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Penny for Your Thoughts? The Protective Effect of Youths' Attitudes Against Drug Use in High-Risk Communities

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Abstract

Individual-level attitudes about drugs are strong predictors of substance use among adolescents, and aggregate-level community norms regarding deviancy and drug use may influence youth attitudes as well as their drug use. This study examined the direct effects of neighborhood norms about deviance, disadvantage, immigrant concentration, and residential stability on youths' attitudes about drug harmfulness as well as their variety of past month substance use. The moderating effect of community norms on the relationship between youth attitudes and drug use was also examined. Results suggest that community norms favorable to deviance and drug use reduced youth's attitudes that drugs were harmful. Further, youth's perceptions of drug harmfulness significantly reduced their substance use in the past month. Neighborhood concentrated immigration also significantly reduced substance use. Finally, living in areas where norms were favorable to deviance enhanced the protective effect of youths' perceptions. Implications for research and substance use prevention strategies are discussed.

Keywords: Drug Use; Youth Attitudes; Neighborhood Norms

Introduction

Youth attitudes regarding the acceptability and/or harms associated with drug use are important factors that can impact their substance use (e.g., Donovan, 2004; Hawkins, Catalano, & Miller, 1992; Johnston, O'Malley, Bachman, & Schulenberg, 2011). In general, studies indicate an inverse relationship between intolerance of drug use and actual use, such that youth who believe that substance use is harmful or who disapprove of drugs are less likely to use drugs, while youth who engage in substance use are more likely to approve of it or believe that it is not harmful (Bachman, Johnston, & O'Malley, 1998; Bachman, Johnston, O'Malley, & Humphrey, 1988), believe many of their peers also use drugs (Johnston et al., 2011; Miller-Day & Barnett, 2004; Simons-Morton et al., 1999), and/or expect positive benefits from its use (Barkin, Smith, & DuRant, 2002; Grube & Agostinelli, 1999; Simons-Morton et al., 1999). Recent data suggests that youth are likely becoming more tolerant and accepting of substance use, with the percentage of 10th and 12th graders reporting that alcohol, marijuana, and tobacco is harmful or poses “great risk” declining from 2009 to 2010 (Johnston et al., 2011). For instance, in 2009, 52% of 12th graders reported that smoking marijuana regularly was very harmful, but only 46% reported similar views in 2010 (Johnston et al., 2011). Additionally, only 25% of 12th graders in 2010 believed that having one or two drinks (beer, wine, or liquor) *nearly every day* was very harmful and less than 40% of 8th graders perceived that smoking up to five cigarettes a day posed a great risk of harm (Johnston et al., 2011).

These trends emphasize the need to understand how youth's attitudes affect their substance use. One somewhat neglected, yet potentially important, area of research is the impact that neighborhood context may have on the development of youth attitudes, as well as the interrelationship between neighborhood context, individual attitudes, and youth substance use.

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Relatively few studies have examined contextual factors that may influence youths' attitudes about drug use (Lipperman-Kreda, Grube, & Paschall, 2010; Thrul, Lipperman-Kreda, Grube, & Friend, 2014). Further, scant research has focused on the contextual factors that may moderate the impact of individual attitudes regarding substance use, although some studies have examined how context may interact with individual-level demographic characteristics such as sex or race/ethnicity (e.g., Lambert, Brown, Phillips, & Ialongo, 2004).

The limited focus on neighborhood context is unfortunate and inhibits our ability to explain the ecological patterning, or differences across social contexts, of youth substance use and their attitudes about substance use. For example, while there does appear to be some research to suggest that substance use varies across neighborhood contexts (Feinberg, Jones, Cleveland, & Greenberg, 2012; Karriker-Jaffe, 2011; Wilcox, 2003), we know much less about why or how neighborhoods impact substance use than we know about how neighborhoods influence other adolescent problems (e.g., delinquency). A better understanding of the contextualization of substance use can help inform prevention and/or intervention efforts designed to reduce substance use, especially those that can simultaneously address ecological and individual influences on drug use (Fagan & Hawkins, 2012; Flay, 2000). We expand upon this line of research in the current study and examine the potential for neighborhood factors to influence youths' perceptions of the harmfulness of drug use, as well as to moderate the relationship between youths' attitudes regarding substance use and their own substance use.

Youth Attitudes and Substance Use

Explanations for the relationship between individual attitudes about drug use and actual engagement in substance use are plentiful. Social learning theory (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979) posits that youth who are exposed to others who use drugs or who perceive

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(perhaps erroneously) that their friends or close acquaintances use drugs are at greater risk for substance use themselves (Donovan, 2004; Hawkins et al., 1992; Miller-Day & Barnett, 2004; Patel & Fromme, 2010; Thrul et al., 2014). When drug use is modeled, reinforced, and accepted by others in their peer or intimate groups, youth are more likely to emulate this behavior and/or believe that it is acceptable and not particularly harmful (Bandura, 1979; Kosterman, Hawkins, Guo, Catalano, & Abbott, 2000; Zimmerman & Vasquez, 2011). Holding beliefs that drug use is “okay,” acceptable, beneficial, or widespread can lower inhibitions against drinking and drug use and also rationalize such behavior (e.g., Sykes & Matza, 1957).

Borrowing from rational choice perspectives, substance use may also be influenced by youths' perceptions of the potential benefits and consequences of using drugs, so that when positive benefits are anticipated (e.g., increased social acceptance), drug use is more likely, and when negative consequences are anticipated (e.g., harmful physical effects), drug use is less likely (e.g., Grube & Agostinelli, 1999; Patel & Fromme, 2010; Simons-Morton et al., 1999).¹ For instance, Barkin et al. (2002) found that seventh graders who held positive beliefs about drug use (e.g., that kids who smoke have more friends) were more likely to report using a variety of drugs, including tobacco, alcohol, and marijuana, in the past month than students who possessed more negative beliefs about drug use. Fisher and colleagues (2007) found that positive views regarding alcohol use predicted the initiation of alcohol use as well as binge drinking among a national sample of adolescents, even when controlling for many other individual, peer, and family risk and protective factors. Similarly, Simons-Morton et al. (1999) found that expectancies about the effects of alcohol had the greatest impact on youths' past month drinking,

¹ In the substance use literature, this process is also often referred to as social “expectancies” regarding substance use (Patel & Fromme, 2010).

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and that youth who perceived that many or most of their peers also drank alcohol were significantly more likely to report drinking.

The effect of youths' attitudes and/or expectancies on their substance use appears to be consistent across much of the literature that has examined this relationship, including studies using both cross-sectional (Barkin et al., 2002; Simons-Morton et al., 1999) and longitudinal (Kosterman et al., 2000; Smith, Goldman, Greenbaum, & Christiansen, 1995) data. Youth attitudes and/or expectancies regarding substance use have been shown to predict the initiation of alcohol and drug use (Fisher et al., 2007) and the prevalence or frequency of substance use in both the past year (Grube & Agostinelli, 1999) and past month (Barkin et al., 2002). Further, these relationships have held even after controlling for other strong predictors of adolescent substance use (Barkin et al., 2002; Gibbons et al., 2004; Tucker, Pollard, de la Haye, Kennedy, & Green, 2013), such as use by family members and/or peers (e.g., Akers, 1985; Zimmerman & Vasquez, 2011).

Neighborhood Context, Norms, and Substance Use

Despite the convincing evidence regarding youths' attitudes and substance use, it is currently unclear how individual attitudes about substance use and their impact on youths' drug use behave when neighborhood context is taken into account. Borrowing from the social disorganization literature, which suggests that neighborhood norms can influence beliefs about the acceptability of violence and/or its usefulness under certain structural conditions (e.g., Anderson, 1999; Berg, Stewart, Brunson, & Simons, 2012; Kirk & Papachristos, 2011; Sampson & Bartusch, 1998), we might posit that neighborhood norms can influence attitudes about drug use as well. That is, youth attitudes regarding substance use may be at least partially influenced by neighborhood norms because youth may be exposed to a variety of beliefs regarding

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substance use – ranging from positive or condoning of drug use to negative or unaccepting of use (Berg et al., 2012) – and depending on their neighborhood, youth may come to believe that substance use is acceptable, normative, or useful in certain circumstances (Anderson, 1999; Kirk & Papachristos, 2011). Neighborhood norms may also be linked to higher youth substance use as well. Norms may increase perceptions among youth that drugs are acceptable to use, that substance use is normative, and/or that drug use will not result in any harms or consequences (Sampson & Bartusch, 1998; Sampson & Wilson, 1995; Stewart & Simons, 2006). However, neighborhood norms might also be related to *lower* substance use if youth in the neighborhood “push back” against these views. That is, youth living in neighborhoods that are more tolerant or accepting of substance use may assert the opposing viewpoint as a “pushback” or “novel” reaction (see Zimmerman & Messner, 2011) to the community view because they have been exposed to the harsh realities of drug use within their communities (e.g., adult drug dependence, drug-related violence and disorder). Indeed, scholars have noted such a reaction against the crack cocaine epidemic among inner city youth, who began to shun this drug and scorned “crack heads” in the neighborhood (Golub & Johnson, 1997; Hamid, 1992). These youth eventually preferred other, more mild forms of drugs over cocaine because of the toll the epidemic had taken in their communities (Hamid, 1992). Thus, teenagers growing up in areas that are more tolerant of drugs may come to believe more strongly that drugs are harmful, and this belief may *protect* them from engaging in substance use.

While community norms hold great potential, theoretically, to explain youth attitudes and substance use, little research has examined these interrelationships. Further, the existing research in this area has faced methodological limitations. For instance, studies of youth substance use often utilize samples of school children clustered within schools, and use this context, rather than

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neighborhoods, as the aggregate units (Cleveland, Feinberg, & Greenberg, 2010; Ennett, Flewelling, Lindrooth, & Norton, 1997). In addition, studies may include too few individuals per neighborhood, aggregate youth responses in order to approximate contextual variables (a technique which can lead to same source bias), or focus simply on structural but not social (e.g., norms, residents' interactions) characteristics of neighborhoods (Gardner, Barajas, & Brooks-Gunn, 2010). Indeed, the multilevel research that has centered on neighborhood effects on adolescent substance use has primarily examined neighborhood indicators of socioeconomic status, poverty, and/or disadvantage (Gardner et al., 2010). It has been posited that neighborhood socioeconomic status influences youth substance use by exposing youth to stressors (e.g., violence), adult models of substance use, access to drugs, and/or limited resources or organizations that combat drug use (Fagan, Wright, & Pinchevsky, 2013; Gardner et al., 2010). Nonetheless, studies have evidenced mixed results as to whether or not these structural factors influence substance use among youth (e.g., Brenner, Bauermeister, & Zimmerman, 2011; Maimon & Browning, 2012; Tucker et al., 2013).²

Other important neighborhood factors have been relatively unexamined, despite their potential to influence youth substance use, including: neighborhood stress and disorder (Galea, Rudenstine, & Vlahov, 2005; Gibbons et al., 2004; Winstanley et al., 2008), social networks supportive of drug use (Galea et al., 2005), access to or availability of drugs (Gardner et al., 2010; Kulis, Marsiglia, Sicotte, & Nieri, 2007; Maimon & Browning, 2010; A. L. Tobler, Komro, & Maldonado-Molina, 2009; A. L. Tobler, Livingston, & Komro, 2011), exposure to other's drug use (Kulis et al., 2007; Reboussin, Preisser, Song, & Wolfson, 2010; Song et al.,

² Space limitations prevent a review of evidence concerning neighborhood structural influences, such as disadvantage, poverty, residential stability, or concentrations of immigrants, on youth substance use. Readers are directed to reviews by Galea et al. (2005) and Gardner et al. (2010).

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2009), low levels of informal or formal social controls (Kulis et al., 2007; A. L. Tobler et al., 2009; A. L. Tobler et al., 2011), a lack of neighborhood services (e.g., substance abuse treatment or other preventative services) (Galea et al., 2005), and neighborhood cultural norms that are favorable to drug use (Chilenski & Greenberg, 2009; Kulis et al., 2007; Musick, Seltzer, & Schwartz, 2008; Van Horn, Hawkins, Arthur, & Catalano, 2007). While their direct effects on substance use have been examined in some research, very few studies have investigated the interaction between such neighborhood-level characteristics and individual-level factors (e.g., attitudes) on adolescent substance use (Gibbons et al., 2004; Lambert et al., 2004; Lipperman-Kreda et al., 2010; Thrul et al., 2014).

In the current study, we focus on whether neighborhood-level attitudes and beliefs regarding the acceptability of adolescent deviance influence youths' drug use and whether such norms moderate the relationship between youth attitudes regarding drugs and their own substance use. We focus on neighborhood norms³ – beliefs about acceptable and unacceptable behaviors (Musick et al., 2008) – for three reasons. First, relatively little research has examined the effects of neighborhood cultural norms on youth drug use, although it has been posited as an important factor (Gardner et al., 2010). Given that norms may be related to either increased or decreased substance use, as discussed above, it is perhaps unsurprising that the evidence in this area mixed. For instance, Musick et al. (2008) found that community norms regarding drug use (disapproval of smoking, drinking, or marijuana use) did not significantly impact teenagers' smoking, drinking, or drug use in bivariate and fully specified models controlling for many relevant individual psychosocial risk factors. However, Lipperman-Kreda et al. (2010) reported that

³ Our focus on neighborhood “norms” is not meant to imply that all residents within neighborhoods necessarily hold or subscribe to these belief systems, but rather, that residents within neighborhoods may be exposed to different beliefs at varying levels, depending on the neighborhood in which they reside (Sampson & Wilson, 1995).

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adolescents' perceptions that adults in their community disapproved of youth alcohol use increased their own disapproval of alcohol use, which in turn reduced their past month alcohol use. Furthermore, Van Horn and colleagues (2007) reported that youth substance use was higher in areas where community norms were favorable to substance use (as independently reported by community leaders). Thus, while some scholars have not found evidence linking neighborhood norms with adolescent drug use, others have.

Second, it is important to account for the effects of structural influences when examining the impact of community norms on substance use, but this has not often been done in the research in this area. Cultural norms are intricately linked with the structural features of the neighborhood (Berg et al., 2012; Kirk & Papachristos, 2011; Sampson & Bartusch, 1998). Research has shown that areas characterized by high levels of disorder, disadvantage, poverty, or disorganization may support norms that are more tolerant of deviant lifestyles (Sampson & Bartusch, 1998), or they may house various value systems among residents (e.g., residents' beliefs may range from very supportive to very unsupportive of drug use, delinquency, crime, and so forth, see, e.g., Berg et al., 2012; Kirk & Papachristos, 2011). Areas characterized by high levels of immigrants may also have unique value systems that are reflective of values embraced by the immigrants' country of origin (Kulis et al., 2007; Portes & Rumbaut, 2001). In fact, the "Latino paradox" (Sampson & Bean, 2006) refers to evidence that higher concentrations of immigrants at the aggregate level are associated with lower levels of crime and violence (e.g., Desmond & Kubrin, 2009; Lee, Martinez, & Rosenfeld, 2001; Martinez, Lee, & Nielsen, 2004; Sampson, Morenoff, & Raudenbush, 2005; Wright & Benson, 2010), and it has been suggested that immigrants' unique value systems (presumably from their country of origin) are protective against such negative outcomes (Sampson, 2008). Another important neighborhood structural feature, residential

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turnover, may impact the variety of norms which are present among communities (Kasarda & Janowitz, 1974; Kornhauser, 1978), or may simply lead to attenuated or withered cultural norms in the area (Kornhauser, 1978; Warner, 2003). Thus, it is important to account for the effects of each of these structural influences when examining the potential impact of community norms on substance use among youth.

Finally, of the limited amount of research that has examined neighborhood cultural norms on substance use, the majority of studies have focused on the direct effects of norms on substance use without considering how norms may a) impact one's own attitudes regarding substance use or b) moderate the impact of individual attitudes on substance use. Our study seeks to clarify if and how these relationships occur. We examine if neighborhood norms which are more accepting of deviance and/or drug use increase the likelihood that youth will perceive that drug use is acceptable, normative, or inconsequential, or if the reverse effect is evidenced (where youth living in tolerant neighborhoods assert the opposing viewpoint as a "pushback" against the community view). In terms of moderating effects, living in a context that is more tolerant of deviance and substance use could enhance the influence of youths' attitudes regarding substance use on their own drug use, or it could weaken the effect. Risk amplification and cumulative disadvantage processes (Bellair & McNulty, 2010; Berg et al., 2012; Hawkins et al., 1992) suggest that the likelihood of delinquency and substance use may be greatest for children who experience multiple individual, peer, family, school, and/or community risk factors. Thus, when youth view substance use as positive, beneficial, or inconsequential *and* they live in neighborhoods with norms more tolerant of deviance and drug use, they may be at increased risk to use drugs (e.g., amplifying the negative effect of their attitudes on their own drug use). Conversely, there is some evidence that "messages," or beliefs, which are novel and distinct

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from those perpetrated around youth may have the most potent impact on their behavior (Wright & Fagan, 2013; Zimmerman & Messner, 2011). In this case, living in a neighborhood with norms favorable to drug use and deviance may weaken the relationship between youths' attitudes and their substance use.

We examine these possibilities in the current study by assessing the impact of youths' attitudes and beliefs regarding substance use on their own drug use when neighborhood structural factors, and importantly, norms, are considered. This study addresses three research questions: a) what are the effects of neighborhood structural characteristics and norms on youths' perceptions of the harmfulness of drug use?; b) what are the direct effects of neighborhood structural characteristics and norms on youths' recent use of a variety of substances (tobacco, alcohol, and marijuana)?; and c) do community norms that are favorable to deviance moderate the impact of youths' perceptions of drug harmfulness on their substance use?

Methods

Data

This study relies on data collected from the Project on Human Development in Chicago Neighborhoods (PHDCN) (Earls, Brooks-Gunn, Raudenbush, & Sampson, 2002) – a longitudinal, multi-component study designed to investigate neighborhood influences on youth development. Chicago's 847 census tracts were combined to create 343 neighborhood clusters (NCs), which were then stratified by seven categories of racial/ethnic composition and three levels of socioeconomic status. Next, using stratified probability sampling techniques, 80 NCs were selected from the 343 NCs, and households within the 80 NCs were then randomly selected to participate in the Longitudinal Cohort Study (LCS). Interviews with 6,228 youth from seven age cohorts (birth, 3, 6, 9, 12, 15, 18) and their primary caregivers were conducted (75 percent of

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the eligible population) during the LCS. Wave one interviews were conducted in 1994-97 and wave two in 1997-2000.

The PHDCN also collected information pertaining to neighborhood structural and social conditions. Data regarding structural features such as neighborhood disadvantage, residential stability, and immigrant concentration were abstracted from the 1990 U.S. Census. Since each NC comprised several contiguous census tracts, Census information pertaining to each NC was calculated by staff at the Inter-university Consortium for Political and Social Research (ICPSR) to ensure confidentiality of the subjects of the PHDCN. Measures related to neighborhood norms were derived from the Community Survey portion of the PHDCN. Utilizing a three-stage sampling approach, city blocks were sampled within each NC, dwelling units were sampled within each block, and one adult resident was sampled within each dwelling unit. The Community Survey was conducted in 1994-1995 and was independent from the Longitudinal Cohort Study but included information on the 80 NCs from which the LCS was drawn.

Sample

Given our focus on adolescent substance use and perceptions, the current study includes youth in cohorts 9 – 15 (i.e., those aged 9, 12, and 15 years at wave one) and their caregivers. At wave one, 2,344 of these youth participated in the study; at wave two, 1,987 (85%) remained in the study. Primary independent and dependent variables were drawn from wave two interviews while demographic characteristics and some control variables (including prior substance use) were taken from wave one interviews (see Table 1 for more details). Our final analysis sample is comprised of 1,719 youth⁴ and their caregivers at wave two from 79 Chicago neighborhoods.⁵

There were no significant differences ($p \leq .05$) between the wave one sample and the analysis

⁴ A total of 268 cases were removed using listwise deletion for missing data.

⁵ One of the 80 neighborhood clusters dropped out once analyses were restricted to adolescents in cohorts 9-15.

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sample on the main dependent or independent variables, although the analysis sample does include slightly more Hispanic youth and youth from higher socioeconomic statuses, and slightly fewer African American youth and youth from other races/ethnicities.

Dependent Variable

Youth self-reported their frequency of past month tobacco, alcohol, and marijuana use at wave two based on three items derived from the National Household Survey on Drug Abuse (1991). We dichotomized and summed these three items so that *past month substance use* reflects a count of the number of substances (tobacco, alcohol, or marijuana) the respondent reported using in the past month, ranging from zero to three. This measure therefore represents the variety⁶ of substances used by youth and allows for the comparison of youth who report fewer versus more types of substance use.

Independent Variables

Individual-Level Variables. *Perceived harm of drug use* was comprised of seven items derived from the National Household Survey on Drug Abuse (1991). On a four-point Likert scale, youth responded to seven items reflecting the likelihood that people would hurt themselves if they used tobacco and alcohol very frequently, and if they used marijuana sometimes or regularly (alpha = .76). Responses ranged from “definitely won’t” harm themselves to “definitely will” harm themselves. Youth responses were standardized and summed.

Control variables. A number of individual-level control variables were included in analyses because they have been empirically identified as risk factors associated with adolescent substance use (Hawkins et al., 1992). We controlled for youth demographics including *age* (in years), *male*, *Hispanic*, *African American*, *other race/ethnicity*, *immigrant* status (all

⁶ For simplicity, we refer to our outcome measure – the variety of substances used – as “substance use” or “drug use” throughout the remainder of this manuscript.

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dichotomous indicators), and family *socioeconomic status* (a factor reflecting total household income, parental education, and parental employment). Caucasian youth served as the reference category for race/ethnicity. In addition, we controlled for two measures of parenting and peer influences: *parent problem drug use* (indicating parental health, family, job, or legal troubles due to drinking or drug use) and *peer drug use* (reflecting the number of the youth's friends who used drugs in the past year). In terms of individual risk factors, we included measures of youth *prior substance use* (a dichotomous indicator of youth's tobacco, alcohol, or marijuana use in the past year, reported at wave one), *low self-control*, *routine activities*, and *perceptions of drug availability*. Youth's low self-control reflects their temperament and behavioral preferences, as reported by parents, while routine activities taps into the extent to which youth report engaging in unstructured socializing with others. Perceptions of drug availability indicates how difficult youth believe it would be to obtain tobacco, alcohol, or marijuana. A more detailed description of all variables included in the analyses can be found in Table 1.

Neighborhood-Level Variables. *Concentrated disadvantage* was created from a principal components factor analysis using information from the 1990 U.S. Census. Following prior research (e.g., Molnar, Cerda, Roberts, & Buka, 2008), this measure draws from three poverty-related variables ($\alpha = .81$), including the percentage of: residents in a NC living below the poverty line, households receiving public assistance, and residents who are unemployed.

Immigrant concentration was created using principle components factor analysis with two measures from the 1990 U.S. Census – the percentage of residents who are foreign-born and who are Hispanic ($\alpha = .70$) (e.g., Browning, Leventhal, & Brooks-Gunn, 2005; Maimon & Browning, 2010; Morenoff, Sampson, & Raudenbush, 2001). *Residential stability* was also based on principal components factor analysis using two measures derived from the 1990 U.S. Census,

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including the percentage of owner-occupied homes and the population who has lived in the same house for five years ($\alpha = .76$) (e.g., Morenoff et al., 2001; Sampson et al., 2005).

A measure of *community norms favorable to deviance* was constructed using a three-level item response model, consistent with prior research (e.g., Browning, Feinberg, & Dietz, 2004; Wright & Benson, 2010). This measure is comprised of responses from neighborhood residents interviewed as part of the Community Survey regarding the wrongfulness of 13- and 19- year olds smoking cigarettes, using marijuana, drinking alcohol, and getting into fist fights. Responses were originally given from one to five on a Likert-type scale ranging from “extremely wrong” to “not wrong at all.” Because of the skew in responses, the answers to each item were dichotomized; categories of “not wrong at all” and “a little wrong” were combined and coded as 1, whereas “wrong,” “very wrong,” and “extremely wrong” were combined and coded as 0. As such, the measure indicates the degree to which neighborhood communities norms were favorable to deviance (neighborhood internal consistency reliability = .51; see Raudenbush & Sampson, 1999).⁷

--Table 1 About Here--

Analytic Strategy

This study required the use of hierarchical modeling techniques using the statistical software HLM 7.0 (Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) to account for the correlated error that exists with clustered data (e.g., youth clustered within neighborhoods). Use of these techniques ensures that appropriate sample sizes and existing

⁷ The reliability of this measure likely indicates variation in the degree to which residents agreed that such deviance among teenagers was wrong. As discussed by Raudenbush and Sampson (1999), internal consistency in item response-derived measures depends on the degree of respondents' agreement across the items and the number of respondents per neighborhood. In the current study, a mean of 41 respondents per neighborhood cluster reported on norms related to adolescent deviance.

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variance is partitioned at different levels of analyses (the individual and neighborhood levels).

The dependent variable in this study – variety of past month substance use – was analyzed using fixed-effect Poisson models that corrected for over-dispersion.

The analyses for this study proceeded in a series of stages. First, we conducted unconditional models to explore the extent of variation in the perceptions of drug harm and past month substance use across NCs. These models revealed that both significantly varied across NCs, with approximately three percent of the variation in perceptions and seven percent of the variation in substance use existing between neighborhoods. We then examined the impact of neighborhood factors on youths' perceptions of the harm of drug use, controlling for youth demographics, using an intercepts-as-outcome model, where perceptions of drug harmfulness served as the outcome. Next, we examined the relationship between youths' perceived harm of drug use and past month substance use with an intercepts-as-outcome model, where substance use was the outcome. In this model, all individual-level predictors were grand mean centered and fixed (with the exception of perceived harmfulness of drug use, which was allowed to vary randomly). Grand mean centering variables around their mean across all NCs is an appropriate technique to use when the substantive research question under exploration is at the aggregate level (Enders & Tofighi, 2007). Fixed variables were not allowed to vary across NCs, so the coefficients thus indicate the average effect of each variable across all NCs (Raudenbush & Bryk, 2002). The neighborhood-level variables were added to this model to assess their main effects on the rate of past month substance use. Finally, a slope-as-outcome model was conducted to examine the moderating impact of community norms on the relationship between youths' perceived harm of drug use and substance use. All individual-level and neighborhood-level predictors were

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controlled in the slope-as-outcome (cross-level interaction) model. Collinearity was not an issue for any models presented.

Results

Tables 2, 3, and 4 present the results of our three research questions. Table 2 depicts the impacts of neighborhood concentrated disadvantage, immigrant concentration, residential stability, and norms favorable to deviance on youths' perceptions of the harmfulness of drug use. After controlling for youths' demographic characteristics and neighborhood structural characteristics, only the norms measure was significant ($b = -.06, p \leq .01$). The negative coefficient suggested that youth living in neighborhoods where norms are more favorable to adolescent deviance are less likely to believe that drug use is harmful.

--Table 2 About Here--

Table 3 shows the impact of individual-level variables on the variety of past month substance use. Model 1 includes only demographic characteristics and youth perceptions of drug harmfulness, and Model 2 is the fully specified model which includes the full range of psychosocial and demographic covariates, including prior substance use (i.e., assessed at wave one). In both models, perceptions of drug harmfulness was negatively associated with substance use among youth – that is, youth who believe that using drugs is harmful engaged in fewer types of drug use. Other significant risk factors of past month substance use include being older, having more peers who engage in drug use, prior substance use, having more unstructured socializing time (i.e., routine activities) with peers, and reporting that drugs are readily available. Having a parent with a drug problem and being African American (versus being Caucasian) protected youth from engaging in multiple forms of substance use in the past month.

--Table 3 About Here--

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The neighborhood results are presented in Table 4; these models account for all individual-level covariates. Model 1 denotes the effects of the neighborhood structural characteristics only, Model 2 includes neighborhood norms, and Model 3 provides the cross-level interaction between norms and the relationship between perceptions of drug harmfulness and substance use while controlling for the main effects of all neighborhood variables. In all models, immigrant concentration reduced the number of types of drugs that youth reported using. Concentrated disadvantage, residential stability, and neighborhood norms all failed to have significant, direct effects on substance use. However, the cross-level interaction in Model 3 demonstrates that neighborhood norms regarding adolescent deviance marginally ($p \leq .10$)⁸ moderated the relationship between youth perceptions of drug harmfulness and their substance use. As depicted in Figure 1, the cross-level interaction suggests that the suppressive effect of perceiving drugs as harmful became *stronger* in areas where norms are more favorable to deviance in general (the slope became steeper in the negative direction). That is, the protective effect of youths' beliefs that drugs are harmful was most evident in neighborhoods with norms that were more tolerant of adolescent deviance.

--Table 4 and Figure 1 About Here--

Discussion and Conclusions

In this study, we examined whether neighborhood characteristics influenced youths' attitudes about drug and substance use, whether neighborhood features directly impacted recent tobacco, alcohol, and marijuana use among adolescents, and whether neighborhood norms about deviance moderated the impact of youths' perceptions on their own drug use. Our expectations were grounded theoretically by social learning and rational choice perspectives at the individual-level

⁸ At the neighborhood level, we report findings at $p \leq .10$ criterion given the restricted sample size of neighborhoods (79) compared to individuals (1,719) in our sample.

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(e.g., explaining why youths' attitudes would be related to their substance use) and social disorganization theory at the neighborhood level (accounting for why neighborhood features would be related to youths' attitudes and substance use). We were also guided by prior evidence that youth attitudes and beliefs about substance use are empirically linked to their own drug use behavior (e.g., Bachman et al., 1998; Barkin et al., 2002; Johnston et al., 2011), and that neighborhood-level norms regarding deviancy, including drug use, was one possible – but rarely examined – influence on youth substance use (Gardner et al., 2010). We believe that our findings support three main conclusions regarding the importance of individual youth attitudes, neighborhood context, and their interaction for youth substance use. We elaborate upon these below.

First, our results are consistent with previous research (e.g., Donovan, 2004; Johnston et al., 2011) emphasizing that youths' individual attitudes affect their use of tobacco, alcohol and marijuana. In particular, our findings support research showing that youth who consider drug use to be harmful will engage in less substance use (Patel & Fromme, 2010). Further, we have added to the relatively scant literature in this area by showing that such beliefs or perceptions are influenced by the neighborhoods in which youth live (Berg et al., 2012; Lipperman-Kreda et al., 2010; Stewart & Simons, 2006). In fact, we found that youth living in communities where norms were generally favorable to deviance (such as drug use and fighting) believed that drugs were *less* harmful than those youth living in areas where community norms were less tolerant of deviance. Stated differently, residing in a “risky” neighborhood where norms are tolerant of deviance may increase risk factors such as pro-drug attitudes, or, as we found, may reduce protective factors, such as anti-drug attitudes. These findings are somewhat unsurprising given prior evidence that neighborhoods impact attitudes about other outcomes, such as violence

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(Stewart & Simons, 2006), but they extend this literature to attitudes specifically about substance use among youth. Perhaps neighborhood norms about deviance and drug use are more proximate measures to individual-level attitudes than structural disadvantage, immigrant concentration, or residential stability, potentially explaining why these were not significantly related to youth attitudes. Additionally, neighborhood norms and individual attitudes tap into similar constructs (e.g., attitudes or definitions) as outlined by social learning theory, whereas the structural variables do not. However, since there has been very little research examining the neighborhood influences of individual-level attitudes, we are hesitant to draw too many conclusions about the lack of a significant effect for the structural variables, and encourage continued research on this topic.

Secondly, consistent with prior work (e.g., Chilenski & Greenberg, 2009; Gibbons et al., 2004; Kulis et al., 2007), we found that neighborhood characteristics exerted only limited direct effects on adolescent substance use. With the exception of immigrant concentration, none of the neighborhood features impacted past month substance use among adolescents. Perhaps other neighborhood features did not impact youth substance use because drug use often occurs indoors and out of sight from neighbors (Maimon & Browning, 2012). It is also possible that substance use is elevated among youth from wealthier families (Luthar, 2003) who live in more economically advantaged neighborhoods (Wilson, 1987), thereby weakening the overall impact of structural factors on this outcome. These are only speculative explanations, however, and we urge continued research in this area.

Relatively few studies have examined the impact of immigration concentration on substance use (for exceptions see, e.g., Kulis et al., 2007; Maimon & Browning, 2010; Musick et al., 2008; Snedker, Herting, & Walton, 2009; Tucker et al., 2013; Zimmerman & Vasquez, 2011). Our

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study expands research in this area and suggests that areas with higher concentrations of immigrants have *lower* rates of recent substance use among youth. That is, immigrant concentration in a neighborhood appears to be a protective factor inhibiting substance use among adolescents. These results are consistent with prior research on the “Latino paradox” where areas with more immigrants have lower crime and violence rates (e.g., Desmond & Kubrin, 2009; Martinez & Lee, 2000; Sampson et al., 2005; Wright & Benson, 2010). Our findings suggest that the Latino paradox may apply to youth substance use as well, but more research is needed to firmly establish this link. Future research should also more directly examine immigrant norms and attitudes about drugs in order to fully test the Latino paradox (Wright & Benson, 2010).

Finally, our results suggest that, much like when studying youth delinquency and violence (e.g., Berg et al., 2012; Wright & Fagan, 2013; Zimmerman & Messner, 2010, 2011), there is value in examining the moderating effects of neighborhoods on youth substance use. Although we found no direct effect of neighborhood norms on drug use, we did find a modest moderating effect, in that the protective relationship between perceptions of drug harmfulness and substance use was somewhat stronger in neighborhoods with norms more tolerant of deviance. Other research has demonstrated that if norms are conducive to deviance, they can amplify the negative effect of individual risk factors on delinquency (Berg et al., 2012), and our study extends this by focusing on youth substance use. However, in the current study, we uncovered true protective effects of youths’ attitudes against drug use. That is, holding the belief that drug use is harmful was only associated with lower past month substance use where neighborhood norms were favorable to deviance. In essence, our finding may suggest an amplification effect of a protective factor within a “risky” environment. It may be that, in a context where norms are favorable to deviance in general, holding personal beliefs about drugs which run *counter* to the norms in the

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area (i.e., norms that deviance, including drug use, is okay) is particularly influential to one's behavior (see Zimmerman & Messner, 2011 for their "saturation" argument). Given that few studies have considered this issue, we encourage future research to continue to examine whether, why, and how individual risk and protective factors, such as attitudes against drug use, are impacted by contextual features.

Our study is not without limitations. First, our results are based on one urban area (Chicago) with data collected in the 1990s, and we cannot be sure that the results presented are generalizable to other areas or time periods. Secondly, our measures of individual attitudes and substance use were measured at the same time point (wave two of the PHDCN). Data on youth perceptions of drug use were not collected at wave one of the study, which precluded a longitudinal analysis of their impact on substance use measured at wave two. Although the PHDCN does measure substance use at wave three, we believed the impact of youth perceptions would be more immediate, and we also wished to avoid using outcomes from wave three as these measures were further removed from the assessment of neighborhood characteristics. We attempted to control for temporal ordering between youth attitudes and substance use as much as possible by relying on youth reports of their most recent substance use at wave two (i.e., in the past month), but despite our efforts, we cannot confirm temporal ordering between youth attitudes and behaviors. Third, we examined substance use as a count of three types of drugs (alcohol, marijuana, and tobacco) rather than assessing each drug separately or modeling the overall frequency of substance use. While we considered these alternatives, our final variable was based on the fact that, when examined as separate items, some types of substance use did not vary across neighborhoods. Moreover, we did not expect the relationship between attitudes and substance use to vary by type of substance – we expected that attitudes would be associated with

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substance use regardless of the type of drug reported by adolescents. The analyses we conducted most accurately reflect this expectation. While measures of the frequency of use were available, these outcomes were highly skewed, resulting in less reliable estimates in the multilevel models. Although the variety measure does not account for the frequency of use, per se, it does allow for the comparison between youth who report fewer versus more types of substance use. Because our outcome variable does not capture the frequency of substance use or very high levels of use, additional research is needed to investigate how individual and neighborhood factors may affect potentially more problematic levels of drug use. Continued research is needed to understand for whom substance use is most likely and under what circumstances.

Despite its limitations, our study is methodologically strong because it incorporates a wide range of risk factors – at both the individual- and neighborhood-levels – and as such provides a robust examination of the relationship between individual attitudes and drug use as well as the direct and moderating effects of neighborhood characteristics on youth substance use. Our study is also substantively important as it adds to both individually-focused and neighborhood-focused research on youth substance use and suggests that individual attitudes against drug use are not only a strong protective factor limiting use of illicit substances by adolescents, but also that such attitudes are influenced by community norms and can become even more protective in certain neighborhood contexts.

These findings have implications for prevention efforts intended to reduce adolescent substance use. First, they support the implementation of prevention programs that attempt to alter individual attitudes related to substance use, such as school-based drug prevention curricula which identify the physical and social harms associated with substance use with the goal of increasing perceptions that drug use is risky and harmful (Botvin, 1990; N. S. Tobler & Stratton,

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1997). While such individually-focused programs have been shown to reduce substance use (Spath, Greenberg, & Turrisi, 2008), their effects are often relatively small (Flay, 2000; Gorman, 2005). If the larger environments in which youth reside do not support and reinforce these prevention messages, and if community norms run *counter* to program content, intervention effectiveness is likely to be limited (Flay, 2000). In order to maximize prevention efforts, intervention services should attempt to simultaneously change individual and community factors related to substance use, including personal attitudes and contextual norms regarding the acceptability and/or harms of adolescent substance use. Such comprehensive approaches have evidence of effectiveness in reducing youth drug use (Fagan & Hawkins, 2012) and are consistent with our finding that both levels of influence are important. More widespread replication of these types of interventions thus has the potential to significantly lower rates of adolescent substance use and reduce the harms associated with such use.

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Table 1. Definitions, Means and Standard Deviations of Measures Included in Analyses^a

Variable	Definition	Mean	SD	Min-Max
Outcome Measure				
Past month substance use	Count of tobacco, alcohol, marijuana use in the past month (Wave 2)	.32	.74	0-3
Individual-Level Measures				
Perceived harm of drug use	A seven item standardized scale indicating the extent to which youth believed people would “hurt themselves” if they used tobacco and alcohol very frequently, and marijuana sometimes or regularly (Wave 2) (alpha = .76) (National Household Survey on Drug Abuse, 1991)	-.01	1.01	-4.47 – 1.52
Age	Youth’s age in years (Wave 2)	14.00	2.47	9.11– 19.89
Male	Dichotomous variable indicating youth is male	.50	.50	0-1
Hispanic ¹	Dichotomous variable indicating youth is of Hispanic descent	.48	.50	0-1
African American ¹	Dichotomous variable indicating youth is of African American descent	.33	.47	0-1
Other race/ethnicity ¹	Dichotomous variable indicating youth is a race/ethnicity other than Hispanic, African American, or Caucasian	.03	.18	0-1
Immigrant	Dichotomous variable indicating youth is an immigrant	.12	.32	0-1
Socio-economic status	Principal components factor analysis reflecting total household income parental education, and parental employment status at waves 1 or 2 (alpha = .42) (Fagan & Wright, 2011)	.16	.99	-1.67– 2.11
Parent problem drug use	Dichotomous variable indicating that either parent had problems with “health, family, job or police” due to drinking or drug use (Wave 1)	.16	.37	0-1
Peer drug use	A three-item standardized scale reflecting the number of youths’ friends (1=none; 4=all) who used marijuana, alcohol, and tobacco in the past year (alpha=0.85) (Wave 2)	.00	1.00	-.86 – 2.99
Prior substance use	Dichotomous variable reflecting any tobacco, alcohol, or marijuana use in the past year (Wave 1)	.19	.39	0-1
Low self-control	A 17-item standardized scale based on parental ratings of youth inhibitory control (e.g., “has trouble resisting temptation”), decision time (e.g., “often acts on the spur of the moment”), sensation seeking (e.g., “will try anything once”), and persistence	-.01	.99	-2.52 – 3.40

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	(e.g., “tends to give up easily”) on the Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament survey (Buss & Plomin, 1975) (alpha = .75). Higher values indicate lower levels of self-control (see also Gibson, Sullivan, Jones, & Piquero, 2010) (Wave 1)			
Routine activities	A four-item standardized scale based on adolescent responses to whether they “ride around in a car/motorcycle for fun,” “get together with friends and hang out,” “go to parties and other social affairs,” and “the number of days they go out after school or in the evening for fun and recreation” (alpha = .58). Higher values reflect greater unstructured socialization (Maimon & Browning, 2010; Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996) (Wave 2)	.01	1.00	-2.50 – 2.34
Perceptions of drug availability	A three item standardized scale reflecting youth reports of “how easy or hard would it be to get” (1= probably impossible; 2 = very hard; 3 = pretty easy) cigarettes, alcohol, and marijuana (National Household Survey on Drug Abuse, 1991) (alpha=.87) (Wave 2)	.01	1.01	-1.35 – 1.60
Neighborhood-Level Measures				
Concentrated disadvantage	Based on principal components factor analysis of 1990 U.S. Census data on the percentage of neighborhood residents below the poverty line, households receiving public assistance, and unemployed residents (e.g., Molnar, Magdalena, Roberts, & Buka, 2008) (alpha = .81)	-.00	1.01	-1.51 – 2.35
Immigrant concentration	Based on principal components factor analysis of 1990 U.S. Census data on the percentage of residents who are foreign born and who are Hispanic (e.g., Browning et al., 2005; Maimon & Browning, 2010) (alpha = .70)	.01	1.00	-1.27 – 2.54
Residential stability	Based on principal components factor analysis of 1990 U.S. Census data on the percentage of owner-occupied homes in the neighborhood and percentage of the population who lived in the same house five years ago (e.g., Sampson et al., 2005) (alpha = .76)	.01	1.00	-1.72 – 2.12
Community norms favorable to deviance	Scale derived from a three-level item response model (Browning et al., 2004; Wright & Benson, 2010; Wright & Fagan, 2013) reflecting neighborhood residents’ attitudes about the wrongfulness of smoking, drinking, using marijuana, and getting into fist fights among 13- and 19- year olds (neighborhood internal reliability = .51)	-.00	.27	-.52 – .61

^a Based on 1,719 youth in 79 neighborhoods

¹ Caucasian is the reference category

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Table 2. Neighborhood Direct Effects on Youth Perceptions of Harm of Drug Use

	<i>b</i>	SE
<i>Level-1 Intercept</i>	.002	.01
Concentrated disadvantage	-.01	.01
Immigrant concentration	.001	.01
Residential stability	-.001	.01
Community norms favorable to deviance	-.06**	.02
<i>R</i> ²	.13	

** $p \leq .01$ * $p \leq .05$ (two-tailed)

Notes: Results are based on Empirical Bayes (EB) estimates on 1,719 youth in 79 neighborhoods and control for age, male, Hispanic, African American, Other/race ethnicity, immigrant, and socioeconomic status.

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Table 3. Fixed Effect Poisson Models of the Influence of Perceptions of Substance Use Harm on Past Month Substance Use

	Model 1 ^a		Model 2 ^b	
	<i>b</i>	SE	<i>b</i>	SE
Intercept	-2.00**	.10	-2.20**	.08
Independent Variable				
Perceived harm of drug use	-.42**	.04	-.24**	.04
Control Variables				
Age	.49**	.03	.17**	.04
Male	.12	.11	.04	.10
Hispanic ¹	-.17	.15	-.05	.15
African American ¹	-.40**	.13	-.27*	.12
Other race/ethnicity ¹	-.40	.29	-.12	.25
Immigrant	-.14	.17	-.01	.14
Socioeconomic status	.00	.05	-.04	.05
Parent problem drug use	--	--	-.20*	.10
Peer drug use	--	--	.49**	.07
Prior substance use	--	--	.66**	.12
Low self-control	--	--	-.04	.05
Routine activities	--	--	.27**	.05
Perceptions of drug availability	--	--	.23**	.08
χ^2	89.30		111.55	

** $p \leq .01$ * $p \leq .05$

Notes: Results are based on Poisson models correcting for overdispersion; italicized coefficients indicate that perceptions of substance use harm was allowed to vary randomly across the 79 neighborhood clusters (NCs); all other variables were fixed across NCs

^aBased on 1,834 youth in 79 neighborhoods

^bBased on 1,719 youth in 79 neighborhoods

¹Compared to Caucasian youth

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Table 4. Neighborhood Direct and Cross Level Effects on Past Month Substance Use

	Model 1		Model 2		Model 3	
	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE
Direct Effects^a						
Level-1 intercept	-2.19**	.08	-2.19**	.08	-2.20**	.08
Concentrated disadvantage	-.08	.06	-.08	.06	-.08	.05
Immigrant concentration	-.24**	.06	-.22**	.06	-.22**	.06
Residential stability	-.08	.05	-.07	.05	-.06	.05
Community norms favorable to deviance	--	--	.19	.23	.04	.25
χ^2	98.69		99.74			
Cross-Level Interactions^b						
Perceived harm of drug use intercept	--	--	--	--	-.23**	.04
Community norms favorable to deviance	--	--	--	--	-.22 [†]	.12
χ^2	--		--		98.19	

** $p \leq .01$ * $p \leq .05$ † $p \leq .10$ (two-tailed)

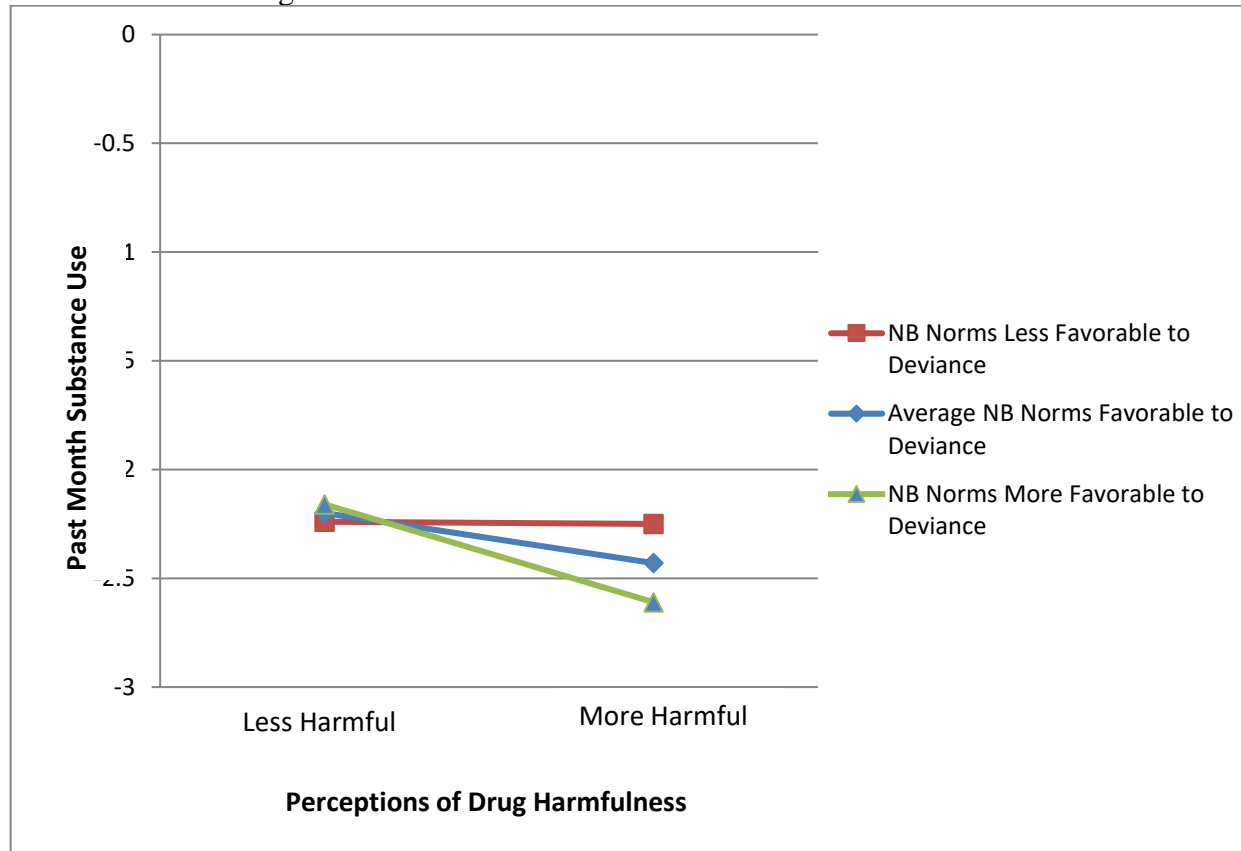
Notes: Results are based on Poisson models correcting for overdispersion; the sample included 1,719 youth in 79 neighborhood clusters (NCs)

^a Models assessing neighborhood direct effects also control for all individual-level covariates

^b Cross-level interactions control for all individual-level covariates and neighborhood direct effects

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Figure 1. Hierarchical Poisson Model Depicting the Relationship between Perceptions of Drug Harmfulness and Past Month Substance Use in Neighborhoods where Norms are Favorable to Deviance^a



^aResults are based on Poisson models correcting for overdispersion; the sample included 1,719 youth in 79 neighborhood clusters (NCs). Depicted model controls for all individual-level covariates and neighborhood direct effects.

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