# Assessment of the Mental Health Impacts Associated with Environmental Change

## Context

The World Health Organization (WHO) defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity', and having the ability 'to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment' (WHO 1948; Undated). The Canadian government adopted this definition of health many years ago, yet mental health – a prominent component of this definition of health – has only become of serious interest of major project impact assessment (IA) in Canada at the federal level very recently with the passage of the *Impact Assessment Act* (*IAA*) in 2019.

While the *IAA* calls only generally for assessment and protection of health, the Tailored Impact Statement Guidelines template (TISG template) indicates that health impact assessment (HIA) must cover mental health in baselines and effects assessment, such as "stress, depression, anxiety, sense of safety" (s.16 of the TISG template). The Health, Social, Economic Guidance (HSE guidance) notes that mental health effects may result from such things as: loss of access to nature, healthy foods, and recreational areas; work being at a distance from family or shift-based; or even from concern for the future. This memo is intended to add additional guidance to practitioners working within the *IAA* framework with respect to how mental health IA can and should be done, particularly with respect to mental health impacts associated with environmental change.

There are several important dimensions of mental health IA captured in the TISG template and HSE guidance which guide mental health IA. First, mental health issues of major project development differ depending on how one relates to a major project. For example, residents of a place that may host a project are one such group, and major project workers are another. Residents may be impacted by project impacts on housing affordability and changes in income, and workers by such things as time away from home and racism on the job. A key focus of good practice mental health IA, like HIA more broadly, is addressing **health inequity**, which concerns equal access and quality of

health care.[1] Second, mental health is a function of many **determinants of health (DoH)**, but is also directly linked to peoples' physical health. Practitioners need to consider inter-relationships between peoples' mental and physical health, but also how individuals' health is inter-related with household, community, and other factors.

Certainly a key challenge for practitioners has been *how* to assess potential impacts to mental health. Historically, IA across pillars has been most interested in those effects that are tangible and quantifiable. IA is challenging at the best of times, and in mental HIA practitioners must often deal with effects that are difficult to identify and measure. As a result, HIAs historically have often paid little attention to, or achieved much analytically, with respect to mental health (Lucyk 2015; St-Pierre 2016).

With HIA gaining momentum, researchers and practitioners are increasingly focusing on mental health IA and supporting its practice. Responding to a lack of attention in HIA to mental health, three streams of mental health IA have emerged (Lucyk 2015; St-Pierre 2016).

1.  Mental Well-being Impact Assessment, developed in the UK (Cooke et al. 2011; Lalani 2011), emphasizes a focus on mental wellness (or mental *health*), as opposed to mental unwellness (or mental *illness*), as well as health equity. Practitioners are instructed to examine how protective factors that enhance peoples' mental health may be affected. Protective factors are organized into three categories: enhancing control, increasing resilience and community assets, and facilitation participation and promoting inclusion. The six steps of this stream – screening, scoping, appraisal, recommendations, identifying indicators and monitoring, and implementing recommendations – differ somewhat from the typical steps in Canadian IA.

2.  Mental Health Impact Assessment was developed in the US at the Chicago-based Adler School of Professional Psychology, an institution which has tended to focus on preventing and treating mental disorders. This second stream of mental health IA relies on typical HIA steps but is solely focused on the social determinants of mental health, and therefore analysis and results are in terms of these social factors.

3.  A third stream lacking any particular label is promoted by the Society of Practitioners of Health Impact Assessment (SOPHIA) conceives of mental health as a component of HIA and focuses on strengthening HIA's capabilities with respect to mental health IA instead of having a separate stream of IA (Lucyk

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[1] **Health inequity** differs from health inequality. Health inequalities are differences in health outcomes – e.g., person A is healthier than person B – whereas health inequities are differences (potentially systemic) in access to care. Health equity is about leveling the playing field (Lalani 2011).

2015). This stream emphasizes the role of community factors and three buffer factors (social connection, sense of confidence, and sleep).

A prominent Canadian consultant (Habitat Health Impact Consulting) was heavily involved in developing the third stream, but all three may be useful in assessments under the *IAA*, depending upon the particularities of the project to be assessed. All three can be adapted to the steps of IA under the *IAA*, and all three subscribe to the basic tenets of HIA including strong attention to determinants of mental health, health equity, and concern for mental health instead of mental illness. Qualitative data is expected to be key in all streams. Readers should consult St-Pierre (2016) for further comparisons of the three streams.

The mental health impacts of major project development can be positive – such as a boost in self-esteem among those that may obtain higher-paying jobs, never mind the improvement to health outcomes that follow from the better housing, food, and material goods that these individuals and their families may obtain – or negative, such as the loss of traditional gathering sites when a greenfield site is developed, adding to the cumulative mental stress on many Indigenous peoples.

The mental health conditions that can arise with major project development include conditions common in the general population (including people and communities that do not have major project development), such as depression and substance misuse, but in recent years several mental health conditions particularly pertinent to major project development have increasingly been recognized. Various forms of mental distress – leading to depression and substance misuse as well as other disorders – are associated with environmental change, both real and perceived. These conditions include **ecological grief**, **solastalgia**, and **risk perception** (also known as 'understanding of risk').[2] Each of these are alluded to in the HSE guidance and TISG template, and each are certainly relevant in Canadian IA, particularly for projects taking place in locales where climate change is particularly noticeable (such as the Arctic) and for projects that involve substantial environmental change or pose risks that have 'dread factor'. This memo explores these mental health conditions and aims to provide practitioners with initial guidance on how mental health impacts associated with environmental change can be undertaken. For guidance on good practice HIA more generally, readers can consult sources such as Bhatia et al. (2014), Westwood and Orenstein (2016), Barron et al. (2010), and NCCHPP (2008).

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[2] The latter – **risk perception** – is not so much a condition as a mental DoH.

# Mental Health Impacts Associated with Environmental Change

## Ecological Grief

**Ecological grief** refers to the grief, pain, sadness, and suffering people feel due to the loss or anticipated loss of beloved ecosystems, landscapes, seascapes, species, or places (Barnett et al. 2016; Clayton et al. 2017; Cunsolo 2018; Cunsolo and Ellis 2018; Marshall et al. 2019). Related mental health conditions include: **solastalgia** ('feeling homesick when you're still at home' because your home has or is anticipated to change dramatically), eco-anxiety, **psychoterratic conditions** ('earth-related mental illness'), ecophobia, and anticipatory grief (Albrecht 2011; Albrecht et al. 2007; Cordial et al. 2012; Hendryx and Innes-Wimsatt 2013). These conditions are characterized by their often ongoing nature, feelings of powerlessness, and the sense that one's identity is being destroyed. These conditions can be caused by both acute events (e.g., severe storms, extreme forest fire events, mountain-top removal for mining) and gradual environmental changes (e.g., rising ocean temperatures, persistent drought), both past or anticipated. **Ecological grief** may be felt individually or through the collective losses of a group, and may even be experienced multiple times and in different ways by the same individual each time a new loss is encountered. Much of the research on **ecological grief** and related conditions has been done within the context of climate change and mining, but these conditions to be stimulated or exacerbated by any sort of substantial environmental change.

A range of negative mental health symptoms and conditions, both **acute** and **chronic**, have been associated with **ecological grief** (Clayton et al. 2017; Howard et al. 2018), including:

- aggression and violence;
- anxiety;
- depression;
- negative emotions, such as anger, despair, distress, fatalism, fear, helplessness, hopelessness, and feelings of loss of control and/or identity;
- strains on social relationships;
- stress and post-traumatic stress;
- substance misuse; and
- suicidal ideation and suicide.

Groups of people with particularly close connections to the environment and sites of development are vulnerable to **ecological grief**. Indigenous people are particularly vulnerable, given their often close connection to the environment, on top of other health inequities they tend to face (Durkalec et al. 2015; Ganesharajah 2009). One study on Inuit mental health and climate change observed relationships between warming

temperatures and melting sea ice with food security, travel, cultural practices, and autonomy, translating further to a damaged sense of place, compromised sense of identity, addiction, and other mental health conditions (Durkalec et al. 2015). Other factors that can increase sensitivity include pre-existing mental health conditions, poor access to health care services and other DoH challenges, but also economic dependence on the environment (Marshall et al. 2019).

Types of major projects undergoing federal IA that might trigger ecological grief include: those involving substantial alteration of the landscape (e.g., large open-pit mines), particularly on greenfield sites, projects with obvious connections to greenhouse gas emissions and climate change, and projects that have disproportionate effects on population groups with strong connections to the host site's environment.

## Risk Perception

Formally, risk is the mathematical product of probability and consequence, but **risk perception**, also known as 'understanding of risk', is how people actually feel about risk (Baldwin and Rawstorne 2019). The term distinguishes **perceived risk** held by people exposed to risk – i.e., individuals' unique perceptions of the probabilities and consequence of risk events – with estimates of so-called **actual risk** as would be calculated by outside technical specialists using models or other quantitative methods. Risks of major projects can be environmental (e.g., oil spills) but also cultural, economic, social, or health in nature. Regardless of what a technical specialist may estimate to be the '**actual risk**', **risk perception** is the anticipation of negative (or positive) events occurring and the meaning of these events to those who may be affected, and this **perceived risk** may vary substantially from **actual risk**. **Perceived risk** is therefore a determinant of mental health (Baldwin and Rawstorne 2019).

Perception is reality, for those subject to risk.[3] Mental health symptoms and conditions stimulated by and associated with **risk perception**, from project announcement and throughout projects' lifespans, include: addictions and substance misuse; anxiety; change in level of physical activity; chronic stress; community conflict and loss of social cohesion; depression; feelings of anger, fear, grief, and loss of control; high blood pressure; post-traumatic stress disorder; loss of attachment to place; and loss of sleep (Baldwin and Rawstorne 2019). The pathway of effect is simple: a project (whether proposed or developed) leads people to perceive risk, and from this to develop mental distress (Figure 1). However, there is more. Social, economic, and potentially other types of effects can also be stimulated by **risk perception**, such as changes in physical activity, community conflict, and increased expenditure on coping mechanisms (Wlodarczyk and
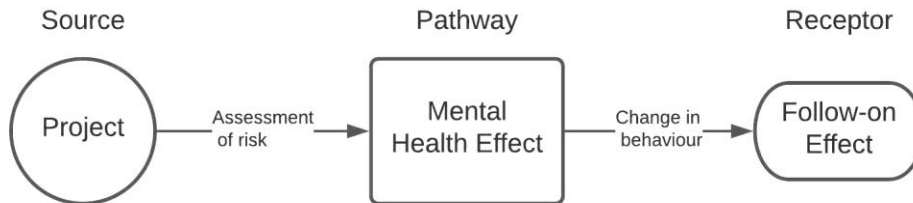
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[3] Some people take offence to the term '**risk perception**' because it can be interpreted to imply that risk and its effects are not real.

Tennyson 2003). In other words, **risk perception** can lead to mental health impacts, but also other impacts (Figure 2).

**Figure 1. Generic risk perception pathway**
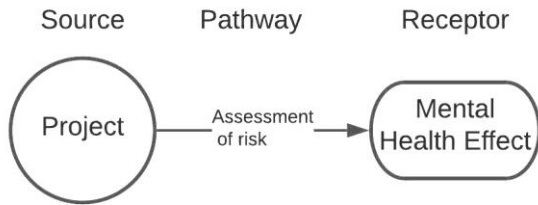


**Figure 2. Follow-on risk perception pathway**



Adapted from: Wlodarczyk and Tennyson (2003).

Risk is inherently subjective. While estimation of '**actual risk**' is seen as an objective activity entailing identification of risks and calculating probabilities, the experiencing or becoming exposed to risk is a subjective process, and the subjective elements of risk are critical to making meaning of risk (Fiorino 1989; Jasanoff 1993). **Risk perception** is at least project-, location-, culture-, and time-specific, involving both external contextual factors and internal psychological factors (Baldwin et al. 2020; Baldwin and Rawstorne 2019). Familiarity with risk, for example, can diminish the perceived concern. **Risk perception** may change through an IA as these factors change and stakeholders' understandings of them evolve. These factors all shape how **risk perception** must be examined within an IA process.

While **risk perception** is context-specific, people tend to stigmatize certain types of risk (Gregory et al. 1996; Gregory and Satterfield 2002; Slovic 1987). Stigma is commonly associated with nuclear power, genetic engineering, pesticides, project activities associated with explosions, chemical spills, or radiation, high-profile diseases (like AIDS and cancer). One could also imagine a host region's population reacting to imposed ethnic differences (i.e., use of a construction workforce composed of a different ethnic

group) and a project proposal involving emerging technology such as artificial intelligence.

## Recommendations

The TISG template provides broad direction to HIA practitioners on what must be done as part of an HIA. Section 9 of the template indicates that baselines must include information on the current state of mental well-being, incorporate a social **DoH** approach, examine how sub-populations may be affected, and contain a community health profile with information on peoples' mental health status. Section 16 indicates that the HIA must assess effects on health based on changes to the environment and must "describe and quantify potential effects to mental ... well-being (e.g., stress, depression, anxiety, and sense of safety)".

Table 1 is intended to buttress the TISG template by helping guide practitioners with respect to addressing the mental health impacts associated with **ecological grief** and **risk perception** at each step of an IA. The content of Table 1 should be considered a starting point for IA planning and not exhaustive or definitive. The content of the table represents a synthesis of information found in the literature reviewed for this memo as well as the authors' ideas, but references are cited in the table where particularly unique or atypical ideas are presented. Table 1 does not reproduce standard good practices in HIA as may be found in HIA good practice guides (see references in Context), or IA broadly.

**Table 1. Activities for consideration in the IA of ecological grief and risk perception**

| IA Step | IA Activity |
|---|---|
| Scoping and IA Planning | • start early and get ample resources, including adequate time, funding, and qualified personnel, to enable satisfactory assessment (good work may require deep integration with communities for at least a few years)<br>• involve affected people: ask stakeholders what matters to them, how they define mental health, and health generally (Gregory et al. 2016)<br>• use means-ends diagrams or similar tools to help identify what matters to people, but also to uncover the antecedents (i.e., underlying factors shaping the impacts), and use value hierarchies to help organize values that people identify (Gregory et al. 2012)<br>• disentangle ambiguous concepts like 'well-being' into tangible components (Gregory et al. 2016)<br>• focus on potential impacts at the community level but also on vulnerable groups<br>• be aware that mental health impacts can begin to manifest from the moment that people are made aware of a project<br>• identify an appropriate **DoH** framework suitable for consideration of the particular mental health issues raised by a project proposal (see <u>Integrating Health Impact Assessment into the Wider Impact Assessment Process</u> memo)<br>• for **ecological grief**, recognize the commonality of environmental change in major project development, and therefore investigate the extent of potential environmental change with the proposed project, and whether **ecological grief** is particularly likely to occur with the project (i.e., factors such as strong lifestyle dependence on environmental components at risk, greenfield nature of site, and extent of environmental change)<br>• for **risk perception**,<br>    ○ identify what risk subjects a project may raise, and explore the extent to which these subjects may stimulate **risk perception**, i.e., a gas pipeline may stimulate substantial risk perception (explosions, spills) compared to a highway extension which may draw little concern (highway accidents are commonplace)<br>    ○ engage with any risk assessors working on the IA, such as those that might be estimating the **actual risk** of oil spills, facility accidents, or other risk events<br>    ○ assume that risk issues are unique to the project, location, time, and population sub-groups, and therefore begin identifying potential contextual factors (Baldwin and Rawstorne 2019; Marshall et al. 2019)<br>    ○ identify groups that may be particularly susceptible to **risk perception** |

| IA Step | IA Activity |
|---|---|
| | <ul><li>○ develop an initial pathway of effects model that features **risk perception** (and the linkages upstream connecting **risk perception** to the project), and assume that **risk perception** is a determinant of health</li><li>○ identify existing sources of risk in proposed project's host region, and inquire about perception(s) of the risks in the community</li><li>○ learn about past community responses to risk</li></ul><ul><li>consider how the project may have a positive effect on cumulative **ecological grief** and/or **risk perception**, e.g., there may be baseline mental health challenges associated with environmental change, and the project may actually counter these positively</li></ul> |
| Valued Component Definition | <ul><li>fit topic into an existing health VC, a mental health VC, or potentially as its own VC</li><li>define mental health value(s) using a values-focused/structured decision-making approach to get at the particular values of the stakeholder(s) in question, and to identify indicators for tracking in baseline and effects prediction (Gregory et al. 2016; Gregory et al. 2012)</li><li>develop a significance threshold that embeds potentially-affected communities' subjective experience with environmental change and/or risk characteristics<ul><li>○ for example, a health VC's significance threshold might revolve around average health (including mental health) outcomes across the superseding jurisdiction (Joseph et al. 2017), i.e., defining a significant impact as one that makes the host region's mental health outcomes non-negligibly worse than province-wide outcomes, but the definition could explicitly identify environmental change or **risk perception** as factors or determinants of mental health or could even specify particular indicators linked to environmental distress or risk as means to measure mental health outcomes in the definition of significance (e.g., connection to land, fear level, etc.)</li></ul></li><li>for indicators, consider use of:<ul><li>○ **proxy measures** and **constructed scales** when **natural metrics** don't exist (Gregory et al. 2016; Gregory et al. 2012);</li><li>○ cultural, social, spiritual, or other atypical indicators of health (Gregory et al. 2016);</li><li>○ **pressure indicators** on factors that underlie mental health generally (such as sense of control, resilience, social participation and inclusion, confidence, sleep), but also factors that underlie **ecological grief** and **risk perception** specifically (such as access or connection to land, lifestyle dependence, state of mental health), and **state indicators** of mental health outcomes (e.g., substance use) (Cooke et al. 2015; Lucyk 2015);</li><li>○ the environmental distress scale to measure the extent of **ecological grief** (see Albrecht et al. 2007);</li></ul></li></ul> |

| IA Step | IA Activity |
|---|---|
| |   o indicators of sense of purpose/hope/belonging/meaning in life, connection to place, social roles/role conflict/identify, cultural continuity, social cohesion, workplace mental health, substance use; cultural continuity (e.g., language use, access to land, sense of self-determination) (Baldwin et al. 2020; Baldwin and Rawstorne 2019; CIHR and IAAC 2020; Marshall et al. 2019) |
| Baseline Development (Past, Present, Reasonably Foreseeable Future) | • gather quantitative and qualitative data consistent with indicators developed in previous step<br>• baseline data may be drawn from information on mental health DoH and outcomes from existing statistical data, local subject-matter experts, and from but also *with* host community members themselves (see Towards Ethical Research in Health Impact Assessment memo)<br>• for **ecological grief,** review past IA studies in project location and analogues to get a sense of past environmental change and existing environmental distress<br>• for **risk perception,** assume that risk issues are unique to the project, location, time, and population sub-groups, and due to the context-specific nature of **risk perception** and limited applicability of existing data, gather baseline data on factors underlying **risk perception** from the point of view of stakeholders using workshops, questionnaires, and/or interviews<br>• maintain a cumulative effects lens: **ecological grief** is a function of cumulative environmental change, and **risk perception** is a function of cumulative risk factors, and therefore the baseline should examine the history of environmental change and risk in the host region, the range of present sources of environmental distress and risk, and reasonably foreseeable future sources of distress and risk, so that effects prediction is based upon an understanding of the cumulative effects on mental health along these two pathways, and refine the pathway of effects model during this process of discovery<br>• triangulate all available data, i.e., synthesize all available data to build as complete a picture as possible of past, present, and reasonably foreseeable conditions<br>• interpret mental health outcomes of baseline with respect to significance threshold to put project effects in context (Joseph et al. 2017) |
| Mitigation | • target mitigation 'upstream' in the pathway of effects model, i.e., closer to the project in pathway linkages<br>• explore mitigation measures that aim to address common mental health phenomena, given their overlap with the mental health effects of **ecological grief** and **risk perception**<br>• for **ecological grief**, consider measures such as: enhancing community resiliency, social capital, and social cohesion; 'embracing loss' through collaborative planning for the loss, ensuring community ownership of the knowledge of the loss, and memorializing the loss; cultivating individuals' sense of optimism and resilience, and their coping and self-regulation skills; supporting conservation or other measures that help protect the environmental components that are expected to undergo loss; offsets or compensation for losses (though |

| IA Step | IA Activity |
|---|---|
| | these effects on their own may have minimal effectiveness); increasing familiarity with project, including environmental damage mitigation initiatives; expanding host communities' mental health care services; and establishing environmental change help groups and frequent communication channels (Barnett et al. 2016; Clayton et al. 2017; Cooke et al. 2011)<br>• for **risk perception**, consider measures such as: enhancing sense of place; communication of, and enhancement of, the economic and other benefits of a project; enhancing community resiliency, social capital, and social cohesion; increasing familiarity with project, including risk mitigation initiatives, monitoring, and reporting; and measures that may ameliorate **perceived risk** even if they may not affect **actual risk** (Cooke et al. 2011) |
| Residual Effects Prediction | • predict relative change when absolute change cannot be predicted, i.e., when one cannot quantify changes in environmental distress, use triangulation of available evidence to argue whether environmental distress is likely to increase or decrease<br>• include an effects characterization criterion pertaining to health equity – standard effects characterization criteria in Canada include magnitude, geographic extent, frequency and/or duration, reversibility, and context, and so explicitly include equity as a criterion in order to bring out distributional effects (Shandro and Jokinen 2018)<br>• liaise with other IA practitioners about possible changes in behaviour in affected people, leading to potential effects on other VCs (see Integrating Health Impact Assessment into the Wider Impact Assessment Process)<br>• when mental health is defined by potentially-affected communities, consider collaborative IA given need to objectively predict effects of project on subjectively-defined community definitions of health<br>• draw upon the conclusions in other VCs (e.g., biophysical VCs) as well as any risk assessments (e.g., in an 'accidents and malfunctions' study) to inform pathways of effects pertaining to **ecological grief** and **risk perception** (see Integrating Health Impact Assessment into the Wider Impact Assessment Process)<br>• involve affected people in co-production of knowledge of possible losses (Barnett et al. 2016)<br>• consider use of psychosocial modeling, linking sources of risk, factors that moderate peoples' understanding of risk, and the mental health effects that may result (Baldwin et al. 2020; Baldwin and Rawstorne 2019)<br>• consider how mental health effects may stimulate behavioural change that has its own health or other effects covered in other VCs (Wlodarczyk and Tennyson 2003) |
| Effects Interpretation | • ensure community input into significance determination, either by way of definition of significance threshold, or through community input into meaning of project effects |
| Follow-up | • due to knowledge (epistemic) uncertainty (Gregory et al. 2012) of potential effects on mental health, plan to undertake follow-up monitoring of mitigation effectiveness and actual effects |

| IA Step | IA Activity |
|---|---|
|  | • involve affected communities in monitoring, or better yet implement co-management with affected communities, to help alleviate impacts |

## Case Study: Developing Indicators for Community Conceptions of Health

A common challenge in HIA is how to capture, track, and express the wide variety of health impacts that may occur. This is a challenge for HIA generally, for mental health IA, and for IA of the mental health impacts associated with environmental change.

Gregory et al. (2016) discuss the challenges of indicator selection in the context of Indigenous health. As the authors explain, HIA has often applied an "overly narrow conceptualization of 'health'" when examining potential health impacts on Indigenous people (1-2). The WHO definition of health goes beyond physical disease to recognize social and other **DoH**, but mental health IA needs to go further, and the IA of potential impacts on Indigenous people needs to go further still to "capture many of the more nuanced cultural or social indicators of Native health" (Gregory et al. 2016, 3). Yet Indigenous communities are not alike; rarely can a 'one-size-fits-all' approach be applied across communities. While this case study does not focus on **ecological grief** or **risk perception** specifically, it highlights the need to disentangle the mental health challenges that a project may bring to the fore, and to understand these challenges from the point of view of potentially-affected communities.

Gregory et al. suggest that IA needs to start by engaging directly with the community of interest to understand what health means to the community, and from there to identify indicators that can be used to build a baseline and anchor an IA. They identify four key criteria for indicators to meet: (1) be sufficiently comprehensive as a group to capture the range of interests of potentially-affected communities; (2) be sensitive to change and thereby support the distinction of different types and levels of impacts; (3) cover the range of anticipated health impacts of alternatives under consideration; and (4) highlight key health concerns of the community. The authors highlight several techniques for identifying indicators, including brainstorming with the community to identify **natural metrics** (e.g., depression occurrence, suicide rate), finding **proxy measures** (e.g., use of mental health services, alcohol use), and developing **constructed scales** (think Richter scale, Michelin restaurant rating system, Likert scale).

The authors draw on three case studies to exemplify these techniques, and one of these concerns health from the perspective of an Indigenous community in south-western BC threatened with the loss of access to traditional fishing grounds (the other two are from the US and New Zealand). One **natural metric** and eight **constructed scales** were developed by the community to capture nine dimensions of health (Table 2).

**Table 2. Indicators of health for Indigenous community in southwestern BC**

| Health Component | Description | Measure or Scale[1] |
|---|---|---|
| Physical health | Eating salmon, physical activity of harvesting and processing fish | Poor ↔ great |
| Ceremonial quality | Availability of fish for village ceremonies, funerals, and feasts | Lacking ↔ fulfilling |
| Psychological health | Absence of frustration and anger | Angry ↔ satisfied |
| Emotional health | Absence of embarrassment, shame | Embarrassed ↔ proud |
| Fairness, equity | Being treated differently by government regulators | Treated unfairly ↔ fairly |
| Trust | Confidence in government decision-making and management | Uncertain ↔ confident |
| Economic cost | Cost of replacement foods | Dollars |
| Cultural and traditional opportunities | Lost opportunities to teach, learn, share, or process foods | Few ↔ many opportunities |
| Social and community togetherness | Prospering as a group, looking after each other | Isolation ↔ working together |

Source: Gregory et al. (2016). Note: 1. Each scale had multiple categories; only the end categories of each scale are presented.

This definition of health developed by the community and captured in the range of topics in Table 2 is markedly different from standard conceptions of health. The case study exemplifies how the health of Indigenous people is often directly tied to environment, culture, community, and governance. Assessment of potential mental health impacts associated with environmental change may therefore need to be broad in its scope of coverage.

The case study is also indicative of the challenges in IAs of mental health that should be expected. Assessing the mental health impacts associated with environmental change can be expected to require:

- practitioner enthusiasm, but also skill;
- substantial engagement with potentially affected communities, or even co-creation of the HIA;
- strong relationships with potentially-affected communities;
- time and sufficient budget to carry out quality work; and
- the capability to not just gather baseline information through the lenses of communities' own conceptions of mental health but to make predictions that both reflect communities' understandings of their own health and how, from an objective standpoint, the project can reasonably be expected to affect health.

To achieve the latter, any proponent-led assessment must grapple with its interest bias vis-à-vis potentially-affected communities but also the sensitivity of mental health issues, and for this reason IA of mental health (and health more broadly) might only

succeed through some sort of collaborative IA process (see <u>Towards Ethical Research in Health Impact Assessment</u> memo).

## Key Points to Remember

1. Mental health is a key component of HIA.

2. Mental health has many of the same determinants as physical health, and likewise is strongly linked to other impacts of projects. Therefore, mental health IA must be a part of, and integrated to, the rest of an impact assessment.

3. Mental health impacts are highly contextual. Different people are affected differently, and mental health impacts are also a function of a range of other external and internal factors, all of which must be considered. As is standard in IA, mental health IA should focus on those most vulnerable, and doing so will serve HIA's objective of addressing **health inequity**.

4. **Ecological grief** is a set of mental health conditions resulting from anticipated or actual environmental change.

5. **Risk perception** (also known as 'understanding of risk') is a determinant of mental health associated with perceptions of the probabilities and consequences of risk events.

6. Mental health impacts may be impact end-points or may have other follow-on effects.

7. Indicators of mental health may include **natural metrics**, **proxy measures**, and **constructed scales**, all of which are best developed with potentially-affected communities.

## Key Terms

**actual risk**: risk as calculated by technical risk experts, based on quantitative studies, but divorced from how those potentially affected by risk may feel

**acute effects:** tend to develop suddenly and last a short time

**chronic effects:** tend to develop slowly and last a long time

**constructed scale**: measure of a mental health effect that is developed for a particular analysis because no natural metrics or proxy measures exist or are satisfactory (commonly-known examples of constructed scales include the Richter scale, Michelin restaurant rating system, and Likert scale)

**determinants of health (DoH):** factors that influence peoples' health outcomes

**ecological grief:** grief, pain, sadness, and suffering due to the loss or anticipated loss of ecosystems, places, and other environmental phenomena to which people have a close connection

**health inequity**: equal access, quality, and opportunities for health care (in contrast to health equality which refers to equal health outcomes)

**natural metric**: widely understood and commonly used direct measure of the condition of a phenomenon (e.g., dollars, kms)

**perceived risk**: peoples' perception of the extent of risk they face, often shaped by qualitative characteristics such as voluntariness of exposure, potential for catastrophe, and novelty

**pressure indicators:** indicators of the levels of stress on a value (in the health context, pressure indicators are generally indicators of DoH)

**proxy measure**: indirect measure of the condition of a phenomenon that is well-correlated to its condition, e.g., use of mental health services, alcohol use

**psychoterratic conditions**: mental illness caused by the severing of linkages between people and their home environment (as opposed to somaterratic illness, which is the threats to physical well-being by living in an environment compromised by contamination)

**risk perception**: how people perceive the probabilities and consequences of uncertain events; also known as understanding of risk

**solastalgia**: environmentally-induced mental distress produced by environmental change impacting people in their home environments (as opposed to nostalgia, which is the melancholia or homesickness experienced by individuals away from their loved home)

**state indicators:** indicators of the conditions of values (in the health context, state indicators are generally indicators of health outcomes)

## Sources

### Key Sources

Albrecht, G., G.-M. Sartore, L. Connor, N. Higginbotham, S. Freeman, B. Kelly, H. Stain, A. Tonna and G. Pollard (2007). Solastalgia: The Distress Caused by Environmental Change. Australasian Psychiatry 15: S95-S98.

> This paper provides a good explanation of solastalgia, but also other mental health conditions associated with environmental change. Two Australian case studies are drawn upon to help explain solastalgia: (1) drought, and (2) open-pit coal mining. The authors take the topic back to the global picture, and the relevance of these terms around the world, given global environmental change.

Baldwin, C. and P. Rawstorne (2019). Public understanding of risk in health impact assessment: a psychosocial approach. Impact Assessment and Project Appraisal 37(5): 382-396.

This paper provides a good explanation of risk perception, though the authors prefer the term 'understanding of risk', and presents a method called the psychosocial approach for assessing risk perception in HIA. Risk perception is defined as a DoH, and the authors discuss factors that shape it. Practical realities of mental health IA are discussed, and a model (which could be used to inform a pathways of effects model for mental health IA) is presented. The paper discusses the subjective side to risk, how these shape mental health effects, and the kinds of health effects that can occur. The authors also distinguish risk perception from environmental annoyance, which is the health effect that may occur when people become aware of an environmental effect. This paper is a solid resource for those trying to understand risk perception on a conceptual level, but also from a practical implementation perspective.

Clayton, S., C. M. Manning, K. Krygsman and M. Speiser (2017). Mental Health and Our Changing Climate: Impacts, Implications, and Guidance. San Francisco, USA, ecoAmerica. 69 pp.

This report covers how climate change is affecting mental health. While not stated as such, this is a good resource on ecological grief. The report explains the connection between climate change and mental health, describes factors shaping peoples' sensitivity to health effects, and describes acute and chronic mental health impacts. Recommendations are provided for health practitioners and policy makers, and some of this material is relevant to HIA practitioners and proponents seeking to mitigate health impacts of environmental change.

Cooke, A., L. Friedli, T. Coggins, N. Edmonds, J. Michaelson, K. O'Hara, L. Snowden, J. Stansfield, N. Steuer and A. Scott-Samuel (2011). Mental Well-being Impact Assessment: A Toolkit for Well-being. London, National MWIA Collaborative.

This may be the most detailed and comprehensive guidebook available on how to do mental health IA and is the guide for the UK stream called 'mental well-being impact assessment'. There are five chapters in the guidebook: (1) overview of the method, (2) detailed evidence on how mental health can be affected by projects, programs, and policies, (3) a screening method, (4) the complete IA method, (5) monitoring and indicators, and (6) more resources for practitioners. The terminology and order of the steps suggested in the method differs from typical Canadian IA, but this guidebook and the method it describes is apparently well-established in the UK, and there is substantial content in the guidebook that will be useful to practitioners assessing mental health impacts of projects.

Lucyk, K. (2015). Report on Mental Health in Health Impact Assessment. Calgary, AB, Habitat Health Impact Consulting. 79 pp.

This report from a prominent Canadian HIA consultant is a great resource for understanding the history and context of mental health IA, but also is a great resource on data sources, scoping mental health issues, making pathway of effects models, indicators of mental health, methods of mental health IA, and case studies. This report will provide readers with both a good contextual understanding of mental health IA, but also provide solid methodological guidance.

St-Pierre, L. (2016). Mental Health in the Field of Health Impact Assessment. Montreal, QC, National Collaborating Centre for Healthy Public Policy. 12 pp.

This short piece provides a good overview of the history of mental health IA within the broader HIA field and compares the three mental health IA streams of the UK, the US, and SOPHIA. The

document also captures key themes in the practice of mental health IA overall, such as the interest in promoting mental wellness (as opposed to just the absence of illness), and the need to think about the distribution of HIA (i.e., health equity). Practitioners will benefit from the perspective on mental health IA provided in this report.

## Other Sources

Albrecht, G. (2011). Chronic Environmental Change: Emerging 'Psychoterratic' Syndromes. In: Climate Change and Human Well-Being. International and Cultural Psychology. I. Weissbecker. New York, USA, Springer.

Baldwin, C., B. Cave and P. Rawstorne (2020). Measuring the Impact of Public Understandings of Risk from Urban and Industrial Development on Community Psychosocial Well-Being: a Mixed Methods Strategy. International Journal of Community Well-Being 3(1): 57-82.

Barnett, J., P. Tschakert, L. Head and W. N. Adger (2016). A science of loss. Nature Climate Change 6(11): 976-978.

Barron, T., M. R. Orenstein and A.-L. Tamburrini (2010). Health Effects Assessment Tool (HEAT): An Innovative Guide for HIA in Resource Development Projects. Habitat Health Impact Consulting & ERM. 34 pp.

Bhatia, R., L. Farhang, J. C. Heller, M. Lee, M. Orenstein, M. Richardson and A. Wernham (2014). Minimum Elements Practice Standards HIA. Society for Practitioners of Health Impact Assessment. 11 pp.

CIHR and IAAC (Canadian Institutes of Health Research & Impact Assessment Agency of Canada) (2020). Best Brains Exchange Report: Mental Health Outcomes and Impact Assessment. Ottawa, ON. 19 pp.

Cordial, P., R. Riding-Malon and H. Lips (2012). The Effects of Mountaintop Removal Coal Mining on Mental Health, Well-Being, and Community Health in Central Appalachia. Ecopsychology 4(3): 201-208.

Cunsolo, A. (2018) To Grief or Not to Grieve? NiCHE (Network in Canadian History & Environment), https://niche-canada.org/2018/01/19/to-grieve-or-not-to-grieve/.

Cunsolo, A. and N. R. Ellis (2018). Ecological grief as a mental health response to climate change-related loss. Nature Climate Change 8(4): 275-281.

Durkalec, A., C. Furgal, M. W. Skinner and T. Sheldon (2015). Climate change influences on environment as a determinant of Indigenous health: Relationships to place, sea ice, and health in an Inuit community. Soc Sci Med 136-137: 17-26.

Fiorino, D. J. (1989). Technical and Democratic Values in Risk Analysis. Risk Analysis 9(3): 293-299.

Galway, L. P., T. Beery, K. Jones-Casey and K. Tasala (2019). Mapping the Solastalgia Literature: A Scoping Review Study. Int J Environ Res Public Health 16(15).

Ganesharajah, C. (2009). Indigenous Health and Wellbeing: The Importance of Country. Australian Institute of Aboriginal and Torres Strait Islander Studies. 43 pp.

Gregory, R., L. Failing, M. Harstone, G. Long, T. L. McDaniels and D. Ohlson (2012). Structured Decision Making: A Practical Guide to Environmental Management Choices, Wiley-Blackwell. 299 pp.

Gregory, R. S. and T. A. Satterfield (2002). Beyond Perception: The Experience of Risk and Stigma in Community Contexts. Risk Analysis 22(2): 347-358.

Gregory, R., P. Slovic and J. Flynn (1996). Risk perceptions, stigma, and health policy. Health & Place 2(4): 213-220.

Gregory, R., D. Easterling, N. Kaechele and W. Trousdale (2016). Values-Based Measures of Impacts to Indigenous Health. Risk Analysis 36(8): 1581-1588.

Health Canada (2004). Canadian Handbook on Health Impact Assessment. Volumes 2 and 3.

Hendryx, M. and K. A. Innes-Wimsatt (2013). Increased Risk of Depression for People Living in Coal Mining Areas of Central Appalachia. Ecopsychology 5(3): 179-187.

Howard, C., C. Rose and N. Rivers (2018). Lancet Countdown 2018 Report: Briefing for Canadian Policymakers. Lancet Countdown: Tracking Progress on Health and Climate Change, Canadian Medical Association, and Canadian Public Health Association. 24 pp.

Jasanoff, S. (1993). Bridging the Two Cultures of Risk Analysis. Risk Analysis 13(2): 123-129.

Joseph, C., T. Zeeg, D. Angus, A. Usborne and E. Mutrie (2017). Use of significance thresholds to integrate cumulative effects into project-level socio-economic impact assessment in Canada. Environmental Impact Assessment Review 67: 1-9.

Lalani, N. (2011). Mental Well-being Impact Assessment: A Primer. Toronto, Wellesley Institute. 8 pp.

Marshall, N., W. N. Adger, C. Benham, K. Brown, M. I Curnock, G. G. Gurney, P. Marshall, P. L Pert and L. Thiault (2019). Reef Grief: investigating the relationship between place meanings and place change on the Great Barrier Reef, Australia. Sustainability Science 14(3): 579-587.

NCCHPP (National Collaborating Centre for Healthy Public Policy) (2008). Health Impact Assessment (HIA): Guides & Tools. National Collaborating Centre for Health Public Policy & Institut national de sante publique (Quebec). 22 pp.

Orenstein, M., M. Lee and A. Angel (2013). Determinants of health and Industrial Development in the Regional Municipality of Wood Buffalo. Calgary, AB, Habitat Health Impact Consulting. 79 pp.

Shandro, J. and L. Jokinen (2018). A Guideline for Conducting Health Impact Assessment for First Nations in British Columbia. Tsimshian Environmental Stewardship Authority. 33 pp.

Slovic, P. (1987). Perception of Risk. Science 236(4799): 280-285.

Westwood, E. and M. Orenstein (2016). Resource Kit for HIA Practitioners: HIA for Industrial Projects. Habitat Health Impact Consulting. 44 pp.

WHO (World Health Organization) (1948). Preamble to the Constitution of WHO as adopted by the International Health Conference, New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of WHO, no. 2, p. 100) and entered into force on 7 April 1948.

____ (Undated). The 1st International Conference on Health Promotion, Ottawa, 1986. https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference. Accessed on January 19, 2021.

Wlodarczyk, T. L. and J. Tennyson (2003). Social and economic effects from attitudes towards risk. Impact Assessment and Project Appraisal 21(3): 179-185.

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