

CICC, Université de Montréal - Postdoctoral Bursary 2021

An investigation of the role of the stress response system and cortisol as intermediaries between environments
 adverse effects of early childhood and quality of life and adjustment to adulthood
 Research Proposal – Kathleen Kennedy-Turner

Issue

Poor quality of life, especially stress-related health outcomes (e.g., depression, cardiovascular disease) cost Canadians and Canadian society billions of dollars yearly (Heart & Stroke Foundation, 2017; Smetanin et al., 2011). Given this cost, researchers are increasingly attempting to understand to what degree the neighbourhoods we live, learn, and work in, affect our development especially in terms of quality of life and later adjustment. Quality of life can be measured through social indicators, typically classified as “objective” measures (e.g., crime per capita, proportion of people living in poverty, education level; Diener & Suh, 1997), and social well-being, which is concerned with how people perceive their lives (Caron, Cargo, Daniel, Liu, 2019; Diener & Suh, 1997). Adjustment in later life refers to a broad range of outcomes such as educational attainment, criminalization, and employment status. Quality of life and adjustment outcomes are highly related and are both impacted by early life environments such as the neighbourhoods where we reside or attend school. Quality of life measures are associated with health-related outcomes (chronic stress, physical and mental health), and can therefore be treated as health-related quality of life indicators (Diener & Suh, 1997). Despite the overlap and interrelation between quality of life and adjustment, it is imperative to examine both. This will give a more comprehensive understanding of well-being, specifically by examining the underlying mechanisms contributing to both quality of life and adjustment. Understanding the mechanisms through which neighbourhood environments ‘get under the skin’, affecting quality of life and later adjustment, can help inform urban and physical environment planning, social policy, and policies addressing inequalities amongst neighborhoods.

Neighbourhood environments have been shown to impact quality of life and adjustment outcomes such as: education and criminal charges (Kennedy-Turner et al., 2020), stress-related outcomes (Theall, Shirtcliff, Dismukes, Wallace, & Drury, 2017), and later psychiatric disorders (Hastings et al., 2019). Neighbourhood environments therefore have a broad impact on development and quality of life and adjustment outcomes, yet the mechanism itself is poorly understood. Understanding the mechanism through which the environment contributes to quality of life and adjustment can help to inform interventions for populations living in disadvantaged neighbourhoods.

Neighbourhood environments can be assessed in several different ways. Researchers have examined Census information to derive indicators of neighbourhoods’ social environment such as the number of people in that neighbourhood who are single parents, who are living below the poverty line, and who are part of a racialized group, or those living below the poverty line. Individuals living in socially disadvantaged neighbourhoods may demonstrate more aggression (Chang, Wang, & Tsai, 2016), lower education (Kennedy-Turner et al., 2019), poorer mental health (Hastings et al., 2019), poorer physical health, including biological stress (Theall et al., 2017), and more generally poorer quality of life (Caron et al., 2019)

Further, neighbourhoods can also be assessed in terms of the physical or built environment using Geographic Information Systems. The built environment includes assessments of lighting, green space, noise pollution, accessibility to resources, and residential density (Nordbø, Nordh, Raanaas, & Aamodt, 2018). In general, it has been found that environments with poorer built environments (e.g. less green space, more noise) are associated with poor quality of life and health outcomes such as increased stress (Matthews, & Yang, 2010), mental health problems (Evans, 2003), and poorer adjustment outcomes such as criminalization (Anderson, MacDonald, Bluthenthal, & Ashwood, 2013).

To better understand the potential mechanisms through which neighbourhood environments affect quality of life and adjustment, theoretical models incorporating several levels of influence can be utilized. For example, Ecological Systems Theory (Bronfenbrenner, 1979) provides an overarching framework for understanding how different systems can affect development over the lifespan.

Neighbourhood environments, especially in early developmental stages, can therefore have far reaching and embedded effects. These effects can be exacerbated when elements of the neighbourhood environment interact with individual characteristics and other systems across the course of development. Specifically, neighbourhood environments might contribute to changes in the stress response system, which will then be associated with a change in adjustment, behavior, and health-related quality of life outcomes. In the most extreme cases it is expected these early-life changes contribute to later poorer quality of life (e.g. mental health problems) and/or poorer adjustment (e.g. less education, criminal charges). Examining these associations using these guiding frameworks will elucidate our understanding of how neighbourhoods get ‘under the skin’ to produce long lasting effects detrimental to adjustment and quality of life. Investigating what impacts both quality of life and adjustment will provide a comprehensive understanding of well-being.

Objectives

In my postdoctoral research, I plan to examine how early environments contribute to later poorer quality of life and adjustment. Quality of life and adjustment outcomes include criminal charges, psychiatric illness, education level, employment status, and stress-related outcomes. The main research question is whether early neighbourhood environments, including built and social environment measures, and an altered stress response can explain poorer quality of life and poor adjustment later in life.

Methodology

To assess the research question of whether altered stress responses to neighbourhood environments affect quality of life and adjustment in later life, we will be using data from the Concordia Longitudinal Research Project (CLRP; Co-directors: Lisa A. Serbin and Dale M. Stack). This data provides measures of neighbourhood perceptions, stress-related outcomes such as cortisol (diurnal or awakening response; collected in two generations, in the 1990s and then in the early 2000s), and adjustment related outcomes (e.g., education, criminal charges, mental health). This data will be combined with census (available as early as the 1980s) and geographic information system (GIS) measures (including data as early as 1990, available from several sources including Canadian Urban Environment Health Research Consortium (CANUE), and DMTI Spatial©), to examine how the early environment contributes to poor quality of life and adjustment outcomes (e.g., education, criminal charges, mental health), and whether this relation is mediated through cortisol. The sample will be drawn from the CLRP and will consist of about 270 individuals that were selected for follow up. For these individuals, we will derive ego-centered neighbourhood measures, representing a 1km circular buffer surrounding their residential postal code. To assess the proposed complex relations between early-neighbourhood environments, cortisol, and later quality of life and adjustment, structural equation modeling will be used. This approach allows for the estimation of direct effects, but also indirect effects through early life adaptation to the neighbourhood environment. We will also investigate multi-level aspects that account for variability within the person, and between neighbourhoods. We expect that poorer neighbourhood environments will alter cortisol output which will (directly or indirectly) predict lower educational attainment, increased probability of criminal charges, and increased probability of a mental health disorder. Our measurement and analytical approach ensures that we will be able to test the hypothesized pathways in our sample in a realistic timeline.

Schedule

Months 1-3: Data access, literature review, refining of hypotheses and statistical approach

Months 3-6: Data screening, cleaning, development/refining of cortisol analysis, data analysis

Months 6-9: writing, editing, and publishing of results

Months 9-12: publishing, presenting of results

References

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The statement of motivations to carry out his project at CICC

Although my project has been funded to be carried out at the INRS, I feel that researchers at CICC can provide valuable insight especially when considering life outcomes such as criminalization. I would appreciate collaborating with researchers from CICC in order to have a comprehensive examination of adult outcomes. My supervisor at the INRS, Dr. Carolyn Côté-Lussier, has also been appointed at a CICC, and as her postdoc, I feel I will benefit greatly from this collaboration. Multidisciplinary approaches often provide unique information to the understanding of the development of behaviour, and therefore working with collaborators at CICC would provide invaluable information.