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### Putting adolescent alcohol use in context: understanding the role of neighbourhood effects

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Because initiation into alcohol use often occurs in adolescence, this life stage has been established as a crucial period to reduce high risk drinking through prevention and intervention strategies (Hawks, Scott, McBride, Jones, & Stockwell, 2002; Kuntsche, Knibbe, Gmel, & Engels, 2005; Tanner-Smith, 2012). These strategies are often geared at reducing the frequency and amount of alcohol use that occurs in adolescence; consequently it is important to understand the emerging trends and risk factors associated with adolescent drinking behaviours in order to better target policies (Caria, Faggiano, Bellocco, & Galanti, 2011; Sznitman et al., 2013; Tanner-Smith, 2012).

Many studies exist that examine the role of individual, peer, family and school characteristics on adolescent alcohol use. An understudied potential influence on adolescent alcohol use is the neighbourhood environment. Neighbourhoods represent an important aspect in which the lived experiences of adolescents are embedded. It has been theorised that young people may be especially affected by their neighbourhood due to limited mobility likely restricting each individual's school, family and peers to a confined geographic area (Aminzadeh et al., 2013; Åslund & Nilsson, 2013). Neighbourhood variation in adolescent alcohol use behaviours has been found in several regions (Jonkman, Steketee, Tombourou, Cini, & Williams, 2012). Gaining a better understanding of any neighbourhood characteristics associated with these variations in adolescent alcohol use allow for a more upstream approach to policy intervention strategies (Jackson, Denny, & Ameratunga, 2014). Identifying disparities in adolescent alcohol use outcomes represents an important step towards moving to more equitable policies and interventions that better target neighbourhoods at

high risk for elevated alcohol use (Breen et al., 2014; Jackson et al., 2014; Jonkman et al., 2012). Therefore understanding the neighbourhood factors that influence these inequities can aid in the appropriate design of health promotion programmes and a better understanding of the etiology of adolescent drinking behaviours (Yen & Syme, 1999).

There are several pathways in which the neighbourhood environment has been theorised to influence drinking behaviour (Vinther-Larsen, Huckle, You, & Casswell, 2012). It is posited that living in areas which create distress (i.e., high material deprivation and low social cohesion) results in risky behaviours such as alcohol consumption as a means to cope (Green, Leyland, Sweeting, & Benzeval, 2013; Vinther-Larsen et al., 2012). This has been labelled the stress-induced hypothesis (Stimpson, Ju, Raji, & Eschbach, 2007). Additionally, physical resources within a neighbourhood encourage or discourage health behaviours (Stimpson, Ju, Raji, & Eschbach, 2007). In terms of adolescent alcohol consumption these resources may take the form of increased availability through high numbers of alcohol outlets or a lack of support or community services available for youth (Stimpson et al., 2007; Vinther-Larsen et al., 2012; Young et al., 2012). Furthermore, it could be that spaces that allow for adolescent alcohol consumption (i.e., unsupervised spaces) may present a resource for increased high risk consumption. These are considered structural pathways as it is the physical structures in the neighbourhood that are thought to influence drinking behaviours. The social norm or social-contagion pathway hypothesis posits that as high risk alcohol use increases it becomes normalized and an increased uptake of that behaviour will be adapted. The above theories are not mutually exclusive and more than one of these processes may be at play; they may also be interconnected. For example high accessibility to alcohol may cluster in areas of high social disorganization (Holmes et al., 2014) increasing consumption in the general population and leading to increased acceptance of high levels of alcohol use and thereby increasing alcohol consumption among adolescents. It is obvious that these relationships are complex and a thorough understanding of the existing evidence is needed to move research forward.

Previous studies that examine the neighbourhood characteristics and adolescent drinking outcomes focus primarily on alcohol availability, urban/rurality and neighbourhood socioeconomic status (SES). A smaller number of studies also exist that examine the role of the neighbourhood social environment and neighbourhood level social norms. Accordingly, this paper will outline contemporary evidence of the role of the neighbourhood level risk and protective factors associated with adolescent alcohol use as well as discuss the possible theoretical pathways that might underlie these potential relationships.

#### *Commercial alcohol availability*

Generally, studies examining the neighbourhood commercial availability of alcohol as a predictor of adolescent alcohol use have found mixed results (Bryden, Roberts, McKee, & Petticrew, 2012). The results tend to vary with type of availability measure used in the analysis. The most common measure used to determine availability of alcohol is outlet density within a defined geographic region (usually divided into off-trade and on-trade store types) (Holmes et al., 2014). Sometimes distance to nearest alcohol outlet is also used. Recently, adolescent exposure to outlets en route to school has also been examined (Milam, Furr-Holden, Cooley-Strickland, Bradshaw, & Leaf, 2012). Young et al. (2012) examined the relationship between weekly alcohol use among adolescents in Glasgow and commercial alcohol availability and found proximity to off-sales outlets was positively associated (non-linearly) with alcohol use; however density was not. This relationship was only present at shorter distances than found in previous research of adults (Young, Macdonald, & Ellaway, 2012), which supports the hypothesis that adolescent health behaviours are influenced by a more limited geographic range due to limited mobility (Åslund & Nilsson, 2013; Tanner-Smith, 2012). In a recent review Bryden et al. (2012) found eight studies that examined adolescent alcohol use in relation to commercial alcohol availability. Some studies found that results depended on the drinking outcome variable used in analyses (Milam, Furr-Holden, Harrell, Jalongo, & Leaf, 2013; Paschall, Grube, Thomas, Cannon, & Treffers, 2012). A recent representative study of Australian youth showed that drinking behaviours of younger adolescents (aged 12-14) were sensitive to outlet density while the behaviours of older adolescents were not (Rowland et al., 2014). These examples indicate that the effect of commercial alcohol availability may vary by measurement of commercial alcohol availability, population under study (i.e., specific age groups or regions) and drinking outcome examined.

Commercial alcohol availability may represent an important covariate in studies of other factors of the neighbourhood environment and adolescent drinking behaviours (Vinther-Larsen et al., 2012). For instance, it might be that outlets are concentrated in specific types of areas, such as more deprived areas or areas with low social cohesion. Brenner et al. (2010) suggests studies examining interactions between neighbourhood variables and commercial alcohol availability may provide more useful insights into the role of neighbourhoods in adolescent alcohol use. Overall, in light of disparities in past findings, more research is needed to gain a better understanding of the relationship between commercial alcohol availability and adolescent alcohol use in order to further inform alcohol policy. Additionally, when designing studies and interpreting results careful consideration should be given to the measure of commercial availability used.

*Urban/rurality*

Multiple studies have found urban/rural variations in adolescent alcohol use (i.e. Coomber et al., 2011; Donath et al., 2011; Gutiérrez & Atienzo, 2011; Wilson & Donnermeyer, 2006). Various theories exist explaining these disparities (Wilson & Donnermeyer, 2006). One theory assumes a lack of anonymity of residents in rural areas leads to less social disorganization and greater social control resulting in reduced adolescent alcohol consumption (Wilson & Donnermeyer, 2006). However, recent research does not support this. Contemporary research undertaken in the US, Australia, Germany, Mexico and the Netherlands have consistently shown that adolescents residing in rural areas drink more than those in urban areas (Coomber et al., 2011; Donath et al., 2011; Gutiérrez & Atienzo, 2011; Jonkman et al., 2012). The most common theory attributed to this pattern is that those who live in rural areas lack accessibility to interesting leisure time activities; therefore leading them to engage in alcohol consumption due to a deficiency in alternative activities (Donath et al., 2011).

In order to better understand predictors of adolescent alcohol use studies that are designed including both urban and rural participants are needed; this allows for testing of direct and moderating effects of urban/rurality (Wilson & Donnermeyer, 2006). Urban/rurality can be thought of as a higher level structural variable in that it is difficult to alter urban/rural status via community interventions (Jonkman et al., 2012). However, gaining more insight into the mechanisms that underlie the urban/rural inequality in adolescent drinking outcomes is an important area of future research which has received little attention to-date (Zhen-Duan & Taylor, 2014).

### *Neighbourhood deprivation*

Studies that have examined adolescent alcohol consumption as an outcome of neighbourhood deprivation have found varied results (Bryden et al., 2012; Jackson et al., 2014). Some studies have found increased risk of higher levels of consumption for those living in deprived areas; some have found increased risk of higher levels of consumption among those living in more affluent areas, while some studies found no relationship among the total population but that among some subgroups significant relationships exist (i.e., Fagan, Wright, & Pinchevsky, 2013; Kling, Liebman, & Katz, 2007; Trim and Chassin, 2008). The mixed findings may be due to variations in measures of consumption (i.e., quantity versus frequency), as proposed by Vinther-Larsen et al. 2013, or differences in control variables and model specification. Additionally differences may be due to contextual differences between study sites.

A notable limitation of these studies is that it is not possible to tease out the theorised underlying mechanisms of neighbourhood deprivation and adolescent alcohol use. Several potential underlying

mechanisms have been discussed. For example, it has been hypothesised that material deprivation within the neighbourhood may lead to deterioration of neighbourhood conditions causing increased alcohol use in order to cope with stress the stress of living in such an environment (Bloomfield & Stock, 2013). Neighbourhoods that experience deprivation are hypothesized to have low levels of social cohesion and integration, which is thought to increase problematic behaviour such as adolescent drinking (Jackson et al., 2014). Further, neighbourhoods experiencing deprivation may also have decreased access to safe facilities that offer alternative activities to drinking or have increased accessibility to alcohol; both may influence consumption in opposite directions. To better understand the role that neighbourhood deprivation may play in adolescent alcohol consumption studies that are carefully designed to test specific hypothesis based on theoretical considerations are needed. Due to the inconsistent findings it has been suggested that the social conditions within the neighbourhood should be more carefully examined in future studies.

### *Social environment*

Commonly overlooked elements of the neighbourhood environment are the social dimensions of the neighbourhoods in which we live (Yen & Syme, 1999). Generally, these dimensions represent collective socialization processes, such as, neighbourhood social disorganization, disorder and social capital (Cantillon, 2006). Two recent reviews of neighbourhood effects on adolescent alcohol use found few studies that examined these social dimensions compared indicators of neighbourhood deprivation (Bryden, Roberts, Petticrew, & McKee, 2013; Jackson et al., 2014).

As noted above, when a positive relationship is found between neighbourhood deprivation and health risk behaviours the mechanisms underlying the relationship are often hypothesized to be due to social processes (Neutens, Vyncke, De Winter, & Willems, 2013; Schulz et al., 2013; Tanner-Smith, 2012). Bloomfield and Stock (2013) conclude that the presence of disorder indicated by abandoned buildings and other signs of neglect pose a risk for adolescent alcohol and other drug use; while positive influences such as neighbourhood social cohesion reduce risk. However the effects of the neighbourhood social environment on individual health outcomes and behaviours have not been conclusive (Morgan & Swann, 2004). Again, mixed results may be due to the influence of unaccounted for moderating factors (Bloomfield & Stock, 2013; Jackson et al., 2014), varying measures of the social environment, or varying outcome measures (Bryden et al., 2013). A Swedish study examined neighbourhood social capital and adolescent alcohol use. Neighbourhood social capital was measured using a 7 item scale that included questions about feeling safe, getting help from neighbours and neighbourhood physical conditions. A measure was also included that aggregated the scale to administrative boundaries by using the median of the individual measures

(Åslund & Nilsson, 2013). They found negative associations were present for individual perceived social capital but not at the neighbourhood level. A study by Oman et al. (2013) examined neighbourhood, family and individual predictors of non-use of alcohol in Oklahoma City, and found no evidence of neighbourhood environment influencing this relationship. However, Steen (2008) found in a study of Florida youth that a county measure of having neighbours available to talk to was negatively related to ever having tried alcohol, while perceived abandoned buildings was positively related. It is clear from the variations within these studies that future research is needed to gain better insight into these relationships. Due to the great variation in measurements of the social environment it is difficult to draw conclusions regarding the influence on adolescent alcohol use. More clarity is needed in conceptualising and measuring the dimensions of adolescents' neighbourhood social environments in further studies. Moreover, moderation and mediation analysis is needed to develop a better understanding of how these neighbourhood social processes might be linked to adolescent alcohol use.

### *Social Norms*

Some studies indicate social influences, such as the behavioural norms of a community, may be more powerful than material deprivation in predicting health behaviours (Fagan, Wright, & Pinchevsky, 2013; Tobler, Komro, & Maldonado-Molina, 2009). Social norms may be measured by adult or peer tolerance, perceived neighbourhood acceptance or aggregated measures of adolescent or adult drinking behaviour (Bryden et al., 2013; Paschall et al., 2012; Sznitman et al., 2013). It has been hypothesized that if youth alcohol use becomes normative and enters mainstream society, young people who are "well-adjusted" rather than "risky" will increasingly engage in use (Sznitman et al., 2013). In this scenario areas with higher prevalence of use would see a weaker relationship between risk factors and alcohol use, than areas with lower prevalence (Sznitman et al., 2013).

To date, there are few studies that examine neighbourhood level variation in social norms around drinking in adolescents. Overall, studies that examine direct effects of neighbourhood level alcohol use by adolescents and adults find positive relationships with individual adolescent alcohol use (Jackson et al., 2014; Paschall et al., 2012; Paschall, Lipperman-Kreda, & Grube, 2014). These results are not surprising and further research is needed to understand what neighbourhood conditions are associated with increased drinking at the neighbourhood level, in order to test for a mediating effect of social norms.

### *Conclusions*

The broad theme that emerged from this review is that a lack of consistent evidence exists examining the neighbourhood variation of adolescent alcohol use and its potential determinants. Perhaps the most consistent evidence of neighbourhood influences on adolescent drinking behaviours points to an urban/rural disparity in adolescent drinking behaviour. Gaining a better understanding of the underlying mechanisms would aid in developing policies that could reduce adolescent alcohol use in rural areas therefore reducing inequities. Additionally, neighbourhood level factors may in fact also act as mediators on national policies (Toumbourou, Olsson, Rowland, Renati, & Hallam, 2014). As few studies have examined differential effects of national strategies across neighbourhoods, this is an important area for future research. Overall, further studies are needed that are designed based on theory (Holmes et al., 2014) and that consider potential moderating and mediation effects in order to improve the evidence base (Jackson et al. 2014).

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