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Understanding rural risk environments for drug-related harms: Progress, challenges, and steps forward

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Introduction

Across several continents, epidemics of drug-related harms have been expanding from cities to rural areas (Mack, Jones, & Ballesteros, 2017; Palombi, St Hill, Lipsky, Swanoski, & Lutfiyya, 2018; Penington Institute, 2019). In the United States, for example, young adults in rural areas have higher rates of newly diagnosed Hepatitis C virus cases than any other population (Zibbell et al., 2015), and the CDC concluded in 2016 that the US counties most vulnerable to outbreaks of injection-related HIV or hepatitis C were “overwhelmingly rural” (Van Handel et al., 2016). In Australia, rates of fatal drug overdoses in rural and regional areas grew almost five times faster than in large cities (Penington Institute, 2019); the US has undergone a similar transition (Mack et al., 2017).

Though this crisis has been brewing for two decades, remarkably little is known about features of rural “risk environments” that may create vulnerability or resilience to drug-related harms. Developed by Rhodes (2002, 2009), the risk environment model (REM) is a widely applied theoretical framework that posits that drug-related harms are consequences of multiple intersecting domains of physical, social, policy, and economic environments manifesting at macro- (e.g., drug trafficking routes), meso- (e.g., programs serving people who use drugs [PWUD]), and micro- (e.g., drug use locations) levels. REM was developed in part to shift public health’s focus from changing behaviors of individual PWUD to addressing environmental determinants that create vulnerabilities to drug-related harms. REM has been widely applied to understand the determinants of drug-related harms, and has evolved over time. To illustrate, new environmental domains (e.g. health care and law enforcement) have been proposed (Cooper, Bossak, Tempalski, Des Jarlais, & Friedman, 2009; Cooper et al., 2012; Cooper & Tempalski, 2014), and Collins et al. have

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conceptualized how intersections of gender, race/ethnicity, and other dimensions of social position might modify the effects of environmental features (Collins, Boyd, Cooper, & McNeil, 2019). Potent though it is, however, REM has rarely been applied to rural areas. Rural areas across the globe share a constellation of REM features that may shape vulnerability to drug-related harms, and influence the provision of evidence-based services. These features include physical isolation, underdeveloped infrastructure and health care systems, stigma against PWUD, and limited economic opportunities, as well as robust social networks, social cohesion, and social capital, and histories of mass mobilization. However, REM-guided research about how these features intersect over time to shape drug-related harms remains limited.

This special issue is thus designed to advance theoretical and empirical understandings of rural risk environments, with the acknowledgment that “rural” and “urban” are hardly a dichotomy but rather exist on a continuum and that rurality and urbanicity vary in their social, political, and cultural context regionally and globally. The articles in this special issue reveal several theoretical, methodological, and substantive challenges in current research and interventions into rural risk environments. In this Editorial, we consider several of these challenges, and offer possible paths toward meeting them (see Table 1 for a summary of recommendations).

Heterogeneous Local Rural Risk Environments and Post-Structuralist Approaches

Jenkins and Hagan (2019) observed that variations in risk environments can arise across urban, suburban, and rural risk environments that are all governed by the same state or province’s policies, and Kolak et al. (2020) documented multiple risk environment typologies within ZIP codes and counties in a single rural region of one US state. As Cooper and colleagues (2020) note, REM and other multilevel conceptual models have historically been dominated by structuralist approaches that assume that features of the macrolevel exert monolithic impacts (Duff, 2007; Rhodes, 2009); these approaches thus leave little possibility for the heterogeneities that Jenkins and Hagan and Kolak et al. consider.

The emergence of post-structuralist approaches within REM, however, can actively support its deeper engagement with these heterogeneities. Post-structuralist approaches themselves are highly heterogeneous, and so we anchor this discussion in Duff’s conceptualizations of Drug Use Contexts (2007). Duff maintains that local geographies of drug-related harms emerge from assemblages of relationships that draw together diverse experiences of space, practice, and embodiment. Within an assemblage, elements exist in mutually transformative relationships with one another; assemblages are highly dynamic, as new elements enter and alter the others. This relational perspective creates space for the emergence of heterogeneous local geographies, because it allows macrolevel features (as well as meso- and micro-level features) to transform and be transformed by their relationships with other elements, rather than exerting a monolithic and thus homogenizing impact. Though rarely discussed in this special issue, the notion of such interplay is not new for REM: one of REM’s fundamental propositions is that levels and domains intersect with one another to form risk environments

(Rhodes, 2002, 2009; Rhodes, Singer, Bourgois, Friedman, & Strathdee, 2005). Duff's conceptualization of assemblages of interpenetrating elements may, however, provide a bridge to *apply* this fundamental REM proposition to future research seeking to understand heterogeneities across rural risk environments. It can, for example, help future REM-guided analyses explore the possibility that distinctive rural risk environments form even when governed by the same state laws, because the implementation and experience of these laws are shaped by, and shape, local micro- and meso-level features. It can also support REM-based analyses of rural risk environments by calling attention to the *processes* through which these relationships form and evolve, rather than treating them as static.

The Mesolevel in Rural Risk Environments: Harm Reduction Programs

Features operating within the mesolevel – defined as including “perceived group ‘norms’ ... and institutional or organizational responses” (Rhodes et al., 2005, p 1027) – emerged as significant in the rural risk environments described by several papers in this special issue. Winstanley (2020) called attention to the phenomenon of “overdose compassion fatigue,” and noted that this fatigue might be more common in rural areas, where first responders are often repeatedly summoned to respond to overdoses and are more likely to know overdose victims. Green and colleagues (2019) and Cooper and colleagues (2020) analyzed the roles of pharmacies in shaping access to opioid use disorder medications (MOUD) in rural areas. Showalter (2020) and Rudolph and colleagues (2019) testify to the salience of network structure in shaping rural risk environments, and call attention to potentially unique network characteristics of rural residents that might differentiate them from those in urban areas.

As observed by Cooper et al. (2020), however, the mesolevel has held a relatively marginal position within REM's theoretical papers, occasionally recognized in these publications but typically omitted (Rhodes, 2002, 2009; Rhodes & Simic, 2005; Rhodes et al., 2005; Rhodes et al., 1999); neglect of the mesolevel is common in multilevel approaches (Richter & Dragano, 2018). We argue that future REM-guided research and interventions should center the mesolevel, and that this level may have particular salience for understanding and intervening in rural areas. Regardless of rurality, features of the mesolevel may intensify or mitigate hazards operating within other levels, or amplify or undermine resources operating at other levels (Richter & Dragano, 2018). A syringe service program may, for example, prevent an HIV outbreak in the presence of significant war on drugs initiatives funded and organized at the macrolevel. Researchers and practitioners centering the mesolevel in REM may find allies in implementation science, where there is growing dissatisfaction with implementation science's historically narrow focus on intra-organizational processes and growth toward engaging with the macrolevel (Bruns et al., 2019; Cooper et al., 2020).

REM's meso-level may be especially important in rural areas now, as multiple funding agencies, non-governmental organizations, user unions, and other community groups are currently mobilizing to rapidly implement harm reduction programs. As attested to by several of the empirical and theoretical articles published in this special issue, the emerging programs serving PWUD in rural areas are often shaped by intersecting features of various REM levels. The papers published in this special issue, for example, suggest that access to drug-related health services may depend on policies regulating the provision of MOUD

(Richard et al., 2020); DEA and wholesaler stipulations for pharmacies dispensing opioid analgesics (Cooper et al., 2020); healthcare providers' reluctance to prescribe MOUD because of fears of medication diversion and abuse and community stigma (Cooper et al., 2020; Richard et al., 2020); the organization of service provision at pharmacies (Green et al., 2019); and geographic remoteness and lack of transportation (Csak, Szecsi, Kassai, Marvanykovi, & Racz, 2020). As observed by Jenkins and Hagan (2019), the nature of these intersecting features in rural areas may be distinct from those operating in urban areas. For instance, rural remoteness and low population density may suppress revenue for healthcare services (a feature of REM's economic domain) and may, therefore, curtail the number of healthcare providers who can prescribe MOUD (a feature of REM's healthcare domain).

Multiple papers in this special issue addressed stigma, and the ways that this potent feature of the social environment shapes the treatment and harm reduction landscape in rural areas. Stigma surrounding substance use and PWUD was a recurring theme and a prominent feature of the rural risk environments highlighted throughout this special issue. This stigma could be compounded by stigma against rural areas themselves and against subgroups of rural residents. As Showalter describes, rural communities themselves are derided for their "cultural and political backwardness, the services they lack, and the resources of which they are deprived" (2020, p. 16); Csak and colleagues (2020) powerfully illustrate stigma toward people of Roma origin in Hungary. Compounded stigma against rural areas themselves and against rural subpopulations may thus undermine local treatment and harm reduction programming efforts.

In addition, these articles point to stigma toward evidence-based practices used to treat and reduce the harms of substance use (Fadanelli et al., 2019; Richard et al., 2020). For example, Richard and colleagues (2020) present findings from qualitative interviews conducted in Appalachian Ohio, in which local stakeholders describe how stigmatizing attitudes conceptualize MOUD as at odds with abstinence and recovery; Richard et al. also explore the entrenchment of these stigmatizing attitudes in the criminal justice system, including drug courts. Additionally, as described by Cooper and colleagues (2020), in many cases rural communities' trust in MOUD prescribers has been eroded by decades of exploitation by the pharmaceutical industry, exploitation that has recently gained increased attention as a result of litigation. An environment of eroded trust coupled with a persistent lack of resources is fertile ground for the development and perpetuation of stigmatizing and victim-blaming attitudes, attitudes that can undermine evidence-based programs. As illustrated by Winstanley (2020), these attitudes can be intensified by the utter exhaustion that occurs when compassion collides with the reality of living in close-knit communities that have been devastated for generations by opioid use and overdose, yet have lacked the infrastructure needed to effectively support people's remission and recovery. Stigma against MOUD and other evidence-based harm reduction interventions is particularly damaging because it simultaneously limits individuals' access to evidence-based treatment and exacerbates the social exclusion of people treated with MOUD. This stigma is self-perpetuating: it silences people who have been helped by MOUD and conceals their success stories from potential treatment providers, pharmacists, judges, policymakers, and peers, who in turn cite doubts about MOUD effectiveness as a reason for their negative attitudes toward medications.

Understanding whether and how stigma and other features of the microlevel, mesolevel, and macrolevel shape the reach, adoption, implementation, sustainment, and utilization of harm reduction programs in rural areas will be vital to their success. It is not enough to simply establish a program; multiple domains of the risk environment may need to evolve to permit effective service provision and utilization. Sustained and effective harm reduction programs can be achieved only by concerted actions of federal, state, and local policy- and other decision-makers, actions that must also be embraced by local communities. These are formidable challenges. Addressing the full complement of barriers to harm reduction service provision and utilization in rural areas will require comprehensive, multipronged interventions targeting policies and policing practices; service provision protocols and providers' attitudes; building local infrastructure; and changing social norms (see Table 1). Developing and testing a variety of comprehensive strategies should be a priority for rural risk environment research and response agendas.

The Mesolevel in Rural Risk Environments: Social Networks

Paradoxically, some of the same features of the rural risk environment that perpetuate stigma and negatively impact treatment seeking are the very features of rural communities that are uniquely positioned to leverage for positive change. Social networks illustrate this complexity. Thomas and colleagues (2019), Jenkins and Hagan (2019), and Showalter (2020) highlight that tight-knit social networks in rural communities can undermine programming by limiting anonymity and heightening fears of stigma. However, these same networks, if leveraged, can be a source of social support, foster dissemination of evidence-based practices, and facilitate progressive policy change. Findings by Rudolph and colleagues (2019), for example, suggest that injection cessation among close peers (i.e., social support partners, family, and those with whom they have long relationships and frequent interaction) may be associated with individual's likelihood of ceasing injection. Networks may also facilitate diffusion of interventions (Latkin & Knowlton, 2015). These findings underscore the potential of social networks in promoting harm reduction interventions and research, and highlight the need for additional research in this arena.

Methods to Study Rural Risk Environments

Our ability to understand and transform rural risk environments depends, in part, on advances in research methods to study drug-related harms in rural settings. Unfortunately, rigorous empirical studies, particularly quantitative studies, have been primarily conducted in cities. There is a unique set of challenges to directly translating novel and established research methods from urban to rural settings. The scarcity of rigorous empirical quantitative data on rural risk environments might be attributable, to varying degrees, to a range of potential difficulties that accompany recruiting sufficiently large samples of PWUD to power hypothesis tests of quantitative data. These difficulties include oppressive law enforcement practices; low density of underlying PWUD population; research fatigue and saturation among a relatively small pool of PWUD available for research; distrust of researchers, who are often perceived as outsiders; lack of transportation; underdeveloped health and social infrastructure through which to engage PWUD; stigma; and difficulties maintaining participant confidentiality in small rural communities. (Brown, 2003; Draus,

Siegal, Carlson, Falck, & Wang, 2005; Young, Rudolph, & Havens, 2018; Young, Rudolph, Quillen, & Havens, 2014) It is unsurprising that most of the empirical studies included into our special issue relied on qualitative methods, methods that do not require large sample sizes.

Recruitment and meaningful involvement of rural PWUD in research may be only possible by building long-term trust between the research and PWUD communities. Ethnographic methods and community-based participatory research (CBPR) are two tools to build such trust (Draus et al., 2005). CBPR is a proven method to help ensure meaningful inclusion of marginalized and hard-to-reach populations, including PWUD, in the design, implementation, interpretation and dissemination of research (Christopher, Watts, McCormick, & Young, 2008; Coughlin, 2016). While no studies in our special issue employed this method, empirical findings and theoretical discussions of high social cohesion of rural PWUD networks and their embeddedness in larger communities (Jenkins & Hagan, 2019; Showalter, 2020; Thomas et al., 2019) suggest that CBPR may be a useful strategy for studying rural risk environments in the future.

Studying and intervening in rural drug-related epidemics also requires developing valid measures that capture specific features of these environments. Kolak and colleagues' (2020) work in rural southern Illinois presents a promising step in this direction. In their spatiotemporal analysis of drug-related health outcomes in that region, they measured local rates of high-risk industry employment and occupational injuries, indicators that may capture need for pain treatment in agriculture and mining occupations that are predominant in rural areas. Fadanelli et al's (2019) identification of *trap houses* as key risk-generating microenvironments in rural Kentucky also has important implications for measurement: when these are abandoned mobile homes, these abandoned structures will not appear in administrative databases of abandoned residences, because mobile homes are classified as personal property, not housing structures. Novel measures, such as Google Audit, may be needed to capture these and other unique features of rural risk environments, though these methods come with their own challenges in rural settings (Crawford et al., 2019).

Conclusion

Developing a new body of research into the risk environment in rural areas and related interventions requires rapid and coordinated advances in theory, public health practice, and research methods. Better theoretical understanding of the dynamic and heterogeneous natures of rural risk environments and complex interactions of their domains across levels may inform the creation of effective interventions, particularly if this work acknowledges the significance of the mesolevel. Multipronged multilevel interventions that combine evidence-based harm reduction services with efforts to reduce stigma and other barriers to services and that leverage social networks need to be developed and tested. Mounting effective responses depends on conducting empirical research that meaningfully involves communities of rural PWUD; studying these responses requires developing novel research methods and technologies to meet challenges posed by rural environments. By raising new questions and sharing emerging answers about rural risk environments, the articles in this special issue take us one step closer toward reducing drug-related harms in rural areas.

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Table 1.**Recommendations to Advance Research and Interventions into Rural Risk Environments**

Topic	Recommendations
Post-Structuralist Approaches	Advance theoretical reflection and empirical research on the dynamic, heterogeneous natures of the rural risk environment and interactions of its' domains at various levels.
The Mesolevel in Rural Risk Environments: Harm Reduction Programs	- Comprehensive, multipronged harm reduction interventions must be accompanied by initiatives designed to alter repressive drug policies and policing practices; meet broader socioeconomic needs of PWUD; foster activism and mobilization of PWUD communities; develop PWUD-friendly service provision protocols; sensitize providers to PWUD needs; build local service infrastructure; and change social norms that stigmatize PWUD. - Every harm reduction strategy, intervention, and policy launched in a rural area should incorporate initiatives to reduce stigma against PWUD or mitigate its' impact.
The Mesolevel in Rural Risk Environments: Social Networks	- Social networks may promote harm reduction behaviors, disseminate interventions, and help engaged PWUD in research. - Additional research on the characteristics of rural social networks and their influence on drug-related risks is needed.
Methods to Study Rural Risk Environments	- Ethnographic methods and CBPR may be helpful tools to build trust in rural communities and overcome barriers to recruitment of participants. - Novel methods are needed to better measure unique features of rural risk environments.