Title: Emerging opportunities for life course research on neighbourhoods and mental health

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Social capital, referring to the quality and quantity of social relationships in a community, and the socio-economic characteristics of neighbourhoods are considered influential determinants for the mental wellbeing of residents,[1-3] but most of the empirical evidence on these relationships is limited in several ways. Cross-sectional studies cannot distinguish between social causation and social selection/drift mechanisms. For example, poor mental health may constrain individuals to migrate into, or remain in, neighbourhoods with worse conditions.[1][2] A further, and equally critical, limitation of the cross-sectional design for this research area is the absence of the life course approach.

While common mental disorders can occur at any age, the first onset of major depression most likely occurs during young adulthood. Consequently, depression onset in young adulthood is a powerful predictor of chronic depression or recurrent depressive episodes in later life.[4] Therefore, understanding the links between the neighbourhood environment, as intertwined with and influencing other life circumstances (job market integration, social integration), and depression during young adulthood is crucial to assess how these conditions may increase the risk of developing this disorder. Given limited and conflicting reports for emerging adults, it is unclear whether life circumstances and more proximate risk factors play a greater role than neighbourhood factors at this life stage, or whether neighbourhoods are important through their impact on these determinants.[5]

Goldstein and colleagues add much-needed life course evidence to this literature by investigating the associations between social fragmentation (a composite index based on the share of female-headed households, residents living in the area <5 years, foreign-born residents and renters), income inequality (GINI index) and economic disadvantage (household income) with depressive symptoms in the US NEXT Generation Health Study.[5] Using annual assessments on depressive symptoms, the study tracked a nationally representative sample of US adolescents from 15-16 to 21-22 years of age, thereby capturing their transition into adulthood. Markers of the neighbourhood environment were derived using objective Census-tract level data geocoded using residential addresses at four time points over the follow-up. Contrary to most studies in this literature that relied on measurements at a single occasion,[1-3] repeated exposure data allows the study to account for changes in neighbourhood conditions.

Goldstein et al employed a multilevel prospective design to investigate depressive symptom differences by the neighbourhood environmental attributes independent of individual- and family-level factors. None of the nested models showed any evidence of symptom differences by social fragmentation, income inequality or economic disadvantage over the six-year period. Their lack of findings echo previous studies whereby neighbourhood socio-economic conditions did not increase the risk of depressive symptoms among young adults over a 10- and 14-year study in Finland and the US, respectively.[5]

The authors express methodological concern regarding the use of US census tracts to identify neighbourhoods, which group an average of 4,000 residents according to administrative boundaries. As census tracts do not accurately capture egocentric definitions of neighbourhoods that are more likely to reflect the daily experienced neighbourhood, this spatial unit may have underestimated true associations.[6] Although assessing social fragmentation, income inequality and economic disadvantage using egocentrically defined neighbourhoods is one strategy to improve studies like the one conducted by Goldstein et al,

these markers remain an indirect sociodemographic proxy of the social environment that are unlikely to efficiently capture influential dimensions such as social cohesion, collective efficacy, and social incivilities and delinquency.[7]

Notably, the abovementioned US study[5] found that depressive symptoms did not increase by neighbourhood disadvantage, using similar data as for Goldstein et al's[5] marker of social fragmentation; but perceived neighbourhood safety and physical neglect strongly predicted higher symptom increases from adolescence to adulthood.[5] A dominant criticism of evidence relating self-reported neighbourhood characteristics, such as cognitive (perceived) social capital, with mental health is the likelihood of cognitive distortion bias or same-source bias.[1 3] Reverse causation, however, is less probable among young adults because depression rarely occurs prior to this life stage.[4] Ultimately however, neighbourhood perceptions become informative when they can be compared to objective neighbourhood data of the same dimension. Despite the tendency to prioritize objective over subjective measurements, both are vital for a nuanced exploration of the relationships between neighbourhood social and physical environments and mental health. As little work has employed methodological techniques that can refine the measurement of neighbourhoods using subjective appraisals,[8 9] we encourage future studies to implement ecometric or multilevel factor analytic methods to capture the abovementioned neighbourhood characteristics related to the social interactions of residents.

Goldstein et al caution against using their null findings to dismiss the importance of neighbourhood environments on the mental wellbeing of emerging adults.[5] For instance, their study focussed on the residential neighbourhood, while young adults are particularly mobile and likely to spend a substantial fraction of their time out of their residential environment. Daily dynamics of individuals over space are essential because they reflect key social and behavioural processes and expose them to distinct geographic environments. Recent advances and novel methods in sensor-based tracking, paired with smartphone ecological momentary assessment, can help generate knowledge on how individual and neighbourhood determinants experienced over daily activities coincide to influence health-related behaviours, and physical and mental health.[10] Applying these tools to studies of late adolescents and young adults would be particularly valuable as many social and health trajectories take shape during this period.[4]

Moreover, the full breadth of the neighbourhood context entails not only the social environment, but also the physical and built environment and access to health and social services. These additional dimensions portray other harmful forms of neighbourhood disadvantage, including poor aesthetic qualities of place, low street integration and dwindling infrastructure to sparsity of service providers and poor quality of care.[7] Furthermore, in addition to the neighbourhood local social and physical environment, it is relevant to recognise the wider regulatory and policy context at the meso- and macro-scales. It is obviously no easy task to gather data on this wide set of environmental determinants and the MINDMAP project bears significance on this research area. By linking individual-level data from multiple cohort studies of ageing across Europe and North America with not only area-level information on the social and physical environment, but also with policy indicators, MINDMAP provides a unique opportunity to understand how neighbourhoods and the wider social, physical and political environment influences mental wellbeing and cognition in the

later life course.[11] Data integration of this kind can enrich other life course studies interested in neighbourhood effects.

Life course environmental epidemiology provides a framework to enhance knowledge on the relationship of the neighbourhood context with mental wellbeing. For example, certain exposures may be important through sensitive period, accumulation of risk or chain of risk processes across the life course.[4] As maternal depression is a grave risk factor for offspring depression,[4] evidence relating neighbourhood disadvantage with poor mental health among mothers of infants and young children[3] also highlights the importance of intergenerational processes. Applying these models to understand the causal effects of neighbourhoods on mental health net of a large set of confounders requires investigators to grapple with a complex hierarchy of individual- and area-level factors thoughtfully organized within a causal diagram (e.g., a directed acyclic graph).[12] Multilevel longitudinal investigations should draw on the emerging opportunities discussed here in order to promote knowledge on neighbourhoods and mental health across the life course.

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