

How does loneliness affect health?

Background

For over 100 years, researchers have documented the harmful effects of loneliness and social isolation on human health (James, [2017](#)). Seeds for this research are found in early observational studies showing that unmarried bachelors have shorter life expectancies than their married counterparts (“Health Tract, No. 294,” [1867](#)). However, our contemporary understanding of the health implications of social disconnection remained largely stagnant until the field was re-ignited in the 1970’s by the work of John Cassel ([1976](#)) and Sidney Cobb ([1976](#)), whom argued that social supports play a critical role in regulating biological functions of the human body (House et al., [1988](#)). Since then, an avalanche of studies have demonstrated that various dimensions of social disconnection are associated with dramatic adverse health consequences (See reviews and meta-analyses by Schwarzer & Leppin, [1988](#); Uchino et al, [2006](#), [2018](#); Holt-Lunstad, [2010](#), [2015](#); Roelfs et al, [2011](#); Gilbert et al., [2013](#); Eran et al., [2013](#); Nyqvist et al., [2014](#); and Leigh-Hunt et al. [2017](#); Wang et al., [2020](#); Vila [2021](#)). In fact, the risk of death associated with loneliness is similar to the effects of being obese, leading a sedentary life, having high blood pressure, having high cholesterol, living somewhere with abysmal air quality, drinking more than 6 alcohol drinks per day, or smoking more than 15 cigarettes a day (House et al., [1988](#); Holt-Lunstad, [2010](#); Pantell et al., [2013](#)).

The list of diseases and conditions that have been linked to social disconnection is expansive and includes mood, anxiety, and psychotic disorders (Wang et al., [2018](#); Lim et al., [2018](#); Mann et al., [2022](#)); cardiovascular disease (Barth et al, [2010](#); Valtorta et al., [2016](#); Formann & Gallo et al., [2013](#)), cancer (Chida et al., [2008](#)), diabetes (Brinkhues et al., [2017](#)), neurocognitive impairments (Cene et al., [2022](#); Penninkilampi et al., [2018](#); Kuiper et al., [2015](#)), poorer immune response (Uchino et al., [2020](#); Pourriyahi et al, [2021](#); Murphy et al., [2022](#); (Jamshed & Arslan, [2022](#)), inflammation (Jaremka et al., [2013](#); Smith et al., [2020](#); Walker et al., [2019](#)), and poor metabolism (Pourriyahi et al, [2021](#); Shiovitz-Ezra et al., [2019](#); Whisman et al, [2010](#)).

Not only are lonely people more likely to experience these outcomes, but they are also more likely to die from them. In particular, loneliness and social isolation has been linked with higher incidence of death from cancer (Krajc et al, [2022](#); Wang et al. 2020; Nausheen et al., [2009](#); Pinquart & Duberstein et al., [2010](#)) and cardiovascular disease (Long et al., [2022](#); Hodgson et al, [2020](#)) – conditions which are leading causes of death in most developed countries and globally.

Yet, despite the mountains of evidence demonstrating the deleterious health consequences of social disconnection, people demonstrate a strong and persistent propensity to under-rate the impact of social connection on health outcomes (Alexander et al, [2018](#)). As such, health and economic costs of loneliness continue to skyrocket as we direct a growing proportion of healthcare funding to treatment of disease rather than trying to build healthier communities that could help prevent the onset of disease (Flowers et al., [2017](#); Bowers et al., [2022](#)).

Purpose

The purpose of this brief is to explain how loneliness contributes to higher rates of morbidity and mortality. In doing so, we acknowledge that this relationship is multi-causal with a variety of mechanisms working in consort to create the dramatic, body-wide health consequences that we observe. In highlighting these mechanisms, we hope that we can better articulate the various ways that loneliness impacts health and encourage policy makers to direct resources to addressing these mechanisms.

Evidence from Existing Studies

There are a variety of plausible pathways by which loneliness and poor health are related (Cacioppo, Hawkley, & Berntson, [2003](#); Holt-Lunstad & Steptoe, [2022](#)). We group these into four primary mechanisms: (1) Co-occurring Characteristics and Conditions, (2) Differential Access to Care, (3) Differences in Health-related Behaviour, and (4) the Dysregulation of Stress Responses.

Co-occurring Characteristics and Conditions. One important explanation for the impact of loneliness on health is that loneliness simply clusters with other traits that predispose a person to poor health (National Academies of Sciences, [2020](#); Shovestul et al., [2020](#); Dahlberg et al., [2021](#)). This theory posits that lonely people are simply less able to build and maintain social connections due to their personal characteristics, the presence of co-occurring illness, situational factors, or some other innate quality that is also predictive of health and longevity. In other words, loneliness may not necessarily cause poor health at all, it could simply be a characteristic of people who are already likely to experience poor health outcomes. In support of this theory, some studies have shown that people at greater risk for poor health also experience greater levels of loneliness. For example, people with disabilities or mental health problems, older people with mobility or hearing difficulties, and low-income individuals have been shown to have much higher rates of loneliness due to the barriers they face to social inclusion (Hutten et al., [2021](#); Steptoe & Gessa et al., [2021](#)). This suggests that conditions which co-occur with loneliness might explain, at least in part, the association between loneliness and poor health.

Differential Access to Care. Another reasonable explanation for the association between loneliness and health is that people who are lonely experience more barriers to healthcare and when they do access care, they receive poorer care from their doctors (Aoki & Urushibara-Miyachi, [2019](#); Noyes et al., [2011](#); Vozikaki et al., [2017](#); Larson & Yao, [2005](#); Musich et al., [2015](#); Turabian et al., [2019](#); Zaporowska-Stachowiak et al., [2017](#)). It's not difficult to imagine that someone without friends or family would find it more difficult to make it to a doctor's appointment. Indeed, having people around means you may have someone to schedule a doctor's appointment for you when you're sick, remind you to take your medications, or encourage you that it's finally time to have that lump looked at (Gage-Bouchard, [2018](#); Mondesir et al., [2018](#)). Of course, even when lonely or isolated people do access care, the negative affect, biases, and social vigilance associated with loneliness may limit the quality of interactions and communication between doctors and patients (Balfour, [2012](#)) – thereby inhibiting effective clinical exploration and trust (Ha & Longnecker, [2010](#)). For example, van der Zwet et al. ([2009](#)) found that general practitioners spent less time with and were more likely to refer patients who were lonely to other doctors. In assessing the importance of this mechanism,



we should recognize that medical care explains only a small part of our health and wellbeing (10-20%) and that, in fact, the largest determinants of health are upstream social and economic determinants (Hood et al., [2016](#); Artiga & Hinton, [2018](#); Braveman & Gottlieb, [2014](#); McGinnis et al., [2002](#)). Furthermore, much of the care we receive in support of our health comes from unpaid caregivers outside of the healthcare system (Sudhinaraset et al., [2013](#); Kumah et al., [2022](#)). Spouses, siblings, friends, children, neighbours, and even strangers provide a variety of supports and care for us in a variety of circumstances (Smith, [2013](#); Barker, [2002](#); Seifert & Konig, [2019](#)). Lonely people may be cut off from these sources of support and therefore have poorer health simply as a function of not getting the help and care they need in order to manage or recover from illness (Taube et al., [2014](#)). As a result of missing out on these supports, lonely individuals may actually have greater rates of hospitalization and re-hospitalization (Marty et al., [2019](#); Mistry et al., [2001](#); Gert-Emerson & Jaywardhana, [2015](#); Jakobsson et al., [2011](#)) and when they are hospitalized they may stay in care longer (Hawker & Romero-Ortuno et al., [2016](#); Taube et al., [2014](#)). In fact, studies have shown that loneliness is associated with increased healthcare spending (Shaw et al., [2017](#)) and that this is due to increased health need. Given that lonely people may have more barriers to care but also have more health problems, the literature has been mixed as to whether they utilize healthcare more or less frequently than others (Valtorta et al., [2018](#)). Finally, it is also important to recognize that people who are lonely may access care specifically to address their loneliness (Ellaway & Macintyre et al., [1999](#)), but yet, loneliness is often missed or ignored in clinical evaluations (Yoshida et al., [2022](#); van der Zwet et al., [2009](#)).

Differences in Health-related Behaviour. A third explanation for the effect of loneliness on health is that lonelier people simply lead less healthy lives and therefore end up sicker and die quicker (Kobayashi & Steptoe, [2018](#); Perez et al., [2022](#)). Many studies support this view by showing that higher levels of loneliness are indeed associated with a wide range of health behaviors, including

- binge eating and over-nutrition (Hanna & Collins, [2015](#); Mason et al., [2016](#); Miskovic-Wheatley et al., [2022](#); Wiedemann et al., [2018](#); Zeeck et al., [2011](#));
- consumption of sugary, fatty, or otherwise unhealthy food and drink (Henriksen et al., [2014](#); Jiang et al., [2022](#));
- malnutrition, skipping meals, and lower daily intake of proteins, fruits, and vegetables (Delerue Matos et al., [2021](#); Eskelinen et al., [2016](#); Ferry et al., [2005](#); Hanna & Collins, [2015](#); Iizaka et al., [2008](#); Kobayashi & Steptoe, [2018](#); Pengpid & Peltzer, [2020](#); Solway et al., [2020](#));
- eating disorders (Cortés-García et al., [2022](#); Levine, [2012](#); Makri et al., [2022](#); Southward et al., [2014](#); Tatsi et al., [2019](#); Zeeck et al., [2011](#));
- substance use and abuse, including elevated use of alcohol, cannabis, tobacco, and other drugs (Akerlind & Hörnquist, [1992](#); Berberian et al., [2022](#); Bragard et al., [2022](#); Gutkind et al., [2022](#); Ham et al., [2009](#); Kobayashi & Steptoe, [2018](#); Konno et al., [2022](#); McClure-Thomas et al., [2022](#); Morishima et al., [2022](#); Sadava & Thompson, [1986](#); Savolainen et al., [2020](#); Schonfeld & Dupree, [1991](#); Shield et al., [2022](#); Stickley et al., [2013](#); Tanskanen et al., [2021](#));
- worse medication and treatment adherence (Detsis et al., [2017](#); Sousa et al., [2019](#); Essery et al., [2017](#); Margin et al., [2015](#); Shahin et al., [2021](#); Avci et al., [2018](#));



- physical inactivity, sedentary behaviour, or less frequent exercise (Hawkey et al., [2009](#); Pels & Kleinert, [2015](#); Delerue Matos et al., [2021](#); Jiang et al., [2022](#); Kobayashi & Steptoe, [2018](#); Shankar et al., [2011](#));
- compulsive gambling (Savolainen et al., [2020](#));
- compulsive or problematic internet and technology use (Ang et al., [2018](#); Costa et al., [2019](#); Wongpakaran et al., [2021](#); Huang et al., [2020](#));
- high risk or compulsive sexual behavior (Torres et al., [2007](#); Butler et al., [2017](#)); and
- suicide.

These behaviours then translate into poorer health through their direct causal effects on the structure and function of the body (Kobayashi & Steptoe, [2018](#); Mason, [2020](#)). However, even with the wide diversity of these associations, the question remains “Why do people who are lonely engage in all these risky behaviours?” One likely factor appears to be impairment of executive control functioning among people with loneliness (Cacioppo & Lawkley, [2010](#); Sin et al., [2020](#)). Executive function refers to the cognitive processes that relate to behavior, planning, reasoning, and problem solving. They play a critical role in helping individuals manage and navigate social situations. In fact, it has been argued that much of our cognitive capacity evolved from our need to manage our increasingly complex social relationships (Dunbar, [2009](#); Barrett et al., [2022](#); Wascher et al., [2018](#); Spink et al., [2007](#)). Thus, a strong relationship between sociality and executive control is broadly consistent with evolutionary theory. Indeed, if executive control largely exists to manage social relationships, then it is not a stretch to assume that individuals who are lonely and socially isolated would experience considerable declines in cognitive function in the absence of social stimuli. This is what is broadly observed: people who are lonely experience rapid cognitive decline (Lara et al., [2019](#); Kuiper et al., [2015](#)) and cellular aging more broadly (Hawkey & Cacioppo, [2016](#); Wilson et al., [2018](#); Galkin et al., [2022](#)). The decline of executive control and cognitive function explain why lonely people exhibit such poorer self-control when it comes to their diets, exercise, substance use, sexual behavior, emotional regulation, and other compulsions. Of course, another way to think about this is that people who are lonely or socially isolated are simply self-medicating with unhealthy foods, persistent relaxation, and other potentially harmful behaviours as they strive to cope with the realities of being cut off from others (Brinkhof et al., [2022](#); Warringa et al., [2020](#); Deckx et al., [2018](#)). Another possible reason that lonely people engage in riskier behavior is that they are subject to less social control and peer pressure (Umberson, [1987](#)). Indeed, peers exert many normative influences that shape our behaviours (Hagger, [2019](#); McEachan et al., [2016](#)). Together, the absence of social control, declines in executive function, and coping behaviours may each contribute to the unhealthy behaviours that result in poorer health among individuals who are lonely.

Dysregulation of Stress Responses. Finally, a fourth possible explanation is that the stress responses of lonely people become dysregulated as they fail to secure healthy attachments with others (Velotti et al., [2020](#); Eres et al., [2021](#); Pourriyahi et al., [2021](#), Brown et al., [2018](#); Bzdok & Dunbar, [2020](#)). By “dysregulated”, we mean that the biological mechanisms that produce and manage stress are not working correctly. In a healthy person, stress mobilizes individuals to action and once the action is undertaken the stress is relieved. This conceptualization of stress was described early by Cannon ([1915](#)) as the “fight or flight response” and was shown to include emotional processes such as thirst, hunger, fear, anger, and pain. Just as hunger motivates an individual to find food and thirst motivates someone to drink, loneliness has evolved to motivate humans and other social animals to find social



connection (Cacioppo et al., [2014](#); Hawkley & Capitanio, [2015](#)). This is accomplished by the brain monitoring for social stimuli and evaluating whether the level of social connection one is receiving is sufficient to meet one's needs. When a person perceives a deficiency in social connection, this is communicated from the prefrontal cortex and limbic regions of the brain to the sympathetic–adrenal–medullary (SAM) and the hypothalamic-pituitary-adrenocortical (HPA) axes. This causes the release of neuro-hormones into the blood stream, including epinephrine and the glucocorticoid cortisol. These hormones prepare people for action by regulating energy levels, metabolic processes, inflammatory processes, and cardiovascular function. A negative feedback cycle then shuts off production to limit persistent exposure, which otherwise causes wear and tear to the body. However, when this system is persistently activated – such as when someone fails to find social connection – the body begins to become insensitive to the effects of neuro-hormones and therefore responds by increasing production. As a result, the negative feedback cycles are also weakened. These changes, in turn, result in the over-activation of the stress response causing it to be overly sensitive and reactive – which is what we describe as “dysregulation” (Cacioppo et al., [2016b](#); Cacioppo et al., [2016a](#)). These mechanisms explain why the health impacts of loneliness appear to be most strongly related to cardiovascular health, as well as metabolic and inflammatory diseases (Li & Xia, [2020](#)).

Of course, there are a variety of reasons that the stress response becomes so dysregulated in lonely individuals. First, lonely individuals become anxious and hypervigilant to social threats—which in turn encourage them to increase their distance from others, contributing to greater levels of isolation. Thus, loneliness, and particularly chronic loneliness, represents a viscous feedback loop with deleterious mental and physical consequence (Hawkley & Cacioppo, [2013](#)). Additionally, there appears to be some genetic risk for loneliness and other emotional problems, suggesting that individuals who are lonely may also be more vulnerable to this sort of feedback cycle (Spithoven et al., [2019](#)). Researchers have also found that lonely people experience greater levels of stress explicitly because they are lonely, experience more other kinds of stressful events overall, and are more reactive to the stressful events they do experience (Brandt et al., [2022](#); Fox et al., [2021](#); Tung et al., [2019](#); Lam et al., [2021](#); Nowland et al., [2018](#); Cacioppo & Hawkley, [2009](#)). Furthermore, with fewer social supports available to them, lonely people may not be as well equipped to rebuff or recover from the stressors they face (Ozbay et al., [2007](#); Harandi et al., [2017](#); Li et al., [2021](#)). Each of these pathways may further disrupt their normal stress response and cause psychological harm to the brain and physiological harm to the body. Supporting this view, there is a well-documented association between loneliness and mood disorders, anxiety disorders, psychotic disorders, and general unhappiness (Mushtaq et al., [2014](#); Tragantzopoulou & Giannouli, [2021](#); Wang et al., [2018](#); Hards et al., [2022](#)). Clearly, the effects of loneliness are widespread and impact a wide range of body systems.

Analyses from the Canadian Social Connection Survey

Using data from the 2022 Canadian Social Connection Survey, we examined whether DeJong Loneliness Scores predicted worse self-rated physical health (rated 1 [Poor] to 5 [Excellent]) controlling for age, gender, ethnicity, sexual orientation, disability status, household income, and big five personality traits. These analyses of 1,510 participants, showed that higher loneliness scores were associated with worse self-rated physical health ($\beta = -0.106$, $SE = 0.014$, $p < 0.001$). Notably, we did find that people with lower incomes and those living with disabilities did experience higher levels of loneliness, even controlling for other demographic factors and personality traits. However, when models were constructed including only people without



disabilities (n = 666) or only people with household incomes above \$60,000 per year (n = 454) the effect of loneliness remained statistically significant – suggesting that the finding is robust even in samples that do not likely have co-occurring challenges. As an additional robustness check, we also build a model that additionally controlled for the effects of household size, relationship status, number of close friends, GAD-2 Anxiety scores, and PHQ-2 Depression Scores in order to further isolate the effect of loneliness from situational factors and general mental health challenges. Once again, we found that the effect remained statistically significant ($\beta = -0.039$, $SE = 0.016$, $p = 0.01$).

To explore the potential effects of differential access to care, we used data from the 2021 Canadian Social Connection Survey to examine whether participants with higher loneliness scores were less likely to have a primary care provider, whether they were less likely to have visited their primary care provider in the past year, and whether their primary care provider was less likely to ask them about their social connections. We found that they were not less likely to have a primary care provider ($p = 0.40$), not less likely to have had a primary care visit in the past year ($p = 0.12$), and were not less likely to have been asked about their social relationships ($p = 0.35$). As such, we find little support for differences in healthcare access and utilization.

Finally, we examined the effects of loneliness on self-reported substance use and found that lonely individuals were more likely to report using alcohol ($p = 0.004$), tobacco ($p < 0.001$), and cannabis ($p < 0.001$), as well as less commonly used drugs such as methamphetamine ($p < 0.001$), cocaine ($p < 0.001$), sedatives ($p < 0.001$), hallucinogens ($p < 0.001$), and prescription pain killers ($p < 0.001$). This suggests that people may be using substances to cope with experiences of loneliness and is supportive of the dysregulated stress hypothesis and the health behavior hypothesis.

Discussion

While additional research is needed to ascertain which of the four primary pathways above contributes the most to the association between loneliness and poor physical health, it is clear that there are robust links between social and physical health. Future analyses in the Canadian Social Connection Survey will explore these hypotheses in greater depth and research from a wide variety of sources is needed. While longitudinal, interdisciplinary studies are difficult and expensive, they are clearly warranted given the strength of the effects of loneliness on poor health. Nevertheless, even without such studies it is clear that interventions to address loneliness and social isolation are desperately needed.

Conclusion

Based on the available evidence and our analyses of the Canadian Social Connection Survey, we recommend policies and programs that address loneliness and social isolation, as well as those which aim to mitigate the harmful effects of poor social health on physical and mental health.

Suggested Citation: Kiffer Card, Cindy Yu, Adam Frost, Jocelle Refol, Pete Bombaci (2022) "Evidence Brief – How does loneliness affect health?" Canadian Alliance for Social Connection and Health.

