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Digital geographies of Indigenous health: Exploring Indigenous Mental Health content from Turtle Island during COVID-19

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Abstract

The physical and mental health and wellness of Indigenous peoples is cultivated through interrelations with spiritual, cultural, community, and social practices: these practices strengthen identity and belonging. COVID-19 has disrupted many of these relational practices or shifted them to digital environments such as social media. Drawing on a thematic analysis of Tweets from March 2020-December 2021 (n=1137), I address the research question: *How are Twitter users across Turtle Island engaging with Indigenous mental health content on Twitter during the COVID-19 pandemic?* Within an Indigenous context, no exploratory research has been conducted on *who* is engaging with mental health content on social media, *where* they are located, or *what* is being said. Filling this gap requires a novel research agenda - Indigenous digital health geographies – that understands how access to, and participation with, digital environments, can influence Indigenous peoples' health and wellness. Findings demonstrate that Twitter is space for expressing and strengthening Indigeneity, sharing cultural knowledge/resources, and supporting healing from trauma. Creating capacity for dedicated social media roles and researchers within existing Indigenous Twitter practices may improve mental health outcomes; this approach also requires a policy shift that adheres to the relational ethics of Twitter users and researchers.

Keywords

Indigenous Health Geographies, Digital Geographies, Indigenous Digital Health Geography, Mental Health, COVID-19

Summary for Lay Audience

Indigenous peoples worldwide have unique and interconnected relationships with their land and environments; these connections are critical for strengthening connection with spirit, culture, and community, all of which are vital for health and wellness. COVID-19 uniquely impacts Indigenous peoples' abilities to maintain these relationships; the lockdown of communities and the establishment of social/physical distancing measures has led to deteriorating physical and mental health and it led to exacerbated inequities among communities who suffered prior to the pandemic. However, amidst these global crises alternative perspectives and methods for enabling Indigenous people to engage in relational, health promoting practices – via social media.

In summer 2020, I was involved in a research team that interviewed Indigenous health care providers, who talked about how they and their patients were mobilizing to support connection to land, culture, and one another. Examples include virtual fitness groups, online powwows, dance, and public art.

Building from the findings of this work, my MA research examines Indigenous mental health content on the social media platform Twitter, to identify key supports, tensions, and constrains of Indigenous peoples' mental health during the first 22 months of the pandemic. Each tweet was also classified as a re-tweet, original tweet, or reply and mention. Next, it was described as being a personal expression, news/media, online gathering, resource, or other. In addition, I categorized the different user types engaging with this content and recorded their geographic locations.

From March 2020-December 2021, 65 different tweet themes were identified across 1137 tweets. There were 12 key themes based on the total number of times there were referenced: Mental health supports, resources, healing, education, politics and government, youth, media, trauma, racialized effects, health inequity, compounding effects and intersectionality, and racism. Most Twitter users were individuals' accounts, the greatest number of tweets came from the USA, most often tweets were in "re-tweet" form, and shared news/media content.

These findings shed light on the everyday conversations of Indigenous mental health on Twitter during the pandemic, as well as how social media research may support the self-determination of Indigenous mental health.

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Chapter 1

1 Introduction

This thesis explores Indigenous mental health content on Twitter during the first 22 months of the COVID-19 pandemic by conducting a mixed-methods thematic analysis of Tweets, and content analysis of the Twitter users. During the first wave of the pandemic, I was a part of a research team that interviewed Indigenous physicians and health and social care providers about their experiences of social distancing, and how they perceived its impacts on the people they provide care for (Richmond et al., 2022). I worked as a part of a collaborative team – each of us with different backgrounds and strengths. Despite the demands of working on the frontlines, participants took the time to join us on zoom – and often seemed proud of their communities and excited to share the stories of resilience and creative coping amidst the first wave. Amongst our findings there was an emphasis on the uptake of digital technologies to share health information, remain connected with others, and participate in culture. It was an honour to be involved in this research and to connect with such remarkable individuals.

My thesis builds from this research experience to better understand the ways Indigenous peoples interact with digital environments in their everyday lives to support health and well-being. We hope that the findings of this research will contribute the self-determination of Indigenous peoples' health in order to address persistent gaps in physical, mental, and social conditions of health by better understanding Indigenous engagement with digital environments, and through ethical engagement in Indigenous digital health geography research theory and practice.

1.1 Research Problem and Objectives

Sense of identity, belonging and social relationships are paramount to Indigenous[1] peoples' physical, mental, spiritual, and emotional well-being. Since the beginning of the pandemic, the public has been encouraged to participate in physical and social distancing as a public health measure. In an effort to reduce the spread of the COVID-19 virus, many of the social, cultural, and spiritual practices that support Indigenous peoples' mental health have been disrupted. In an effort to remain connected – and to support their wellness – many Indigenous individuals and communities are leveraging social media, such as Facebook, Twitter, Instagram, and TikTok. This research addresses the following question: *How are Twitter users across Turtle Island engaging with Indigenous mental health content on Twitter during the COVID-19 pandemic?*

This research is guided by two objectives:

1. To describe key themes of Indigenous mental health content on twitter throughout the different waves of the COVID-19 pandemic, and
2. To enumerate the users, location, tweet type, and originality of tweets to evaluate who is engaging, where, and how with this content.

It is expected that Tweet themes will share the racialized experiences of mental health during the pandemic, different supports that exist for Indigenous peoples both online and in-person, and additional content of advocacy and personal expression. In terms of users,

[1] Indigenous peoples refers to "Those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system." (United Nations, 2015, p. 004).

it is hypothesized that it will be mostly individuals tweeting, and that it will be predominantly re-tweets rather than original content. As for location, it is expected to see similar contributions from users in the USA and Canada.

Another key aim of this research is to contribute to the theory and praxis of Indigenous digital health geographies. At present, there is no proposed Indigenous Digital Health Geography theoretical framework, methodology, or research agenda. Indigenous people are using social media in mainstream and unique ways, many of which support health and well-being. Researchers have a responsibility to support these practices through our research, in ethically and culturally safe ways.

1.2 Background information

The SARS-CoV-2 virus is a physical illness effecting the respiratory system and transmits through respiratory droplets and have potential to cause illness if they enter another person's eyes, mouth, or nose (McIntosh et al., 2020). This virologic and epidemiological information is what has informed may of the public health measures, such as social distancing, hand hygiene, and the wearing of masks in public spaces. COVID-19 has also been understood by health researchers as a "syndemic pandemic", framing the biological impacts of the virus in conjunction with social conditions and inequalities, urging for multi-faceted public health responses (Rod & Hulvej Rod, 2021). The pandemic has highlighted global inequalities of health, economy, and geography, and patterns of COVID incidence and death reflect these inequalities experienced by racialized and low-income people (Kim et al., 2020; Nanda, 2020). It has exacerbated inequalities of not only physical health, but also mental well-being from unprecedented fear and isolation.

Therefore, COVID-19 has aggravated the barriers to well-being that many Indigenous peoples of Turtle Island[2] experience.

Understanding the ways in which Indigenous peoples are utilizing social media during the pandemic requires a novel methodology: Indigenous Digital Health Geographies. This research agenda comes at the nexus of Indigenous health geography, critical digital geographies, and Indigenous health and wellness. Together these inform a decolonizing, relational, and holistic approach that explores how access to, and participation with, digital environments, can influence Indigenous peoples' health. To date, there has not been a developed research agenda of Indigenous digital health geographies, despite the great potential for its applications within the contexts of healing, climate change, and repossession.

Indigenous peoples globally experience inequities in physical and mental health, as well as social factors that contribute to health and well-being. These outcomes are a result of a common experience of settler-colonialism (Greenwood et al., 2015), and ongoing racism, structural discrimination, and environmental dispossession (Adelson, 2005; Reading et al., 2009; Richmond & Ross, 2009). Processes such as these have multifaceted affects; inability to participate in or access Indigenous specific determinants of health such as language, time with the land, community, and traditional foods (Gracey & King, 2009; Tobias & Richmond, 2014); racism and discrimination causing ill-health in western

[2] Turtle Island is the term used by some, but not all, Indigenous communities to describe the continent known contemporarily as North America. The name Turtle Island comes from the creation story of some Ojibwe and Iroquoian speaking people. As a grateful guest on the traditional territories of the Attawandaran, Anishinaabe and Haudenausaunee Peoples I have tried to choose language that honours their teachings, stories, experiences, and truths.

medical practices or past experiences of this inhibiting individuals from accessing these services (Ambtman-Smith, 2021); and both direct and intergenerational traumas (Paradies, 2016).

Indigenous health geography is a sub-discipline of human geography that understands the unique relationships that Indigenous peoples have with their local environments, and how various political, environmental, and social processes impact access to traditional territories and ecosystems (Richmond & Big-Canoe, 2018).

Digital geographies are a turn in geographic thought that aims to describe how technology impacts geographic research, and the daily processes of human geographies (Ash et al., 2018). This includes interactions on and with social media as one example on how interactions with the digital realm may also have outcomes in the physical world.

Currently, most of the research surrounding Indigenous digital geographies as they pertain to health and well-being, come from Australia (Sweet, 2013). The literature often focuses on intervention-based research with a deficit lens, in which Indigenous individuals participate with social media sites or hashtags to promote healthier lifestyles. At this point in time, there is no exploratory research pertaining to everyday social media use and Indigenous peoples' mental health.

1.3 Research Approach

This research employs a strength-based approach - which acknowledges that there are actualized or potential negative aspects of a situation – but chooses to build on the known strengths (Brough et al., 2004; Gharabaghi & Anderson-Nathe, 2017). In this case, we are

extending the findings from Richmond et al. (2022) that indicate the heightened use of social media and pursuing further detail on who is utilizing social media for mental health, where they are located, and what they are sharing. We know that COVID-19 has had stark differences across communities, both spatially and temporally, and we hope this research will highlight some of the community-led successes during the pandemic – and provide rich data in which can be used to further these initiatives.

Tweets and associated Twitter data (usernames, location by proxy) were collected using the Twitter API V2 academic developer license and Postman software. The dataset consists of 1137 tweet entries for the first 22 months of the pandemic and includes the Tweet text as well as the author name, username, and proxy location. These tweet entries were organized into Excel spreadsheets; one sheet for each month of data from March 2020 to December 2021. Using NVivo qualitative analysis software, the Excel sheets were uploaded and coded used a mixed-methods, inductive-deductive approach. Mixed-methods were chosen as they are not commonly used in Indigenous health research but have great potential to reduce epistemic barriers (Botha, 2011). As a non-Indigenous researcher, this is one of my responsibilities.

1.4 Chapter Summaries

This thesis consists of five chapters. **Chapter 2 – Literature Review,** contains three main sections: Indigenous geography, Indigenous health, and Digital geographies. These three bodies of literature are used to inform our understanding of Indigenous digital health geographies, which builds at the nexus of these three knowledges. Indigenous health explores the holistic and relational understandings of Indigenous health across

different communities. After this introduction, I introduce contemporary patterns and determinants of Indigenous peoples' health, such as connection with land, Indigenous knowledge, and community. As this research is focused on the mental health during COVID-19, I will briefly overview the Indigenous peoples' mental health prior to the pandemic, generally the health and social impacts of COVID-19 on Indigenous peoples, and then lastly, Indigenous mental health and COVID-19. The next section of the literature review explores the theory and applications of Indigenous health geography, which understands how the unique relationships that Indigenous peoples have with their local environments impacts health and well-being. The section pertaining to Digital Geographies is next and highlights the origins of this turn in geographic thought as well as critiques brought forth by feminist digital geographers that can help inform Indigenous digital health geographies. This chapter concludes by emphasising the gap in knowledge this research addresses: that there has been no exploratory research on Indigenous health content on Twitter, and therefore no existing theory, methods, or agenda to do this research.

Chapter 3 – Research Design, Methods, and Analysis, outlines the methods and methodology this research employs. The chapter begins with my self-location and positionality, as I situate myself with the research. Following this, I introduce the mixed-methods research design and Indigenous digital health geographies – specifically in the context of the strengths and limitations of digital and Indigenous health geography approaches. Next, the data collection phases are overviewed, and the inductive-deductive analysis approach using NVivo software is explained.

Chapter 4 – Findings, shares the findings of the thematic, content, and temporal analysis of tweets and their content and creator details. The themes have been enumerated and categorized as supports, tensions, and constrains of Indigenous peoples' mental health. There is a focus on the top referenced themes from each year (2020 and 2021), combined years, and from Indigenous users. Tables are used to display the findings, and examples from tweets are provided.

Chapter 5 – Discussion, contextualizes the findings amongst the current literature and addresses the gap in knowledge. There are three components of the chapter: Theoretical, methodological, and applied contributions. The theoretical contributions discuss Indigenous Digital Health Geography and five possible dimensions, as conceptualized by the findings of the mixed-methods analysis. The methodological contributions focus on relational accountability in Indigenous digital health geography research, and the utilization of location by proxy. In the applied contributions, I put forth two policy recommendations that aim to the support ethical, reciprocal, Indigenous health social media research, with a focus on capacity building that can support community self-determination and ascertaining of health goals. The thesis concludes in the section, with brief summary and recommendations for future research.

Chapter 2

2 Literature Review

My thesis builds from three many bodies of literature: 1) Indigenous geography; 2) Indigenous health; and 3) Digital geography. Together, these pillars lay a contextual framework from which my research documents the uptake of social media during COVID-19 to support Indigenous mental health goals and overcome the inertia of health inequities. In this chapter various factors that support, constrain, or act as a tension of Indigenous mental health are introduced.

2.1 Indigenous Geography

Indigenous Geography was developed to address inherent discrimination in Geography, who's traditions are founded in colonialism and capitalism, as Europeans in the fifteenth century systematically searched for new land and resources (Livingston & Good, 1993). The term geo-graphy means to "write earth" – the pursuit of geographic knowledge was intrinsically linked to mercantilism and wealth, and the systematic observation, recording, and removal of natural resources. Today, these hierarchal, paternalistic, empirical, and extractive views are often still highlighted in the epistemological traditions of contemporary geography. Indigenous geography opposes this and considers the 'colonial present', emphasizing the continued need to decolonize research methods and augment research that supports the political, cultural, and economic self-determination of Indigenous people (Larsen & Johnson, 2012).

Indigenous geographies seek to dismantle and reorient geographic theory and practice about Indigenous relationships with space and place (Larsen & Johnson, 2012), and are led by communities and their epistemologies, ontologies, and methodologies (Louis, 2007). For example, utilizing an Indigenous methodology, such as relational accountability, guides research to be conducted with Indigenous perspectives and worldviews (Louis, 2007; Wilson, 2008; Reitmeier, 2020). Relational accountability requires respect, reciprocity, responsibility, and relevance as a foundation and ongoing commitment in research intentions and engagements (Louis, 2007; Wilson, 2008; Reitmeier, 2020):

> "If research does not benefit the community by extending the quality of life for those in the community, it should not be done. Geographers need to start building ethical research relationships with Indigenous communities. By doing so geographers will contribute to the body of knowledge about Indigenous peoples and their relationship to the places where they live, those cultural landscapes infused with meaning." (Louis, 2007, p. 131)

Indigenous geographers employ a variety of methods, depending on the context of the research. Mixed-methods approaches, consisting of both quantitative and qualitative data collection and analysis have rarely been employed in Indigenous geography. As Botha (2011) would argue, applying mixed-methods to Indigenous geographies may reduce epistemic differences, and support Indigenous voices in research.

2.1.1 What is Indigenous Health Geography Theory?

Indigenous health geography is a sub-discipline of human geography that recognizes the critical relationship between Indigenous people, their local environments, and health (Richmond & Big-Canoe, 2018). Moreover, it emerged in response to Western health and

geographic research which continues to minimize and misrepresent Indigenous ways of knowing, capacity, and well-being through these research practices (Louis, 2007).

Much like Indigenous concepts of health, Indigenous health geography extends from a relational worldview, but it specifically focuses on understandings the distinctive relationships Indigenous peoples have with their varying environments, and what meanings these places hold (Richmond & Big-Canoe, 2018). Interacting with local ecosystems extends beyond a physical relationship with space; it is a sacred connection with spirit, culture, knowledge, language, ceremony, and medicine. Indigenous health geography examines social, political, economic, and environmental processes that have transformed these inherent relationships over time, leading to decreased or increased access to traditional territories and ways of being (Richmond & Ross, 2009; Big-Canoe & Richmond, 2014). The goal of Indigenous health geography is to enhance Indigenous health equity by understanding the role of place, and relationships rooted in place, to support self-determination of health goals.

2.1.2 How Can We Apply Indigenous Health Geography?

Two critical concepts in the geographies of Indigenous health are environmental dispossession and repossession. These explain the various social, cultural, political, and environmental processes can negatively or positively impact Indigenous peoples' relationships with their local ecosystems and therefore health; this describes environmental dispossession and repossession respectively (Richmond & Ross, 2009; Big-Canoe & Richmond, 2014). Globally, Indigenous communities are practicing environmental repossession of ancestral territories in unique ways, including land-based

initiative's such as canoe trips, or in the process of land-making in urban areas (Hatala et al., 2019; Mikraszewicz & Richmond, 2019). Across these diverse geographies and unique cultures, we understand a common theme that environmental repossession works towards strengthening the social, environmental, and spiritual relationships that support the holistic health of Indigenous peoples (Big-Canoe & Richmond, 2014). However, there has been little attention to the applied ways environmental repossession occurs (Nightingale & Richmond, 2021) and there is no research theorizing the role of digital geographies and Indigenous health.

Taking a strength-based approach in research is another means of applied environmental repossession, as Indigenous ways of knowing, being, and doing are asserted. This means that we acknowledge the potential negative dimensions of a situation, but instead choose to focus on known strengths rather than these weaknesses. Strength-based approaches are used to counteract the largely deficit orientated research, which often perpetuate extractive research methods and the objectification of research participants and data (Gharabaghi & Anderson-Nathe, 2017). For example, social media has often been discussed as being a negative factor of self-image and mental health, however, in this research we are building from the findings of Richmond et al. (2022) who found that during the pandemic social media has created spaces of social connection and wellbeing across Turtle Island. Digital environments are colonized spaces and will be discussed further in section **2.3 Digital Geographies**. Indigenous-led social media sites can also be leveraged as places of social, cultural, and land relationships that promote health. By focusing on the latter, within Indigenous epistemologies, we can begin to explore

Indigenous Digital Geographies and how repossession may occur through digital environments.

2.2 Indigenous Health

2.2.1 Understandings of Health and Wellness

Indigenous peoples of Turtle Island have diverse understandings of health, situated in local ecologies, knowledge, and culture. However, there is a widespread cultural imperative that Indigenous knowledge, ways of life, and wellness are interconnected with local environments and social relationships (Richmond & Ross, 2009; United Nations, 2015). The health of an individual is considered as intergenerational and interwoven with community, land, and spirit (Greenwood & Lindsay, 2019). This holistic understanding of health, viewed through a relational ontology, contrasts Western biomedical approaches to health (Reading et al., 2009). These relational ontologies are defined as worldviews in which all physical and metaphysical entities are interrelated (Setsenko, 2008). On Turtle Island, this is expressed uniquely across nations, for example, the Cree concept *mena ka ki haw ni wah koo makaganak* means "and also to all to whom I am related" (Wilson & Wilson, 1998). In this conceptualization of health, maintaining good relationships, specifically social relationships, is essential for wellness (King et al., 2009).

Two Anishinaabe concepts exemplify the relational and holistic meaning of health: the medicine wheel and Minobiimadisiwin. The medicine wheel is a sphere that consists of four directions, each representing different core elements of health – physical, mental, emotional, and spiritual. Well-being is comprehended as a balance of these four elements. Minobiimadisiwin is the Anishinaabe concept of "the good life", a philosophy that

recognizes the interconnection of land, spirit, and human relationships. Additionally, it means “continuous rebirth”, indicating our interactions are affected by past generations, and impact future generations – emphasizing attention to respect and balance (LaDuke, 1992). Together, these concepts describe health as fulfilling one’s roles, responsibilities to community, and nourishing one’s mental, emotional, spiritual, and physical self.

Indigenous Knowledge (IK) systems, which are “the culturally and spiritually based ways Indigenous peoples *relate to* their ecosystems and to one another” promote well-being through relationships (LaDuke, 1994). Similarly, Inuit Qaujimajatuqangit (IQ) describes land-based Inuit knowledge systems that support the “good life” through belonging and connection (Tagalik, 2018). Ultimately, individuals’ connections to the land and to one another support well-being, through participation with culture and relationship with community and spirit. Indigenous meanings of health are proactive, social, and closely linked to human and natural environments; they centre the creation and maintenance of good relationships with all creation, through participation in culture. These philosophies are often not practiced or appreciated in biomedical health environments (Reading et al., 2009).

2.2.2 Patterns and Determinants of Health

For Indigenous Peoples, including communities and individuals of Turtle Island, (neo)colonialism, racism, environmental dispossession, and structural discrimination form significant determinants underlying current health inequities (Adelson, 2005; Reading et al., 2009; Richmond & Ross, 2009). Indigenous community-led health programs, organizations and research have had success in addressing the persistent burden of

infectious, chronic, and social issues that Indigenous peoples' face due to these processes (O'Neil et al., 1998; Khoury, 2015). This being said, these initiatives are often limited by the bureaucratic surveillance and neo-liberal managerialist agendas of governments attempting to streamline services (O'Neil et al., 1998; Khoury, 2015). These systemic and political factors are forms of contemporary colonialism that limit the self-determination of Indigenous communities to prioritize and address their health concerns. This highlights the importance of informal and grassroots health promotion, and the need to overcome the systemic barriers that limit them, as the biomedical structures in place are not changing rapidly or significantly enough to address Indigenous health needs.

Globally, Indigenous people endure a greater burden of communicable and non-communicable diseases, mental health issues, and social issues (King et al., 2009). There is a persistent health gap in Canada's Indigenous populations due to the environmental dispossession, structural discrimination, and racism (Adelson, 2005; King et al., 2009). Indigenous people face greater instances of infant and maternal mortality, malnutrition, cardiovascular diseases, HIV/AIDS, malaria, tuberculosis, and diabetes. This is a result of the government of Canada's attempts of assimilation, by eliminating traditional knowledge systems, medicines, languages, and culture. The elimination of locally relevant wellness and community practices is a cause of harm, limits resilience, and healing. Mainstream health systems are also often perceived as violent places (Ambtman-Smith, 2021), as many Indigenous people experience mistreatment, blame, and racism at the interpersonal and institutional levels. Current inequities in Indigenous health are the result from several compounding factors and processes. Improvements in health equity

may be achieved through supporting Indigenous self-determination and leadership and addressing the persistent harms in our systems (Smylie et al., 2022).

In the social sciences, the term racialization is understood as "the process of constructing racial meaning, including the creation of racial categories and the signification of these categories in relation to people, objects, and ideas" (Murji and Solomos, 2005; Satzewich, 2011, in Denis & Clair, 2015 p. 860). Understanding this process urges us to address its embeddedness in power structures and relations, and how it contributes to longstanding racial inequities (Denis & Clair, 2015). In geography specifically, there is an need to acknowledge White spaces as racialized places – tied to colonialism – in order to reveal the social privileges and power hierarchies that White people benefit from (Vélez, & Solórzano, 2018). The creation of these racialized spaces of power and inequity are also a result of political processes, one example being the Indian Act – the only race-based legislation in the world – which is still in place today in so-called Canada. This legislation opposes Indigenous self-governance, and continues to "shape life opportunities, economic conditions, and the overall health status of individuals, families, and communities." (Browne et al., 2005). The Indian Act's bureaucratic role in managing healthcare racializes Indigenous experiences in Western systems [through racism and access barriers] that privilege Whiteness, but also limits communities' ability to create "parallel" healthcare systems that centre self-determined needs and practices (Anderson, 2016).

2.2.3 COVID-19 and Indigenous Health

Indigenous peoples of North America have faced multiple threats of novel diseases prior to COVID-19 – including influenza, tuberculosis, and smallpox. Despite significantly

higher infection rates than their non-Indigenous counterparts, Indigenous communities have survived (Groves et al., 2020; McLeod et al., 2020; Richardson & Crawford 2020). Indigenous practices of care for one another have improved the resilience against COVID-19, as many communities focus on the well-being of older and future generations (Richmond et al., 2022). In Canada, despite underlying vulnerabilities such as overcrowding, lack of clean water, or greater instances of chronic and infectious health issues, many Indigenous communities fared well in the initial waves (Richardson & Crawford 2020). Indigenous communities acted quickly to implement stricter measures than the general population, such as reserve checkpoints and closures, or health education and guidelines in Indigenous languages (Richardson & Crawford, 2020). These actions of community self-determination led to fewer cases and higher recovery rates by First Nations on-reserve in Canada than the general population during the first wave of the pandemic (Government of Canada, 2020; Power et al., 2020; Richmond et al., 2020; Mashford-Pringle et al., 2021).

The Chiefs of Ontario have been collecting, synthesizing, and sharing COVID-19 testing data specific to on and off-reserve First Nations peoples in the province. In their report from April 8, 2021 – near the end of the "third wave" - highlights that although the rest of Ontario was facing an increase in positive cases, First Nations were following a decreasing trend (Chiefs of Ontario, 2021). Although First Nations peoples had a higher rate of hospitalization, the death rate from COVID-19 was about half the Ontario rate (Chiefs of Ontario, 2021). Unfortunately, this trend has not continued to present. In their 96th weekly report which shares trends up until February 21, 2022, the hospitalizations of First Nations individuals remain significantly above the provincial average until February

2022 when the gap thins. Similarly, from July 2021 to February 2022, First Nations people had a higher death rate than the rest of Ontario – again with the difference decreasing and then remaining steady into February 2022. The Chiefs of Ontario emphasize that these findings are likely underestimates due to the change in testing mandates in December 2021 (Chiefs of Ontario, 2022).

This is just one example of the case trends of COVID-19 experienced by Indigenous peoples – this varies within and between communities. Unfortunately, there is a lack of national, representative data for Indigenous peoples in Canada and the USA. In Canada, there is only aggregate data for First Nations people living on-reserve available through Statistics Canada – excluding urban Indigenous people, Métis, Inuit, and non-status individuals. This means their estimate of 112,876 total cases, 3,428 hospitalizations, 111,131 recovered cases, and 739 deaths (Statistics Canada, 2022) is a gross underestimate. Determining general trends is also difficult due to this lack of data; emphasizing the need for better data collection practices and alternative data sources that demonstrate not only case numbers, but also experiences.

The Ontario government made the decision to prioritize First Nations, Métis, and Inuit peoples (both on-reserve and in urban areas) in the first roll-out of vaccines, recognizing the increased vulnerabilities many members of this population face, specifically, Elders. Vaccine education and awareness has taken many unique forms to support informed decision making, and culturally safe administration practices. Examples include participating in Ceremony or smudge prior to vaccination, Indigenous specific vaccination clinics or administrators in mainstream settings, education in local languages,

trauma-informed communication, and “Vaccination Powwows” (Draaisma, 2021; Foxworth et al., 2021).

The news and media play a role in policy responses, health decision making, and Indigenous health narratives (Herbst, 1998; Schwitzer, 2005; Bakir 2006). LaPoe and colleagues (2022) share how mainstream news sources during the pandemic are deficit-based and share a “doom trajectory” for communities experiencing health inequities. Their findings emphasize the need for Indigenous media to be amplified, as it situates historical and cultural contexts of health inequities while taking a resilience-based approach to highlight health experiences (LaPoe et al., 2022). It is also necessary to have Indigenous representation and relationship within mainstream news.

Positive health outcomes occur when strategies are localized, contextualized, and community-led. This includes disseminating information in Indigenous languages, addressing lack of access to hygiene measures (housing, water), and the ongoing violence and mistrust of healthcare systems (Curtice & Choo, 2020; Meneses-Navarro, 2020). Responses to the pandemic require not only supporting and strengthening a community’s current and desired approaches, but also addressing the systematic issues that cause Indigenous peoples to be more vulnerable in the first place (Curtice & Choo, 2020; Richardson 2020).

2.2.4 Indigenous Peoples’ Mental Health

Globally, Indigenous peoples experience poorer mental, physical, and emotional health outcomes as a result of colonialism (King & Gracey, 2009). In fact, a scoping review of Indigenous mental health research in Canada by Nelson and Wilson (2017), found that

36% of the articles (81 total) explore the social determinants of mental health, including colonialism. Kelm (1998) describes colonization as:

> "a process that includes geographic incursion, socio-cultural dislocation, the establishment of external political control and economic dispossession, the provision of low-level social services and ultimately, the creation of ideological formulations around race and skin colour that position the colonizer at a higher evolution level than the colonized" (p. 123)

Colonization is the process of taking control of land and Indigenous peoples, whereas colonialism is the policy and actions of continued exploitation and decimation of land, people, and culture (Oxford Dictionary). Settler-colonists were led by the Doctrine of Discovery – a Papal bull developed in the fifteenth century by Spain, Portugal, England, and the Church, that presently still exists – and used this international law of colonialism to justify their Eurocentric ideologies of resource use and superiority over the rest of the world (Miller, 2019), and oppress the sovereignty of Indigenous nations. Indigenous peoples established diverse education practices, governance, conflict resolution, spiritual ways, and economic systems long before the arrival of European settlers (Bombay et al., 2014a). These relational ways of being promote belonging, social support, culture, and identity. The doctrine directly opposes Indigenous relational worldviews as it positions white settler-colonists above the land and Indigenous peoples and relational ontologies view all creation as interdependent and equal. Laws succeeding the Doctrine of Discovery, such as the Indian Act in Canada, follow the same colonial agendas and continuously aim to assimilate Indigenous peoples (Bombay et al., 2014a).

Colonialism may be understood as distal determinant of health – a "cause of the causes" – and at the root of racialized experiences of poor health. It drives social, political, and economic inequality through its embeddedness in Western structures and policy and its

intersectionality with race, class, capitalism, and gender (Nelson & Wilson, 2017). Colonialism extends racist ideologies that European settlers are superior to Indigenous peoples, and capitalist societies argue that the environment is lesser than humankind. These narratives are present today in biomedical healthcare, child welfare, education, and criminal justice systems. Consequently, this leads to First Nations, Métis, Inuit, and Urban Indigenous populations having greater inequities of the social determinants of health (SDOH); housing, education, employment, poverty, nutrition, and clean water. These experiences are often compounded and interconnected with one another (Jenkins, 2021). As a result of these SDOH disparities, Indigenous people generally, face higher rates of anxiety, depression, attempted suicide, and substance use than non-Indigenous people, although this differs between communities and nations (Brascoupé & Waters, 2009; Asmundson 2020).

Colonial practices have direct impact on Indigenous peoples' mental health and well-being, through trauma. One example is the Indian residential school system (IRSS) that forcibly removed Indigenous children from their families to attend. The IRSS was led by the Canadian government and various churches, with the goal of assimilating Indigenous children into mainstream society through cultural genocide: the abolishment of traditional knowledge systems, language, connection to land and community. Many children were physically, mentally, and sexually abused at these schools, and tragically, many children did not return home. Bombay (2015) states "colonists perversely recognised the importance of early life experiences and their contribution to healthy development" (p. 861). The cruelties endured in the IRSS and other colonial practices do not just impact the individuals who directly faced them, the trauma extends laterally across communities, and

through generations. The loss of culture, land, and cohesion leads to further ill-health outcomes of both individuals and communities and can only be addressed through structural and societal level changes that have Indigenous methods of healing at the core of their approaches (Marsh et al., 2016).

The IRSS is one example of how colonialism impacts mental health (Bombay et al., 2014b). Hahmann et al. (2022) found that First Nations individuals with grandparents who attended residential schools are more likely to be diagnosed with a mood disorder. For anxiety disorder diagnoses, the odds are higher if an individual had one generation (i.e., parent or grandparent) attend. Cultural identity and group belonging decrease these odds. First Nations adults with a parent who attended the residential school system are more likely to participate in heavy-drinking. Although the statistical significance differs for each of these experiences based on single or double grandparent or parent attendance, the findings from Hahmann et al. (2022) show the intergenerational impacts that the IRSS, one form of colonialism, has on Indigenous peoples' mental health. This is consistent with research from Hall et al. (2015) who position colonialism as the root of problematic substance use by First Nations people and argue that healing must be done through traditional ways.

There is little available data at the provincial and national level on Indigenous mental health in Canada. However, the two primary sources are the Aboriginal Peoples Survey (APS), and the longitudinal survey by the Assembly of First Nations are Indigenous-led and focus on community identified needs/priorities.

The APS is a postcensal survey, ongoing since 1991 that focusses on the economic and social conditions of off reserve Indigenous (First Nations, Métis, and Inuit) peoples above the age of six (Cloutier, 2014). Statistics Canada identifies "The objectives of the APS are to identify the needs of these Aboriginal[3] groups and to inform policy and programs aimed at improving the well-being of Aboriginal peoples" (Cloutier, 2014, p. 7). The survey asks for self-reported mental health, amongst questions on physical health, education, employment and other key social determinants. It also includes questions related to Indigenous specific indicators, such as participation in traditional practices, languages, and attendance (or family attendance) in the residential school system (Cloutier, 2014). The survey was designed with a regional approach, to provide data for each of the provinces, territories and the four Inuit regions (Nunatsiavut, Nunavik, Nunavut, and Inuvialuit, with the Atlantic provinces grouped together (Cloutier, 2014).

The First Nations Longitudinal Regional Health Survey (RHS) is led by the Assembly of First Nations and the First Nations Information Governance Centre, and cycles every four years. In Volume 3, the most recent report, over 24,000 First Nations individuals responded, from over 250 First Nations communities, making it the most successful survey since they survey's inception in 1997 (FNIGC, 2018). The RHS is led by First Nations people, for First Nations people, with the goal of addressing data gaps of the health experiences of on-reserve and northern First Nations peoples. In terms of mental health content, the survey asks a breadth of questions related to mental health diagnoses, substance use, mental health support access, for children (0-11), youth(12-17), and adults

[3] First Nations, Métis, and Inuit peoples.

(18+). The RHS takes a strengths-based approach, and adheres to the principles of Ownership, Control, Access, and Possession (OCAP) that supports Indigenous data sovereignty (FNIGC, 2018).

These two large-scale surveys centre Indigenous values and needs and are very successful in providing long-term data. However, there are still data gaps (Eggertson, 2015; Nelson & Wilson, 2017). The geographic focus of each survey are specific (i.e. on reserve OR off reserve), the RHS is very thorough but includes First Nations peoples only, and the APS is only measures self-reported mental health. There is a continued need for relevant Indigenous mental health indicators and data, and building capacity within these successfully established surveys – all in an ongoing effort to secure funding and create policy.

There have been many efforts at the local level to produce relevant data to inform services and policy. In Hamilton, Ontario, 554 First Nations adults participated in a community-led health survey called “Our Health Counts”. The results found that 42% had been diagnosed with a psychological or mental health disorder, including depression (39%), PTSD (34%), and suicide ideation (41%) (Firestone et al., 2015). This is a disproportionate experience of poor mental health compared to the rest of the adult population in Hamilton.

In the rural context, the number of suicides in Northern Ontario increased from 11 in 1991 to 31 in 2013. Suicide is not a concept or tradition in Anishawbe, it was introduced and incited by colonialism and racism (Eggertson, 2015). Youth with family members who were forced to attend residential schools are more likely to experience depression,

suicidal ideation, and attempts. In some communities, this is described as a contagion or epidemic, but in other communities with similar social and geographic factors, there are no reported instances (Eggerston, 2015). This argues that there is an importance in understanding local social and cultural factors when creating community programs to enhance youth engagement, and support networks (Eggerston, 2015). Suicide prevention requires a trauma informed, holistic and relational approach (Asmundson et al., 2020; Jewell et al., 2020).

Colonialism has created a perpetuating and augmenting cycle of mental health issues. At the core of Indigenous social inequities is colonialism; the attempt to extinguish Indigenous cultures and identities through systematic oppression – especially by targeting youth (Bombay, 2015). It is nearly impossible to disentangle the individual realities of houselessness, unemployment, mental health issues, education, and intergenerational trauma. With these patterns being so widespread across the nation, it is clear that there must be a broader underlying factor; colonialism; but the way it manifests in individuals' lives differs. Supporting Indigenous mental health and well-being necessitates a widespread change – a severance of the cycle of trauma, poverty, and poor mental health.

Poor experiences and mental health outcomes persist, despite greater awareness of the root causes and interconnections leading to these experiences. In this research I position colonialism as a root cause of the mental health issues experienced by Indigenous peoples, and that there are ongoing structural barriers that limit self-determination as key challenges to healing and health equity. My thesis aims to confront these factors by exploring if social media research can be done in a good way, and if Twitter data may be

useful for understanding Indigenous experiences of mental health and strengthening Indigenous mental health resources.

2.2.5 Indigenous Mental Health and COVID-19

During the first waves of the COVID-19 pandemic abrupt lifestyle changes occurred globally, in an effort to mitigate the spread and mortality resulting from the SARS-CoV-2 virus. This included the imposition of lockdowns by many provinces (Canada) and stay-at-home orders in states (USA). Physically, many Indigenous communities in Canada faced lower rates of infection and death than non-Indigenous counterparts in the first wave, with much of the success attributed to communities asserting their right to self-determination of land governance, health information, and service provisions (Richmond et al., 2022). This being said, there have been many discussions on how these practices in conjunction with underlying social and health inequities may be exacerbating the mental health crises that many individuals and communities face. Policies such as lockdowns may decrease social connectedness, which may increase perceived stress, worry, and fatigue (Nitschke et al., 2021). The reduced in-person measures decreased the ability to gather for ceremony or other spiritual gatherings (Burnett et al., 2022) that may support mental health (Marsh et al., 2015).

Globally, the COVID-19 pandemic has been recognized as being a widespread psychological pandemic alongside the disease outbreak itself, due to the parallel rise of mental illnesses such as anxiety, stress, and depression (Rajkumar, 2020; Thakur & Jain, 2020). In Canada, opiate use has surged in recent years leading to an “epidemic” that has only worsened with the global pandemic; with greater travel restrictions impacting the

illegal drug trade, substances have become riskier. Subsequently, there has also been an increase in fatal overdoses since the pandemic (Asmundson et al., 2020). It is also well established that Canada's mental health services are under resourced and have not been equipped to support the nation's mental health needs in the pre-pandemic context (Asmundson et al., 2020). In the Indigenous context, many remote communities do not have access to western or culturally appropriate mental health services (Asmundson et al., 2020). Firestone and colleagues (2015) emphasize a similar issue for urban Indigenous peoples who face difficulty in connecting with appropriate services. Often, it is community organizations that promote mental well-being through holistic programming, services, and events, however, with physical distancing protocols in place many of these supports have ceased or transitioned to online mediums (Asmundson et al., 2020; Richmond et al., 2022).

Arriagada and colleagues (2020) explored the changes of Indigenous peoples' self-reported mental health during the pandemic (N~1,400) and found that about 60% have experienced a decline in their mental well-being since physical distancing protocols came into place. They also found that there are greater disparities of mental illness between Indigenous and non-Indigenous people, and that specifically, women and girls are facing a higher burden of stress (Arriagada et al., 2020). Suspension of regular community activities, health and well-being programming, and cultural gatherings has increased senses of isolation and often led to the decline of individual's wellness or healing progress (Arriagada et al., 2020; Richmond et al., 2022). There has also been an increase in domestic violence, child welfare issues, houselessness, and acute withdrawal episodes due to the closing of supports and forced isolation (Arriagada, 2020). Experiencing a

pandemic can also cause psychological harm; it has often been compared to experiencing a natural disaster in the ways it can mentally effect people (Vigo et al., 2020). Culturally centered care has been proven to support the resilience of individuals and communities in these times, while also promoting positive mental health outcomes (Furlong & Finnie, 2020).

According to Mashford-Pringle et al. (2021), First Nations, Métis, and Inuit people in Ontario describe an increased burden of mental health issues during the pandemic. This arose from the inability to connect socially and culturally with one another, often living in close quarters situations, substance use heightened by the Community Emergency Response Benefit (CERB), and intra/intergenerational trauma associated with Lockdown processes being similar to the Pass System (Mashford-Pringle et al., 2021). Exacerbating this issue is inadequate funding to mental health supports by the federal government. Failure to appropriately and adequately support Indigenous peoples' mental health during this time may result in increased incarceration or suicide (Mashford-Pringle et al., 2021). Supporting Indigenous peoples' mental health during this time requires attention to community-led strategies, informed by local knowledges and practices, rooted in relationality, and is shaped by past, present, and future domains.

2.3 Digital Geographies

2.3.1 What are Digital Geographies?

Digital geographies are a turn of the discipline that recognizes the relationship between technology, geographic processes in daily life, and geographic research. Largely, most of

the research to date has taken place in the Global North, focusing on capital, access, and control of the digital. This upholds the privilege of the materially advantaged settler-colonial, cis-gendered, white population. Digital technologies have the capability to connect, relay information, and transform lives – in their social and tangible structures - but there has been little attention in racialized communities on who is connected, and how, in digital spaces. My research focuses on understanding Indigenous health content on Twitter and how it may inform policy and programming to support the self-determination of Indigenous peoples' health goals.

Digital geographies are an emerging dimension of Geography and presents itself as an essential component of different geographic domains, rather than its own subdiscipline. This is referred to as the "digital turn" in geographic research (Ash et al., 2018). The term digital is defined as "Diverse technologies supported by the Internet, including social media, new spatial media, digital research methods, tools like video conferencing, as well as software and devices that facilitate digital space" (McLean, Maalsen, & Prebble, 2019, p. 741). Essentially, digital geography is a critical framework that urges us to reflect on how the "digital" is related to our environments and research processes, through the lens of our sub-disciplines (i.e., feminist geographies, Indigenous health geographies).

This understanding was first introduced by Ash et al. (2018), who specified three main overlaps of the digital and geography; 1) geographies *of* the digital, 2) geographies *produced by* the digital, and 3) geographies *through* the digital.

1) Geographies *of* the digital describes the inquiry of human interactions with digital and technological spatial realms. In essence, geographies *of* the digital describe the unique

digital environments many of us interact within, in daily lives and geographic research, including social media, blogs, video games (Ash et al., 2018). These spaces have unique structures, aesthetics, and materials that distinguish them from the non-digital world.

2) Geographies *through* the digital entail evolving tools, methodologies, and epistemologies of geographic research that are grounded in technology. For example, Geographic Information Systems (GIS) which collect, store, manage, analyze, and display spatial information (Maguire, 1991). GIS evolved from positivist spatial sciences and cartography, both of which are rooted in masculine positivism, colonialism, and disembodied knowledge (Ash et al., 2018). These origins bring forth criticisms from feminist geographers, who emphasize the importance of inquiring whose knowledge is being privileged in this work, and who is benefitting from these technology/methods (Leszczynski & Elwood, 2015; Ash et al., 2018).

3) Geographies *produced by* the digital refer to how non-digital environments (i.e., urban centres, economic/health/social geographies) are influenced by the digital (i.e., smart cities, information communication technology). Common amongst this literature is the concept of the "digital divide" which refers to explores the unequal access to technology based on geography, access to education and technological training, and material structure (Young, 2019). Typically, the findings of this research focus on materialistic solutions such as improving internet connectivity, with little regard on community priorities or uses of digital technologies (Young, 2019).

Digital geographies are inseparably theoretical and applied, seeking to explore and describe the reciprocal connections between digital and real life through critical inquiry of

geographic epistemologies, ontologies, and technologies. In this research I position these two realms of "digital" and "non-digital" as being interconnected, as informed by feminist critiques of digital geographies (Elwood, 2021). This ontological framework supports holistic and relational worldviews that align with Indigenous ways of knowing and being.

As previously discussed, the origins of geography in the academy (including digital geographies) are rooted in colonialism. In recent years there has been a greater focus to address and dismantle these harmful structures and knowledge bases. Data colonialism is a concept that describes the process of users being dispossessed of personal data, and content which they create, which is then capitalized upon by another (Thatcher et al., 2016; Fraser, 2019). There needs to be a continued focus on how colonialism implicitly and explicitly shapes digital geographies and non-digital realities. Furthering this, there is little exploration on the unique ways Indigenous peoples interact with digital geographies, especially in the context of health and well-being. There needs to be a continued focus on how community health priorities are being supported or constrained by digital geographies.

My master's thesis focuses specifically on social media sites (SMS), a digital technology that connects users online using a specific application, such as Twitter, Facebook, or Instagram. There is no universally accepted definition of social media, within or across disciplines (Carr & Hayes, 2015). SMS have gained popularity globally for their ability to support international and instantaneous networks between users.

Specifically, this research examines content from the application Twitter. Twitter is a platform in which users share brief sentiments of 280 characters or less in a “Tweet”. Multimedia can also be attached to the tweet, such as photos, videos, or audio. Other users are able to engage with tweets through responses, comments, and re-sharing capabilities. Tweets can be broadcasted generally or can be targeted to specific people or audiences through the use of hashtags and direct mentions of other users (Vigil-Hayes et al., 2017). Hashtags precede specific terms in order to identify digital content. Users are then able to access tweets pertaining to these themes by selecting the specific hashtag. Twitter also organizes popular themes/discussions through their “Trending” section, where users can explore the most frequently used hashtags. Tweeting at someone by direct mentioning their username following the “at sign”, sends the tweet directly to them. Using this technique allows users to have conversations and respond to one another’s content. Based on these capabilities, Twitter is an interface that supports the connection of like-minded individuals.

2.3.2 Indigenous Peoples and Digital Geographies

As technology and social media evolve, Indigenous people parallelly use these advances in both mainstream and Indigenous-specific ways (Intahchomphoo, 2018). In the Indigenous specific context, SMS may be used to address misinformation, connect individuals and communities, combat stereotypes, and raise public awareness (Intahchomphoo, 2018). For example, in 2014 “#Sealfie” was used by many Inuit peoples to advocate for traditional seal hunts, in response to Ellen DeGeneres’ tweet at the Oscars supporting the Humane Society of the United States of America, which has been strongly opposed to seal hunting. The hashtag was used to share information about traditional

knowledge and practices related to the seal hunt, to combat misinformation that was being spread by animal rights and conservation activists (Knezevic, 2018). Knezevic et al., (2018) somewhat explored how #Sealfie can impact social and policy change, but there has been no attention to the potential health impacts of connecting socially and culturally through digital platforms, including the advocacy of traditional food systems.

For communities with broad geographic areas, such as the Sioux Lookout in northwestern Ontario, social media shares information between and within communities across great physical distances (Intahchomphoo, 2018). However, this discussion is often also centered around the limitations to accessing the internet on-reserve: the digital divide. Colonizers relocated Indigenous peoples from their traditional lands onto parcels of land titled “reserves”, often located environments with harsh physical geographies and climates, a form of environmental dispossession (Intahchomphoo, 2018). In Canada, there are 3,100 reserves, and 44% of Indigenous people live in rural and remote communities (INAC, n.d.; Statistics Canada, n.d.). Due to the geographic isolation of reserves, low populations, and rough terrain, the communication infrastructure (i.e., to support internet) is often non-existent or limited, with private companies having little incentive to build in these areas due to the aforementioned reasons. The current digital divide that Indigenous peoples face due to lack of infrastructure and associated high costs is a direct result of historical and ongoing colonialism.

Largely, the academic discourse surrounding Indigenous social media focuses on activism, and the digital divide of accessing digital technologies in rural and remote settings. This being said, there is some literature, largely from Australia, that explores the intersection of Indigenous social media and health-wellbeing.

Internationally, researchers have explored the positive impact that social media has on Aboriginal and Torres Strait Islander's health, by promoting dialogues of health, belonging, and awareness (Sweet et al., 2015; Walker et al., 2019). Commonly, themes of cultural knowledge, encouragement, belonging, identity, and self-determination have been identified, and acknowledged as improving educational and health outcomes (Rice et al., 2016; McPhail-Bell et al., 2018; Walker et al., 2019; 2020). However, there is a need to focus Indigenous health SMS research on user engagement demographics, in order to support more successful SMS programs (Brusse et al., 2014).

Within the North American Indigenous context there is little research regarding relationships between Indigenous health and social media. However, one example is Corntassel et al. (2020) who discuss the Instagram account "Everyday Indigenous Resurgence" (EIR) and how it is supporting land-based health connections for Indigenous people on Turtle Island during COVID-19 using an Indigenous storytelling methodology. Richmond et al. (2022), also understand SMS as a health support for Indigenous communities on Turtle Island during COVID-19. Together, these indicate the potential strength of Indigenous SMS for culturally appropriate health promotion.

2.4 Gap in Knowledge

There are several methodological and theoretical gaps in knowledge which this research addresses. Primarily, my thesis employs a mixed-methods approach to understand Indigenous digital geographies in the context of Indigenous health and well-being. Although very different in their content, Indigenous health, Indigenous health

geographies, and critical digital geographies are all rooted in holistic and relational understandings of the world, uniquely positioning themselves to work together to explore Indigenous health and social media. To date, there has been no geographic research that explores or describes who is engaging with Indigenous health content on social media, where they are physically located, or what the key themes in these posts/discussions are.

With an absence of appropriate regional mental health data with Indigenous specific focuses or indicators, it is difficult to inform policy or services. Indigenous health geography research has supported the collection of locally relevant data, and most commonly uses a community-based research method. However, there have been few studies exploring if the everyday practices on social media or digital environments can be utilized to support Indigenous health and research. Similarly, critical digital geographies have been introduced by feminist digital geographers and are expanding to consider the diverse and compounding racial, socio-economic, and geographic factors which influence individuals' relationships with digital realms, contemporary life, and digital geographic research, but there has been little research exploring the unique ways Indigenous people interact with and through the digital to support health and well-being.

Overall, this research explores if digital environments, such as social media sites, can be leveraged to support Indigenous health and well-being through the ability to connect socially, share health information, and foster health-related activities.

Chapter 3

3 Research Design, Methods, and Analysis

Responding to the research question: *How are Twitter users across Turtle Island engaging with Indigenous mental health content on Twitter during the COVID-19 pandemic?* requires a juncture of multiple bodies of knowledge, and likewise, a unique chorus of methods and methodologies. This chapter will explore how pre-existing qualitative and quantitative approaches from digital and Indigenous geographies are applied to gather, analyze, and share Twitter data related to Indigenous peoples' mental health during the pandemic. This design was selected as there is a current lack of mixed-methods literature in Indigenous health geographies, and it supports multiple analysis strategies that may contribute to applied and methodological research outcomes. Specifically, this chapter consists of four sections: Researcher Positionality, and Research Design, Methods, and Analysis.

3.1 Researcher Positionality

My name is Veronica Mary-Isabela Reitmeier, and I am a settler of Polish ancestry living on the Traditional Territory of the Attawandaran, Anishinaabe and Haudenausaune Peoples. I start my introduction this way so that I can situate myself, my family history and my relationships with the land and the Indigenous peoples who have been in relationship with it since time immemorial. My positionality and relationships are constantly evolving, however, there are people, places, and experiences that have remained inseparable from my identity. These elements are also intricately woven into my research motivations, focus, and approaches. Before continuing to discuss my

methodology/methods, it is critical to first share who I am and how I have come to this work.

Often researchers are trained to separate themselves from their projects – to approach things *objectively* – my perception is that this is impossible. When I began my post-secondary education, this was the epistemology I was taught. In the natural sciences, if I were to impact the research in any way, it was attributed to being a "human error". Now I am shocked at how even that terminology perpetuates the notion that personal influence is an immediate deficit. Although this anecdote is primarily an experience in quantitative research, it is also present in qualitative and mixed methods. It is a privilege to be in a field that encourages introspection and self-reflection of identity; it has helped me to grow and challenge my own ways of knowing, being, doing, and biases. I am grateful for this. In addition, practicing reflexivity has made me more aware of not only my privilege and positionality, but also my inherent gifts and skills, something that is often overlooked or not celebrated amongst Western academia.

I am a daughter, sister, aunt, niece, sister-in-law, grandchild, partner, and dog-mom. My middle name, Mary-Isabela, comes from my two babcias (grandmothers) Mary Pawlak and Isabela (Isa) Reitmeier. It is an honour to carry the names of two brave and strong women. They came to Turtle Island from Poland under very different circumstances – Isa was displaced from her family and home during the WWII, and her family had the opportunity to settle safely here, together, and Mary's uncle invited her to visit after she completed school, and she ended up being successfully sponsored to stay here. Both of my babcias were young women trying to make a home and life for themselves, and their families. This makes my connection to this land very different from the relationships

Indigenous peoples have had with it since time immemorial. I acknowledge my privilege as a white woman and the benefits I receive from the systems that were created by settlers, for settlers, that continue to harm Indigenous peoples present day. I actively try to dismantle these systems and narratives in my everyday life, as well as my research.

My babcia Mary passed away in 2004, when I was 5 years old. Although I often feel that I lost her too early and didn't have enough time with her, I also feel grateful for the memories I do have and the way I have come to know her through the stories my family shares. Every time I eat strawberry rhubarb pie, pierogi, or celebrate Wigilia (Christmas Eve), I think of her. I have also always felt her spiritual presence with me – butterflies especially – make me feel as though she has been watching my life unfold. I also find that in times of negative headspace, she is the person in my head that I am talking things through with. The way that I experience spirituality comes from this experience of loss, but metaphysical interactions. My babcia Isa unexpectedly passed away in February 2022. I'm still processing her death.

I care deeply about my family and friends, and I have spent the past two years of the pandemic nurturing these relationships and letting go of the ones which have not reciprocated back. I feel guilty saying that, but I have realized it is part of my respect for myself – for in the past when I held on to the implicitly negative people in my life, it has resulted in my own negative mental health outcomes. I had the pleasure of chatting about this with a knowledge keeper from Walpole Island, who helped me identify this trait of empathy as a gift, and that in order to nurture my gift it means also setting emotional boundaries. As my supervisor and mentor Dr. Chantelle Richmond has said "you can't give if your glass isn't full". It feels vulnerable harnessing control over something that I

usually let life take its course on – like growing apart, moving away. I recognize a strength in this process of feeling uncomfortable, as that is where the growth happens.

One of the most influential places of growth for me in my adolescent years has been within the Indigenous Health Lab (IHL) at Western University, in the department of Geography and Environment. To me, the IHL is a place where I've learned and practiced relational accountability – through relationships, and the process of learning and un-learning as an ally. I was welcomed into the lab in 2018, as an undergraduate research assistant. Many of my current colleagues were also a part of the lab back then, so our relationships have transformed into friendships over the past four years. I have never felt unsupported, or alone, in this place – I feel the opposite – valued, respected, and humbled to be surrounded by such remarkable humans. At the most recent IMGS, my lab-mates helped me practice for my first conference, proudly took pictures as I presented, and one even ran 30 minutes up hill to make it to my presentation. The previous day, we all helped set up for another colleague's sharing circle and yarn weaving session. We do this because we care about one another, and the work that we do.

I come to Indigenous health research as a grateful learner and ally. Prior to university, I had very little exposure to Indigenous culture, knowledge, and the atrocities of the Canadian government. In fact, I remember learning about Iroquois people in grade three – where we also visited the reconstructed longhouse village at Crawford Lake – and that was the only "formal" education I had about Indigenous culture. The little other knowledge I gained came from the initiative of my parents, taking me to Crawford Lake prior to the class trip and by attending the annual local Powwow hosted by Conestoga College. Without this, I likely would have had a greater participation in the erasure

culture that Canadian education systems often perpetuate. It was not until I took the Indigenous Environments class in my second year of university that I became aware of Indigenous peoples' experiences of health, and the role of colonialism in disrupting health and well-being. There was a sudden pivot for me in the way I understood the world, where I began to acknowledge my ignorance, privilege, and responsibility make change. Something inside of me changed that semester. I had also just switched into geography, where much of the learning was emphasized on the meanings of place. This early exposure to Indigenous geographies took it further, by challenging me to think about the ways places and place-based processes often privilege certain people and voices – often they serve the colonial agenda. Previously I mentioned the sense of loyalty I feel to me relationships. My best friends experience ongoing racism and a structural discrimination when accessing care, and in training environments (such as health professional or graduate studies). I come to Indigenous health research because this is the way I see the world now, and if I am not being anti-colonial and anti-racist in the work that I do, then I am continuing to be a part of the problem.

I have always been passionately curious, specifically about natural environments and processes. This curiosity translates into a drive for academic success. I know that I have unique ways of learning and studying, and because of this internalized dedication there are many practical research skills I have gained in my training. This includes navigating different epistemologies, problem solving, quantitative and qualitative analysis, and communication. Although I am nowhere near a master in any of these dimensions, it means that I can approach research with an open-minded and often integrated approach. Indigenous health research is complex, and often requires interdisciplinary approaches –

so I feel as though my way of thinking alongside my training makes me well suited to this research. Moreover, I bring a lot of heart – emotion and dedication – to what I do. Indigenous health research is the only space in academia where I have felt this is supported. Every day I am growing as an ally. I am learning, sharing, and hopefully making change. I perceive learning as my greatest passion, and the people and transformation I encounter in this discipline fuels a reciprocity that makes me want to continue this path.

I hope these stories highlight the values I centre in my life and research: self-expression, support, community, relationality (physical and spiritual), and reciprocity. I hope that through this research, I can reciprocate practical information that communities may leverage for their own well-being goals. It is through these values that I feel connected with my research, regardless of human connection. These principles guide my thesis.

3.2 Research Design

There has been an ongoing reorientation in the ways Indigenous research is conducted. In the past, research has primarily been an extractive deficit-based practice *on* Indigenous peoples rather than *with* Indigenous peoples (Canadian Institutes of Health Research [CIHR], Natural Sciences and Engineering Research Council of Canada [NSERC], & Social Sciences, and Humanities Research Council of Canada [SSHRC], 2014). This has been to the detriment of communities who are left with no relevant data or research outcomes that support their goals. These problematic research practices are no longer acceptable, and there has been a deliberate effort from agencies such as the Tri-Council and First Nations Information Governance Centre to formalize ethical Indigenous

research guidelines and policies (Drawson et al., 2017). Indigenous research methods and methodologies are often documented as practices that prioritize and uphold the values of Indigenous communities (Kovach, 2010; Drawson et al., 2017). Drawson and colleagues (2017) identify five main themes of Indigenous research methods: General Indigenous Frameworks, Western Methods in an Indigenous Context, Community-Based Participatory Research, Storytelling, and Culture-Specific Methods.

Indigenous research methods are dynamic – often reflecting the local traditional knowledge and guided by community process and protocols. As a non-Indigenous researcher who is not directly working with community, I have a responsibility to ensure my methodology and methods are appropriate. This means they are not extractive or erasing, that they reflect but do not appropriate or essentialize Indigenous ways of knowing, and that they support Indigenous health/research sovereignty. All data involving Indigenous peoples is Indigenous data, and there must be accountability and responsibility to the data. For these reasons, I have selected to use mixed-methods in an Indigenous context.

This research utilizes an inductive-deductive analysis method. Thematic analysis is inductive and claimed by the qualitative realm research methodologies. Content analysis, which is similar to thematic analysis, is a quantitative method and uses a deductive approach (Neuendorf, 2018). Combined, these provide a mixed-methods approach to my research and result in the same output: a list of "nodes" with reference and file (month) counts. These enumerations provide numerical, quantitative data, which can then be used to substantiate the discussion of the predominate themes, locations, tweet types, user types, and originality. In addition, this data could be used in future statistical analysis.

The following section describes the strengths and limitations of Digital Geographies, and Indigenous Health Geographies as individual theories, and how their intersections can be augmented to support an Indigenous Digital Health Geography research agenda. Subsequently, an outline of the various qualitative and quantitative approaches and their respective tools will be outlined.

3.2.1 Indigenous Digital Health Geographies

As outlined in the literature review (Chapter Two), Digital Geographies explore the relationship between digital and actual realms, with critical digital geographies emphasizing the inequities of digital use from an intersectional lens. Indigenous health geographies focus on how Indigenous peoples' connection with their local environments supports well-being, and that there are many processes that support and limit these relationships with land; the overarching goal is that communities re-possess their lands, and land-based ways of knowing and being. There are many intersections between these two sub-disciplines, namely their relational ontologies that describe how our lived experience is part of a greater web of all creation – visible and invisible, animate and inanimate. Additionally, both understand that there are a multitude of intersectional factors such as race, gender, and socio-economic status influence access to these [digital, health promoting] environments, and that processes of colonialism and capitalism underly these inequities. Through this shared cognizance, one could propose that Indigenous digital health geographies explore how the access/inaccessibility to digital technologies impacts Indigenous peoples' health.

3.3 Methods

3.3.1 Data Collection

My research employs a mixed-methods approach. Mixed-methods refers to the use of different data collection methods in a research process, typically quantitative (objective) and qualitative (subjective) (Drawson et al., 2017). I will be following a convergent parallel model which situates the quantitative and qualitative components in combination, rather than having the first component dictate the consecutive study design. Convergent parallel frameworks are the most common in social media research (Snelson, 2016).

Indigenous Twitter has recently gained the attention of researchers, particularly in the context of the use of the hashtag #NativeTwitter. Caranto Morford and Ansloos (2021) share that "#NativeTwitter functions as this type of community-based vehicle for engagement with complex questions about Indigenous life, human and non-human kin, and cultural resurgence" (p. 295). Practically, Twitter was selected as the social media platform due to the public nature of its data. It is also easily accessible to researchers through the Twitter API V2, which returns information on both public and private Tweets. Application programming interfaces (APIs) enable developers and researchers to request and deliver specific information (Twitter, 2022a), in this research, from Twitter. A request is generated for an "Endpoint", which then provides a unique digital address for the desired information. Some examples of Endpoints are search/send Tweets, user lookup, or sending direct messages. For this research, we are focused on two "GET" endpoints: Search Tweets (Historic Tweets) and User Lookup.

Due to the nature of the study data being public, and that there was no data collection that involved interacting with people, my supervisor and I determined that there were no perceived risks or needs to receive institutional ethics approval from Western University.

However, in order to access the Twitter API, one must first apply for a developer license. I received approval from Twitter on November 2nd, 2021, for an Academic Developer License to access the Twitter API. This license provides me with unique tokens that can then be used to authenticate API requests. To ease the process of making requests to an API, Twitter recommends the use of Postman – a browser and desktop-based application that has a graphical user interface. Postman can also help organize and store the data needed to access the API (e.g., developer tokens) and save different queries sent through the API and values as variables for efficiency.

The first endpoint I requested was "GET" Search Tweets (Historic). This endpoint is called "historic" as it can retrieve Tweets since the time Twitter was created in 2006. Access to this endpoint requires the user to have an Academic or Premium developer license. Without this, Search Tweets is limited to seven days prior to the current date, which would not provide the data from March 2020-December 2021 needed to undertake a temporal analysis across the different waves of the pandemic. Following the initiation of the Developer and Postman accounts and the input of my unique developer keys into the Postman system, the next step is to set the query and parameters for the GET request, as displayed in Table One.

Table 1: Parameters set for the "GET" endpoint to retrieve tweets for each month from March 2020 to December 2021.

Parameter	Value
Query	(aboriginal OR inuit OR metis OR métis OR first nations OR native OR indigenous) AND (mental health OR well-ness OR wellbeing OR mental illness OR holistic health OR disorder OR psychiatry OR psychology OR trauma OR stress OR psych) AND (COVID OR COVID-19 OR coronavirus OR pandemic OR alpha OR beta OR gamma OR delta OR omicron)
Start_time	YYYY-MM-DDTHH:mm:ssZ
End_time	YYYY-MM-DDTHH:mm:ssZ
Max_results	100
Tweet.fields	author_id, created_at ,geo
User.fields	created_at, username

The set query was adapted from Nelson and Wilson's (2007) scoping review of the Mental Health of Indigenous peoples in Canada. Their query was modified to include terms relevant to the COVID-19 pandemic, including the names of the virus variants (i.e., Omicron). The start_time and end_time parameters were set to a one-week span in the middle of each month, from March 2020 to December 2021, inclusive. The maximum results were set to 100 tweets. This number was selected because following this phase of data collection, the author IDs that have been collected were used to generate further details (e.g., name, username) and the maximum number of author ids that can be inputted into the API is 100. The tweet and user fields selected for this first set of data collection include the author_id, created_at, geo, and username. Unfortunately, only the author_id and created_at data were consistently returned. The author ID is a unique string of numbers assigned to each Twitter account. Similarly, each tweet has a unique ID number.

In order to overcome these limited details in the data return, a second phase of data collection for author information took place. For each month's data, the author_id values were organized into a list with the tweet entry. This was then set as a parameter in the "GET" Users by ID endpoint in Postman. This request returns the parameters of author name and username. With this information, I can determine if it is an individual, organization, media, government, or other types of users. Additionally, it can be used to manually search for the users to determine their location by proxy, for example, if they have self-located themselves in their Twitter bio.

After the author information (Name, Username) was collected and organized with each tweet entry, I began to assign location by proxy for each tweet/user. Sloan et al. (2013) argue that there are three ways to determine location by proxy for tweets: user profile, geo-tagged tweets, and tweet contents. I manually assigned locations for each tweet using the criteria from Sloan (2013), and if this was not possible then the tweet entry was removed from the dataset.

Starting with tweet content, I would read through the tweet and look for any identification of place. If this was not successful, I searched the user on Twitter and looked at their profile. In some cases, individuals self-located at a "pinned" location, mentioned a specific place of work (I.e., Professor @ Arizona State University), or for organizations/companies they had a linked website that could be searched for location. In other cases, location was identified in the username, such as CBCOttawa. In extreme cases, the users' tweet timeline was visually analyzed for spatial patterns, to determine a location; if there was no conclusive evidence then the tweet was removed.

This method returned many unique scales of location: country, state/province, city, area code, traditional territories, treaty, stolen land, reservation names, and more. It was also common for people to include additional location information in their bios, beyond their "current" geography. For example, many Indigenous users also included which nations, communities, or language groups they are a part of. This identity information, which is inherently connected to the land, was also noted in a separate column beside the location by proxy.

While assigning location to the tweets, an inclusion/exclusion criterion was also applied to each tweet entry. In order to be included in analysis, each tweet entry must have:

1) author information,
2) be geographically associated with Turtle Island, and
3) be related to documented Indigenous experiences or determinants health.

For example, a tweet with all information present that discusses mental health resources for Aboriginal and Torres Strait Islanders from so-called Australia would be excluded based on location. In addition, some tweets lacked author information if the User had been blocked or left twitter since the tweet was sent, and as a result it would be removed. In total Postman retrieved N=1790 tweets across the 22-month timeline. Once the criteria were applied, the total number of tweet entries was N=1137, approximately 63.5% of the original return.

Although this iterative process of data collection and organization was time consuming, it also provided me the opportunity to become more familiar with the full dataset. This is often a limitation of the qualitative analysis of "Big Data" sets that are generated through technology. With data collected inter-personally by a researcher (i.e., interviews, sharing

circles, ethnography) there can be an inherent relationship or familiarization between the participants, data, and researcher. For research such as this, there are no interactions with the people contributing the data, and so familiarization not only helps me better understand the themes of the data going into analysis but also builds a sense of responsibility to the tweet content and users who are sharing them. The data collection and organization process took place between March 2022 and the end of May 2022.

3.3.2 Data Organization

With large data sets such as this (n = 1137), data organization is critical for multiple stages of data collection, and for analysis. As outlined before, the information from the first phase of data collection was then used to generate further data associated with tweet. This took place as the author_id returned in phase one being used to collect Username and Name in phase two, and Username from phase two being used to gather the location by proxy.

From each endpoint collection, Postman returns the data as a downloadable JSON script. This text for each month was downloaded and saved to Basic Text Editor. For the analysis of Tweets/Users/Location in NVivo, it was most appropriate to have the data from each phase together, as a “Tweet Entry” row. Microsoft Excel was used as a tool to catalogue the data. Each month from March 2020-Decemeber 2021 had its own Excel page for ease of data location. Within each page is a set of columns, one for each of the parameters from Postman, displayed in Table One. This enabled the author_id column values to be copied and pasted for use in phase two collection. The author data (Username, Name) was then added as a new column with its associated Tweet entry. A

column was also added for location by proxy. In summation, each tweet has their own Excel row, with columns that contain the tweet text, and the details of time/date created, author/username, and location. The tweets were organized by month, with each month set as a new Excel page. These tables for each month were then uploaded onto the NVivo Software for analysis.

3.4 Analysis

3.4.1 Key Terminology

The organized data were uploaded into NVivo with each month from March 2020-Decemeber 2021 as its own “Case”. Cases in NVivo describe a unit of observation and could include a specific person’s interview(s), an event, or a place. In this instance, each case represents all Tweet entries during a certain month and their corresponding parameters details. This method results in 22 different cases, specific for each month of Tweets. Each case is then assigned a “Node”, which is a specific reference. Nodes can be created for cases, as well as themes, or relationships.

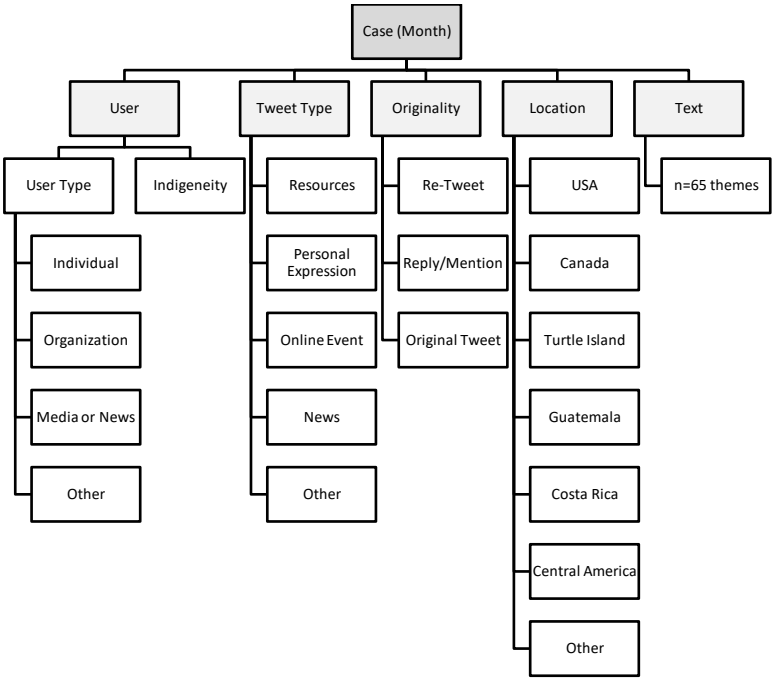


Figure 1: Organization of Cases and hierarchal nodes.

When undertaking a thematic analysis of data, the content is "coded" to a node. For this research, the whole tweet was highlighted and coded to the selected nodes. In other data, such as interviews, line by line coding may occur. Tweets are a maximum length of 280 characters, so due to the concise nature of the data, the complete tweet was selected as the unit of analysis.

Each node can be accessed to view all of the content that has been assigned to that theme. There is also information automatically provided about how many different files (cases) have content coded to the node, and the number of mentions (e.g., how many total codes there are). These metrics provide a basis for analysis as they display the most frequently occurring, and most widespread themes in the data.

Codes may have several levels – general "parent nodes" and more specific "child nodes". For example, within each case I coded all tweets to the node "Text" and then specific

themes (i.e., Health Funding) were child nodes. In addition to “Text” the other parent nodes were for content and creator details and included “Location”, “Originality”, “User Type”, and “Tweet Type”. These are displayed in Figure One.

3.4.2 Analysis of Tweets

After the inclusion/exclusion criteria was applied to the Tweets, a total of n=612 tweets for 2020, and n=525 for 2021, were included for analysis (N=1137). A separate “Text” node was created for 2020 and 2021 respectively. Starting with March 2020, each month’s case file was opened, and the Tweet column was coded to Nodes\\Tweets2020\\Text. When this was completed, the preliminary thematic coding of Tweets was conducted.

Within the Nodes\\Tweets2020\\Text node, the tweets were organized as individual references within their month case. The month cases were automatically alphabetized, starting with April. I chose to follow the file organization instead of according to the Gregorian calendar for ease of continuous coding of the child nodes. Each tweet was coded to one or more child nodes. The 2021 tweets were analyzed first, with themes coded inductively. This means that there was no pre-determined codebook but instead each text was coded to one or more themes that best described the tweet. New child nodes were added as needed, until there was saturation (no new themes). For 2020, the codebook from 2021 was applied for an inductive/deductive mixed analysis. New child nodes were added when needed, and child nodes that were not coded to were removed at the end of the analysis. This inductive/deductive process helps provide consistency to the analysis, ensure that themes are accurately portrayed, and supports the saturation (no new

codes) of tweets. In a practical sense, it also makes the coding process more efficient as there is less time spent on creating new nodes for the repeated themes. In total there were n=53 “Text” child nodes for 2021, and n=59 for 2020.

In addition to coding for main themes, each tweet was coded to two additional parent nodes: “Originality” and “Tweet Type”. “Originality” describes if a tweet was inventive from a user, a re-tweet of someone else’s’ tweet, or if the tweet was addressing another user through the reply/mention function. “Tweet Type” designates each tweet as a personal expression, resource, news, online event, or other. These parent nodes contained pre-determined child nodes, but in some instances additional child nodes were added so that the data could be best displayed. This follows a deductive-inductive coding framework. Specifically, the “Online Event” child node was inductively added to the parent node “Tweet Type” as there were many webinars and gatherings that did not fall into one of the other categories but had the commonality of taking place online. Since the 2021 tweets were analyzed first, this child node was automatically included when analyzing the 2020 tweets as per the inductive-deductive process.

In addition to the Tweets and content information (Originality), the location by proxy data and user information (creator details) were also analyzed using NVivo. Similar to the analysis of tweets, parent nodes were created and coded to the appropriate columns in each creator detail case (“Location” and “User Type” respectively), with more specific child nodes coded after. As with the “Text” parent node, the data was organized into separate nodes for 2020 and 2021. For 2021, the “Location” parent node was opened, and all data was coded to the child nodes “USA”, “Canada”, “Turtle Island”, “Other”, and “Costa Rica”. For 2020 “Location”, the child nodes were “USA”, “Canada”, “Turtle

Island", "Other", and "Guatemala", "Central America". For the "User Type" parent nodes for both 2021 and 2020, each account name was coded to the child nodes "Individual", "Media or News", "Organization", and "Other".

Corresponding to the number of tweets for each year (2020 n=612 and 2021 n=525), there are equivalent references for "Location", "User Type", "Tweet Type" and "Originality". A thorough data cleaning process took place to ensure that all tweet entries had been coded to each parent node, and that for Location, Originality, Tweet Type, and User Type, that the sum of all child nodes was equal to the total number of tweets. This ensures that for a single entry, they were only coded to one child node. The exception for this is "Text" where there may be multiple child nodes, due to the nature of each tweet having one or more themes.

In the data collection process for location by proxy, I observed many individuals also self-identified their Indigeneity within their Twitter bios. This provided the opportunity to collect and analyze Indigenous specific data. When applicable, Indigeneity information was also recorded on the Excel file, in an additional column. This information was copied and pasted, in order to maintain the person's truth in their expression of self-identification. Under the "User" parent node, two new child nodes were created: "Indigenous" and "Indigeneity". The "Indigenous" child node is where the self-identification along with the Tweet and its associated content and creator details (Location, User's Name, Text, Originality) were coded. The "Indigeneity" child node is where only the person's identification was coded. Coding to both of these child nodes permits a further analysis of where Indigenous users are located, what they are saying, and their user type. In some cases, there was no additional identity information in the

Excel file, but a User's Name indicates they are Indigenous (i.e., for the organization *Indigenous Link*). Although there was no "Indigeneity" to code, they would still be coded to "Indigenous" along with the content and creator details. In total, for 2020, there were 43 users who identified their Indigeneity, and 13 in 2021. The total number of tweets from Indigenous users was 45 in 2020, and 82 in 2021.

3.4.3 Temporal Analysis

In addition to analysing and enumerating the tweet themes, there was also opportunity to look at temporal changes in tweet themes across the 22-month period of data. Simply, this can first be done by looking at differences between 2020 and 2021. In addition, it can be analyzed continuously from March 2020 to December 2021, and across the different waves of the pandemic.

Global COVID-19 data was downloaded from the World Health Organization, and the data for Canada and the USA was extracted for use. This data included the fields Date_reported, Country_code, Country, WHO_region, New_cases, Cumulative_cases, New_deaths, Cumulative_deaths, and is available here: https://covid19.who.int/region/amro/country/ca. For the purpose of determining the dates of the different COVID-19 waves, only the Date_reported and New_cases were used for each country. The new case numbers were then added together, to get the total number of new cases for Canada and the USA. The next step was to average the case numbers for each month of recorded thematic data to have one monthly value. The monthly average of combined USA and Canada new cases was plotted as a line graph, with the months from March 2020 to December 2021 along the X axis and the number of new cases along the Y

axis. This plot was visually analyzed to inform the “waves” used for the temporal analysis:

- Wave 1 – March 2020 – June 2020
- Wave 2 – July 2020 – September 2020
- Wave 3 – October 2020 – May 2021
- Wave 4 – June 2021 – October 2021
- Wave 5 – November and December 2021

The overall top tweet themes (n=12), based on the number of references, were categorized into supports, constrains, and tensions of mental health. These themes were then added to the aforementioned line graph, as a stacked bar graph that indicates the number of references of each theme, for each month.

Chapter 4

4 Findings

This chapter presents the main results of the thematic and temporal analysis of tweets. There are three main components of this chapter; describing the top themes as supports, constraints, and tensions of Indigenous peoples' mental health, exploring the temporal nature of tweet themes throughout the pandemic, and the content and creator details of tweets. Ultimately, these findings respond to the two objectives of this thesis:

1. Describe key themes of indigenous mental health content on twitter throughout the different waves of the covid-19 pandemic, and
2. Enumerate the users, location, tweet type, and originality of tweets to evaluate who is engaging, where, and how with this content.

These findings have been illustrated in a series of tables, and graphs. The tables display the nodes and their corresponding number of references, and the number of months they are mentioned in. In addition, the percentages of the number of mentions and the percentage of number of months mentioned in have been included and are denoted by superscripts. These percentages are not meant to display statistical significance, but rather share the estimated proportion of tweets expressing each theme/topic.

4.1 Top Themes

Across both years (2020-21), a total of N=65 different nodes were coded to describe content of tweets. In 2020, there was a total of n=53 theme nodes, and n=59 in 2021. These nodes are shared in Appendix A and B, respectively, and the combined nodes are shown in Appendix C. For each year, the top themes were established by enumerating the total number of references for each node and ranking them based on highest number of

references. Table Two displays the top ten themes from 2020 and Table Three shows the top ten themes from 2021.

Table 2: Top themes of 2020, ranked by the number of references.

TOP THEMES 2020	# of mentions (%)	# of months mentioned (n=10) (%)
Trauma	169 (9.5)[a]	10 (100)[b]
Politics and Government	157 (9)	5 (50)
Youth	116 (6.5)	6 (60)
Health inequity	110 (6)	10 (100)
Media	91 (5)	5 (50)
Mental health supports	78 (4.25)	9 (90)
Racism	69 (4)	5 (50)
Compounding effects and Intersectionality	62 (3.5)	8 (80)
Racialized effects	56 (3)	8 (80)
Healing	56 (3)	3 (30)
TOTAL	**964 (53.75)**	

[a]Presents the number of mentions the code, and the percentage of total mentions.
[b]Presents the number of months the code is mentioned in from total sample (also a percentage).

Table 3: Top themes of 2021, ranked by the number of references.

TOP THEMES 2021	# of mentions (%)	# of months mentioned (n=12) (%)
Trauma	155 (12.75)[a]	10 (83.33)[b]
Racialized effects	153 (12.5)	12 (100)
Mental health supports	75 (6)	11 (91.66)
Resources	75 (6)	11 (91.66)
Health inequity	64 (5)	11 (91.66)
Youth	63 (5)	8 (66.67)
Politics and Government	48 (4)	9 (75)
Healing	44 (3.5)	5 (41.67)
Education	42 (3.5)	9 (75)
Compounding effects and Intersectionality	41 (3.25)	10 (83.33)
TOTAL	**760 (61.5)**	

[a]Presents the number of mentions the code, and the percentage of total mentions.
[b]Presents the number of months the code is mentioned in from total sample (also a percentage).

In both 2020 and 2021 the nodes “Trauma”, “Racialized effects”, “Mental Health Supports”, “Youth”, “Health inequity”, “Politics and Government”, “Compounding effects and Intersectionality”, and “Healing” were present in the top ten nodes. In 2020, “Media” and “Racism” were amongst the top coded themes. For 2021, “Education” and “Resources” were also amongst the top ten nodes. Due to the high degree of consistent themes (n=8), the tweets from the full set (N=22 months) were combined and analyzed together, then being ranked based on the number of references. The top themes when combining the nodes from both years are displayed in Table 4.

Table 4: Top themes of 2020 and 2021 combined, ranked by the number of references.

TOP THEMES (20/21)	# of mentions (%)	# of months mentioned (n=22) (%)
Trauma ▼*	324 (10.5)[a]	20 (91)
Racialized effects ▼	209 (6.75)	20 (91)
Politics and Government ■	205 (6.75)	18 (82)
Youth ■	179 (5.75)	14 (63.5)
Health inequity ▼	174 (5.75)	21 (94.5)
Mental health supports ▲	153 (5)	20 (91)
Resources ▲	123 (4)	20 (91)
Compounding effects and Intersectionality ▼	103 (3.25)	18 (82)
Healing ▲	100 (3.25)	8 (36.5)
Media ■	91 (3)	5 (22.75)
Racism ▼	78 (2.5)	8 (36.5)
Education ▲	59 (2)	15 (68)
TOTAL	**1661 (54)**	**22 (100)**

[a]Presents the number of mentions the code, and the percentage of total mentions.
*Symbols describing ▲ supports, ▼ constrains, and ■ tensions of mental health.

When combining the tweets from both years, the top ranked themes were “Trauma” (n=324), “Racialized effects” (n=209), “Politics and Government” (n=205), “Youth” (n=179), “Health inequity” (n=174), “Mental health supports” (n=153), “Resources” (n=123), “Compounding effects and Intersectionality” (n=103),“Healing” (n=100), and “Media” (n=91).

The top themes that have been displayed in Table Four can also be categorized based on their relationships to Indigenous peoples’ mental health; as supports, constraints, and tensions. Supports have positive impacts on mental health, whereas constraints are negative influences. Tensions describe factors that may have a positive or negative impact, depending on the social, geographic, historical, contexts. These are denoted by symbols in Table Four.

As previously mentioned, there was Indigenous specific data from a total of 56 users who self-identified their Indigeneity in their twitter biographies. In addition, there were Indigenous organizations or media outlets who were not coded to the “Indigeneity” node. These tweets from Indigenous users (both individuals coded to “Indigeneity” and organizations who were not) were coded to the node “Indigenous”. A query run in NVivo found that there was a total of 127 tweets from these users who were coded to “Indigenous”. The result from the thematic analysis of these tweets is displayed in Table 5.

Table 5: Top themes of 2020 and 2021 combined, from Indigenous users, ranked by the number of references.

TOP THEMES (20/21) INDIGENOUS USERS	# of mentions (%)
Politics and Government	38 (10.25)[a]
Trauma	35 (9.5)
Resources	31 (8.5)
Youth	30 (8)
Racism	24 (6.5)
Mental health supports	21 (5.75)
Healing	21 (5.75)
Violence and abuse	13 (3.5)
Health inequity	11 (3)
Media	8 (2)
Research	8 (2)
TOTAL	**240 (65)**

[a]Presents the number of mentions the code, and the percentage of total mentions.

There were 11 main themes that emerged from tweets from Indigenous users from a total of 127 tweets. The top themes were "Politics and Government" (n=38), "Trauma" (n=35), "Resources" (n=31), "Youth" (n=30), "Racism" (n=24), "Mental health supports" (n=21), "Healing" (n=21), "Violence and abuse" (n=13), "Health inequity" (n=11), "Media" (n=8), and "Research" (n=8). Together, these themes make up 65% percent of the total themes expressed by Indigenous users. It is also important to highlight that amongst Indigenous users, many of the themes expressed were the same as non-identified users, with the exception of "Violence and abuse" being more present within Indigenous users' tweets, and "Racialized effects" not being a top theme.

4.1.1 Mental Health Supports

Factors described as positive influences on Indigenous peoples' mental health from both the 2020 and 2021 top themes include healing, mental health supports, education, and

resources. In Table 4, supports are denoted with a ▲ symbol next to the theme name. In total there were four supports identified: “Healing”, “Mental Health Supports”, “Education”, and “Resources”. In the following section these supports will be further defined, and example tweets are shared.

Healing

The node “Healing” was coded to tweets that mentioned healing or described practices or experiences of addressing well-being. Healing takes many forms, and addresses many different concerns, including the physical and mental manifestations of trauma, intergenerational trauma, violence, abuse, racism, dispossession, and structural discrimination. Healing is a lengthy process and must also reflect the unique history, culture, and community of the individual or group who are on a healing journey (Blignault & Williams, 2017). In a holistic sense, healing is the process of achieving balance of the physical, mental, emotion, and spiritual health and goes beyond recovery and practice (Lavallee & Poole, 2009).

Tweets explored many topics related to healing, including the need to heal from intergenerational impacts alongside the current pandemic trauma:

> “Our friends at Red Lodge Transition Services are leaders in building community safety & working to heal historical & generational trauma. https://t.co/bFp4gYq9Iq” (*Organization*, December 2020)

Throughout the pandemic, youth have been taking a critical role in the healing of self and community. This has taken many forms, including through projects such as “Digital Voice” (n=20 tweets) and advocating at the Federal level [United States] (n=51 tweets):

> "TOMORROW: Native youth leaders will take part in hearing before the House Subcommittee for Indigenous Peoples of the United States entitled \Native Youth Perspectives on Mental Health and Healing.\ #COVID19 #Coronavirus #NativeYouth @[username] @[username] https://t.co/x2X9ZQFDi2" (*Media/News*, July 2020)

> "The pandemic has been difficult for Indigenous youth. But they've also found ways to discuss important issues, from violence and mental health challenges to healing. In this Brief, [Name] describes how though a platform called \DigitalVoices\: https://t.co/VFZP6ygI5O https://t.co/TXwR27a7XP," (*Organization*, October 2021)

Sharing stories, experiences, and truths can be part of the healing journey, and as a part of the process of implementing structural change for trauma and healing-informed systems. There were there many examples shared of programs and practices that support healing. For example, there is a high degree of mistrust of hospitals and western medical practices due to the racism and mistreatment that has occurred in them historically and contemporarily (Ambtman-Smith, 2021). As a result, many Indigenous people felt hesitancy of the COVID-19 vaccine; there were many responses to provide cultural education on the vaccine in the local languages and create Indigenous specific vaccine efforts – including the presence of Aboriginal Health Access Centres at mass vaccination clinics in Ontario, and vaccination powwows. Humour is also a critical part of Indigenous culture, including in traditional teachings and story. It has also been widely used in response to deal with colonization. In the COVID-19 context, it has also been used to address the trauma associated with Western medicine, but also encourage vaccine uptake:

> "Indigenous communities use an entertainment event as a way to encourage their people to get vaccinated. Comedy is more than a good laugh, it also brings some light into the healing process of those impacted by trauma. TM #PLLC1BTMR https://t.co/05yet31vN2 via @[username]" (*Other*, March 2021)

In addition to comedy, there were several other practices and structures that were described as promoting healing; art, housing, online wellness groups, stretching, breathing, mindfulness, and trauma informed education.

Mental health supports

Many tweets also articulated the need for, and implementation of specific mental health supports for Indigenous peoples, and other racialized peoples. There were n = 153 tweets about "Mental Health Supports" from all users across both years, accounting for 5% of tweets. As for Indigenous users, 5.75% (n = 21 tweets) were classified as "Mental Health Supports". Generally, this node was coded to tweets that described mental health supports, rather than those that directly shared the specific support and was then accessible to utilize:

> "With thanks to #BebeMooreCampbell for championing #MinorityMentalHealthAwarenessMonth, this #CAPEducation column outlines unique mental health needs for Native, Black, Latinx, & AAPI students, and how schools can support them during & after the pandemic: https://t.co/BE7YmkLSpc," (*Organization*, July 2021)

There were also many tweets that described resources available on digital platforms, such as apps or online gatherings:

> "Ottawa mental health agencies have launched a 'one-stop' website for counselling and mental health help. Get free access for children, youth, adults and families in Ottawa and the surrounding area. https://t.co/N0wbYrMHsZ\n\n#inuit #urbaninuit #mentalhealth @[username] https://t.co/H86k95cFhl" (*Organization*, May 2020)

> "For the last 2 months, The Native Wellness Institute has held a daily online Power Hour to bring healing and wellness to Native Americans across the country. @[username] @[username] & @[username] looked into the benefits of this programming https://t.co/nI0HaPSA2p" (*Individual*, June 2020)

In addition to online services and supports, there were also in initiatives in place, or calls-to-action centered around Indigenous understandings of health and well-being:

> "This week @NCFST piloted a trauma-informed land-based response to #Covid_19 for #Indigenous families in parks. I want to thank our colleagues and partners at the @cityoftoronto, @UofT, and @SickKidsNews for supporting us to make this a reality. https://t.co/rM2EHVPgEN" (*Individual*, June 2020)

> "Fighting Stigma: Hiawatha First Nation family keeps local kids busy with craft kits during pandemic: ... said she worried about the children's mental health not going to school or being able to interact with their peers and she also thought how that's… https://t.co/hoB8DvI5S5" (*Organization*, September 2020)

> "To promote Native children's mental health and wellness @JHUCAIH distributed 42,000+ copies of a storybook titled "Our Smallest Warriors, Our Strongest Medicine: Overcoming COVID-19." The book and other resources are available here: https://t.co/2HLU0Hm0bV #NativesStopTheSpread https://t.co/NXdeQF9jQf https://t.co/oXbiwcenit" (*Individual*, May 2021)

> "A report on youth suicide prevention in New Brunswick Indigenous communities is calling for provincial legislation that would recognize and support Indigenous languages and for more mental health funding. https://t.co/iZIlW86BXQ," (*News/Media*, September 2021)

In conjunction with these specific efforts, there were many tweets that advocated for the specific needs of Indigenous peoples, namely the implementation of culturally relevant supports. This included content about funding to create/maintain these resources, and the sharing of the success of many tribal/community-led mental health initiatives.

Education

Discussing learning environments and material was also a widespread topic on Twitter, specifically in 2021 where it was mentioned 42 (3.5% of tweets) times across nine months (75%), as displayed in Table Three. "Education" was not one of the top themes mentioned by Indigenous users. Many educational environments [at all levels] abruptly transitioned to online or hybrid learning, thereby disrupting not only the academic

components of schooling, but also the formal mental health supports as well as social and recreational factors that often act as informal encouragements of mental well-being. Many users shared opinions and personal expressions of the needs of students during the pandemic:

> "The burden is so heavy for some students and they may not convey this to instructors. Please be kind to them. Indigenous and LGBTQ Students' Mental Health Most Hurt by Pandemic https://t.co/PIPJQJ2mp5" (*Individual*, February 2021)

> "During #BIPOCMentalHealthAwarenessMonth, remember there is no single BIPOC student experience. Native, Black, Latinx, and AAPI students all have unique mental health needs, and have been affected by the pandemic in different ways. #CAPEducation\nhttps://t.co/BE7YmkLSpc" (*Organization*, July 2021)

At the same time, there was dialogue on the ways education and educators provide vital care to learners and communities:

> "Be sure to register for this June 24 webinar from the National Indigenous Women's Resource Center: Trauma-Informed Advocacy in the Time of a Pandemic Register here: https://t.co/F0EqldTClW" (*Organization*, June 2020)

> "We are the COVID-19 Native Response team. Contact us for individual &; group support stress management techniques community education and resources referrals. hotline number: (720) 498-0839 / email: ccp@denverindiancenter.org https://t.co/DxOSPF7y6p" (*Organization*, December 2020)

> "Fantastic thread about triage teachers do in an underfunded system unable to care for its most vulnerable in the way that they need. More counsellors, Indigenous workers, EAs, etc. are needed. We are tired & with added pandemic stress, this feels unsustainable. #bced #bcpoli https://t.co/uyzSeyR7C4" (*Individual*, October 2021)

> "#SoarAboveStigma aims to provide those suffering from addictions, mental health, or COVID-related matters a space to see that they are not alone in our communities while providing outreach support and stigma education for all Indigenous community members. https://t.co/rm3mZk4b7p https://t.co/JYEz2cwQK2" (*Organization*, November 2021)

> "Learn how tribal colleges are bolstering #mentalhealth services - with solutions like Uwiill - to help alleviate the emotional toll of the pandemic on Native American students: https://t.co/9RGfhb3gYw #MentalHealthAwareness #highered #sapro #reslife #satech https://t.co/gIC8IB01p" (*Organization*, November 2021)

With funding announcements pertaining to educational systems' needs during COVID, there were also critiques that followed, urging for a better baseline standard for educational environments:

> "To be clear…educators/parents should be happy that cleaning measures will cont to be in place? Cleaning measures that should've ALWAYS been in school pre pandemic? $45mill for mental health, indigenous ed and learning recovery is insulting. ThNks for doing the bare minimum #bced https://t.co/kWfPtWIJ7B" (*Individual*, June 2021)

Resources

Tweets were coded to the "Resources" node if they shared specific interventions, hotlines, programming, and other initiatives that could be accessed through the tweet itself, differing from the descriptive "Mental health supports" node. Across 2020 and 2021 there was a total of 123 tweets coded to "Resources", making up 4% of the content (Table Four). This increases greatly when looking at Indigenous users' tweets, where resources make up 31 tweets, or 8.5% of mentions (Table Five).

These resources take many different forms, including texts (books, comics, guides etc.), smartphone applications, helplines, web pages:

> "How to take care of your mental health during the COVID-19 pandemic. https://t.co/RAv1nE0u2A @TIOttawa @ottawahealth #Inuit #UrbanInuit #coronavirus #covid19 #wellness @DistressCentreO" (*Organization*, March 2020)

> "A pandemic carries uncertainty & stress which can lead to an increase in domestic & intimate partner violence. NIHB offers tips to care for yourself & loved ones. For help, call the Strong Hearts Native Helpline at 844-

> NATIVE. Visithttps://t.co/qf8DOibZVL. #COVID19 #NativeHealth https://t.co/7VygMjWXDj" (*Organization*, May 2020)
>
> "☆ The FNHA has created a mobile app to connect Indigenous and First Nations people living in #BritishColumbia with up to date #COVID-19 information and other holistic health resources, support and tools. https://t.co/7ksiKti5IH (Screenshot from Apple app store download page) https://t.co/mWjfdsPCQj https://t.co/JNB1Fx2pVv" (*Organization*, June 2020)
>
> "These are challenging times, especially given COVID. @MetisNationON has free, confidential supports for ON Métis incl.24-hr Mental Health & Addictions Crisis Line. If you're struggling please reach out and talk to someone. You aren't alone! #Metis #MentalHealth #EndTheStigma https://t.co/mhOunzEJhf," (*Organization,* September 2020)
>
> "The Tkaronto Indigenous Vaccine Access website provides provide timely, accurate, trauma-informed, and culturally relevant information about COVID-19 vaccinations. Call Auntie 437 703 8703 if you need support navigating your vaccine options or sign up! https://t.co/EAKNA5wwFH https://t.co/09soeg5mTo" (*Organization*, May 2021)
>
> "✨✨ Dear #NativeScholar You are not alone if the pandemic has impacted your wellbeing. In our Issue 06 comic, @ASU PhD candidate @[username], Pueblo of Isleta, shares 6□#Indigenous #wellbeing practices that has profoundly helped her: https://t.co/oq3OkyUvUM" (*Media/News*, July 2021)

The resources that were shared were specific to BIPOC or Indigenous peoples, often times for even individuals of a certain nation, community, or identity. For example, in so-called Canada there were Métis, Inuit, and First Nations specific resources. With many of these resources being online, it means that they are also accessible to Indigenous people living in urban areas.

4.1.2 Mental Health Tensions

Factors described as potentially having either a positive or negative influence on Indigenous peoples' mental health, depending on the context, are described as tensions. From the 2020 and 2021 top themes, tensions include the nodes "Politics and

Government", "Media", and "Youth". In Table 4, tensions are denoted with a ■ symbol next to the theme name. In the following section these tensions will be described, and example tweets are shared.

Politics and Government

"Politics and Government" was the top coded node by Indigenous users, covering 10.25% of their Tweets' content (Table Five). In tweets from all users, it was the third most referenced theme with a total of 205 codes (6.75%) throughout 2020 and 2021 (Table Four). Tweets were coded to "Politics and Government" when they mentioned government figures, policies, and (in)action, at any level, and Indigenous governance systems. Most commonly were tweets that discussed and critiqued the government systems in Canada and the US, at the federal, provincial, and state levels:

> "CDC research just confirmed #Coronavirus is taking a disproportionate toll on Native communities. Yet the Trump administration provides no relief. #CoronavirusIndianCountry is taking a massive toll on Native mental health. https://t.co/87sNlPSTej" (*Organization*, August 2020)

> "Here comes the 4th wave and [Justin Trudeau] decides, let's toss a election to change things up. Covid, indigenous issues, Afghanistan issues, mental health, economy in a mess aren't enough. Let's call an election so he can get a minority government and continue to do absolutely nothing." (*Individual*, August 2021)

> "@[username] @[username] The native Americans that were slaughtered by Mormons would like to voice their Intergenerational trauma as well but the Utah govt still treats them like less than human and let the pandemic rage on in the segregated parts of the state they collectively sent them to.," (*Individual*, January 2021)

In few cases, the opposite occurred where users expressed gratitude for the role of politicians and policy change:

> "Thanks for your support @[username] Our extensive peer supported recovery models are setting the precedence for #recovery #housing The Gov`s #support through the pandemic played a vital role in our ability to serve #Indigenous #health #Mentalhealth #Healing #trauma #abpoli https://t.co/6zr91YDlVW" (*Individual*, September 2021)

There were also tweets that discussing content from, or related to, Indigenous governance systems:

> "RT @ChiefsofOntario: Feds stress caution over a second wave of #COVID19: Indigenous Services Minister says extra caution is being taken for remote communities. https://t.co/Rh9DrWIGnQ" (*News/Media*, September 2020)

> "MKO Grand Chief Garrison Settee called the state-of-emergency declaration the \responsible\ thing to do and said theCOVID-19 pandemic has exposed how deficient First Nations are when it comes to mental and emotional health wellness." (*Individual*, May 2021)

> "Youth participants shared successful ways in which their tribal governments responded to the pandemic, the need to increase awareness of existing mental health resources, and their experiences during the pandemic." #NativeYouth https://t.co/HeyO7X8g77 https://t.co/o4lKxAMf1f, (*Organization*, June 2021)

> "This doesn't come overnight. This didn't just happen because of the pandemic," said Sheila North, former grand chief of Manitoba Keewatinowi Okimakanak (MKO). Trudeau: mental health in Indigenous communities is something the government takes "very, very seriously" (*Individual*, July 2021)

In addition to Twitter content about politics and government, there were also tweets coming from various politicians about policy, funding, and political agendas:

> "Through COVID-19 response funding, $453k in emergency funding has been provided to the community, including $2.2M indirect funding through the Indigenous Community Support Fund, and $170k to Muskegowuk Tribal Council to support mental health service delivery." (*Individual*, June 2021)

> "As Vice-Chair of the Senate Committee on Indian Affairs, I'm hearing the impacts of the COVID-19 pandemic on Alaskan Native and Tribal communities & I'm working hard to address them. https://t.co/9hBj3vjq72" (*Individual*, December 2021)

With two federal elections taking place during the pandemic, the United States during November 2020 and Canada in September 2021, there were also tweets describing platforms and voter concerns:

> "#Yes, Canadians & PM Trudeau are resolved to push indigenous issues forward in the years ahead, but it is not the only concern in this election. Covid recovery, childcare, mental health, gun control, & inflation, to name a few, are also on voters' minds right now" (*Individual*, September 2021)

There is a multitude of discussions on Twitter pertaining to the positive and negative effects and potential of different governance systems on Indigenous peoples' mental health.

Media

The "Media" node was coded at text that included media links (i.e., to news sources, blogs), tweets that mentioned media accounts, or that referred to the media as an entity. Media is a tension as it can share both positive and negative content, with dichotomous effects on health as well. For example, it can be a powerful tool for sharing truths, and for enabling Indigenous peoples to share their voices and stories, becoming an agentic process for individuals (Tsai et al., 2020). However, there are also numerous instances of the media omitting, misconstruing, or misappropriating Indigenous content, and reinforcing colonial narratives through the media. Therefore, it is necessary to critique media/news shared on social media platforms and discern the narratives they render in order to move toward relational centred media practices. In 2020/2021 there were 91 mentions of the media, covering 3% of total references (Table Four). Amongst Indigenous users, "Media" had 2% reference coverage with eight mentions (Table Five).

Overwhelmingly, the media shared negative experiences throughout the pandemic, including alarming the public of conditions and environments that exacerbate both physical and mental health repercussions of COVID-19. Specifically, the media covered several stories at the beginning of the pandemic on the risk associated with outbreaks in prisons due to lack of proper care. The media also shared the decline of inmates' mental health because of these conditions, and the need for a mass release of prisoners:

> "RT @CBCIndigenous: Tension, fear rising inside Dorm 3 of Ottawa jail over COVID-19 https://t.co/K1J1l4Yjjb" (*Individual*, March 2020)
>
> "Prisoners in a provincial jail in Ottawa say they are not receiving proper medical care for flu-like symptoms sweeping through the facility during the COVID-19 pandemic. https://t.co/QlGioVyBCF @[username]" (*News/media*, March 2020)
>
> "@[username] This is a report from the Ottawa jail. #ottnews #covid19 yes: "A large scale release of #prisoners is essential at this time if lives are to be saved\" https://t.co/CAJMBVfFcy" (*Individual*, March 2020)

There were also tweets that expressed how international media coverage of a situation exemplifies its magnitude and urgency:

> "It's so rare that American media reports on something happening in Canada, I think this is a pretty clear indicator of how serious an issue this is. @CNN Canada coronavirus: Pandemic accelerates a mental-health crisis for indigenous youth - CNN https://t.co/SJzY6KJcOW https://t.co/qdRen7oxRA" *Individual*, August 2020)

The media also shared some positive news and experiences during the pandemic, including community events and land-based initiatives to support wellbeing:

> "Looking to take part in virtual National Indigenous Peoples Day celebrations? Learn how from @CTVVancouver https://t.co/HqBgiV15jZ #UBC #wellbeing #NationalIndigenousPeoplesDay" (*Organization*, June 2020)
>
> "If you don't have a subscription to the Toronto Star you can read the full story on @NCFST's new trauma-informed land-based #Covid_19 response below. Thank you again to all our partners and colleagues for supporting this work. https://t.co/wU3Cbbdb2J" (*Individual*, June 2020)

Youth

The node “Youth” describes content that mentioned youth, children, or students of a certain age. “Youth” is considered a tension because amongst the content, there were discrepancies of the sentiments associated with youth, for example, BIPOC youth often have poorer experiences of mental health both prior-to and during COVID-19, but on the contrary, youth have also displayed great action and leadership for healing at all levels – including personal, intergenerational, and systems. Eight percent of the tweets (n = 30) from Indigenous users mentioned “Youth” (Table Five), which is greater than all users, who referenced “Youth” in just under six percent of tweets (n = 179) (Table Four).

Tweets expressed the inequities of mental health experiences and supports that Indigenous youth face due to current and intergenerational trauma, structural discrimination, racism, and environmental dispossession:

> “Prof. @AnnaBanerji said it's upsetting to see the disparity in #mentalhealth support between indigenous and non-indigenous youth in Canada, even during a pandemic. She shared her personal story on the issue with @CNN https://t.co/JaC7nuQvCohttps://t.co/EQaSJCAl7f” (*Organization*, August 2020)

> “Canada has already been dealing with an epidemic among its Indigenous youth. FNIM youth have a depression and suicide rate more than 3X the average for non-Indigenous people but the pandemic is adding a layer of risk to young Indigenous lives. https://t.co/hvZG02EwZ1” (*Organization*, August 2020)

> “@theJagmeetSingh FACT is the descendants of those children struggle with the LEGACY of generational trauma—myself included! The ruling s/incl descendants! First Nations child-welfare ruling based on 'seriously flawed reasoning,' feds argue https://t.co/wH0XztGAjH via @CTVNews” (*Individual*, June 2021)

> “As with every aspect of this pandemic, Indigenous, Black and Latino children have disproportionately lost parents to COVID-19. Without help this portends a generation of children steeped in trauma. HUNGRY KIDS NEED YOUR HELP!

> Give to https://t.co/sUlR3sOqiY! https://t.co/uafhMMEZaA" (*Organization*, September 2021)

On the contrary, there was also content that celebrated the strength and leadership of Indigenous youth:

> "HAPPENING SOON: Native youth leaders will testify about mental health and healing during a remote hearing of the House Subcommittee for Indigenous Peoples of the United States. Tune in at 3pm Eastern! #COVID19 #Coronavirus #NativeYouth @NRDems @UNITYInc76 https://t.co/6h8xQLFxB3" (*News/Media*, July 2020)

> "@[username] @[username] @[username] What gives me hope is seeing all the Indigenous Youth do such amazing things. Especially during the on-going pandemic. You see Indigenous Youth prioritizing their health and mental health as well as succeeding in the arts, trades, stem, etc. #IndigenousSolutions 2/2" (*Individual*, September 2021)

> "The pandemic has been difficult for Indigenous youth. But they've also found ways to discuss important issues, from violence and mental health challenges to healing. In this Brief, Alexa Blyan describes how though a platform called \DigitalVoices\: https://t.co/VFZP6ygI5O https://t.co/TXwR27a7XP" (*Organization*, October 2021)

Additionally, some tweets described culturally relevant mental health supports for youth. This included actualized resources, as well as advocating for the continued need for these programs:

> "@wbiih_ Some of your participants may also be interested in our May 1 online consultation with Atlantic Canadian Indigenous communities about Upstream investment in mental health of infants, children & youth, + the impact of COVID-19. Free registration. Details: https://t.co/qQbqVYiouS https://t.co/WZynF5pTpM" (*Organization*, April 2020)

> "Ottawa mental health agencies have launched a 'one-stop' website for counselling and mental health help. Get free access for children, youth, adults and families in Ottawa and the surrounding area. https://t.co/N0wbYrMHsZ #inuit#urbaninuit #mentalhealth @TIOntario https://t.co/H86k95cFhl" (*Organization*, May 2020)

> "READ I \Coronavirus accelerates a mental-health crisis for Canada's indigenous youth.\ Gov't funding supports Indigenous youth programs that adhere to Jordan's Principle. \We see the impact it has had on the mental health of the youth in our

community.\ https://t.co/0dIQwpBzGD https://t.co/eKyXXfY3zO" (*Organization*, August 2020)

"Fighting Stigma : Hiawatha First Nation family keeps local kids busy with craft kits during pandemic: ... said she worried about the children's mental health not going to school or being able to interact with their peers and she also thought how that's... https://t.co/hoB8DvI5S5" (*Organization*, September, 2020)

"To promote Native children's mental health and wellness @JHUCAIH distributed 42,000+ copies of a storybook titled "Our Smallest Warriors, Our Strongest Medicine: Overcoming COVID-19." The book and other resources are available here: https://t.co/2HLU0Hm0bV #NativesStopTheSpread https://t.co/NXdeQF9jQf https://t.co/oXbiwcenit" (*Individual*, May 2021)

"Youth participants shared successful ways in which their tribal governments responded to the pandemic, the need to increase awareness of existing mental health resources, and their experiences during the pandemic." #NativeYouth https://t.co/HeyO7X8g77 https://t.co/o4lKxAMf1f" (*Organization*, June 2021)

"A report on youth suicide prevention in New Brunswick Indigenous communities is calling for provincial legislation that would recognize and support Indigenous languages and for more mental health funding. https://t.co/iZIlW86BXQ" (*News/Media*, September 2021)

4.1.3 Mental Health Constrains

Factors described having a negative influence on Indigenous peoples' mental health are described as constrains. From the 2020 and 2021 top themes, there are five identified constrains: "Trauma", "Racism", "Racialized effects", "Compounding effects and intersectionality", and "Health inequity". In Table 4, constrains are denoted with a ▼ symbol next to the theme name. In the following section these constrains will be further explained, with example tweets provided.

Trauma

"Trauma" was the highest coded node by all users in 2020/21, with 324 references (10.5%). For Indigenous users, it was coded 35 times, totalling 9.5% of references, and it was the second most referenced theme following "Politics and Government". Indigenous

peoples across Turtle Island have had many diverse experiences of physical, mental, and emotional trauma, resulting from settler colonialism and its direct/indirect processes and structures. This historical, intergenerational, and ongoing experience of trauma has resulted in poorer physical and mental health outcomes for Indigenous peoples (Bombay et al., 2009). "Trauma" was coded to tweets that directly stated the word trauma, but also to specific experiences of trauma, including but not limited to the Indian Residential Schools, Missing and Murdered Indigenous Women, Girls and 2Spirit individuals, the 60s Scoop, and the Indian Act:

> "Indigenous leaders of Keeseekoose First Nation in SK say the community is struggling to cope with the intergenerational trauma caused by a residential school that once operated in the area, with many residents turning to drugs and alcohol to cope. https://t.co/COducgiL0V" (*Individual*, June 2021)

> "I write with the hope that the recent federal announcement will seriously contend with the historic trauma, overcrowding and underlying health challenges faced by Indigenous peoples in addressing and responding to COVID-19.\" https://t.co/KtdhCzikpP" (*Individual*, March 2020)

> "There's a historical trauma, a generational trauma, that carries through. If we lose the elders, it's like a library burning down. Knowing the history of what has happened to us, we had to know how we were going to deal with it if we got hit. [Name] https://t.co/1NLGgv9QRA" (*Individual*, October 2020)

One user expressed the ways that COVID-19 is a new trauma, and they articulated the different ways that new and old traumas are impacting the health and well-being of racialized peoples in the United States of America:

> "In a country that prides itself on being a leader, the U.S. is the world leader in new traumas (COVID-19 mortality rates) & exacerbating old ones (land theft, enslavement, genocide) that impact the health & well-being of Black & Indigenous communities. COVID-19 is a new trauma" (*Individual*, October 2020)

Some Tweets shared trauma specific, and trauma-informed programming to support individuals:

> "Join Dennis Windego's circle to better understand pre- and post-pandemic stress, intergenerational trauma and strategies for managing trauma symptoms. There are four sessions, please choose only one: https://t.co/VqGbmQTn5a #Indigenous #IndigenousHealth #Ottawa #HealingCircle https://t.co/lRHlsJ1KRW" (*Organization,* August 2021)

There were also many examples shared of ways in which Individuals are addressing their trauma amidst the global pandemic:

> "Indigenous communities use an entertainment event as a way to encourage their people to get vaccinated. Comedy is more than a good laugh, it also brings some light into the healing process of those impacted by trauma. TM #PLLC1BTMR https://t.co/05yet31vN2 via @ctvsaskatoon" (*Other,* March 2021)

> "Art has always been seen as part of healing. I wouldn't say it can heal a pandemic — that's impossible — that's physical, but it can heal some of the trauma of living through one, says Wanda Nanibush, an Anishinaabe curator at @agotoronto. @tvo https://t.co/T9gj06euyT" (*Organization,* March 2021)

> "Indigenous leaders of Algonquins of Barriere Lake First Nation in Quebec are returning to the land of their ancestors, their native language, and traditions as way to heal from the generational trauma caused by residential schools. https://t.co/NQG0m6bZuJ" (*News/Media*, June 2021)

Racism

Racism was mentioned in 6.5% of the tweets from Indigenous users, with a total of 24 references. During 2020/2021 in tweets from all users, it was referenced 78 times for a total of 2.5% coverage across years. Racism was coded to tweets that described acts or experiences of racism, or explicitly stated racism. Racism describes "A societal system in which actors are divided into 'races', with power unevenly distributed (or produced) based on these racial classifications." (Paradies, 2006). Racism operates at the interpersonal, structural, and implicit levels.

One compelling Tweet describes how Canada's Prime Minister has a history of racist actions, and that his political agenda often serves to further harm Indigenous peoples, lands, and communities:

> "@JustinTrudeau entire career has been dedicated to oil and gas. Scandal, black face, disregard for the Indigenous lands and climate. Under this economic hardship and stress he is bailing out the rich companies. Who does he work for? #cdnpoli #Covid_19 #COVIDCanada https://t.co/OZscNupuiq" (*Individual*, March 2020)

In addition to these distinct political choices that have racial implications, tweets about racism also call to attention the ongoing structural and interpersonal racism that occurs not only in politics, but also healthcare systems. These experiences of racism are also characterized by fear and mistrust, leading to decreased use of health services or vaccines:

> "@saskndp Elder Earnie Poundmaker with the AFCC says some seniors can face language and cultural challenges when accessing services, while others carry concerns around systemic racism and trauma through past experiences. https://t.co/Wu2Qhwmp1V #skpoli #COVID19 #Indigenous" (*Individual*, March 2021)

> "RT @TorontoStar: An ongoing legacy of systemic racism, colonialism and trauma has left many Indigenous people with a distrust of settler governments and health systems that have hurt and failed us for centuries. As a result, vaccine hesitancy is a reality, Mamakwa writes." (*Individual*, March 2021)

Tweets also emphasized the continued role of historical and on-going racism as a determinant of physical, mental, and social health during the pandemic:

> "July is #BIPOCMentalHealthMonth, and today we're highlighting the often-neglected #Indigenous population and the unique threats posed as a result of this #pandemic. Read more about how #racism and abuse directly affects Indigenous lives: https://t.co/jcUhhwsc4d" (*Organization*, July 2020)

> "@EdTweets__ FWIW it wasn't hard to use evo psychology to predict and uptick in racism and factionalism during a pandemic. One of the purposes of the behavioral immune system is to avoid infection by foreign tribes. Native

> Americans were ravaged by European disease. https://t.co/BbPM9C0Bau" (*Individual*, October 2021)

Racialized effects

"Racialized effects" was coded to tweets that describe the unique way in which COVID-19 has impacted Black, Indigenous, and People of Colour. This includes expressions of their experiences, metrics on COVID-19 effects, research, and in some cases, specific resources. Although it was not one of the top themes described by Indigenous individuals, it was large part of the twitter content from all users with 209 references mentioned in 6.75% of tweets. This makes it the second most referenced theme across 2020/2021. Most tweets focused on the racial disparities in COVID-19 experiences:

> "@[username] @[username] Exactly! Also our Native peoples CDC studies have shown that AI/AN are among the racial and ethnic minority groups at higher risk for severe COVID-19 outcomes. Persisting racial inequity and historical trauma have contributed to disparities in health and socioeconomic factor" (*Individual*, October 2020)

> "One year on in the pandemic: as America both remembers & looks forward, let us not forget the disproportionate economic, health (incl. mental health) impact of #Covid19 on our fellow Americans, including those who are Black, poorer, Latino, Native American or #AsianAmercan. https://t.co/nT8Kgigiu4" (*Individual*, March 2021)

> "Black, Indigenous and people of colour have been disproportionately affected by COVID-19, with higher hospital and ICU admission rates and deaths than for other populations. This brings stress and grief for all our communities. We see you. We support you. #ProtectOurPeopleMB https://t.co/akS1Y1lgC4," (*Organization*, July 2021)

> "@NPR's poll clarifies what we already know. #COVID19 has placed a disproportionate burden on Latine, Black, Indigenous + Asian households - on finances, physical and mental health, education - not despite government help, but because of inadequate help. https://t.co/8EEG6IKaDk" (*Organization*, October 2021)

Tweets also expressed the needs for racially and culturally specific healthcare and supports, that understand the unique health needs and experiences of BIPOC individuals:

> "Fewer than half of Black (48%) and Native Americans (47%) surveyed felt confident they have access to health care providers who understand their ethnic or racial background and experiences. @NextAvenue: https://t.co/SXVJXHYyuA #NDpervasiveneeds https://t.co/F28dHbJxIL" (*Organization*, March 2021)

> "Black, Latinx, Indigenous children and adolescents are asking for mental health supports. They are facing additional structural and social determinants of mental health. We really need transformative solutions #COVID19 #Mentalhealth https://t.co/3oMNsOFu3R" (*Individual*, November 2021)

There are some resources already in place that were shared on Twitter:

> "Beginning Tuesday, June 23, NAMI Seattle is launching our BIPOC Support Group. Open to Black, Indigenous and/or People of Color seeking peer mental health support, meeting Tuesdays 5-6 PM. Visit https://t.co/3gQevghUPD... for instructions on how to join! #BLMSeattle https://t.co/6uEl7bDgHT" (*Organization*, June 2020)

Compounding Effects and Intersectionality

"Compounding Effects and Intersectionality" was coded to tweets that describe how multiple factors, such as the social determinants of health, intergenerational health, culture, and land, are interdependent, and can result in disadvantages when there is disruption of one or more components, issues in other dimensions are often exacerbated. Similarly, intersectionality refers to the ways that social categorizations often overlap and discriminate against certain individuals or groups. Social factors may include race, class, gender, and age. Intersectionality also calls us to action to not essentialize the experiences of oppressed individuals or communities (Crenshaw, 2015). This node was not part of the top themes expressed by Indigenous users, but it was in 3.25% of tweets by non-Identified individuals (n = 103 tweets).

Several users made personal expressions on how they have been affected mentally, financially, environmentally, politically, and physically since the onset of the pandemic:

> "Donate what you can, if you can, to @RightsAction #Covid19 response fund to support Indigenous & campesino communities in #Honduras & #Guatemala. Q'eqchi' plaintiffs in #HudBayMinerals lawsuits suffering multiplying impacts of trauma, #COVID, tropical storms, flooding, crop loss https://t.co/eAAyBgTcrq" (*Individual*, June 2020)

> "#portfolioday since the pandemic ive had no work and my disabilities have made it even harder for me financially been dealing w/ other mental health problems. i do take commissions, please consider donating to a disabled indigenous artist. my kofi and paypal are: @[username] https://t.co/h4XHylE99K" (*Individual*, April 2021)

> Living in a post genocide and colonized america during a pandemic as a native lgbt+ essential healthcare worker f***ing sucks, okay? And I cannot stress the \please do not ask me if i'm okay\ enough. You know the answer. The more important thing is that I'm alive (*Individual*, August 2021)

Most often, tweets explained the multitude of factors that amalgam to result in persistent health inequities experienced by Indigenous peoples:

> "The combined impact of marginalization, health disparities, and socioeconomic circumstances deeply impact mental health and access to services for indigenous communities. #minoritymentalhealthmonth #bipocmentalhealthmonth #work2bewell https://t.co/U68Kh8iKpa?" (*Organization*, July 2020)

> "Mental health treatment has long been cost-prohibitive, scarce, and coercive. Black, Latinx, and Native communities have borne the brunt of the mental health system's inequities. Now, #COVID19 compounds those harms. https://t.co/PfTzfXPAyW" (*News/Media*, September 2020)

> "@[username] Worst part is that obesity in native populations is a result of colonization. Food deserts, generational trauma/epigenetics, exposure to obesogenic pollutants etc. these guys ancestors caused a risk factor for the current pandemic which was partially caused by current white ppl" (*Individual*, October 2020)

> "#Opinion: Women who are Black, Indigenous or people of colour are among the most severely affected by the pandemic — and will continue to be after it's over,

> unless we provide the support necessary to ensure their physical and economic wellbeing. https://t.co/xkLFrkRRig" (*News/Media*, March 2021)

Health Inequity

The "Health Inequity" node describes tweets the express experiences and metrics of the disproportionate ill-health that Indigenous peoples experience due to racism, colonialism, structural discrimination, and environmental dispossession. "Health Inequity" encompassed 5.75% of tweets from all users (n = 174 tweets), and 3% (n = 11 tweets) from Indigenous users.

Much of the content surrounding health inequity focused on data – the need for Indigenous specific data, the sharing of evidence of health inequity, and finally the call to make action based on this evidence:

> "RT @NAFC_ANCA: There's hardly enough data surrounding COVID-19 and Indigenous people (especially off reserve). If you have a minute, please consider filling out this 'COVID-19 mental health' survey: https://t.co/JyzI4ksgxh" (*Individual*, April 2020)

> "American Indians / Native Americans are 1% of the Oregon state population and make-up 3% of Oregon's prison/jail population. Those who are incarcerated have a high incidence of mental health disorders. The COVID-19 pandemic adds further stress and anxiety." (*Other*, May 2020)

> "The Navajo Nation has the highest per capita rate of cases in the country: 6,747, as of Wednesday, among the 173,000 people who live on the reservation. How are leaders addressing mental and behavioral health? By @[username] @[username] https://t.co/8427zRmbbh" (*Individual*, June 2020)

> "Higher proportions of srvyd #Indigenous participants reported fair/poor mental health than non-Indigenous participants during the #COVID19 pandemic (38% compared to 23%) https://t.co/YPE3RFTQn1" (*Organization*, July 2020)

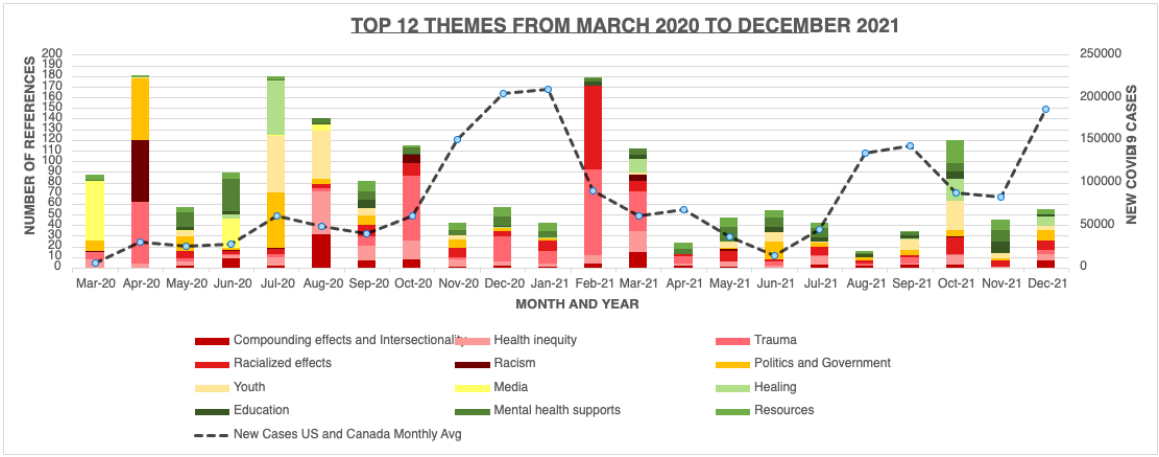
> "CDC research just confirmed #Coronavirus is taking a disproportionate toll on Native communities. Yet the Trump administration provides no relief. #CoronavirusIndianCountry is taking a massive toll on Native mental health. https://t.co/87sNlPSTej" (*Organization*, August 2020)

> "I just published COVID-19 and Global Indigenous Health Inequity: A Holistic Life Cycles Approach to Systems Change. Our CSPC Panel Takeaways & Actions. #Health #Research #SciencePolicy #Indigenous #Metis #FirstNations #researcher https://t.co/f3zq908Buh https://t.co/liz7Xt51GK" (*Individual*, December 2020)

> "COVID-19 has detrimentally affected mental health in Canada. Our research shows #Indigenous participants are at higher risk of negative outcomes. Mental health programs in Canada need to be equitably funded and accessible to overcome these barriers. #COVID19research #univresearch https://t.co/WVLgH38yDm" (*Other*, May 2021)

4.1.4 Temporal Analysis of Tweets

As described in sections 4.1.1, 4.1.2, and 4.1.3, the top tweet themes from both years were categorized in to supports, tensions, and constrains of Indigenous peoples' mental health (Table Four). These twelve categorized themes are shown in Figure Two as a stacked bar graph. Supports are displayed in different shades of green, tensions are yellows, and constrains in reds. The number of mentions/references is displayed on the left Y axis, and the combined new case numbers [for Canada and the USA] are displayed as a line and shown on the right Y axis. Along the X axis are the months from March 2020 to December 2021. Finally, there are black vertical lines that mark the first five waves of the pandemic. Together, this graph displays the proportion of each theme (and categorization) across the different waves of the pandemic, compared to the new case numbers. The number of references of each theme during each month are shown in Appendix D and are separated into the different waves.


TOP 12 THEMES FROM MARCH 2020 TO DECEMBER 2021
NUMBER OF REFERENCES
NEW COVID-19 CASES
MONTH AND YEAR
Mar-20 Apr-20 May-20 Jun-20 Jul-20 Aug-20 Sep-20 Oct-20 Nov-20 Dec-20 Jan-21 Feb-21 Mar-21 Apr-21 May-21 Jun-21 Jul-21 Aug-21 Sep-21 Oct-21 Nov-21 Dec-21
Compounding effects and Intersectionality
Health inequity
Trauma
Racialized effects
Racism
Politics and Government
Youth
Media
Healing
Education
Mental health supports
Resources
New Cases US and Canada Monthly Avg

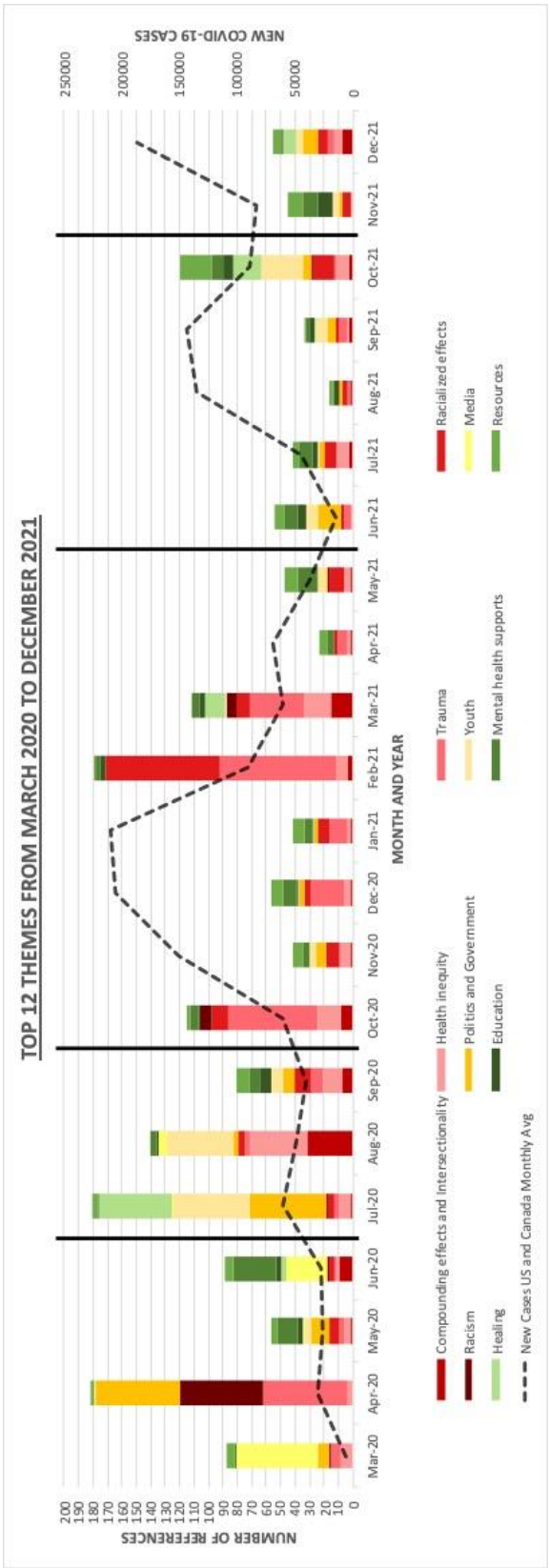


Figure 2: Graph comparing the Top Tweet Themes across each month and with new case numbers (USA and Canada combined). Source: World Health Organization.

There are several general trends that can be seen across the different waves of the pandemic. First, the total number of references (all themes) follow the same trends as new case numbers, until approximately May 2021. Second, the most prevalent constraints throughout the pandemic were “Trauma” and “Health Inequity”. Third, the tension “Youth” was a consistent focus throughout the 22 months span of data. Fourth, the most widespread supports discussed were “Mental Health Supports” and “Resources”.

Wave 1 – March 2020 – June 2020

In the first wave of the pandemic, key tweet themes included tensions such as “Media” (n = 84 references) and “Politics and Government” (n = 84). The constrains with the most mentions were “Racism” (n = 60) and “Health Inequity” (n = 19). Both tensions and constrains were high throughout the first wave (n = 172, n = 229), with very minimal supports (n = 121), especially in March and April (n = 17). Supports, specifically “Mental Health Supports” and “Resources” increase during May and June (n = 39, and n = 11) surpassing the constrains.

Wave 2 – July 2020 – September 2020

At the beginning of the second wave in July 2020 “Healing” was coded more than during any other month (n = 51). Tensions were highly coded July and August, specifically “Youth” (n = 99) and “Politics and Government” (n = 56). As for constrains, “Health inequity” (n = 63), “Compounding effects and Intersectionality” (n = 40), “Racialized effects” (n = 20) and “Trauma” (n = 14) were all coded throughout the three-month wave, but “Racism” was not (n =1).

Wave 3 – October 2020 – May 2021

The third wave of the pandemic is characterized by a high level of discussions of constrains from October into April (n = 641), particularly with the "Trauma" node (n = 223). Only in May is there finally a levelling of supports (n = 20) and constrains (n = 18), where they appear to at almost the same number of references. The number of references for constrains fluctuates drastically during this wave, but consistently has a greater number of references than supports. On the contrary, the number of mentions of supports is much less variable with only a noticeable increase in May 2021. Tensions were not commonly shared, with the exception of "Politics in Government" (n = 13) and "Youth" (n = 11). However, we see "Politics and Government" decrease after the United States Federal election in November 2020.

Wave 4 – June 2021 – October 2021

In the fourth wave we see "Resources" (n = 37), "Mental Health Supports" (n = 27), and "Education" (n = 17) coded throughout, with "Healing" (n = 21) also present in October 2021. In general, the total number of references for constrains are lower than in previous waves (n = 138). We also see an emphasis on the tension "Youth" (n = 47) and "Politics and Government" (n = 33) as in previous waves. At this point, the new case numbers and number of references no longer share the same trends.

Wave 5 – November and December 2021

During the two months of data that we have for the fifth wave, we see a high ratio of tweets about supports in November (n = 50), and an evening out of the factors

(supports/tensions/constrains) in December (n = 21, n = 21, n = 25). “Youth” (n = 9) and “Politics and Government” (n = 12) are the two tensions present and the number of references has decreased from the previous wave. During wave five we also see all constrains present, except for “Racism”.

4.2 Content and Creator Details

In addition to coding tweet themes, each tweet entry was coded to content details (Tweet Type and Originality) and each user was coded to creator details (User Type and Location). This primarily deductive analysis responds to the second objective of this thesis: *To enumerate the users, location, tweet type, and originality of tweets to evaluate who is engaging, where, and how with this content.*

4.2.1 Creator Details

There were two nodes at which creator (Twitter User) data was coded to: “User Type” and “Location”. “User Type” is a parent node that identifies who the Twitter account represents. Usernames were deductively coded to four child nodes: “Individual”, “Organization”, “Media or News”, and “Other”. “Other” was used to describe government accounts and research groups. The most common user type was “Individual” at 797 users making up 70% of all users. This was followed by “Organization” at 242 users (21.25%), “Media or News” with 77 users (6.75%) and “Other” having 21 users (2%). These results are displayed in Table Six.

Table 6: Categorized User Types for 2020-2021

USER TYPE	# of mentions (%)
Individual	797 (70)[a]
Organization	242 (21.25)
Media or News	77 (6.75)
Other	21 (2)
TOTAL	**1137 (100)**

[a]Presents the number of mentions the code, and the percentage of total mentions.

The second creator detail coded was to the parent node "Location". Child nodes included "USA", "Canada", "Turtle Island", "Central America", "Guatemala", "Costa Rica", and "Other". Although users often described their location in a more specific way (i.e., city, nation, state, treaty land), the coding was done at this aggregate level. Turtle Island was the theme coded to non-colonial place names (i.e., traditional territories). As shown in Table Seven, "USA" was the most mentioned location, with 579 (51%) references, followed by "Canada" at 448 (39.5%) mentions, and "Turtle Island" with 92 (8%) references.

Table 7: Categorized Location for 2020-2021

LOCATION	# of mentions (%)
USA	579 (51)[a]
Canada	448 (39.5)
Turtle Island	92 (8)
Central America	5 (0.5)
Guatemala	2 (0)
Costa Rica	1 (0)
Other	10 (1)
TOTAL	**1137 (100)**

[a]Presents the number of mentions the code, and the percentage of total mentions.

4.2.2 Content Details

The first content detail coded was the "Tweet Type". This parent node was used to categorize the intended output of each tweet. The child nodes include "News and Media" with 510 (44.75%) mentions, followed closely by "Personal Expression" with 394 (34.75%), and less common "Resources" with 120 (10.5%), "Online event" with 63 (5.5%), and "Other" with 50 (4.5%) mentions. These findings are shown in Table Eight.

Table 8: Categorized Tweet Type for 2020-2021

TWEET TYPE	# of mentions (%)
News and Media	510 (44.75)[a]
Personal expression	394 (34.75)
Resources	120 (10.5)
Online event	63 (5.5)
Other	50 (4.5)
TOTAL	**1137 (100)**

[a]Presents the number of mentions the code, and the percentage of total mentions.

The second tweet categorization was "Originality", which describes if the tweet was written by the user who shared it. There are only three categories: "Re-tweet", "Original Tweet", and "Reply or mention". The most common way of tweeting was through a "Re-tweet" (n=769 tweets or 67.75%). "Original" tweets only made up 29.25%, with a total of 333 tweets. Finally, there were only 35 tweets that "Reply or mention" another user (3%). The findings for Tweet originality are displayed in Table Nine.

Table 9: Categorized Tweet Originality for 2020-2021

ORIGINALITY	# of mentions (%)
Re-tweet	769 (67.75)[a]
Original tweet	333 (29.25)
Reply or mention	35 (3)
TOTAL	**1137 (100)**

[a]Presents the number of mentions the code, and the percentage of total mentions.

Chapter 5

5 Discussion

This chapter discusses the theoretical, methodological, and applied contributions of this thesis. I will introduce an Indigenous Digital Health Geography (IDHG) research agenda, and dimensions from the content and creator findings. Following this description, I will discuss how IDHG may be applied across other digital platforms and Indigenous social, environmental, and health contexts. The methodological contributions will largely focus on how to practice IDHG in an ethical way; it will reflect on the methods and approaches used in this research and the importance of relationality. Key topics include the use of proxy location, and considerations of decolonizing digital data. The applied contributions of this research are complex and navigate the blurred area between digital and actual realms. This section will provide insights and suggestions on how to create knowledge translation between online users and real-life entities, through structural change, and policy recommendations. The chapter will conclude with directions for future research and reiterate the key findings and contributions of this thesis.

5.1 Theoretical Contributions

Indigenous peoples globally have been utilising new technologies for mainstream and Indigenous specific ways since their emergence. For example, the social media platform Facebook has been described as a place for Indigenous youth to express their identities through content sharing and build relationships and community through the ability to "friend" or join groups (Rice et al., 2016). As discussed in the literature review, in the Indigenous health context there has been a focus on intervention-based digital research,

primarily with Aboriginal and Torres Strait Islander people in so-called Australia. One example is the “Deadly Choice” social networking site campaign in Australia, that utilizes Twitter, Facebook, Instagram, and YouTube in its health promotion efforts to educate and connect Indigenous Australians, with the goal of reducing chronic illnesses (McPhail-Bell et al., 2018). Across these various initiatives, researchers have found that social media sites can enhance health and well-being through their abilities to support identity, belonging, encouragement, and the sharing of cultural knowledge (Rice et al., 2016; McPhail-Bell et al., 2018; Walker et al., 2019; 2020).

Although there are many examples of the positive impacts of social media on Indigenous peoples’ health, there remains a gap in the theoretical aspect of broadly what Indigenous Digital Health Geography is. Using an exploratory method that investigates the everyday conversations of Indigenous mental health content on Twitter, I hope to address this gap in knowledge by presenting an IDHG research agenda. This may be used by researchers undertaking exploratory and intervention-based research alike, as it can provide a theoretical understanding of the relationships between the digital, reality, and health.

In addition to defining an Indigenous Digital Health Geography research agenda, the following section will propose dimensions of IDHG, as informed by the thematic analysis and content and creator details. These dimensions will be related to Indigenous social relationships and health, and their implications for continued well-being when there are environmental, social, or health changes.

5.1.1 Indigenous Digital Health Geographies

From this research, I am proposing an Indigenous Digital Health Geography research agenda as:

> *"The unique ways in which digital environments, access to, and participation with, can influence Indigenous peoples' health and wellness."*

Although this definition is broad, it exemplifies the relational natures of both Indigenous health geography and critical digital geographies. It may be understood and applied in many diverse ways. This may include everyday use; as explored in this thesis; Indigenous health geography research methods such as "PhotoVoice"; intervention-based programming; building and maintaining social relationships online; and, virtual health promotion education, and activities. Although this thesis takes a strength-based approach (Brough et al., 2004; Gharabaghi & Anderson-Nathe, 2017), this definition is neutral and thereby also creates space to discuss the potential negative health implications from the digital. This may involve the digital divide, data colonialism, and negative online practices online such as bullying (Intahchomphoo, 2018; Young, 2019)

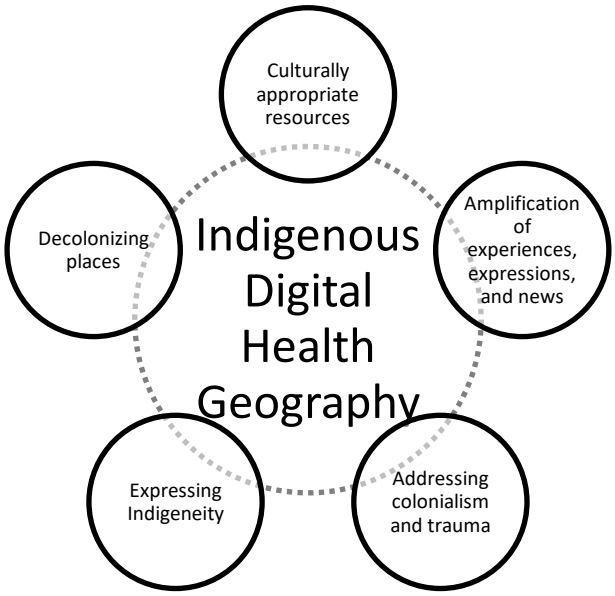


Figure 3: Emerging dimensions of Indigenous Digital Geography Research Agenda

In Chapter Four: Findings, the top themes by number of references were categorized as supports, tensions, and constrains and example Tweets were provided. The content and creator details were also enumerated to provide supplementary quantitative data. All together, these results indicate five dimensions of Indigenous Digital Health Geography:

- Culturally appropriate resources,
- Amplification of experiences, expressions, and news,
- Addressing colonialism and trauma,
- Expressing Indigeneity, and
- Decolonizing places.

This is certainly not an exhaustive list but provides an agenda for further research to consider and critique. The dimensions may operate independently, or interactively, to support Indigenous health and are displayed in Figure Three.

Culturally Appropriate Resources

Cultural care has been described in health disciplines as:

> "The theory is a holistic, culturally based care theory that incorporates broad humanistic dimensions about people in their cultural life context. It is also unique in its incorporation of social structure factors, such as religion, politics, economics, cultural history, life span, values, kinship, and philosophy of living; and geo-environmental factors, as potential influencers of culture care phenomena (Leininger, 2007, p. 9)"

In the Indigenous context, this means understanding the importance of local environments and Indigenous knowledge systems, as well as processes of environmental dispossession, structural discrimination, and colonialism. Without spaces that reflect the unique needs and experiences of Indigenous peoples, services are not accessed or underutilized, leading to poorer health outcomes (Marrone, 2017). Several thematic nodes highlighted the importance of culturally appropriate mental health resources, their focus being two-fold included discussions of both digital and in-person formats of primary care and programming, as well culturally informed media practices. These nodes included Mental health supports (n=153), Resources (n=123), Community initiatives (n=62), Trauma informed (n=32), and Traditions (n=6).

Sharing resources on Twitter widens the potential population that may engage with these supports. The use of digital platforms such as Zoom, Facebook, Twitter, Instagram, and YouTube enable individuals from vast geographies (even globally!) to participate. Advertising or sharing resources using these media, and emails, mean that lines of communication that may have ceased during lockdowns were now available. Using the digital environment for both practice and communication is essential for providing cultural care when it cannot take place in-person. This pivot that occurred online to create programming like nation-wide "Power Hour" gatherings for Indigenous people, virtual counselling, and sharing land-based activities, may directly affect health outcomes by encouraging social and environmental relationships. The resources shared online were

diverse and often locally relevant and informed. In the Canadian context for example, many tweets shared distinct resources for First Nations, Métis, or Inuit people in specific cities or provinces; one of the most compelling tweets referred to vaccine information for urban Indigenous people in Tkaronto, where there was a phone number provided to call "Auntie". In some Indigenous praxis, grandmas and aunties are respected as the being responsible for nurturing the health of the community and teaching younger generations (Anderson, 2020). This is just one example of cultural care in digital environments.

Sharing these resources online not only have an impact on Indigenous peoples' access to health, but when media and social media are culturally informed, they have the potential for discursive activism, that is "political knowledge building through critique, conscious raising, meaning making, reflection and reframing" (Barker-Plummer & Barker-Pummer, 2018). Discursive activism using Twitter has been explored by feminist social scientists and is thought to achieve similar goals of social awareness to a larger audience, with fewer financial and gate-keeping barriers (Barker-Plummer & Barker-Pummer, 2018). Raynauld et al. (2017) investigated the role of Twitter for social activism during the first summer of the #IdleNoMore (2013) and found that 85% of tweets mentioned core Indigenous culture, and that this contributed to broadcasting political and civic engagement. This is consistent with the findings of this research in which re-tweets were the most common form of tweet output (67.75%), and the sharing of culturally specific resources, and supports.

Together, this emphasizes the need for accurate, representative, and culturally appropriate information to be shared as it can be received by users accessing informed-care, and the media may provoke social consciousness of other users.

Amplification of Experiences, Expressions, and News

As previously discussed, the most common type of tweet originality was “re-tweeting”. Most often tweets were sent by individuals (70%), and shared news (44.75%) or personal expressions (34.75%). These metrics highlight the second key dimension if Indigenous digital health geographies; *Amplification of Experiences, Expressions, and New.*

Storytelling and sharing are inherent parts of Indigenous cultures, although expressed in different ways across nations. The practices share local histories and teachings, which help connect individuals together but also with ancestors, future generations, and the land (Corntassel, 2009). Although this praxis on Twitter does not equate to storytelling, Twitter does provide a platform for Indigenous people to voice their unique experiences of COVID-19 with one another; this creates a way to build or maintain connections through one’s expression. The amplification aspect supports a further reach of spatial and social networks.

Addressing Colonialism and Trauma

Many tweets discussed content related to trauma (n=324) and historical/ongoing colonialism (n=18), and its presence through racism (n=78) and racialized experiences (n=209) of COVID-19 and the ongoing individual and collective healing (n=100).

Indigenous peoples globally face poorer health outcomes and colonialism is a key underlying factor. It has been introduced as a “cause of the causes”, termed a *distal* determinant of Indigenous peoples’ health (Czyzewski, 2011; Greenwood et al., 2018). Colonialism’s effects are both direct and indirect, including political and legal structures

that have oppressed traditional governance, ways of knowing and being, access to traditional territories, forced assimilation, and the introduction of infectious diseases. These processes not only impact directly affected individuals and communities, but they also stem intergenerationally.

Users are addressing colonialism as a determinant of health on Twitter by sharing their truths using the platform:

> "The trauma experienced by #IndigenousPeoples frm #colonization colonization, the #residentialschools and the '60s Scoop was passed down to younger generations, and it contributes to the poor mental and physical health of people today. https://t.co/pxWCFa4liW" (*Individual*, July 2020)

> "In the age of Covid-19, Native Americans whose ancestors survived earlier pandemics brought by European settlers and who continue to live under colonial rule in cities and on reservations, are fighting for the wellbeing of their communities and families. https://t.co/7cKzUqtJ7M" (*Other*, August 2020)

> "@[username] Worst part is that obesity in native populations is a result of colonization. Food deserts, generational trauma/epigenetics, exposure to obesogenic pollutants etc. these guys ancestors caused a risk factor for the current pandemic which was partially caused by current white ppl" (*Individual*, October 2020)

> "There's a lot of things that are a result of residential school trauma and things of our history, along with colonialism, that really put a skeptical notion on our people to take that vaccination. https://t.co/NOAWjFe7Ad" (*Organization*, March 2021)

These tweets share the contemporary realities of colonialism, while situating them in the context of health. Sharing these experiences may address the inattention and ignorance that many political and health figures have.

Expressing Indigeneity

One emerging theme was the self-expression of Indigeneity on Twitter. As I was gathering the location by proxy data, I noticed many Twitter users sharing their

Indigeneity, through membership of a language group, nation, or community, in their Twitter biography. Due to the large dataset and the inability of the Postman software to retrieve biography information, data for Indigeneity was not an expected data component. Self-identification is just one example of how Indigeneity is expressed on Twitter.

Other literature has examined the use of traditional languages on Twitter. Keegan et al. (2015) share how Basque, Haitian Creole, Welsh, Irish Gaelic, Frisian, Kapampangan and te reo Māori are present on Twitter. They specifically looked at te reo Māori tweets and users and found that tweets in the language were mostly had a spiritual or commercial purpose, rather than for conversation (Keegan et al., 2015). Language revitalization through Twitter may be one way to strengthen the connection between digital and actual spaces.

Indigeneity was also expressed within many tweets, where cultural practices and traditions were shared:

> ""We dance for the ones who can't dance–we dance for the sick, we dance for the elderly, we dance for our ancestors. It really helps us with our mental health, our physical health. And … other people get joy off of our dancing."—Tiny Rosales, Ojibwe tribe https://t.co/Jd56xNg1cM" (*Organization*, August 2020)

This was not exclusive to Twitter. TikTok and Facebook were both used to increase access to Indigenous sport during COVID-19; examples include viral "Social Distance Powwow" and "Pass the Rezball" challenges (Leonard et al., 2020). These are examples of how sharing cultural practices online can also be health-promoting, as they relate to social, cultural, spiritual, and physical health.

Decolonizing Places

Settler-colonists came to Turtle Island and re-named places, often by surveyors, cartographers, and politicians in the name of colonial powers (Gray & Rück, 2019). The naming process erased and Indigenous place names and in turn the deep personal and spiritual meanings and naming practices associated with place (Gray & Rück, 2019). Currently, some communities are asserting their self-determination by re-asserting traditional place names.

While collecting the location by proxy data, it became evident that Twitter users are utilizing their location tag and biographies to also share Indigenous place names to locate themselves. Each user has 30 characters to geo-locate themselves, or they can use up to 160 characters in their biography. For example, I have tagged my location as “Turtle Island” but have also shared in my biography that I am on the traditional territories of the Attawandaran, Anishinaabe & Haudenosaunee peoples. In our tweet sample, there were at least 92 users who self-located themselves using a decolonial place name. This includes using traditional languages, nations, and treaties. As the location by proxy was first assigned from tweet content, and then from user profile, there may be more users in the sample who have also done this. A word cloud of the place names is displayed in Figure Four.

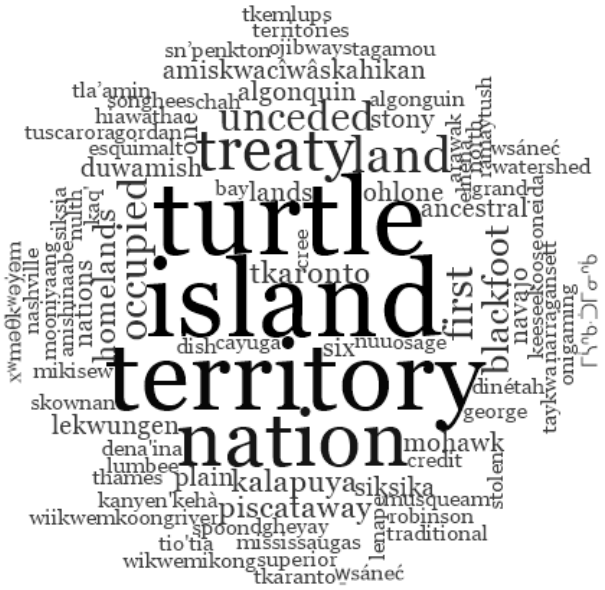


Figure 4: Indigenous place names coded to the location node "Turtle Island" (n=92), displayed as a word cloud with text size proportional to the number of references.

Revisiting the Indigenous Digital Health Geography Research Agenda

The five dimensions of Indigenous Digital Health Geography have been informed by the findings of this research, and situated amongst additional literature from Indigenous health, Indigenous health geographies, and digital geographies. Although derived from tweets in the COVID-19 context, the IDHG agenda may be useful in other social, environmental, and health contexts.

For example, Indigenous people globally are more vulnerable to the physical and mental health impacts of climate change, due to their distinct relationships with the land (King et al., 2009; Vecchio, 2022). Social media may be leveraged to share information about environmental change, as it is happening, and amplify it to the global community. Similarly, users may communicate with one another about rapid changes, and emergency responses.

As previously mentioned, Twitter is not the only social media site which IDHG can be applied. Twitter's mottos and values are about creating public conversations for change, that it is a free and safe space to have a voice (Twitter, 2022a). Instagram, TikTok, YouTube, and Facebook all have different values and modes of engagement. For example, Facebook enables users to create public or private groups, host events, create a detailed profile, share photos and videos, facilitate live videos, instantaneously message individuals or groups, and more. In addition, there aren't the same character limits as Twitter has. All of these factors make Facebook better suited to connect with individuals that are in one's existing social circles and geographic areas, whereas Twitter may be more opportune for connecting and meeting individuals with a greater degree of separation. Each social media has its own strengths and limitations but may be used to advance Indigenous peoples' health through our proposed dimensions.

5.2 Methodological Contributions

One of the key considerations of this project, and of future studies in Indigenous Digital Health Geographies, should be about *doing* this research in an ethical and relational way. Although this research did not fit the criteria for a formal ethics review from the non-Medical Research Ethics Board at Western University, it does have its own unique relational ethics and Twitter Terms of Use to abide by.

Indigenous scholars such as Wilson and Wilson (1998), Smith (1999), Louis (2007) and Wilson (2008) have described that Indigenous ways of knowing, and therefore Indigenous research, centre relational accountability. Relational accountability is contextual; following cultural protocols to create and maintain ethical research spaces and process

(Ermine, 2005; 2007; Kovach, 2009). There is no specific method to relational accountability, rather it is the "the commitment to doing things in a good way, while considering both the specific and multitude of relationships that exist through space and time" (Reitmeier, 2020).

In this research, the primary relationship that I am accountable to is that of the Indigenous users who have been engaging with Twitter during the pandemic to express themselves, share and gather news/resources, and connect with other users. I am accountable to them, and to the content they have shared, to make sure that the research that engages with it is meaningful and reciprocal. This is a difficult task, when you are positioned as a non-Indigenous user, who does not have physical relationships with the users themselves. However, this research has also been motivated by the interviews I helped facilitate in 2020, where Indigenous physicians and social care providers emphasized the uptake of social media by themselves, and the communities they care for, in order to stay connected and share cultural and health knowledge in times of physical distancing (Richmond, 2020). In turn, I am accountable to the participants of that research as well, and to the strength of the individuals and communities who began leveraging social media while the pandemic was first beginning. I have also held awareness that not all individuals have access to the digital, for various (and often compounding) socio, economic, and geographic reasons. Additionally, there is the paramount consideration of this data being used not only in a relevant way, but also in a way that directly opposes the ongoing data colonialism that occurs in digital geography. Lastly, I need to be accountable to the ontological position that experiences of the digital can translate to peoples' lives in

reality. Together, these are relational ethical considerations when undertaking Indigenous digital geographies.

In practice, upholding this relational accountability means using analysis approaches that maintain the truths and integrity of the data. Determining these methods would not have been possible without meeting with my supervisor and advisory committee. They were able to provide feedback and suggestions based on their academic expertise, as well as their life experiences (as Indigenous scholars on Twitter).

5.2.1 Strengths and Limitations of Methods Used

The key method of this research was thematic analysis, manually coded on the NVivo software. Thematic analysis is often praised for its accessibility and versatility; that it is not tied to a singular theoretical approach, and it can be utilized for many different data types and sizes (Clarke & Braun, 2017). Thematic analysis has been often used in Indigenous research, although it is not considered an Indigenous method – as Kovach (2010) puts forth that Indigenous research methods should extend from Indigenous paradigms. However, non-Indigenous methods can still provide valuable insights when analyzed through a decolonized lens and are contextualized appropriately. The goal of this thematic analysis then, was to:

1. Describe key themes of indigenous mental health content on twitter throughout the different waves of the covid-19 pandemic, and
2. Enumerate the users, location, tweet type, and originality of tweets to evaluate who is engaging, where, and how with this content.

And their corresponding results have been contextualized within the greater literature of Indigenous health geography, Indigenous health, and Digital Geographies.

Although thematic analysis can be computerized, and that practice may be favoured for large data sets, my research data was manually coded using NVivo software. This was a deliberate (although time consuming!) approach, so that the tweets could be coded inductively with Indigenous specific context, and so that any nuances were not overlooked or missed. I perceive that manual thematic analysis builds a relationship between the researcher and the data; especially after manually searching up users' locations and seeing their profiles.

The output of a basic thematic analysis is a list of codes that can be further interpreted into themes or categories – in this case, as supports, tensions, and constrains of Indigenous mental health, and then into further overarching themes, such as the five dimensions of IDHG described in the previous section. In addition, using a software such as NVivo means there is numeric evidence to support these findings.

Tweets have a character limit of 280, but the Twitter data collected and analyzed in this research provides rich insights on the Mental health experiences and needs of Indigenous peoples across Turtle Island. This is especially important to consider as there is little data in the Canadian context on Indigenous peoples' mental health. Social media may be an alternative data source to traditional national, provincial, or regional surveys, to better understand contextualized, and geographically specific Indigenous mental health needs. This being said, there is one major limitation of using social media data, and that is the formal Terms of Use that a platform has. In the Twitter API V2 Terms of Service, developers must agree that they will not redistribute corpora (a collection) of Tweets, even for research purposes, and if they are to be shared with the government that must be identified when applying for a developer license (Scannell, 2022; Twitter, 2022b). This

may provide replicability issues from a research perspective, but also prevents the distribution of personal information.

5.2.2 Location by Proxy

One of the limitations of Twitter data in geographic research is that roughly only 3% of tweets are geo-referenced (Leetaru et al., 2013), meaning a user has shared the location from which they are tweeting. When looking at self-identified location and a user biography, approximately a third of tweets provide geographic information. As discussed in Chapter Two, tweets were excluded if their geographic location could not be identified – thus reducing the amount of content greatly.

For this reason, a very broad inclusion criteria for location by proxy was used. This included location described in tweet, self-identified location, biography information, links to additional sites, or tweet content. Although this proved to be useful, with approximately two thirds of the tweets remaining, it means a lower validity and reliability of the location data. This is one of the main critiques from Graham et al. (2014), that the location people identify on their profile is not always where they are tweeting from, and therefore proxy is not a valid measurement of location. This, alongside the time consumption of looking up many of the users manually, are two limitations of my approach. An additional limitation is that for coding purposes, each location was coded to a national level (or Turtle Island) and thereby is of large grain, however, for a big dataset over a vast study area, such as this, it may still be deemed appropriate. Had I been focusing on one nation or region in particular, the data would have been coded accordingly to a smaller grain.

Overall, having location data is important, even in aggregate. When using qualitative analysis software such as NVivo, researchers are able to perform coding queries that look for intersections between codes. If you were to code the tweet to the location of the user, then you can then explore spatial thematic patterns of tweets. For organizations that are sharing online events, resources, or programming, it may be useful to know the geographic extent of participants. Similarly, if may be informative of where specific types of physical resources (i.e., land-based programming) should be located. Most importantly, Indigenous cultures and understandings of health are land-based and localized, and therefore location data is essential for informing relevant policy and initiatives.

5.3 Applied Contributions

It is clear from this research that Twitter (and social media data in general) may provide rich localized information about experiences, expressions, news/media, and resources related to Indigenous peoples' mental health, but there are limitations in access and control of said data. Twitter data may support the existing Indigenous health surveys in Canada - the Regional Health Survey and Aboriginal Peoples' Survey.

This section of the discussion will explore recommendations on how to better facilitate synergistic knowledge and data sharing between Twitter Users, researchers, and government, health organizations, and funding agencies. Focusing on this structure may augment the ability to reciprocate and invest back into community initiatives and concerns that are indicated by Twitter Users.

5.3.1 Synergistic Knowledge Sharing for Self-Determination of Health

The “conflicts” amidst the Twitter ecosystem of users, researchers, businesses, and Twitter itself have been long acknowledged (Puschmann & Burgess, 2013). Twitter has attempted to manage the use by third parties by using the API and application licensing protocol. An API is needed by any user planning on reproduce, modify, create derivative works, distribute, sell, transfer, publicly display/perform, transmit or otherwise use the Content or Services (Twitter, 2022c). Effectively, this is an additional barrier to doing social media research as one needs to be proficient in using the API and any associated interfaces (such as Postman). In addition, much of the language used in Twitter’s terms of Service and Use are ambiguous, and it is up the discretion of the researcher if their use is “ethical” (Puschmann & Burgess, 2013). Another distinction is that what is “ethical” may or may not be “legal” (Beurskens, 2013), and the legality is difficult because of the globalized nature of Twitter.

For users, Twitter has stated: “You retain your rights to any Content you submit, post, or display on or through the Services. What’s yours is yours — you own your Content (and your incorporated audio, photos and videos are considered part of the Content)” (Twitter, 2022c, Section 3). However, this data can be accessed and used by anyone with an API. Even though you “own” your Twitter data, you clearly do not have complete control or possession of it.

My first recommendation is that there needs to be improved social media literacy as it pertains to the rights and of users (and their content) and researchers. This awareness can

help ensure that users are aware of any potential uses of their tweets and information. Researchers should also be aware of the unique limitations to their own research; for example, when applying for an API, a reviewer should distinguish any ethical or legal parameters the researcher needs to follow as they relate to the specific research protocol. This is one way the API use can be better distinguished between researchers (of different methods and disciplines), businesses, and users using the API. Improving the literacy and awareness of rights and responsibilities of both parties can help promote a more even engagement, with diminishing power hierarchies between data contributors and researchers.

Researchers who are undertaking Indigenous digital geography research must also understand the protocols about sharing Indigenous knowledges. As described in section 2.1.1. Indigenous knowledges are rooted in local realities and relationships with land, community, and spirit. Indigenous knowledge is learned through time on the land, passed through generations such as through oral traditions, and through revealed or spiritual experiences (Indigenous Innovation Initiative, 2021) – making it inappropriate to be share or re-shared in social media. Beyond this, researchers must also be critical of the uses and interactions with Indigenous social media data.

All data involving Indigenous peoples is Indigenous data, and there must be accountability and responsibility to the data. There has been an active movement towards Indigenous data sovereignty in the past two decades, with the global ‘data revolution’ – the unprecedented increase in data production and demand – and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) at play (Kukutai & Taylor,

2016). To date, there is no established protocol or best practices for Indigenous social media data.

In other contexts, such as research involving First Nations people of so-called Canada, a set of principles called OCAP® have been enacted. OCAP stands for ownership, control, access, and possession. This looks like "the collective ownership of group information; First Nations control over research and information; First Nations' management of access to their data and physical possession of the data" (Schnarch, 2004). The goal is for researchers and communities to engage with OCAP principles together, to ensure First Nations sovereignty over their data, and respectful, reciprocal, relevant research (Mecredy et al., 2018). OCAP has been created in direct response to First Nations' advocacy and desire combat the colonial underpinnings of research. Data colonialism has already been identified by critical digital geographers as an ongoing issue in the digital realm and era of "Big Data" (Thatcher et al., 2016). Perhaps by integrating principles such as OCAP into the Twitter API Terms of Use, or OCAP training for researchers undertaking Indigenous research, we can begin tackling this issue. One way in which this is already mobilizing in digital environments is through the use of Traditional Knowledge (TK) Licenses and Labels. TK labels were created in response to UNDRIP and address the gaps that creative commons licenses have as it pertains to the unique needs of Indigenous knowledge systems (Anderson & Christen, 2013). Local Contexts, the website which delivers TK labels, describes them as:

> "Digital markers that define attribution, access, and use rights for Indigenous cultural heritage. Twenty TK Labels have been developed through direct community partnership and collaboration. Each TK Label can be adapted and customized to reflect ongoing relationships and authority including proper use, guidelines for action, or responsible stewardship and re-use." (Local Contexts, 2022)

TK labels are currently being used in a variety of applications, such as Ravenspace Publishing and the Sq'éwlets Virtual Museum (Local Contexts, 2022). If a relationship were to be made between Twitter Inc. and Local Contexts, perhaps TK labels could be integrated into Tweets in a similar sense as hashtags. In addition, researchers using Twitter data could also utilize them in any digital research outlets (i.e., websites).

5.3.2 Policy Recommendations

There is a clear disconnect and ambiguity between the different stakeholders of Indigenous Twitter research (users, researchers, and Twitter) and their respective rights. This being said, it is an important area to focus on in order to build more ethical social media research environments. This research has highlighted that Twitter can be a valuable source of information on the localized, real-time, or longitudinal, experiences and media content of Indigenous peoples' health. These considerations bring me to two specific policy recommendations:

1. Improved literacy of the Twitter Terms of Use and Terms of Service for both users and researchers, and improve their API application process to give specific feedback and research protocols, and
2. Government investment in funding and training for community [health] organizations to have dedicated social media roles and researchers to improve engagement, resource sharing, and collect data relevant to self-determined health needs.

My first recommendation addresses the need for defined protocols for Indigenous social media data. It is also in direct conjunctions with the ethical paradigm of relational accountability: How are we, as twitter users and researchers, able to conduct ethical research if we are not clear on our roles and responsibilities? We cannot enter into meaningful research if we are unaware of our position in it. This also reinforces the rights

of Twitter users, who may unknowingly and unwillingly be sharing their data with researchers such as myself – this perpetuates data colonialism, if there are no meaningful contributions back from this data. We need to be better.

Improving the literacy through clearer terms (and regular reminders, not just pop ups notifying users that terms are changing as they are happening) is step one. Twitter could also create a system where if researchers use their API keys to collect user information, that the researcher must then identify these User IDs back to Twitter to notify them their content is being used in research, and for what purpose. Building this awareness also creates accountability for the researcher to do what they proposed. As previously mentioned, reinforcing OCAP® or similar principles and training in the API application process may be another way to ensure that Indigenous digital health geography research is being done in a good way.

The second recommendation comes from the need to support locally relevant, self-determined health goals amidst the current lack of Indigenous mental health data. Although I have outlined many tensions of social media data and research, there is still a great potential for its use. Twitter is a nexus of users sharing their everyday experiences, while also amplifying news from mainstream and localized systems. This dual discourse can help organizations identify needs, but also dominant social narratives that may be underlying current health policy and programming. There is a current gap in the ability to create a synergy between Twitter data, and policy/funding/programming, and reciprocity back into community identified strengths and goals.

I propose that if organizations see potential in social media data for informing their community's health needs, that there needs to be dedicated financial and educational resources for it. This may include financial support for a specific social media role within their organization, who would be responsible for operating the social media accounts, and social media research. One requirement of obtaining this funding could be follow up reports and sharing of research findings in order to maintain funding. The research could also be used to provide "evidence" for health initiative funding. This is one way that Indigenous Digital Health Geography knowledge can be translated into actualized health outcomes and address the persistent inequities in mental health outcomes that result from the lack of appropriate data.

5.4 Conclusion

This thesis addressed the research question: *How are Twitter users across Turtle Island engaging with Indigenous mental health content on Twitter during the COVID-19 pandemic?* by responding to two objectives:

1. Describe key themes of Indigenous mental health content on twitter throughout the different waves of the COVID-19 pandemic, and
2. Enumerate the users, location, tweet type, and originality of tweets to evaluate who is engaging, where, and how with this content.

I employed a mixed-methods thematic analysis to determine 65 themes in tweets across 22 months of the pandemic. The number of references for each theme during each month were enumerated using NVivo in order to determine the top themes, which were then categorized as supports, tensions, and constrains of Indigenous peoples' mental health. In

addition to coding tweet text for themes, the content (Tweet Type, Originality) and creator (Location, User Type) details for each tweet entry were also coded.

There were 12 top themes, four supports (Mental Health Supports, Resources, Healing, Education), three tensions (Youth, Politics and Governments, Media), and five constrains (Trauma, Racialized effects, Racism, Health Inequity, Compounding Effects and Intersectionality). Most often, tweets came from the accounts of Individuals, were located in the USA, shared news or media, and were in the form of a retweet.

These results have informed an Indigenous Digital Health Geography agenda, which understands the unique ways in which digital environments, access to, and participation with, can influence Indigenous peoples' health. This research agenda has been informed by concepts of Indigenous health, Indigenous health geography, and digital geographies, which form a nexus around relational epistemologies, diverse methodologies, and decolonizing potential. The research findings lead to five general proposed dimensions of IDHG: culturally appropriate resources, amplification of experiences, expressions, and news, addressing colonialism and trauma, expressing Indigeneity, and decolonizing places.

In future research, I recommend utilising digital geography methods such as social and spatial network analysis to gather and analyze quantitative data on the interactions between users, and their physical geographic locations. Drawing from qualitative methods, interviews could be conducted with the operators of community health organizations' Twitter accounts on their experiences on with health promotion and

engagement, and their perceptions on how it may impact the wellness of the users who engage with their accounts.

Beyond these findings, this research also contributes to the praxis and ethics of doing Indigenous digital health geography research and makes recommendations on how to better support relational accountability and reciprocity in this research.

This research highlights many areas for improvement in Indigenous digital geography research, especially as it pertains to upholding Indigenous research ethics such as relational accountability, combatting the complicated digital realm which tends to favour paternalistic and capitalist norms. I the discussion I have proposed several policy recommendations that may help initiate and mobilize synergistic knowledge sharing that will support the self-determined goals/initiatives of Indigenous peoples' mental health and well-being. We need to invest in community organizations' knowledge and capacity to do Indigenous Digital Health Geography research in order to support health equity.

In conclusion, Indigenous Digital Health Geography may be a useful discipline to help support Indigenous peoples' mental health, through its ability to share resources, news, expressions, and as a research practice. In an increasingly digital world, it is important to further understand the ways in which we interact with and on the digital and the subsequent impacts on our health. It is my hope that this research will start, or support, conversations about Indigenous data sovereignty, health equity, and self-determination of health.

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Appendices

Appendix A: List of Tweet Nodes and # of mentions in 2020

Name	Files (months)	References
Location	10	612
Canada	10	288
Central America	1	5
Guatemala	1	2
Other	3	5
Turtle Island	9	52
USA	9	260
Originality	10	612
Original tweet	10	181
Reply or mention	6	13
Re-tweet	10	418
Text	10	612
Ancestors	3	15
Art	4	13
Barriers to care	3	15
Colonialism	3	12
Community initiatives	7	51
Compounding effects and Intersectionality	8	62
COVID relief and responses	3	12
Death	1	2
Depression	2	11
Distancing	1	1
Education	6	17
Elders	5	22
Environments	5	42
Fear	1	56
Financial stress	3	9
Food security	2	19
Grief	1	4
Healing	3	56
Health and social care worker	3	12
Health communication	2	7
Health equity	1	2
Health funding	8	37
Health inequity	10	110
Health promotion	2	3
Holistic	4	15
Housing	4	12
Incarceration	1	57
Isolation	5	7
Knowledge	2	2
Lockdown	2	9
Marginalization	1	1
Media	5	91
Mental health supports	9	78
Off reserve	3	16
On reserve	3	5

Physical wellness	3	23
Podcast	1	2
Politics and Government	9	157
Racialized effects	8	56
Racism	5	69
Reading	1	1
Relationships	3	45
Remote	1	9
Research	9	24
Residential Schools	1	1
Resources	9	48
Responsibilities	1	40
Spirituality	1	1
Storytelling	1	4
Stress	2	13
Students	2	11
Substance Use	6	14
Suicide	5	13
Traditions and Culture	6	12
Trauma	10	169
Trauma informed	1	25
Vaccine	1	1
Violence and abuse	6	54
Youth	6	116
Tweet Type	10	612
News and Media	10	263
Online event	5	23
Other	8	23
Personal expression	10	233
Resources	9	70
User	10	612
Indigeneity	7	43
Indigenous	10	524
User type	10	612
Individual	10	432
Media or News	8	39
Organization	10	133
Other	5	8

Appendix B: List of Tweet Nodes and # of mentions in 2021

Name	Files (months)	References
Location	12	525
Canada	12	160
Costa Rica	1	1
Other	4	5
Turtle Island	10	40
USA	12	319
Originality	12	525
Original tweet	12	152
Reply or Mention	9	22
Re-tweet	12	351
Text	12	525
Ancestors	1	2
Art	4	16
Barriers to care	2	2
Colonialism	2	6
Comedy	1	1
Community initiatives	3	11
Compounding effects and Intersectionality	10	41
COVID relief and responses	4	19
Death	2	28
Depression	1	5
Education	9	42
Elders	2	2
Employment	3	4
Environments	3	6
Financial stress	5	37
Genocide	2	2
Grief	2	4
Healing	5	44
Health and social care worker	9	19
Health communication	3	12
Health equity	4	12
Health funding	6	20
Health inequity	11	64
Health promotion	2	5
Holistic	2	6
Ignorance	1	1
Incarceration	1	1
Isolation	3	10
Knowledge	2	16
Lockdown	3	4
Mental health supports	11	75
Physical wellness	1	10
Podcast	4	20
Politics and Government	9	48
Racialized effects	12	153
Racism	3	9
Reading	4	7
Relationships	4	6

Research	7	21
Residential Schools	4	5
Resources	11	75
Responsibilities	2	2
Self-determination	1	1
Spirituality	1	1
Students	6	27
Substance Use	6	25
Suicide	5	12
Traditions	5	6
Trauma	10	155
Trauma informed	3	7
Vaccine	6	34
Violence and abuse	2	23
Youth	8	63
Tweet Type	12	525
News	11	247
Online event	8	40
Other	4	27
Personal expression	12	162
Resources	9	50
User	12	525
Indigeneity	4	13
Indigenous	10	232
User type	12	525
Individual	12	365
Media or News	10	38
Organization	12	109
Other	7	13

Appendix C: List of Tweet Nodes and # of mentions in 2020 and 2021 (combined)

Name	Files (Months)	References
User	22	1137
User type	22	1137
Other	12	21
Organization	22	242
Media or News	18	77
Individual	22	797
Indigenous	20	756
Indigeneity	11	56
Tweet Type	22	1137
Resources	18	120
Personal expression	22	395
Other	12	50
Online event	13	63
News	21	510
Text	22	1137
Youth	14	179
Violence and abuse	8	77
Vaccine	7	35
Trauma informed	4	32
Trauma	20	324
Traditions and Culture	6	12
Traditions	5	6
Suicide	10	25
Substance Use	12	39
Students	8	38
Stress	2	13
Storytelling	1	4
Spirituality	2	2
Self-determination	1	1
Responsibilities	3	42
Resources	20	123
Residential Schools	5	6
Research	16	45
Remote	1	9
Relationships	7	51
Reading	5	8
Racism	8	78
Racialized effects	20	209
Politics and Government	18	205
Podcast	5	22
Physical wellness	4	33
On reserve	3	5
Off reserve	3	16
Mental health supports	20	153
Media	5	91
Marginalization	1	1
Lockdown	5	13
Knowledge	4	18
Isolation	8	17
Incarceration	2	58

Ignorance	1	1
Housing	4	12
Holistic	6	21
Health promotion	4	8
Health inequity	21	174
Health funding	14	57
Health equity	5	14
Health communication	5	19
Health and social care worker	12	31
Healing	8	100
Grief	3	8
Genocide	2	2
Food security	2	19
Financial stress	8	46
Fear	1	56
Environments	8	48
Employment	3	4
Elders	7	24
Education	15	59
Distancing	1	1
Depression	3	16
Death	3	30
COVID relief and responses	7	31
Compounding effects and Intersectionality	18	103
Community initiatives	10	62
Comedy	1	1
Colonialism	5	18
Barriers to care	5	17
Art	8	29
Ancestors	4	17
Originality	22	1137
Re-tweet	22	769
Reply or Mention	15	35
Original tweet	22	333
Location	22	1137
USA	21	579
Turtle Island	19	92
Other	7	10
Guatemala	1	2
Costa Rica	1	1
Central America	1	5
Canada	22	448

Appendix D: Distribution of top themes across each wave of the pandemic

Wave 1	Mar2020	April2020	May2020	June2020
Compounding effects and Intersectionality	0	0	2	9
Education	0	0	0	1
Healing	0	0	0	4
Health inequity	8	4	4	3
Mental health supports	1	0	10	29
Politics and Government	9	58	13	2
Racialized effects	0	0	7	3
Racism	1	58	0	1
Trauma	7	58	3	1
Youth	0	1	5	0
Resources	5	2	5	6
Media	56	0	1	27

Wave 2	July2020	August2020	September2020
Compounding effects and Intersectionality	2	31	7
Education	0	0	0
Healing	51	0	0
Health inequity	8	41	14
Mental health supports	1	4	8
Politics and Government	52	4	9
Racialized effects	5	4	11
Racism	1	0	0
Trauma	3	3	8
Youth	53	46	7
Resources	3	0	9
Media	1	6	0

Wave 3	Oct20	Nov20	Dec20	Jan21	Feb21	March21	April21	May2021
Compounding effects and Intersectionality	8	1	2	1	4	15	2	1
Education	0	0	1	0	3	0	0	0
Healing	0	0	1	1	0	13	0	0
Health inequity	17	7	4	3	8	19	2	5
Mental health supports	2	5	6	6	3	6	0	11
Politics and Government	0	7	3	2	0	0	0	1
Racialized effects	12	9	5	9	79	9	2	10
Racism	8	0	0	0	0	6	0	2
Trauma	61	2	23	12	80	38	7	0
Youth	0	4	0	0	0	2	0	5
Resources	2	7	9	8	1	0	5	9
Media	0	0	0	0	0	0	0	0

Wave 4	June2021	July2021	August2021	September2021	October2021
Compounding effects and Intersectionality	0	3	2	3	3
Education	5	4	3	0	5
Healing	0	0	0	1	20
Health inequity	2	8	0	1	9
Mental health supports	9	9	0	3	6
Politics and Government	16	3	3	5	6
Racialized effects	2	8	3	2	15
Racism	0	0	0	0	1
Trauma	4	1	2	6	1
Youth	9	1	0	9	28
Resources	7	5	2	1	22
Media	0	0	0	0	0

Wave 5	November 2021	December 2021
Compounding effects and Intersectionality	0	7
Education	8	2
Healing	0	9
Health inequity	1	6
Mental health supports	11	0
Politics and Government	2	10
Racialized effects	6	8
Racism	0	0
Trauma	0	4
Youth	5	4
Resources	10	5
Media	0	0

Curriculum Vitae

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