



## Original article

## Impacts of mining on the mental health of individuals in Interior Alaska

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## ABSTRACT

Large-scale mining is expanding across Alaska, particularly in regions where nearby communities maintain deep relationships with the land. While existing research emphasizes physical health risks—such as exposure to mine dust and contamination of air and water—far less is known about the mental health consequences for individuals residing in surrounding communities. This study employed a qualitative thematic analysis to examine the lived experiences of 19 individuals residing near operating large-scale mines in Alaska's Interior region. Semi-structured qualitative interviews reflected four themes that provided valuable insight on the relationship between large-scale mining and the mental health of individuals residing in nearby communities: changes to the environment, distrust in mining industries and political systems, economic and infrastructure tradeoffs, and identified mental health impacts. These results highlight the need for mental health considerations in the permitting of mining projects and in land management policies in Alaska and in future research.

## 1. Introduction

Mineral extraction is the process of retrieving minerals from the earth through methods like open-pit mining, placer mining, solution mining, underground mining, and strip mining (Blowes et al., 2014). It is becoming increasingly more common in remote areas where Indigenous or other marginalized communities reside (Brisbois et al., 2019). In fact, most undeveloped mineral resources in the United States are within 35 miles of Indigenous lands (Earthworks, n.d.).

In Alaska, there are currently six operating large-scale hardrock mines: The Red Dog Mine in the Northwest Arctic region; the Fort Knox Mine, Pogo Mine, and Manh Choh mine in the Interior region, and the Greens Creek and Kensington Mines in the Southeast region (Alaska Minerals Commission, 2024; Manh Choh Kinross, n.d.). While there is no agreed definition of large-scale mining, it is generally associated with companies that are multi-national or have multiple sites, are engrained in global finance markets, and participate in the international supply of mineral and metal commodities (Kemp and Owen, 2019).

Research on the health impacts of large-scale mining often focuses on risks to the physical health of mine workers, leaving a gap in research that addresses impacts to health outcomes outside of direct toxic exposures, such as risks to the mental health and well-being of individuals in surrounding communities (Brisbois et al., 2019). This study aims to answer the question: Does large-scale mining impact the mental health and well-being of surrounding residents?

While environmental impacts from mining are more localized than those related to climate change, the degradation to the environment that results from large-scale mining operations may cause similar impacts to that of climate change, as physical changes to the land can alter access to land-based activities, lead to community displacement, or result in psychological trauma associated with environmental-related disasters (Berry et al., 2010). The destruction of landscapes can diminish people's connection to the land and their sense of belonging, in addition to risking their health by limiting recreational areas and threatening the local food supply. Furthermore, the disruption of landscapes can impact community wellbeing through damage to economic and social structures (Berry et al., 2010).

## 2. Literature review

Mental health is defined by the World Health Organization as a state of mental wellness that allows individuals to adapt and cope, as well as to learn and contribute within their communities (World Health Organization, 2025). Literature on the mental health impacts of mine workers has indicated that a high work load, risky conditions, and job strain related to compliance may put mine workers at an increased risk of developing depressive disorders, job stress, anxiety, and sleep disorders (Pizarro et al., 2021). Additionally, research has identified public health risks of mining, such as risks of respiratory disease from exposure to mine dust (Yu and Zahidi, 2023). However, existing literature

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examining how large-scale mining impacts the mental health of surrounding communities is limited. This study seeks to help fill that gap by establishing a foundation for future research that centers community experiences and explores the mental health challenges of individuals living near large-scale mining operations in Alaska.

The following sections examine existing literature related to mining and mental health, as well as examine the relationship between large-scale mining and mental health through the following pathways: (1) environmental impacts, (2) cultural and Indigenous impacts, and (3) socio-economic impacts.

### 2.1. Environmental impacts

Research shows that long-term impacts of climate change on the environment and extreme climate change related weather events have an impact on mental health (Comtesse et al., 2021). This research is important in the context of helping us understand how both long-term and immediate impacts to the environment relate to the mental health of those residing nearby large-scale mining projects in Alaska. Researchers have noted that extreme precipitation events caused by climate change heighten the risks of mining, as mining infrastructure is generally designed under the assumption that current variables regarding the physical environment will remain consistent (Sergeant et al., 2022).

Large-scale mining operations are being operated and explored in ecologically sensitive areas throughout Alaska, which could result in the contamination of fish and wildlife, waterways, a reduction in air and water quality, and the degradation of landscapes (Adams et al., 2025). Tapering biodiversity can lead to experiences with ecological grief, which is used to express the emotional response to non-economic losses such as the loss of areas of ecological importance, loss of ways of life, and loss of personal identity in relation to the landscape or environment (Comtesse et al., 2021). Ecological grief is most likely to be developed by people who have a close relationship with their natural environment through living, working, or cultural practices. Experiences with ecological grief are likely to be more pronounced for those in rural communities (Berry et al., 2010). Results of ecological grief could include risk factors for mental disorders such as post-traumatic stress disorder (PTSD) or depression (Comtesse et al., 2021).

The concept of solastalgia is also relevant within the discussion of mental health and mining. Solastalgia is described as the pain and distress that impacts individuals as a result of changes directly related to their home environment (Albrecht et al., 2007). Research has shown that environmental changes from mining have resulted in chronic stressors that have led to solastalgia, which draws attention to the intersectionality of environmental stressors and human distress (Albrecht et al., 2007). A case study that examined experiences of solastalgia amongst community members in Zimbabwe that are impacted by gold mining found that extensive environmental degradation led to altered ecosystems, resulting in negative impacts for both the health and livelihood of participants (Nyakuwanika, 2025). Participants reported experiencing nostalgia for the pre-mining environment and a deep sense of disconnection from their home due to the pollution and noise from nearby gold mining (Nyakuwanika, 2025). Understanding solastalgia in the context of community members' relationships with their home environment during and after mining can help us better understand how mining-related environmental degradation may affect the mental health and well-being of surrounding communities in Alaska.

### 2.2. Cultural and indigenous impacts

Reduced access to traditional foods in relation to a changing environment has been correlated with declining mental health in Indigenous communities (Lawrance et al., 2022). This leads us to the expectation that a changing landscape and the presence of pollutants from large-scale mining operations could have a similar impact on access to

traditional foods and therefore, result in the deterioration of mental health for those impacted.

Additionally, connection to the land is more common in rural areas where there is a higher dependence on nature, and it includes traditional knowledge and practices, which is significant for the wellbeing of Indigenous people (Leyton-Flor and Sangha, 2024). Changes to the environment disrupt cultures and ways of life, which can jeopardize individuals' sense of identity, purpose, and mental health (Lawrance et al., 2022).

### 2.3. Socio-economic impacts

While mining can bring more jobs and income to some local service sectors, they sometimes leave communities worse off than before (De Valck et al., 2021). Research observing the long-term socio-economic impacts of coal mining on communities in Queensland, Australia found that while mining is a very profitable avenue for private corporations, it can come at a significant cost for local communities, including increases in the cost of housing in conjunction with fewer available accommodations due to a growing non-resident workforce. The authors found that regions with active coal mining activities reported a higher percentage of low-income households who experience financial hardship from the costs associated with rent. They also wrote that mining had an unfavorable impact on other sectors of the local economy, such as agriculture, which led to a decline in social cohesion (De Valck et al., 2021). When agricultural productivity is reduced, it impacts the viability of the industries that support it, like local businesses and services, and even the local labor force. The socioeconomic hardship that this creates leads to poor mental health (Berry et al., 2010).

Furthermore, decision-making related to mining has historically remained between mining companies and certain levels of government, with limited opportunities for public participation (Kadenic, 2015). This process has not considered the communities that are most impacted by large-scale mining, which rarely experience the benefits of the industry's prosperity (Kadenic, 2015). Feelings of being dismissed or betrayed by the government or industry companies were linked to people's uncertainty about the future of their lands in communities where they had little control over decisions regarding nearby resource development (Morton Ninomiya, 2023).

In summary, this literature review highlights that environmental degradation, such as pollution, loss of biodiversity, and immediate and unexpected disruptions to landscapes, can lead to ecological grief, solastalgia, anxiousness, and emotional distress (Lawrance et al., 2022; Nyakuwanika, 2025). For Indigenous and rural communities, these environmental changes are inseparable from harm, as large-scale mining activities threaten local food systems, identity, and land-based practices that are a foundation to well-being and positive mental health (Leyton-Flor and Sangha, 2024). In addition, while mining companies can generate short-term economic benefits, it often contributes to social inequalities, socioeconomic hardships, and weakened social cohesion that lead to poor mental health (Berry et al., 2010; De Valck et al., 2021).

Together, this evidence demonstrates that the mental health impacts of large-scale mining are multidimensional and deeply intertwined with place, identity, and structural conditions – underscoring the need for further research and policy approaches that prioritize community inclusion, cultural resilience, and long-term sustainability. The term “resilience,” used throughout this paper, refers to the ability to recover from difficulties (Robertson and Cooper, 2013). In a mental health context, the scope of resilience is often centered around recovery from a traumatic experience and the ability to grow through challenges (Robertson and Cooper, 2013).

Continued research is needed to examine impacts of large-scale mining on the mental health of individuals within surrounding communities in Alaska. Understanding this relationship is essential for building awareness of potential long-term consequences related to mental health that could result from large-scale mining. It can also guide

improvements for mental health program strategies, as well as inform mining permitting processes and land management policies, and promote community resilience in the face of the ongoing development of mineral extraction projects. Therefore, the overarching purpose of the current research was to examine the potential relationship between large-scale mining and the mental health of individuals living in nearby communities in the Interior region of Alaska.

### 3. Methods

#### 3.1. Design

This study employed an inductive and deductive qualitative thematic analysis (Braun and Clarke, 2006; 2021a; 2021b) to examine how individuals living in communities surrounding operating large-scale mines in Alaska understand and experience the potential mental health impacts of mining. Thematic analysis provides a theoretically flexible approach for identifying, analyzing, and interpreting patterns across qualitative data while accommodating both data-driven and conceptually informed coding (Ahmed et al., 2026; Majumdar, 2022). To ensure analytic rigor, the research team maintained reflexive awareness throughout the analytic process and documented coding decisions, theme development, and interpretation to strengthen the credibility, dependability, and trustworthiness of the findings (Braun and Clarke, 2019; Nowell et al., 2017).

#### 3.2. Sample

The current study utilized a time limited purposive sampling method, supplemented by use of snowball sampling via a flyer that was distributed electronically through community organizations and networks and on community-focused Facebook groups. Inclusion criteria included consenting adults who: (1) were aged 18 or older; (2) lived in one of the following communities that are nearby large-scale mining operations: Fairbanks, Delta Junction, Tok, or the Native Village of Dot Lake, Alaska; (3) were English speaking; and (4) had access to internet and Zoom. Mine workers were excluded from the study.

The recruitment flyer included a link to a Google form where community members could submit their email to initiate contact with the researcher. Community members also had the option to reach out to the researcher directly by email. Eligible and interested participants were provided with a link to secure a time and date for a confidential interview. Participants were provided with a consent form, a list of mental health resources, and a Zoom link. Verbal consent was obtained before beginning the interview. All study protocols were reviewed and approved by the University of Alaska Anchorage Institutional Review Board (IRB).

#### 3.3. Data collection and analysis

Following completion of consent, semi-structured digitally recorded confidential interviews were utilized to collect data. Semi-structured interviews were utilized to enable participants to share personal experiences from different periods and perspectives across their lives. First, participant demographic information was collected including age group, resident community, number of years residing in community, and gender. Interviews lasted thirty to sixty minutes and consisted of seven clear, open-ended questions to explore the potential mental health impacts of participants living near large-scale operating mines. Interview questions explored participant experiences of living in their community as mining activities have developed over time, the role the environment plays in their daily life, changes observed as a result of mining, as well as any both personal and community impacts to mental health and well-being from mining. The interview questions can be found in the Appendix.

Transcripts were generated verbatim from recorded interviews by

the researchers. Cleaned and deidentified transcripts were uploaded into ATLAS.ti Desktop Version 25.0.2 qualitative coding software for reviewing, systematic coding, constant comparison, and analysis to identify patterns within the data collected.

Thematic analysis was used to analyze the data using Braun and Clarke's six-phase approach (Braun and Clarke, 2006; 2021a). This involved becoming familiar with the data, generating and memoing initial codes, identifying themes, reviewing and refining themes, naming and defining themes, and finalizing the report (Braun and Clarke, 2006; 2021a). Thematic deductive and inductive analysis (Ahmed et al., 2025) was used to recognize themes within data sets to explore processes, construct meaning, and develop conceptual insights directly from participants' accounts (Padgett, 2016). This process included creating codes based on the themes and insights that were identified in the transcripts, followed by consolidating codes into groups that were developed into the themes of this study, and selecting supporting quotes. An audit trail was maintained in ATLAS.ti through the documentation of code creations, modifications to data, code merges, and memos, all which validate the density of data associated with the prominent themes that are highlighted in this study.

Data saturation was achieved when no new themes emerged from additional interviews and thematic redundancy was consistently present in the data. ATLAS.ti Desktop Version 25.0.2 qualitative coding software was utilized to track code and theme recurrence to aid the first author in monitoring progress made towards data saturation.

#### 3.4. Reflexivity and trustworthiness

The interviewer and coding team consisted of one individual, the first author, who resides in Southeast Alaska and has no relationship to the Interior region communities included in this study. The first author has professional experience within the mining impacts sector, which informed her interest in exploring potential mental health impacts from large-scale mining. However, this research was conducted separately as a graduate student. The first author does not hold a position of influence in regard to mining in the Interior region of Alaska. Bias was mitigated and quality and trustworthiness of the data analysis were strengthened through continuous consultation with and supervision from the first author's advisor. Additionally, interview questions were neutral, open-ended, and developed in consultation with the first author's advisor. The researcher remained mindful and aware of balancing prior knowledge and familiarity with openness to the perspectives and experiences of participants to further reduce influence of researcher bias.

### 4. Findings

The recruited sample consisted of 19 consenting adult study

**Table 1**  
Characteristics of sample (N = 19).

| Length of time in community | Years            | f  |
|-----------------------------|------------------|----|
|                             | 0–10 years       | 1  |
|                             | 10–19 years      | 1  |
|                             | 20–29 years      | 1  |
|                             | 30–39 years      | 5  |
|                             | 40–49 years      | 2  |
|                             | 50–59 years      | 6  |
|                             | 60–69 years      | 0  |
|                             | 70 years or more | 3  |
| Age                         |                  |    |
|                             | 18–24            | 0  |
|                             | 25–34            | 1  |
|                             | 35–44            | 0  |
|                             | 45–54            | 1  |
|                             | 55–64            | 5  |
|                             | 65 and older     | 12 |

participants. As shown in Table 1, the length of time participants have lived in their respective communities ranged from 8 to 78 years and represented an older population.

The analysis process resulted in notable insights from the data, including the interpretation of patterns within participants' narratives that contributed to understanding their lived experiences as it related to the research topic. Four themes were identified through thematic analysis in the data that provided valuable insight on the relationship between large-scale mining and the mental health of individuals residing in nearby communities. These themes included: a) Changes to the environment; b) Distrust in mining industries and political systems; c) Economic and infrastructure tradeoffs; and d). Identified mental health impacts. No diagnostic instruments were used in this study. The mental health impacts highlighted in this study were identified and described by participants. Each theme is described below.

#### 4.1. Theme 1: changes to the environment

Many participants expressed changes to their environment due to large-scale mining, as well as concerns for how these changes trigger emotional distress. This includes observations of pollution that are currently impacting areas for wild food harvesting. Some participants also expressed concerns about mining impacts on wildlife, in which some participants are noticing population declines within their communities. This disrupts the way of life for many of the participants included in this study. One participant stated, "We used to berry pick alongside of the roads and dig for roots and harvest mushrooms and look for our medicinal plants, but we don't want to do that when our water is showing positive for contamination already."

In addition to impacting wild food harvesting areas, participants noted concerns about the degradation of natural scenery and the presence of air, water, and noise pollution from nearby mining, citing that these changes impact stress levels as it relates to their ability to comfortably spend time outdoors. In citing environmental concerns, several participants specified worries about the long-term impacts of large-scale mining and the burden it will cause future generations, from both environmental and economic standpoints. One participant shared:

*I just don't see it as much of a positive as I used to. I really see it as a scar on the land. It's affecting air pollution you know, the air quality with all the trucks and the mill and so forth going. I worry about our water quality. I worry about the long-term effects. You know, is my granddaughter gonna have to figure out how to deal with all the environmental issues that mine is gonna, you know, leave?*

Nearly all participants cited their connection to the land and access to outdoor recreation as key reasons for living where they do. Many pointed to the scenic landscape, clean environment, emotional or spiritual connection to the land, and abundance of recreational opportunities as primary factors in their decision to live in their community. Many of these opportunities are being jeopardized by large-scale mining, which participants expressed has a negative impact on their overall quality of life. Access to trails are being disrupted by mining development, including areas historically utilized for dog mushing. This is causing some participants to question their longevity residing in a place where many anticipated living for the entirety of their lives. One participant stated:

*I didn't move to Alaska to live surrounded by mines. I moved to Alaska to be able to walk outside and be on a trail, or see a moose, or listen to the birds, or you know, drive 20 min and go fishing.*

Most participants raised concerns about how scenic highways have turned into industrial corridors due to ore hauling. Narrow, underdeveloped rural road systems are also being utilized for the transport of ore and heavy machinery for mining. Rural road systems that are attractive for cyclists are being inundated with traffic from ore trucks and heavy machinery traveling to and from mining sites, raising safety concerns for

road users. These changes not only impact how participants use and experience these spaces but also contribute to elevated levels of stress, anxiety, and diminished sense of safety in daily life.

#### 4.2. Theme 2: distrust in mining industries and political systems

The majority of participants expressed disapproval of the management and oversight of mining projects, or lack thereof, from government agencies. Many participants also expressed frustration regarding the use of Alaska Mental Health Trust Authority lands for large-scale mining projects that jeopardize the mental health of surrounding communities by limiting access to lands for outdoor recreation while opening an avenue for continued environmental risks. A participant commented on this experience, stating:

*It's super, you know, it's just really intimidating and, disappointing, you know, because that recreational use of this area is just so precious to so many people, and the whole irony that the Mental Health Trust, you know, permits mining to secure money for mental health is just the sickest irony when the land is, like, the greatest mental health facility there is. The way it is.*

The absence of transparency between the Alaska Mental Health Trust Authority, government agencies, and mining representatives has created a sense of hopelessness and powerlessness for most of the participants. The consent of surrounding communities has not been considered by decision makers and developers. Many participants reported that public meetings have not been held to inform their communities of expanded nearby large-scale mining operations, and when they reach out to government agencies or mining companies directly, their concerns and inquiries often go unanswered. This has led to a theme of widespread distrust in decision makers to consider the impacts large-scale mining has on individuals within surrounding communities. One participant shared:

*It's depressing to think about the whole situation, and how little control the people have over their environment and where they live, and how little the government officials are really caring or doing anything. You know, how little they're doing to try to protect us and protect our quality of life. It's depressing.*

Participants in this study described experiencing sadness, emotional irritability, anger, and heightened stress in connection with their interactions and perceptions of both government agencies and mining representatives. These emotional responses reflect a broader pattern of frustration, mistrust, and perceived powerlessness among participants included in this study.

Another recurring theme in participants' accounts was the belief that mining companies operate with minimal oversight or accountability. Many expressed the view that these companies are not required to adhere to the same rules or standards as others, contributing to a sense of injustice and eroding confidence in regulatory systems.

Concerns about safety further compounded these sentiments. Several participants reported directly observing ore transport trucks engaging in traffic violations, particularly in adverse weather conditions that pose a higher risk to other motorists. These incidents were described as not only hazardous but also representative of a broader disregard for community well-being. As a result, participants indicated that their sense of safety as road users had been significantly diminished, reinforcing feelings of vulnerability and distress in their daily lives.

#### 4.3. Theme 3: economic and infrastructure tradeoffs

While safety concerns from the increased trucking of ore was one of the most common themes presented in this study, participants also expressed frustration with the negative economic and infrastructure impacts of increased ore trucking. One participant stated:

*The public didn't get to vote on this. And the public's still asking, what's in it for us, living here, other than ripping up our roads, which still hasn't become clear in a funding process, or in a taxation format?*

Two participants commented that large-scale mining has benefitted their community economically by providing jobs. However, other participants expressed concerns that mine workers are often outsourced from outside of Alaska. Participants largely agreed that the economic costs of large-scale mining far outweigh any benefits they have observed or experienced. Participants expressed anger and frustration at the profitability of large-scale mining operations, largely owned by foreign corporations, who rely on public infrastructure that is maintained by taxpayers to sustain their operations. One participant emphasized:

*My concern is that you have increased highway traffic. You have increased highway maintenance. You have increased pollution from, from rubber tires, and God only knows from exhaust all up through the corridor. So that's just where I come from, and this is unprecedented, never been done before, and it's being done right in our backyard, and our leaders, the people that we elect to put there, are turning a blind eye.*

Most participants viewed the economic gains as flowing to external corporate interests, while communities bear the burdens of infrastructure strain, environmental impacts, and inadequate taxation or regulation. This perceived imbalance fostered feelings of inequity, weakened trust in governance, and a sense that communities are subsidizing industry without fair return. These conditions contributed to negative mental health impacts, with participants reporting ongoing stress, frustration, and feelings of powerlessness linked to perceived lack of accountability and limited local benefit.

#### 4.4. Theme 4: identified mental health impacts

While participants described a range of negative mental health impacts associated with large-scale mining, none reported any direct positive effects on mental well-being. Reported impacts ranged from anger and frustration, self-reported feelings of anxiousness, hopelessness, stress, worry about the future, fear, distress, and negative impacts to sleep. Several participants emphasized that they experience stress and frustration from dedicating substantial time to advocating for greater transparency in mining practices and stronger environmental protections, often at the expense of time they would otherwise spend on hobbies and other activities they enjoy. In the words of one participant:

*It [mining] has meant extreme environmental anxiety and depression, particularly because the growth is ongoing and it's probably never going to be resolved in my lifetime. Bad dreams, insomnia, a negative attitude when interacting with people because you're always on high alert when you go out into the countryside to ski, hike, dog mush, skijoring.*

This account highlights the persistent and intrusive nature of these experiences, which extend into daily routines, including social interactions and sleep. Another participant shared:

*It's violated my self-identity. I'm a longtime mountain climber and utilize the outdoors in all seasons, and now there's just noise and light pollution, heavier traffic, road damage, all promoting anxiety. There's decreased aesthetic pleasure due to the changes in the landscape. All these are chronic long-term effects because they've been going on for two-thirds of my lifetime, and I'm only seeing them increasing with no remedy or cure in sight.*

The rapid pace of mining development, particularly within the current political climate and amid rising gold prices, has intensified uncertainty about the future, leaving many participants feeling overwhelmed and intimidated. Combined with visible and cumulative environmental changes, participants described a sense that these impacts are long-lasting and increasingly difficult to mitigate, contributing to feelings of anxiousness and diminished well-being.

## 5. Discussion

The purpose of this study was to explore the potential relationship between large-scale mining and the mental health of individuals through the perceptions and lived experiences of participants residing near a large-scale operating mine. The current research found that participants predominantly reported negative impacts to mental well-being that they associated with large-scale mining. These impacts were closely linked to concerns about environmental changes, personal safety, perceived regulatory failures, and an overall distrust in government agencies, decision makers, and mining companies. Negative impacts to mental well-being reported through this study include experiences with stress, feelings of anxiousness, and hopelessness.

Connection to the land and access to outdoor recreation was central to most participants expressing their decision to live in their respective communities. A clean environment, scenic landscapes, access to trails, wildlife, and emotional or spiritual ties to a place were frequently described as foundational to quality of life and overall well-being. However, large-scale mining is altering how individuals in surrounding communities can engage with the landscape by disrupting access to outdoor and recreational areas, as well as wild foods harvest areas, and exposing these areas to pollution, leading us to echo earlier studies that demonstrate the negative impacts that environmental disruptions can have on individuals' sense of identity, purpose, and mental well-being (Lawrance et al., 2022). Prior literature has identified that this is especially true for rural and Indigenous communities, where there may be a higher dependence on nature, including for wild food harvesting, knowledge, and cultural practices (Leyton-Flor and Sangha, 2024). The cumulative impacts of these environmental changes from nearby mining have led several participants of this study to worry about whether they can continue living where they do, emphasizing the broader implications for mental health and overall well-being.

These findings align with prior research demonstrating that environmental degradation and perceived loss of control over local resources can contribute to negative mental health impacts. Consistent with existing research on the mental health impacts of climate change, this study identified the ways in which environmental degradation—including pollution, biodiversity loss, and sudden disruptions to landscapes—can contribute to declining mental health (Lawrance et al., 2022). The term “ecological grief,” which is used by researchers to describe the mourning of the loss of landscapes, ecosystems, wildlife, and ways of life as long-term emotional impacts of climate change (Comtesse et al., 2021) is prominent through this study and is relevant among study participant experiences of localised mental health impacts from nearby large-scale mining. The concept of solastalgia is also present in the findings of this study, specifically through participant experiences of distress from mining-related pollution that has directly impacted their home environment (Albrecht et al., 2007). This study demonstrates that nearby mining threats to the natural and social environments on which individuals depend for their way of life and overall well-being are associated with negative mental health impacts similar to those identified in existing climate change research (Berry et al., 2010).

Feelings of distrust toward government agencies and mining companies contributed to participants' experiences of frustration and hopelessness, reinforcing prior research that links these emotional responses to feelings of uncertainty about the future (Morton Ninomiya, 2023). In the absence of opportunities to participate in decision-making regarding nearby mineral extraction, participants reported heightened concerns about the future of surrounding lands, as well as their own properties and livelihoods. This is also relevant in the context of increased ore trucking that was reported by many participants, as the transformation of scenic highways into perceived industrial corridors has occurred without the consent of nearby communities, contributing to safety concerns and self-reported feelings of anxiousness.

While mining companies can generate short-term economic benefits,

the findings from this study are in line with prior research examining the economic outcomes of mining as it relates to the complexity of the boom-and-bust cycle of the mining industry. Both the findings from this study and existing literature indicate that these short-term economic benefits often contribute to social inequalities and weakened social cohesion that can result in increased stress and uncertainty (Shandro et al., 2011).

The limited research on the mental health impacts experienced by individuals living near large-scale mining operations in Alaska is concerning, particularly as political momentum toward expanded mineral extraction advances within the state without fully considering the effects on nearby residents. This study highlights the mental health implications for individuals living near large-scale mining operations, which include self-reported experiences with stress, anxiousness, frustration, and feelings of helplessness in response to environmental disruptions, increased ore hauling, concerns relating to personal safety, and the perceived lack of transparency from government agencies and mining companies.

However, the lack of positive mental health effects identified in this study highlights an inherent exclusion of perspectives from residents who potentially benefit from or are neutral toward large-scale mining near their community. The sample size and recruitment methods of this study may have resulted in a concentration of perspectives that reflect negative experiences from nearby mining, limiting the possibility of positive experiences from nearby mining that may be identified in a larger sample.

The cumulative effect of experiences reported by participants appear to extend beyond immediate emotional responses, contributing to longer-term mental health strain. These findings identify the need to consider mental health in the planning of large-scale mineral extraction projects and land management decisions. Including community voices, increasing transparency, and addressing disruptions to the environment, in addition to expanding access to mental health resources and services, may aid residents in strengthening community resilience. In other words, these actions may improve a community's ability to learn in a way that more proactively maintains their mental health and well-being when faced with challenges from nearby mining (Robertson and Cooper, 2013).

These findings point to the need for more accountable policy approaches to large-scale mining in Alaska that better align with local economic benefits and impacts, as well as policy approaches that prioritize the consent and consultation of nearby communities in the potential for the permitting of large-scale mining operations at any phase. As the original stewards of the lands, Indigenous communities bring generations of knowledge, deep cultural connection, and enduring responsibility for environmental stewardship. Additionally, prior literature has identified the close proximity of undeveloped mineral resources to Indigenous lands (Earthworks, n.d.). Therefore, the inclusion of Indigenous communities in decision-making and consultation around extractive industrial development should be of the utmost importance.

Mining projects should be required to include mental health impact assessments to evaluate how nearby residents may be affected. Policy changes should also address the need for enhanced safety measures and stricter regulations in regard to the transportation of ore, particularly to protect road users and to mitigate the impacts of mining related trucking on public infrastructure. In the case of the Alaska Mental Health Trust Authority, which manages significant land holdings that may be leased for mining to generate revenue for mental health programs, an evaluation should be conducted to further examine the apparent contradiction of generating revenue for mental health programs by enabling large-scale mining developments that directly negatively impact the mental health of Alaskans.

The impacts of large-scale mining on the mental health of individuals in the Interior region of Alaska may be amplified, as some of these residents already face a number of unique challenges relevant to their isolated geographic location, including limited access to health care and

mental health services, high travel costs, and provider shortages. They also may have a higher reliance on the health of the environment for harvesting wild food or for their overall wellbeing, as indicated by participants in the study who expressed that the clean environment, scenic allure, and opportunities for outdoor recreation were driving factors for remaining in their communities. As a result, large-scale mining development risks extend far beyond environmental concerns. In fact, they may result in population declines as landscapes, access to outdoor opportunities, and the health of the environment continue to be threatened.

## 6. Limitations

This study has several limitations that should be considered when interpreting the findings. First, although data saturation was achieved in efforts to mitigate a skewed sample, because the sample size was relatively small, findings may only reflect the views and experiences of those who held similar beliefs about mining and may not represent universal beliefs. Furthermore, recruitment methods including snowball sampling may have contributed to a more cohesive sample with negative views of mining, as many participants learned about the study and participated after being referred by individuals who they know and may have held similar beliefs. This also may have restricted opportunities for family members of mining households to learn about the study and participate. Additionally, the exclusion of mine workers may have limited opportunities to include perspectives of residents who benefit from large-scale mining near their community. Thus, a larger and more representative sample may have produced alternative findings. Further, limited access to reliable internet in Alaska may have constrained recruitment efforts. The sample size in this study was limited to communities in the Interior Region of Alaska. Therefore, findings identified in this study may not be transferable to other communities in Alaska or beyond. Including additional perspectives from other regions in Alaska is critical for future research studies on this topic.

The timeline for this study was limited due to graduate school requirements for the first author. No dedicated funding was available for this study, which constrained the scope of data collection and the number of participants that could be recruited. One tribal community was included in recruitment efforts for this study. A limited timeline restricted opportunities to engage with additional tribal communities, as written permission was required by the University of Alaska Anchorage IRB to include tribal communities in recruitment efforts for the study. Despite these limitations, the findings offer valuable insight into individual implications and identify important areas for continued research. However, despite timeline challenges, the data reached saturation and demonstrated that no new information or themes were emerging from the data collection. Consultation and peer-debriefing with the first author's advisor was used to enhance the quality and trustworthiness of this study, as well as to mitigate researcher bias.

Finally, as an exploratory qualitative study, this inquiry relied on the self-report of its participants. While there was absolutely no reason to believe participants were not honestly reporting their experiences and perceptions, the inherent bias limitation potential of this design should be considered. Additionally, member checking was not conducted during this study. Participants did not have the opportunity to review the interpretation of their interviews, which may have strengthened the credibility of the findings. Lastly, the data were coded by a single researcher, the first author. An audit trail was maintained and data analysis was strengthened through continuous consultation with the first author's advisor, however, the inclusion of multiple coders may have enhanced credibility.

## 7. Conclusion and recommendations

Future research should broaden samples. Indigenous and rural communities should be prioritized to further explore how cultural

connections to the land, traditional knowledge, and wild food harvesting practices influence mental health and resilience as it relates to impacts from large-scale mining. Additionally, research should evaluate the role of government agencies, including the Alaska Mental Health Trust Authority, decision makers, and land management policies, while incorporating ethical approaches for including meaningful community consultation and consent in decision-making practices. Future research should also explore prevention and therapeutic approaches for working with individuals and communities experiencing behavioral health impacts from large-scale mining. Such research can contribute to the development of interventions that support individual resilience in the face of impacts from large-scale mining.

This study examined the mental health impacts of large-scale mining on individuals living in communities surrounding large-scale mining operations in the Interior region of Alaska. Findings reflect participant self-reported experiences with stress, anxiety, and hopelessness as a result of environmental changes and safety concerns relating to mining operations, in addition to overall distrust in government agencies, decision makers, and mining companies. These results highlight the need for mental health considerations in the permitting of mining projects and in land management policies. They also draw attention to the need for prioritized consultation with Indigenous and rural communities, who may experience amplified impacts from mining due to their close proximity to undeveloped mineral resources, which has been identified in prior research (Earthworks, n.d.). Finally, continued research is critical for expanding understanding of the impacts large-scale mining has on the mental health of individuals in surrounding communities in Alaska.

#### CRediT authorship contribution statement

**Marie Rose Fudge:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Kathi Trawver:** Writing – review & editing, Supervision, Project administration, Conceptualization.

#### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.exis.2026.102030](https://doi.org/10.1016/j.exis.2026.102030).

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