

Mental illness and significant cognitive impairment among marginalized adults in Vancouver's Downtown Eastside

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Around the world and close to home, health and wellness are experienced on a social gradient; consistently, those with lower socioeconomic position experience worse health.¹ Mental illness and addictions are linked with social inequities, including poverty, stigma, and social exclusion. In Vancouver's Downtown Eastside (DTES) neighbourhood, residents live in poverty and substandard housing, and many suffer from infectious diseases and substance use disorders.² To address some of these health challenges, substantial health research has engaged the DTES community to reduce overdose deaths,³ transmission of HIV,⁴ and HIV-related mortality.⁵ Other efforts have examined harm reduction substitution therapies for substance dependence.⁶⁻⁸ The At Home/Chez Soi study demonstrated that providing subsidized housing and supports for homeless adults with mental illness improved housing stability⁹⁻¹¹ and quality of life.^{9,12} However, this intervention had limited impact on daily substance use^{9,13} and mental health.⁸ The mental health needs of the community may be significant and under-supported.¹⁴ A Vancouver Police Department report highlighted that nearly half of calls to the police from the DTES were related to mental health.¹⁵ Police, rather than health care professionals, are often the first responders to mental health crises.^{15,16} Overall, the impact of mental illness in the community is largely unstudied and requires attention.

To address this gap, the Hotel Study was launched in 2008 to better characterize the health needs of individuals in the DTES who live in single room occupancy hotels, with a particular focus on mental health and cognitive function. This ongoing, naturalistic, longitudinal observational study follows over 400 adults living in marginalized housing monthly for ten years. The study comprehensively investigates mental, physical, and social health domains using objective and self-report standardized assessment tools. Participants are notified of clinically significant findings and connected with care. Here, we summarize findings from recent publications, addressing the consequences and risk factors for mental illness and areas for future investigation.

Severe consequences of mental illness

Mental illness is among the most common health challenges faced by the Hotel Study cohort. Vila-Rodriguez *et al.*¹⁷ examined viral exposure, substance dependence, neurological, and psychiatric illness, and found participants were living with a median of three co-morbid illnesses, including a particularly high burden of substance dependence (95%), hepatitis C infection (70%), psychosis (47%), and mood disorders (30%). Living with co-morbid conditions was associated with worse real-world functioning, including work productivity, independent living, and social relationships. Further, these potentially treatable illnesses might increase mortality risk. Participants (median age 44,

78% male) experienced a mortality rate over eight-times that of age- and sex-matched Canadians.¹⁸ Of the potentially treatable illnesses, psychosis or hepatitis C-associated liver dysfunction independently increased the risk of premature mortality among participants less than 55 years of age. For example, surviving to age 50 was more likely (94%) among those without psychosis, but less likely for those with psychosis (68%). Disturbingly, both psychosis and hepatitis C had extremely low treatment rates (32% and 0%, respectively).

Factors affecting mental health

Researchers and clinicians alike seek to better understand the intersecting biological, psychological, and social effects of factors affecting mental health. For example, substance use can have direct neurotoxic effects, impair decision-making, and lead to social isolation.^{19,20} Non-prescription drugs, such as methamphetamine, cocaine, and cannabis, can predispose and exacerbate mental illness. Methamphetamine and marijuana use may exacerbate the severity of positive symptoms, whereas opioid use may be associated with worse negative symptoms.²¹ Severe polysubstance use is also associated with worse physical, mental, and social health outcomes.²² Individuals frequently using substances associated with greater drug-related harms were more likely to experience persistent hepatitis C infection, substance-induced psychosis, and criminal activity. The examination of biological changes associated with substance use and mental illness by Willi *et al.*²³ identified differences in brain structure associated with experiencing cocaine-induced psychosis compared to cocaine use without history of psychosis. Specifically, participants with psychosis had reduced structural integrity of white matter tracts within frontal and interhemispheric pathways (Figure 1). This aberrant myelination may result from abnormal neurodevelopment that increases vulnerability for psychosis, or may represent a greater sensitivity to the effects of chronic cocaine exposure.

The burden of exposure to biopsychosocial factors, such as social marginalization, viral infection, and substance use, may also impact the expression of psychosis, as well as cognitive processing. Giesbrecht *et al.*²⁴ identified a unique psychosis symptom construct characterized by poor insight among Hotel Study participants that differed from previously examined populations with schizophrenia. Gicas *et al.*²⁵ identified substantial cognitive impairment across the cohort, beyond what would be expected with aging. However, these deficits were not the same for everyone. Some participants demonstrated significant weakness in making decisions in the context of reward and punishment. This impairment may lead to impulsivity and engagement in behaviours that are immediately rewarding with less consideration for long-term consequences. These participants had high rates of heroin use and dependence, as well as a trend of greater injection drug use and HIV infection. These individuals may also have challenges with treatment adherence²⁶ and may benefit from

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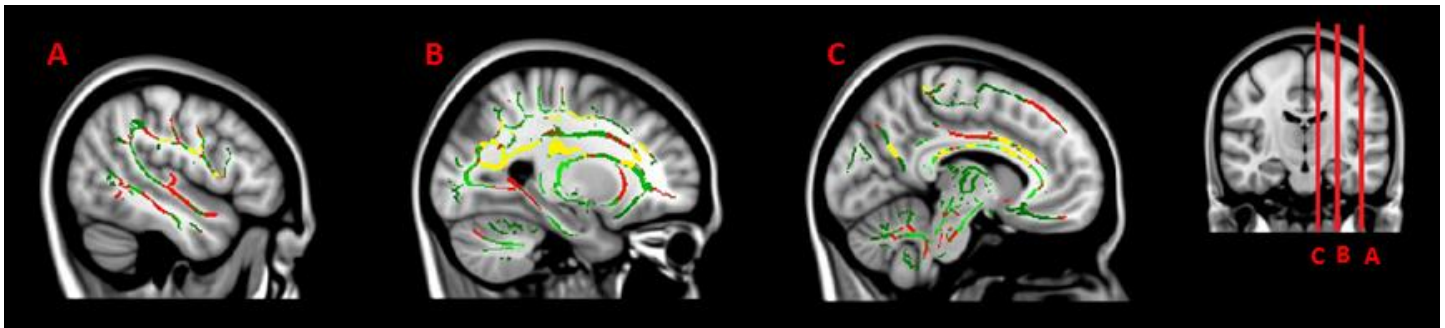


Figure 1 | Tract-based spatial statistics of between-group fractional anisotropy differences using diffusion tensor imaging. White matter pathways of reduced structural integrity are depicted in individuals who use cocaine and experience substance-induced psychosis compared to individuals who use cocaine without current or past psychosis. A series of sagittal structural magnetic resonance imaging slices highlighting white matter integrity differences between groups. Green = white matter skeleton; red = significantly reduced structural integrity ($P < 0.05$); yellow = most severe reduced structural integrity ($P < 0.01$).

targeted psychoeducation for risk-taking behaviour.²⁷ Another group demonstrated global cognitive impairments, including verbal memory, attention, and mental flexibility, coupled with neurological signs that suggest overall poor brain integrity. This group had a widespread burden of factors, including viral infection, alcohol use, and psychotic symptoms. These individuals may benefit from highly structured care that assists with real-world tasks.²⁶ Thus, understanding an individual's relative strengths and weaknesses in cognitive processing may help to personalize and scale supports in care delivery.

Considerations for the future

Overall, the Hotel Study identified a high prevalence and significant impact of mental illness among marginally housed adults in Vancouver's DTES. Mental illness contributes to the compounding health challenges and premature mortality faced by these individuals, and is accompanied by impairment in brain structure and function. Illnesses, such as psychotic disorders, can be challenging to manage, especially for individuals restricted by access to care, stigma, and competing priorities when living in poverty with addictions. This research underscores the need to utilize innovative treatments and delivery methods to minimize barriers to quality care and prevent unnecessary death. For some individuals, depot antipsychotic medications can be effective in reducing dosing frequency and increasing contact with care providers,²⁸ and have been shown to reduce relapse and rehospitalization rates^{29,30} with similar mortality risk reduction as oral medications.^{30,31} Psychosocial interventions, such as cognitive therapy and assertive community treatment, may also improve the course of illness for individuals with severe mental health and addiction needs.^{32,33} In the DTES, assertive community treatment program expansion is a priority for care delivery.³⁴ In order to improve quality of life and wellness, our health and social service system must be prepared to address these complex needs and, as providers, we must advocate to redesign societal structures that hinder wellness and foster this social gradient of health inequity.

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