



Association of environmental indicators with teen alcohol use and problem behavior: Teens' observations vs. objectively-measured indicators[☆]



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ABSTRACT

Most prior studies use objectively measured data (e.g., census-based indicators) to assess contextual risks. However, teens' observations might be more important for their risk behavior. Objectives: 1) determine relationships between observed and objective indicators of contextual risks 2) determine relations of observed and objective indicators with teen alcohol use and problem behavior. Teens aged 14–16 (N=170) carried GPS-enabled smartphones for one month, with locations documented. Ecological momentary assessment (EMA) measured teens' observations via texts regarding risk behaviors and environmental observations. Objective indicators of alcohol outlets and disorganization were spatially joined to EMAs based on teens' location at the time of the texts. Observed and objective disorganization, and objective indicators of alcohol outlets were related to alcohol use. Observed disorganization was related to problem behavior, while objective indicators were unrelated. Findings suggest the importance of considering teens' observations of contextual risk for understanding influences on risk behavior and suggest future directions for research and prevention strategies.

1. Introduction

Based on ecological theories that underscore the importance of individuals' embeddedness in their social context, development must be considered within its context (Bronfenbrenner, 1979). Social-ecological theories, such as developmental system theories, posit that while individuals are influenced by their environments, they also actively select and shape their environments (LaScala et al., 2005; Bronfenbrenner and Morris, 2006; Urban et al., 2009; Bronfenbrenner, 1979). Measuring individuals' exposure to physical and social environments is a difficult task. Most research on neighborhood contextual risks and teen problem behavior relies on the use of objectively measured data (e.g. Census based measures, planning and zoning data, and other routinely collected secondary sources) to assess neighborhood characteristics (e.g., Burton and Jarrett, 2000; Leventhal and

Brooks-Gunn, 2000; Cook et al., 2015; Wright et al., 2014). However, these global indicators may not provide enough detail to adequately illuminate the link between contextual risks and teen outcomes. Teens' own observations of their environment might be more important in determining their behaviors than appraisals made by researchers, since residents and researchers often define the same neighborhoods quite differently (Burton and Price-Spratlen, 1999). This study compares observed and objectively measured indicators of environmental exposures for teens, and compares relationships with risk behaviors. Although biases may also exist in data assessed by researchers, we use the term “objectively” measured data to describe data based on records (e.g., census data, alcohol outlet data), rather than by residents' observations, in line with prior work (Goldman-Mellor et al., 2016).

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1.1. Environmental contextual risks influence teen risk behaviors

Contextual risks such as social disorganization, defined as residents' difficulty preserving social and physical order (Shaw and McKay, 1942), have been related to youth risk behavior (Byrnes et al., 2007; Leventhal and Brooks-Gunn, 2000). Disorganization may lead to risk behavior for teens because this disorder may interfere with processes that encourage healthy behavior (Sampson and Groves, 1989; Wilson, 1987; Brody et al., 2001). Structural social characteristics of neighborhoods (e.g., poverty) may disrupt neighborhood social organization, resulting in problem behaviors (Shaw and McKay, 1942; Sampson and Groves, 1989), and as such, these factors are often used as proxies for disorganization (Freisthler, 2004; Ennett et al., 1997; Lee and Cubbin, 2002). Prior studies provide evidence of a relationship between greater disorganization and increased alcohol, tobacco, and other drug (ATOD) use and other youth risk behaviors, such as delinquency (Xue et al., 2007; Byrnes et al., 2007; Tobler et al., 2009; Wiehe et al., 2013). Neighborhood disorder has also been linked to mental health, such as depressive symptoms (Wight et al., 2006; Hurd et al., 2013), and biological indicators of stress, such as lower levels of serum cortisol in children (Dulin-Keita et al., 2012).

Higher concentrations of alcohol outlets in residential neighborhoods have been related to youths' alcohol use, heavy drinking, and drinking problems (e.g., Truong and Sturm, 2009; Kypri et al., 2008; Treno et al., 2008). The literature emphasizes two possible mechanisms by which these relationships might arise. First, alcohol outlets may be indicators of disorganization stemming from a lack of normative controls against problem behaviors (Gruenewald, 2007). Second, although teens are less likely to obtain alcohol from outlets as from other sources (Hearst et al., 2007; Paschall et al., 2007), exposure to outlets may influence teen use (Pasch et al., 2009) through greater access for their social contacts (Reboussin et al., 2011) and by changing perceptions of alcohol use as more normative (Pasch et al., 2009).

Most prior research has measured exposure to contextual risks with administratively defined units (e.g., census tracts), limited to an area around teens' homes (Basta et al., 2010; Wiehe et al., 2008; Feng et al., 2010; Leal and Chaix, 2011). However, these units may not reflect the spaces where teens actually spend their time, an issue referred to as the uncertain geographic context problem (Kwan, 2012). For example, many teens spend half or more of their time away from home (Wiehe et al., 2008), and teens spend time in locations that cut across traditional definitions of neighborhood (e.g., census tract) (Basta et al., 2010). Activity space can be defined as the geographic area an individual moves within during their daily activities (Gesler and Meade, 1988; Mason, 2010). Activity space may provide a more accurate measure of contextual risks (Kwan, 2012). Global positioning system (GPS) devices can be used to assess activity space, by using detailed data to determine actual physical spaces and paths that people spend time in during their day (Wiehe et al., 2008; Maddison et al., 2010; Zenk et al., 2011; Cohen Hubal et al., 2000). For example, a study of substance issues among adults used GPS to assess locations and Ecological Momentary Assessment (EMA) to assess cravings, mood, and stress, finding that areas rated by research staff observers as more disordered were counterintuitively related to more positive mood, fewer cravings, and lower stress (Epstein et al., 2014). Another study using GPS-EMA techniques among a sample of mostly African-American adolescents assessed activity space disorder via GPS linked to census measures, and used EMA to assess mood, behavior, and peer activities (Mason et al., 2016). Results showed that peer networks moderated the association between parent relationship and substance use for adolescents with high risk activity spaces. Another study using the same sample (Mennis et al., 2016) found census measures of relative disadvantage associated with substance use, feelings of safety, and stress. The relationship between stress and relative disadvantage was moderated by substance use such that greater substance use increased the effect of relative disadvantage on stress levels.

1.2. Conceptualizations of contextual risk

1.2.1. Neighborhood as physical site

Most studies of neighborhood effects on youth outcomes conceptualize the neighborhood as a physical site (e.g., census tracts, zip codes) (Burton and Jarrett, 2000). Studies defining neighborhoods as a physical site frequently use objectively measured indicators of contextual risk. Objectively measured indicators have been associated with teen risk behavior, such as alcohol use and other problem behavior (behaviors that might cause teens to get in trouble with the law (e.g., sold drugs, got into a fight), with school, or with their parents) (e.g., Treno et al., 2008, Cook et al., 2015, Wright et al., 2014). For example, higher neighborhood socioeconomic status (SES) was related to higher rates of drunkenness in Asian American teens in a longitudinal study (Cook et al., 2015). Another study found that greater density of off-premise alcohol outlets is associated with higher teen perceptions of alcohol availability and use of alcohol from off-premise outlets (Treno et al., 2008). Concentrated disadvantage (e.g., indicators of low SES such as the percentage in poverty and percentage unemployed) in census blocks has also been related to young adult reoffending (Wright et al., 2014).

Defining neighborhoods in this way has advantages of being able to use designated (and typically standardized) boundaries to denote neighborhoods, permits calculations of neighborhood characteristics across a standard physical area, and allows the use of Geographic Information Systems (GIS) techniques. Comparisons of neighborhood characteristics across a large number of neighborhoods and families is also facilitated.

1.2.2. Observations of neighborhoods

An alternate approach uses residents' observations of their own neighborhoods to determine neighborhood borders and characteristics (Burton and Jarrett, 2000). This approach is consistent with contextual theories that underscore the role of the individual's interpretation of and interaction with the environment (Bronfenbrenner, 1992; Jessor et al., 1995). Given that residents' observations of their neighborhoods often differ from objectively measured indicators, their observations may be better predictors of outcomes (Burton and Price-Spratlen, 1999). For example, census tracts are frequently used to demarcate neighborhood boundaries, but they are often much larger than those defined by youth (Burton and Price-Spratlen, 1999). Some studies have found teens' views of contextual risks related to their risk behavior (e.g., Friese et al., 2015, Fite et al., 2010, Byrnes et al., 2007). In a study of Native American teens, perceptions of neighborhoods with less normative restrictions on ATOD use, greater observed neighborhood disorganization, and less observed police involvement were all related to higher drinking rates (Friese et al., 2015). A study of mostly African-American teens found that protective peer networks mitigated the impact of perceived activity space risk on substance use (Mason et al., 2015). Findings also showed that peer networks moderated the effect of perceived activity space risk on marijuana use, but for boys only. Not only have teen observations been found to be important, but caregiver observations of unsafe neighborhood conditions have also been related to youth aggression (Fite et al., 2010).

2. Objectives

Few studies have compared objectively measured indicators and observed contextual risks. A study of low-income women (Elo et al., 2009) found that objectively measured indicators (crime and census measures) of neighborhood crime and disorder were significant predictors of women's perceptions of their residential census tracts. A study of Illinois adults (Ross and Mirowsky, 2001) found that objectively measured neighborhood disadvantage (census indicators) predicted perceived neighborhood disorder and fear, which was related to worse physical health outcomes.

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