

REDUCE FOSSIL FUEL DEPENDENCE TO IMPROVE MENTAL HEALTH

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As brain scientists concerned with mental health, in this memoir we highlight how diminishing our dependence on fossil fuels can benefit individual well-being and reduce public health care expenses. Whereas the domain of health science is often concerned with treating or curing disease, here we provide scientific evidence to argue that reducing fossil fuel consumption can act as a preventative medicine by encouraging active modes of transportation and promoting resilient communities.

The global climate crisis is propelling an abundance of social, political, economic, and ecological issues. This memoir discusses a select number of pressing concerns to demonstrate how our dependence on fossil fuels can negatively impact mental health. More specifically, because transit accounts for the majority of Montreal's carbon emissions and passenger vehicles are the largest emitter among all transportation methods (Ville de Montréal, 2015), we highlight how minimizing the number of single-occupancy vehicles can cut emissions while improving the health of Montrealers.

This memoir reviews scientific findings to demonstrate that (1) driving to commute induces stress and burdens mental health, (2) motor vehicle collisions are a primary cause of traumatic brain injury, (3) widespread use of single-occupancy vehicles begets urban isolation, (4) active modes of transit can prevent and alleviate physical disease and mental disorders, and (5) rising sea level are creating millions of climate refugees with increased vulnerability to mental health burdens. We conclude with three sets of recommendations for action that the City of Montreal can take to reduce our dependency on fossil fuels and thus promote mental health.

(1) Commuters who drive to work have higher levels of stress than those who take public transit (Wener & Evans, 2011). When drivers switch transportation methods and begin using public transport, stress decreases both subjectively and in terms of hormonal physiology (Wener, Evans, & Boatley, 2005). Factors that propel stress among drivers include traffic congestion (largely caused by the volume of single-occupancy vehicles) and the unpredictability of the transit time (compared to the more consistent public transport times). Chronic stress leads to lasting changes in the structure and function of the brain while increasing the likelihood of developing depression and anxiety among other health complications such as cardiovascular disease (Lupien, McEwen, Gunnar, & Heim, 2009; Steptoe & Kivimaki, 2012).

(2) In the province of Quebec, motor vehicle collisions result in approximately 460 injuries and five fatalities per 100,000 citizens each year (Transport Canada, 2011). In young adults, motor vehicle collisions are the primary cause of traumatic brain injuries (Gessel, Fields, Collins, Dick, & Comstock, 2007). Such brain injuries often cause lifelong struggles that impact individual well-being and incur substantial health care expenses. Unlike with passenger vehicles, collisions with public transit are rare. An increased availability of public and active transit methods would likely decrease the use of personal vehicles and thus reduce health issues prompted by stress and traumatic brain injuries.

(3) Large volumes of single-occupancy vehicles inhibit community cohesion and increase urban isolation. Residents in car-oriented neighborhoods are less likely to know their neighbors, participate politically, trust others, and engage socially (Leyden, 2003). Greater access to public transit also reduces the risk of anxiety and depression, especially among vulnerable populations (Melis, Gelormino, Marra, Ferracin, & Costa, 2015).

(4) Active modes of transportation, such as walking and cycling, promote physical exercise—which is one of the most effective preventative medicines (Naci & Ioannidis, 2013). Indeed, lack of physical activity is the fourth leading cause of death worldwide (Kohl et al., 2012). Integrating active transport into the daily routines of citizens holds the potential to reduce heart disease, type 2 diabetes, and obesity (Lee et al., 2012), as well as Alzheimer's disease (Radak et al., 2010), and mental health issues including depression, anxiety, and attention deficits (Salmon, 2001). Developing a city that fosters active transport can help minimize health complications, increase well-being, and save public health expenses.

(5) Fossil fuel consumption is propelling global warming and generating an international refugee crisis. Researchers predict that melting ice caps and rising sea levels will displace hundreds of millions of people and flood many major coastal cities by 2100. Such mass displacement of climate refugees has huge implications across a range of disciplines. Concerning mental health, refugees and their children develop high rates of disorders when displaced to high-income countries such as Canada (Fazel, Reed, Panter-Brick, & Stein, 2012). This places a health-related

toll on Canadian cities such as Montreal, which generously host so many displaced individuals from abroad. Whereas Montreal's complicity in the fossil fuel economy plays but a small role in contributing to the global refugee crisis, we have the opportunity to become a world-leader by eroding our dependence on fossil fuels and encouraging other cities do to the same.

FEASIBLE ACTIONS TO REDUCE FOSSIL FUEL CONSUMPTION AND IMPROVE MENTAL HEALTH:

1. Free Montreal from financial ties to the fossil fuel industry.

- Divest pension funds (e.g., Bureau des régimes de retraite de Montréal) and other municipal investments away from holdings in fossil fuel companies. A list of organisations and municipalities that have already committed to divestment can be found here: <http://gofossilfree.org/commitments/>
- Collaborate with other municipalities and the provincial government to block new pipelines passing through or near Montreal and to prohibit or enact laws against the exploration and extraction of fossil fuels from risky sources (e.g., shale gas in the St. Lawrence River).
- Refuse to subsidize the fossil fuel industry and encourage the provincial and federal governments to stop providing fossil fuel companies with subsidies (currently all provincial and federal governments combined provide \$2.7 billion annually in subsidies: Bast, Doukas, Pickard, Burg, & Whitley, 2015).

2. Make communal transport less expensive and more efficient than personal vehicles.

- Lower public transit fees and transit times so that this system becomes more time- and cost-efficient than driving a personal vehicle. Educate citizens about the cost-effectiveness and time-efficiency of public transit versus personal vehicle use.
- Encourage car-sharing and ride-sharing programs.

3. Design Montreal to encourage active transport

- Create protected bike lanes where a physical barrier separates cyclists from vehicles. These bike lanes cut cyclist injuries in half (Teschke et al., 2012) and increase the number of cyclist (Monsere et al., 2014).

- Develop more bike lanes, maintain bike lanes during the winter, provide more bike racks, continue to increase the number of car-free streets, and develop the BIXI bike sharing program to reach as many citizens as reasonably possible.
- Maintain and develop ‘green’ spaces in the city. Living in a neighbourhood with more parks and trees increases the likelihood of using active transport and correlates with better physical and mental health (Sugiyama, Leslie, Giles-Corti, & Owen, 2008).

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