between peer substance use and adolescent use of tobacco, alcohol, and marijuana (Mayberry et al., 2009). Future studies can consider interactions of contextual influences in affecting adolescent substance use.

Conclusions and Implications

Findings from the current study suggested superior applicability of the primary socialization model compared to the peer cluster model across ethnic groups and highlighted the importance of using multi-ethnicity samples to examine ethnic variations in associations among contextual influences and adolescent substance use. One implication of these findings is that instead of only focusing on family and peer contexts, substance use prevention efforts may also promote adolescents' sense of connection to school and neighborhood cohesion, which also play a protective role (although mostly indirect via peer associations) in reducing adolescent substance use. In addition, results also suggested that substance use preventions need to target different aspects of risk or protective contextual influences for adolescents from different ethnic groups. For example, because peer substance use was found to be the strongest direct association with substance use for White and Asian adolescents whereas it appeared to be less salient for African American, Latino, and Southeast Asian adolescents, substance use preventions that focus on adolescents' peer associations might be most effective in reducing substance use for White and Asian adolescents. However, for Latino adolescents, preventions that target at promoting adolescents' positive relationship with parents might

be more effective given that parental involvement was found to be the strongest influence on substance use for Latino adolescents.

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Figure 1

The Peer Cluster Model

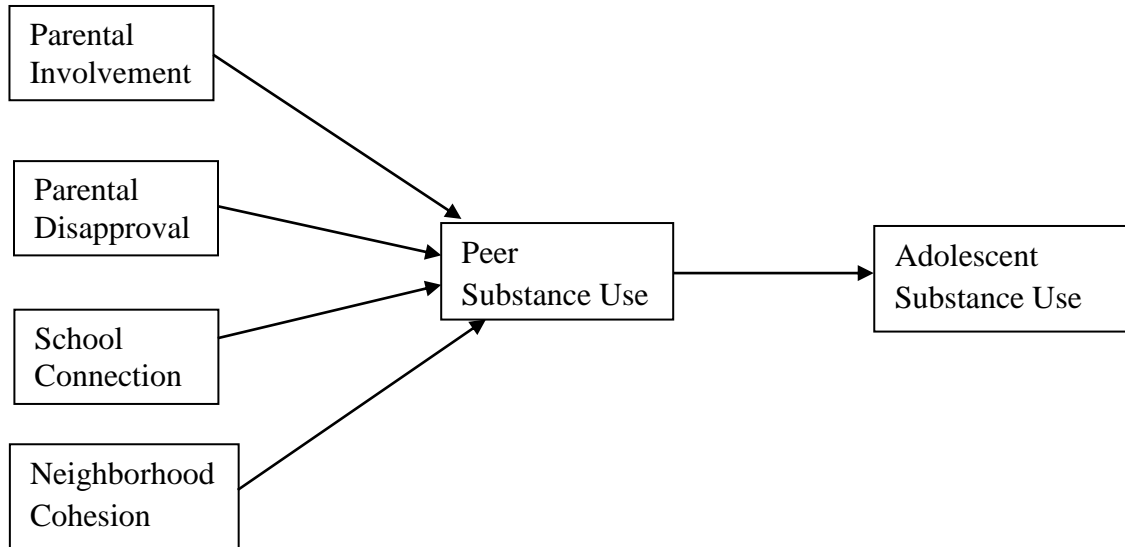


Figure 2

The Primary Socialization Model

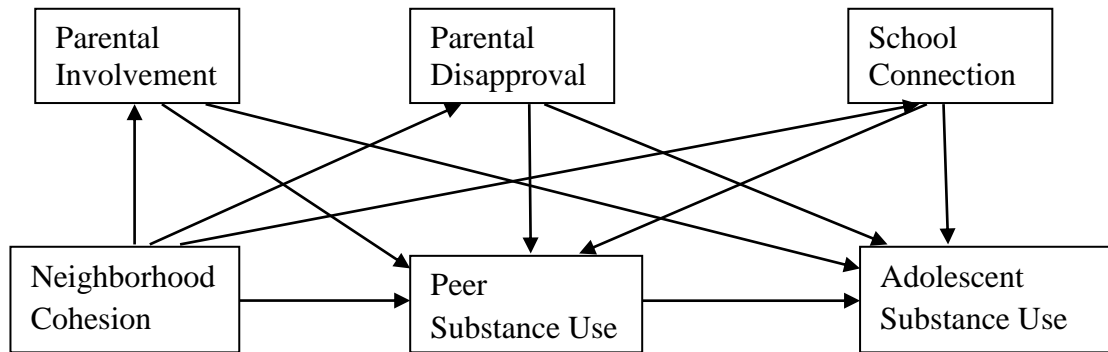


Table 1

Descriptive Statistics of the Total Sample and Sample by Race/Ethnicity

	Total Sample (n=5,992)	White (n=5,185)	Latino (n=160)	African American (n=330)	Asian (n=179)	Southeast Asian (n=138)
Age	14.85 (1.72)	14.88 (1.73)	14.73 (1.65)	14.53 (1.65) *	14.66 (1.86)	14.84 (1.72)
Mother education	3.06 (1.71)	3.13 (1.68)	2.20 (1.93)*	2.48 (1.62)*	3.43 (2.00)	1.40 (1.51)*
Father education	3.29 (1.83)	3.35 (1.80)	2.24 (1.97)*	2.60 (1.78)*	4.01 (1.97)*	2.41 (1.47)*
Peer substance use	1.14 (.98)	1.15 (.99)	1.20 (.93)	1.17 (.93)	.79 (.88)*	1.26 (1.02)
Parental involvement	3.22 (.79)	3.27 (.75)	2.99 (.94)*	2.84 (1.04)*	3.16 (.81)	2.53 (1.00)*
Parental disapproval	3.26 (.94)	3.26 (.92)	3.26 (1.08)	3.23 (1.10)	3.38 (.93)	3.12 (1.08)
School connection	1.83 (.54)	1.83 (.54)	1.86 (.56)	1.87 (.62)	1.93 (.45)	1.75 (.63)
Neighborhood cohesion	1.88 (.56)	1.91 (.54)	1.76 (.62)*	1.67 (.69)*	1.84 (.55)	1.56 (.65)*
Adolescent substance use	.58 (.61)	.60 (.61)	.54 (.59)	.56 (.59)	.34 (.51)*	.45 (.57)*

Note. * $p < .05$: mean is significantly different from that of the White group.

Standard deviations are in parenthesis.

Table 2

Factor Loadings for Exploratory Factor Analysis with 27 Items

Items	Factor Loadings						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
I tell my parents whom I'm going to be with before I go out	.789						
I talk to my parents about the plans I have with my friends	.774						
When I go out my parents ask me where I'm going	.743						
My parents usually know what I am doing after school	.740						
My parents are there when I need them	.601						
My Parents care about me	.580						
I believe I am getting a good, high quality education at my school		.812					
I am getting the education and skills I need to be successful after I graduate from high school		.792					
My teachers care about me and how well I do in school		.613					
I enjoy going to school		.595					
The rules at my school are enforced fairly		.572					
Generally, counselors, nurses, social workers, and psychologists at my school are helpful when I need them		.539					
Kids at school treat me unfairly because of my race or ethnicity			.807				
The teachers in my school			.781				

sometimes treat me unfairly because of my race		
People sometimes treat me unfairly because of my race or ethnicity	-0.756	
There are places in my school where I don't feel safe	0.500	
If I were doing something wrong, adults in my community would probably tell my parent(s)		0.699
Adults in my community keep an eye on what teens are up to		0.687
People in my community know and care about each other.		0.651
If I had a problem, there are neighbors whom I could count on to help me		0.634
My neighborhood is a safe place to live		0.459
Most of my friends do not drink or do drugs		0.871
Most of my friends do not smoke cigarettes or chew tobacco		0.859
My parent(s) think it is wrong for teens my age to drink alcohol		0.904
My parent(s) think it is wrong for teens my age to smoke/chew tobacco		0.893
Other harassment from student at school		0.781
Sexual harassment from student at school		0.755

Note. Only factor loadings over .40 are presented.

Table 3

Factor Loadings for Exploratory Factor Analysis with 9 Substance Use Items

Items	Factor loadings	
	Normative	Illicit
Hard liquor use past year	.870	
Beer and wine use past year	.861	
Smoke past year	.799	
Marijuana use past year	.781	
Stimulant use past year		.710
Cocaine use past year		.693
Hallucinogen use past year		.692
Unauthorized prescription use past year		.618
Inhalant use past year		.557

Note. Only factor loadings over .40 are presented.

Table 4

Model Fit Statistics Comparing Peer Cluster and Primary Socialization Models across Ethnic Groups

	Fit statistics									
	χ^2	df	<i>p</i>	χ^2/df	CFI	RMSEA	AIC	Fit	$\Delta \chi^2$	ΔCFI
<i>White (n = 5185)</i>										
Peer Cluster Model	296.12	4	<.01	74.03	.95	.12	342	Poor		
Primary Socialization Model	.81	1	.37	.808	1.00	.00	53	Good	295.31 ^a	.05
<i>African American (n = 330)</i>										
Peer Cluster Model	20.20	4	<.01	5.05	.89	.11	60	Poor		
Primary Socialization Model	3.53	1	.06	3.53	.98	.09	56	Acceptable	16.67 ^a	.09
<i>Latino (n = 160)</i>										
Peer Cluster Model	24.41	4	<.01	6.10	.79	.18	70	Poor ^a		
Primary Socialization Model	.07	1	.79	.07	1.00	.00	52	Good	24.34 ^a	.21
<i>Southeast Asian (n = 138)</i>										
Peer Cluster Model	4.70	4	.32	1.18	.99	.04	51	Good		
Primary Socialization Model	.95	1	.33	.95	1.00	.00	53	Good	3.75	.01
<i>Asian (n = 179)</i>										
Peer Cluster Model	7.69	4	.10	1.92	.98	.07	54	Acceptable		
Primary Socialization Model	.01	1	.92	.01	1.00	.00	52	Good	7.68 ^b	.02

Note. ^a $\Delta \chi^2$ was statistically significant, $p < .05$. ^b $\Delta \chi^2$ approached statistical significance, $p = .053$.

Table 5

Unstandardized and Standardized Parameter Estimates across Ethnic Groups

Parameter Estimate	B (β)				
	White (n = 5185)	African American (n = 330)	Latino (n = 160)	Southeast Asian (n = 138)	Asian (n = 179)
Neighborhood cohesion \rightarrow peer substance use	-.20 (-.11)	-.27 (-.19)	-.24 (-.16)	-.00 (-.00)	-.04 (-.02)
Neighborhood cohesion \rightarrow parental involvement	.42 (.30)	.19 (.13)^a	.46 (.30)	.26 (.17)	.59 (.40)
Neighborhood cohesion \rightarrow parental disapproval	.34 (.20)	.23 (.15)	.46 (.26)	.20 (.12)	.09 (.05)
Neighborhood cohesion \rightarrow school connection	.44 (.44)	.32 (.36)^a	.36 (.40)	.28 (.29)	.33 (.40)
Parental involvement \rightarrow peer substance use	-.15 (-.11)	-.04 (-.04)	-.03 (-.03)	-.27 (-.27)	-.16 (-.15)
Parental disapproval \rightarrow peer substance use	-.25 (-.24)	-.27 (-.30)	-.04 (-.05) ^a	-.06 (-.06) ^a	-.29 (-.30)
School connection \rightarrow peer substance use	-.35 (-.19)	.05 (.03) ^a	-.27 (-.17)	-.27 (-.16)	-.45 (-.23)
Peer substance use \rightarrow adolescent substance use	.35 (.57)	.19 (.32)^a	.19 (.30)^a	.23 (.41)^a	.30 (.52)
Parental involvement \rightarrow adolescent substance use	-.08 (-.09)	-.05 (-.09)	-.25 (-.41)^a	-.06 (-.11)	-.04 (-.06)
Parental disapproval \rightarrow adolescent substance use	-.08 (-.12)	-.09 (-.16)	-.01 (-.02)	-.02 (-.04)	-.04 (-.08)
School connection \rightarrow adolescent substance use	-.08 (-.07)	-.09 (-.10)	.04 (.04)	-.09 (-.10)	-.15 (-.13)

Note. Standardized coefficients are in parenthesis. Coefficients $P < .05$ are in boldface. ^a indicates significant difference from the coefficients of the White sample.