

## Picture this: Investigating mental health impacts of climate change on youth using a photovoice intervention

Imagine isto: Investigando os impactos das mudanças climáticas na saúde mental dos jovens utilizando a metodologia *photovoice* como intervenção

Enquête sur les effets du changement climatique sur la santé mentale des jeunes à l'aide d'une intervention photovoice

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### Abstract

This paper focuses on the mental health impacts of climate change in youth and young adults, with a specific interest in undergraduates in environmentally-related programs of study. We used photovoice methodology as a data collection tool and simultaneously analyzed it as a potential intervention to manage climate-related mental health impacts and empower youth. Youth involved in the study experienced diverse climate-related mental health impacts derived from a range of experiences, including environmental education itself. To cope, study participants drew on several primary sources of resilience, including spending time in nature, participating in the community, taking environmental action, and practicing mindful reflection. Our study found that through participation in photovoice, which reflects key elements of these coping strategies, youth experienced subjective improvements in mental health and well-being and feelings of empowerment. We conclude with recommendations for managing climate-related mental health impacts and improving supports, specifically in post-secondary institutions.

**Keywords:** eco-anxiety, eco-grief, photovoice, youth, climate change

### Resumo

Este artigo foca nos impactos das mudanças climáticas na saúde mental de jovens e adultos/as, especificamente os/as estudantes universitários/as de programas relacionados com o meio ambiente. A metodologia *photovoice* foi utilizada como ferramenta de recolha de dados e analisada como potencial intervenção para gerir os impactos na saúde mental relacionado com o clima e empoderar os/as jovens. Os/As jovens envolvidos/as experimentaram diversos impactos na saúde mental relacionados com as mudanças climáticas, derivados de experiências, incluindo a própria educação ambiental. Para lidar com isso, os/as participantes recorreram a fontes primárias de resiliência, incluindo passar tempo na natureza, participar de atividades na comunidade, promover ações ambientais e praticar reflexão consciente. O estudo a partir da metodologia *photovoice*

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reflete elementos-chave dessas estratégias de *coping* e os/as jovens experimentaram melhorias subjetivas na saúde mental e bem-estar, desenvolvendo empoderamento. Concluimos, recomendando a gestão dos impactos na saúde mental relacionados com as mudanças climáticas, melhorando o apoio à saúde mental em instituições pós-secundárias.

**Palavras-chave:** eco-ansiedade, eco-luto, *photovoice*, jovem, mudanças climáticas

### Résumé

Cet article porte sur les effets du changement climatique sur la santé mentale des jeunes et des jeunes adultes, avec un intérêt particulier pour les étudiants de premier cycle inscrits à des programmes d'études liés à l'environnement. Nous avons utilisé la méthodologie "photovoice" comme outil de collecte de données et l'avons analysée simultanément comme une intervention potentielle pour gérer les impacts sur la santé mentale liés au climat et responsabiliser les jeunes. Les jeunes participant à l'étude ont fait face à divers impacts sur leur santé mentale liés au climat, découlant d'une série d'expériences, dont l'éducation environnementale elle-même. Pour y faire face, les participants à l'étude ont puisé dans plusieurs sources primaires de résilience, notamment en se reconnectant avec la nature, en participant avec leur communauté, en prenant des mesures environnementales, et en pratiquant la réflexion attentive. Notre étude a révélé qu'en participant au "photovoice", qui reflète les éléments clés de ces stratégies d'adaptation, les jeunes ont connu des améliorations subjectives de leur santé mentale et de leur bien-être, ainsi que des sentiments d'autonomisation. Nous concluons par des recommandations pour gérer les impacts sur la santé mentale liés au climat et améliorer les soutiens, en particulier dans les établissements postsecondaires.

**Mots-clés:** éco-anxiété, éco-deuil, photovoice, jeunesse, changement climatique

A growing body of research is finding that the threat of climate change, whether experienced directly or indirectly, can result in "emotional distress and anxiety about the future, leaving many individuals feeling scared, sad, depressed, numb, helpless and hopeless, frustrated or angry" (Helm et al., 2018, p. 161). When experienced directly, climate impacts can cause severe psychological trauma, including cases of depression, anxiety, post-traumatic stress disorder, and suicide (Clayton et al., 2017). Even in cases of indirect impacts, awareness of climate change can compound existing stressors and lead to depression, anxiety, and maladaptive behaviors (Panu, 2018).

The past decade has seen a rise in both chronic and acute mental health effects of climate change. Recent Canadian research, which is the context of our study, has documented a sharp increase in climate-related mental health effects, with 79% of Canadians expressing concern about the impacts of climate change (Cunsolo et al., 2020). Internationally, the impact of climate change on mental health is now widely accepted; In 2019, the first International Summit on Psychology's Contributions to Global Health, involving over 40 national psychological associations, passed a resolution "acknowledging that climate change poses a serious threat to mental health and signaling a desire to deal with the problem" (Craps, 2020, p. 3).

Young people are particularly vulnerable. Teens are old enough to have a strong

comprehension of the science and failures of political actors to adequately address the situation, breeding increasing frustration and hopelessness (Baker et al., 2021). One survey of British youth found that 73% were “worried about the state of the planet” (Cunsolo et al., 2020, p. 261) and 19% have had bad dreams about climate change. A global survey across 10 countries found that “45% of respondents said their feelings about climate change negatively affected their daily life and functioning” (Hickman et al., 2021, p. 863). A growing number of young adults cite concerns around climate change as a reason for choosing not to have their own children (Panu, 2020). Scholars point out that some youth face compounding vulnerabilities based on socio-economic status, race, culture, gender, and environmental justice issues (Clayton et al., 2017).

Learning about climate change and its impacts may itself contribute. Clayton (2018) argues that intimate awareness of and engagement with climate information is “a prerequisite for an emotional response” (p. 260). Not surprisingly, evidence suggests that young climate activists and university students enrolled in environmentally-related programs are particularly vulnerable to eco-anxiety and related mental health impacts (Kelly, 2017; Kluttz, 2020; Wallace et al., 2020). In the context of post-secondary education, climate-related mental health impacts are often compounded by the stresses of an undergraduate degree (Ramasubramanian, 2016; Wallace et al., 2020). An Australian study found that undergraduate environment students report higher rates of climate-related anxiety than their non-environment counterparts, and about half feel that their institutions do not adequately prepare them to manage these mental health impacts (Kelly, 2017). A recent review of 49 post-secondary institutions in Canada, the US, and internationally concluded, similarly, that “action on mental health and the climate crisis is overall quite limited in the context of post-secondary institutions” (Kluttz, 2020, p. 17).

Despite these vulnerabilities, young people are change-makers with ideas, vision, and energy (Trott, 2019). The *Fridays for Future* movement inspired by Greta Thunberg is an excellent example of the capacities of youth to take direct action and influence the political sphere (Panu, 2020). For young people in a time of climate change, “the moral failure of business-as-usual avoidance responses” (Moser, 2019, p. 5) from parties in power is salt in the wound. Bearing witness to ecological destruction and watching political leaders sit idle while being fed narratives of a “bright future” is an impossible reconciliation.

Though in severe cases eco-anxiety can be detrimental, mild anxiety can encourage information-seeking and problem-solving behaviours (Panu, 2020). A healthy and manageable level of worry about climate change can facilitate education (Ojala, 2016) and foster sustainable behaviours (Lewis, 2018). In other words, “without anxiety, little would be accomplished” (Panu, 2020, p. 12). Given the context of climate change, eco-anxiety is a rational, appropriate, and moral response (Lewis, 2018; Panu, 2020); however, any mental health intervention without collective action to halt climate change itself risks ignoring the primary driver of distress (Hickman et al., 2021). In the meantime, managing mental health impacts at the individual level

in ways that acknowledge peoples' experiences and foster action, while preventing debilitating effects, may be the most effective course of action. In the context of this research, the phrase "mental health impacts" refers to the negative emotional and mental experiences elicited when witnessing or thinking about climate change. The "mental health impacts" discussed are not limited to acute or clinical diagnoses, and we do not intend to pathologize these experiences; in fact, they are the apt, empathetic and natural responses of many to the catastrophic impacts of climate change. We use "mental health impacts" broadly to acknowledge the destabilizing, demoralizing and demotivating emotional and psychological effects that can occur.

The literature reveals factors that mitigate eco-anxiety and other climate-related mental health issues. Indigenous worldviews have long expressed that a connection to the land is important to "all aspects of physical, spiritual, emotional, and mental health and well-being" (Mashford-Pringle & Stewart, 2019, p. 65). Indeed, a large body of evidence has found that interacting with nature can reduce stress (e.g., Clayton et al., 2017; Franco et al., 2017; Hatala et al., 2020) and have a "restorative function and rehabilitative benefits" (Nurse et al., 2010, p. 28). In 1984, Edward Osborne Wilson crafted the *biophilia hypothesis* to describe this phenomenon, and more recently, Louv (2008) coined the term "nature-deficit disorder" to describe a range of behavioral and emotional problems among children believed to result from too little time spent outdoors. Mindfulness practices like journaling, yoga and artistic self-expression that "focus attention on regulation, bodily awareness, and non-reactivity to inner experiences" (Ramasubramanian, 2016, p. 308) can also promote well-being, increase resiliency and mitigate anxiety and depression, especially when connected to nature.

## Photovoice

Originally developed by Wang and Burris (1997), photovoice is a participatory action research (PAR) method that draws from feminist theory, documentary photography, and empowerment education for critical consciousness (Sutton-Brown, 2014). Empowerment is a key pillar of photovoice research as participants are actively involved in data collection and analysis (Bulla & Steelman, 2016). Traditionally, photovoice methodology is conducted through a multi-step process, recruiting community members as participants who take photographs based on particular themes, engage in discussion of the images with one another, and then share the photographs and data with local policy-makers (Sutton-Brown, 2014). The engagement in critical dialogue through focus groups is crucial, allowing participants to partake in meaning-making and analysis, determining for themselves the themes and issues of importance.

Some traditional areas of application include public health, and social and environmental justice (Bulla & Steelman, 2016), but this methodology has been used to engage youth on various

research topics (Rose et al., 2017). As a PAR method, photovoice aims to generate knowledge, engage youth and amplify their voices in matters such as climate change that will have major impacts on their futures (Hatala et al., 2020). Photovoice has been used to engage youth in a range of environmental and conservation efforts (Bulla & Steelman, 2016; Derr & Simmons, 2020; Trott, 2019) and has been shown to improve both learning outcomes and sense of agency in environmental education (Sprague et al., 2021). Cook (2014), for instance, found that the use of photovoice improved undergraduate students' learning of scientific concepts and increased interest in local environmental issues.

Photovoice has also been used to understand the lived experiences of mental health (Han & Oliffe, 2016). While few studies have explored the application of photovoice to eco-anxiety specifically, the methodology represents a promising tool for addressing the broad range of climate emotions experienced by youth (Baker et al., 2021). Capturing photographs and conversing with others can lead to critical thinking, self-reflection, the discovery of strengths and perspectives, and the development of social support (Han & Oliffe, 2015; Vélez-Grau, 2019). Photovoice can create opportunities for youth to not only interact with nature but also consider how those interactions contribute to their well-being (Hatala et al., 2020; Helm et al., 2018). Photovoice is a creative medium through which young people can grapple with ideas of place, identity, and community, and consider sustainable solutions to local environmental problems (Trott, 2019). Moreover, the PAR nature of photovoice may help to combat the sense of paralysis experienced in relation to climate change and provide “therapeutic value” (Han & Oliffe, 2015, p. 122; Trott, 2019).

In this paper, we focus on the mental health impacts of climate change in young people in a medium-sized city in southern Ontario, Canada, with a specific interest in undergraduate students in environmentally-related programs of study. Photovoice methodology is used as a data collection tool and is simultaneously analyzed as a potential intervention to manage climate-related mental health impacts.

## Methodology

The central purpose of this study was to explore the potential of using photovoice to understand and improve the mental health dimension of climate change among youth. This study involved a mixed-method approach, combining unique but complementary data sources: a survey of eco-anxiety, a photovoice exercise, and focus groups exploring the meanings of photovoice outcomes and the experience of participating in the exercise. While the survey quantified the commonality and severity of eco-anxiety among the student population, the photovoice exercise and focus groups provided detailed and personal qualitative accounts of

students' climate-related mental health experiences. Participants between the ages of 16 and 23 were drawn from a university campus and community-based environmental networks in Waterloo, Ontario, Canada. This project received ethical clearance from a University of Waterloo Research Ethics Committee and took all necessary steps to ensure ethical approaches in the recruitment and involvement of the youth participants and the use, management, and storage of data.

### Eco-Anxiety Survey

This survey was used to collect contextual data concerning the mental health impacts of climate change among youth in Waterloo, Ontario and recruit participants for the study's photovoice and focus group portions. The survey was administered electronically to 66 members of local community-based climate action groups and student associations, and to students enrolled in climate-related undergraduate programs at the University of Waterloo. Excluding a brief demographic data section, the survey contained a total of 32 items, 24 from a questionnaire specifically developed to quantify climate anxiety using questions that measure cognitive-emotional and functional impairment, the experience of climate change, and climate action (Clayton & Karazsia, 2020). A description of the photovoice and focus group components was included at the end of the initial survey and interested respondents were asked to provide an email address to contact them with information about the next steps. Survey responses for each scale and question were aggregated for descriptive statistics, calculating the average response for each measure. Given the focus on qualitative methods and because probability sampling was beyond the scope of the survey elements of this project, inferential statistical analyses were not used to determine the statistical significance of the survey results.

### Photovoice activity

Photovoice activity participants were asked to take photographs over a two-week period that addressed two prompting questions: (1) "Does climate change impact your mental well-being or sense of happiness? If so, how?" and (2) "In spite of the climate crisis, what gives you courage for the future?" Participants were asked to submit one photograph and written description for each prompt. Photographs were visually analyzed by the researcher at a basic level for subject matter.

## Focus groups

A total of three video conference focus groups were organized to engage seven participants in sharing and discussing their photographs and emerging themes. Each focus group was guided by two consistent rounds of discussion based on the prompting questions, photographs, and written descriptions. The first round explored how climate change impacted participants' mental well-being, and the second reflected on participants' sources of courage. After sharing photographs and reading written descriptions aloud to the group, focus group participants were asked additional questions to maximize conversation and reflection on experiences of climate change, climate action, and mental health, including, "Did you notice any shared themes, ideas or experiences between your photographs and written descriptions?" and "Is there anything not captured in the photographs that you wanted to mention?". The focus groups were audio-recorded and transcribed for analysis. The transcripts were manually coded using word processing software and then thematically analyzed for dominant, recurrent, and discordant ideas, along with shifts and gaps in conversation. Theoretical insights and other results of this thematic analysis are presented below.

## Results

### Survey results

Findings from our survey confirm that our sample of youth were experiencing climate anxiety. A total of 66 individuals between the ages of 17 and 23, (mean = 20) completed the survey (73% female, 20% male, 7% non-identified); over half (55%) reported "never" or "rarely" feeling hopeful for the future regarding climate change. A total of (66%) reported having had a nightmare about climate change, and in response to scale items measuring cognitive-emotional impairment, 26% reported difficulty functioning more often than "sometimes", surpassing the 25% threshold above which the scale designers state that "climate change is beginning to have a significant effect on mental health" (Clayton & Karazsia, 2020, p. 6). Eighty-eight percent (88%) of our survey respondents reported noticing landscape changes in a place of personal significance due to climate change. Qualitative photovoice activity and focus group data provide a personal, visual, and verbal account of the impacts measured in the quantitative data.

### Themes from photovoice activity and focus groups

A total of 12 of the 14 photographs captured in the photovoice activity featured natural landscapes of personal importance to the participants. Many of the places captured were local to the participant's home, while some were related to school projects or vacation destinations. Only 2 of the 14 photographs featured human subjects, 3 featured animal subjects, and 4 featured waterbodies. While sharing and discussing the images in the focus groups, three broad themes emerged: Encounters Leading to Mental Health Impacts of Climate Change, Mental Health Impacts of Climate Change/Emotional States, and Coping Strategies and Facilitators of Resilience (defined as participants' ongoing ability to function despite mental health impacts of climate change).

### ***Encounters leading to mental health impacts of climate change***

***Deterioration of places of personal importance.*** The most frequently cited encounter leading to mental health impacts of climate change was witnessing changes or deterioration to places of personal importance, including landscape changes, the loss or displacement of species, and intense weather. Several photographs highlighted landscape changes due to development; illegal resource extraction; litter; habitat degradation; intense weather events; sea and lake level rise; flooding and pollution. Participants also referenced the loss or displacement of species, both flora and fauna, noting several endangered species. One focus group participant reflected on these landscape changes as a unique, yet common, experience:

I live inland, so I see change in local forests, whereas you live coastal, and you're seeing a totally different problem. It just shows how far-reaching climate change is. It's not just going to be small pockets, it's happening everywhere, and it's impacting everyone differently. (Jennifer Rhynas<sup>1</sup>)

In some cases, changes due to intense weather events were associated with an increased sense of danger and volatility, including fear of increased disease, violence, and infrastructure damage, as depicted in the following quotation:

I've always lived a 10-minute walk to the river. Its role in my life has changed along with the climate. As a child, we'd swim there almost every day and we'd skate on the shallow parts in the winter frequently. But after two floods... and unstable ice from the rapid freeze thaw cycles, the river is also a frequent reminder that climate change is occurring. (FG1, P1; see Figure 1)

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<sup>1</sup> Some participants are identified, with ethics committee approval, at the request of the participant. For all others, an alphanumeric code is used to differentiate the participants and their contributions.



FIGURE 1

FG1, P1, prompt 1 (impacts) photovoice image, ice-encased plant by the river



Climate education. The next most common encounter leading to mental health impacts of climate change among focus group participants was educational exposure to climate-related information. Participants explained that studying climate change makes its consequences an inescapable reality: “I’ve been trained now to see signs of lack of health on the landscape everywhere I go, so it’s impossible to ignore it” (Emily Swerdfager).

Without solutions-focused narratives, post-secondary environmental education can reinforce a sense of helplessness: “All it does is really talk about the negatives, and never the positives... So you just become trapped in the cycle of learning about negativity and not learning what to do about it” (Mackenzie Cosman).

Another participant described a similar dynamic in reference to the experience of collecting data for their thesis:

The more that I was learning about that landscape, the more heartbreaking and devastating it was. As I was falling more in love with it, it was also breaking my heart. I was coming to see all the signs of deterioration. (Emily Swerdfager)

“Our education can be a process of accumulating worry”, one participant remarked (FG2, P3). Compounding these concerns, our focus group data suggests that guilt and despair are derived from learning about the history and lived reality of the colonization and violence towards Indigenous communities.

Consideration of future generations. Considering future generations was another pathway through which climate-related mental health impacts were experienced. Participants expressed

concern for younger generations, which manifested in blanket statements and personal stories, as encapsulated in this quotation:

My brother just had a baby in November... and that has been a huge joy in my life. But it also... was so heartbreaking because I think about how, when she gets to be my age, she might not ever get to see the snow-capped mountains. These places that I really want to bring her to, might not be there. (Emily Swerdfager; see Figure 2)

FIGURE 2

**Emily Swerdfager, prompt 1 (impacts) photovoice image, melting glacier and snow-capped mountains**



**Media exposure.** Exposure to climate change information via media emerged in the data as a potential pathway for mental health impacts. Participants mentioned avoiding the coverage of devastating impacts of climate change frequently featured on news programming and expressed interest in more positive news stories: “If there was a CP24 for good news, I would watch that” (FG2, P3).

#### *Mental health impacts of climate change/emotional states*

**Eco-grief.** Themes of grief frequently emerge in our data, both directly and indirectly, through expressions such as “a heavy feeling”, “feeling bogged down”, “deep sadness”, and the feeling of “inheriting a dying world”. “It’s really hard when your happy place and the place that gives you peace of mind is also the place that is the source of a lot of your deepest anxiety and grief” (Emily Swerdfager). For at least one participant, a sense of “eco-grief” applied to landscapes

and creatures already lost to environmental destruction, as well as those yet to be lost.

***Anxiety and worry.*** Anxiety and worry were frequently captured in the photographs, which focus group participants attributed to perceived or anticipated landscape changes, concern about the intensification of climate change, and uncertainty for one's future. Uncertainty emerged as a notable subtheme in participants' attributions of the source of anxiety, as illustrated in the following quotation: "It's these uncertainties that impact my mental health when unpredictable consequences affect places I love most" (Mackenzie Cosman). One participant stated that they would not have children because of their experience with climate anxiety, and another said, "It makes me very upset to think about my future and my potential children's future" (Jennifer Rynas).

***Guilt.*** In some of the focus group data, guilt was conveyed through descriptions of personal efforts to combat climate change as inadequate or expressing a sense of self-imposed pressure to do more. Some data points reflected guilt about making unsustainable choices or avoiding thinking about climate change out of self-preservation. As one participant observed, "Having an added sense of responsibility opens up a door for guilt when you're not doing enough; and it can be paralyzing" (FG2, P3).

***Hopelessness.*** Feelings of hopelessness and powerlessness were mentioned in the focus group discussions. One participant, for example, described a sense of "powerlessness that my friends and I feel about what we're supposed to be doing and what actual steps we're supposed to be taking" (FG1, P1). Another explained that their individual actions feel so small that they question whether those actions matter. One participant even cited functional impairments resulting from the mental health impacts of climate change they experienced, including difficulty focusing on and completing schoolwork, and trouble making upbeat small talk:

As an environment student and young adult, there is a serious level of frustration, pressure, and sadness that comes with dealing with these topics, especially when I often think about where we went wrong and how we became so disconnected from our planet. And I think it's only going to get worse before it gets better. (FG2, P3)

### ***Coping strategies and facilitators of resilience***

Our focus group discussions about hope shed light on sources of resilience and courage for the future despite the climate crisis, including time spent in nature, a sense of community,

political and environmental action, avoidance, and humour.

***Spending time in nature.*** The most frequently cited theme surrounding hope was spending time in nature, which participants associated with captivation, peace, harmony, hope, calm, grounding, recharging, ease of worries, and strengthened connection to the natural world. Not only did participants report that spending time in nature gives them courage for the future but, for some, seeing other people connecting with nature did as well: “Watching people interact with nature... made me hopeful that stronger connections to nature will make people more likely to take steps to protect it and to reduce their impact” (FG1, P1). One participant described access to natural spaces as “life-changing”. Outdoor recreation and education were mentioned as active ways to spend time in nature and facilitate coping.

***Encounters with other species.*** Photographs and focus group discussions suggested that encounters with other species were perceived as important, emotional, and profound moments. These encounters were recounted as “magical”, “motivational”, “joyful”, and an opportunity for relationship-making and trust-building. Our data suggested that, for some, encounters with nature foster hope: “Seeing the Great Blue Heron reminds me that not all is lost and that I should enjoy my time in nature, rather than worrying whether it will last; focusing on just observing the things around while they’re here” (FG1, P1; see Figure 3).

FIGURE 3

FG1, P1, prompt 2 (courage) photovoice image, Great Blue Heron flying



A particularly strong theme that emerged was nature’s inspirational impact. Focus group participants commented on the carbon-absorbing ability of forests, the wondrous interconnection of trees in underground networks, and the resiliency and adaptability of

ecosystems: “This is why forests give me courage for the future, because it’s a constant reminder of ecological processes still working in our favour” (Mackenzie Cosman). Encounters with nature may be a source of resolve: “The truth I found in the caribou’s eyes will never let me deny the urgency of our environmental crisis or my responsibility to take action” (Emily Swerdfager; see Figure 4).

FIGURE 4

Emily Swerdfager, prompt 2 (courage) photovoice image, endangered caribou



Nature can be energizing, as depicted in the following quotation:

It’s motivating to keep doing this work of fighting the biodiversity crisis because I know that there are still more beautiful landscapes and species that I’ll get to see along the way. Even if they aren’t here for that long, to get to see them is a privilege, and I hope to try and tell their stories as much as I can through those experiences. (Emily Swerdfager)

**Community.** Community was the second most highly discussed topic concerning coping: “I think that interconnection [of nature] also reminds me of the importance of being interconnected with my own community, because I feel like that’s where you find resilience” (FG2, P1).

Participants spoke of resiliency that comes from a sense of community, the power in putting aside differences and coming together, and the importance of empowerment.

**Future generations.** Within this theme were subthemes about the capacity of youth and the value of a childlike sense of wonder: “Kids are so full of wonder and curiosity, they’re so

excited to learn and discover new things. I truly think that they can help battle climate change” (Jennifer Rhynas).

***Indigenous knowledge.*** Indigenous knowledge and Indigenous communities were highlighted by participants as a source of hope and courage for the future. A desire to strengthen and empower Indigenous communities and respectfully learn from their cultures was expressed.

***Participation in political and environmental action.*** A strong, recurring theme in the focus group data was that involvement in political and environmental action fosters resiliency. Participants mentioned small-scale individual actions, such as growing one’s own food, eating less meat, and conserving energy and water. Larger-scale community actions were discussed, including urban biodiversity initiatives, creation of accessible green spaces and increased opportunities for outdoor recreation. A need for systemic change emerged as a minor yet fundamental subtheme in our data, as participants acknowledged that the roots of the climate crisis (and the resulting mental health impacts) cannot be addressed without it.

***Avoidance.*** Though a less-prominent theme, some participants actively avoided thinking about climate change, compartmentalizing their thoughts in order to cope. Our data suggested that avoidance can create other emotional reactions. One participant, for instance, described how guilt was the fallout of using avoidance as a coping mechanism: “While climate change is scary to think about, I tend to not think about it and I don’t invest a lot of time or emotional bandwidth to that. And... that can make me feel really guilty” (Jennifer Rhynas).

***Sense of humour.*** Humour emerged as a minor theme in the data on resilience. Focus group participants suggested that a sense of humour is a means of striking a balance between the seriousness of important issues and enjoyment of life: “Humour plays an interesting role when we express some of the darker things in life and the climate crisis is definitely one of them” (FG2, P3).

### ***The post-secondary context***

While not explicitly embedded in focus group protocol, several observations about the post-secondary context emerged as themes in focus group discussions.

Lack of recognition or support. A perceived lack of acknowledgement of the mental health

impacts of climate change within environmental education was a strong theme in the data about resilience as illustrated by the following quote:

That's something that frustrates me, especially with working on my thesis. It takes me a long time to get something done because not only am I processing through the data, I'm also processing through these devastating feelings of grief and loss. I wish there was way more support for that in my academic experience. (Emily Swerdfager)

Participants shared a common perception that climate emotions were not openly discussed in academia and that specific supports were therefore rare and difficult to access. The focus group data conveyed a desire for more discussion to help students process the emotional impacts of environmental education:

I don't see why these kinds of conversations couldn't be happening more often within the faculty or within our education because I think they're important and it gives people a chance to know that other people are feeling the same way. (FG2, P3)

### *Participant experience in photovoice activity and focus groups*

All participants indicated that participating in photovoice activities and focus groups such as the one featured in this research can positively change perspectives and is an empowering experience. When asked what they found meaningful or empowering about it, participants said the following:

Connecting with other people who have similar experiences, as well as having a space to share creatively and capture my climate anxiety through art.

I felt like my voice was valued and I had the space to share my thoughts without being interrupted or undermined.

It was very empowering to hear why other people had hope for the future and being able to relate that to my own situation.

## **Discussion**

To preface the discussion, we acknowledge the danger in individualizing and pathologizing the mental health impacts of climate change. To do so would risk downplaying the global nature of these experiences and placing responsibility for mitigating or managing climate change (and

the resulting mental health impacts) on the individual alone (Hickman et al., 2017). While this study focusses on sources of individual resilience and provides recommended actions for post-secondary institutions to aid students in managing mental health impacts, it is of utmost importance that parties in power, including universities, take direct and meaningful action to mitigate climate change, thus addressing the root of the distress.

Consistent with other research, our study found high levels of eco-anxiety and other climate-related mental health effects among young people in Waterloo, Ontario (Hickman et al., 2021; Kelly, 2017; Wallace et al., 2020). The proportion of respondents who reported difficulties in functioning due to climate anxiety (26%) indicates that climate change is having a “considerable effect on mental health” (Clayton & Karazsia, 2020, p. 6); the 66% of respondents who have had a nightmare about climate change compares to only 19% in a recent survey of British youth (Cunsolo et al., 2020). Both the photography and focus group discussion conveyed almost as wide a range of mental health impacts as are present in the literature: eco-grief, eco-anxiety, guilt, hopelessness, anger, frustration, and functional impairment. The focus groups revealed the presence of vicarious, anticipatory grief, and other indirect mental health impacts as a result of learning about current and projected climate impacts (Kluttz, 2020).

Together, the survey results, photographs, and focus group data clearly indicate that directly witnessing changes in natural places of personal significance is a prevalent source of the climate-related anxiety that youth experience. Among university students enrolled in environmentally-related programs, who accounted for most of our participants, the mental health impacts of direct exposure to ecological decay were compounded by educational exposure. Consistent with other related literature (i.e., Kelly, 2017; Kluttz, 2020; Ramasubramanian, 2016; Wallace et al., 2020), our participants discussed how constant engagement with climate change research through classes and projects (without adequate support to emotionally process the information) was an emotional burden that contributed to feelings of eco-anxiety and eco-grief. They also shared that their university was not adequately addressing the mental health impacts associated with the content of their degree or preparing students to manage those impacts.

Our findings on sources of resilience corroborate existing research as well. Spending time in nature was the clearest theme in our data about hope and resilience. This finding coincides with a truth long known by Indigenous peoples (Mashford-Pringle & Stewart, 2019) and is reinforced by a large body of research, including several controlled studies which have identified the “restorative function and rehabilitative benefits” (Nurse et al., 2010, p. 28) of time spent in nature (Franco et al., 2017). A related but less prominent theme in our focus groups, also supported in the literature (e.g., Ramasubramanian, 2016), recalls the positive effects that self-reflection, expression, and mindfulness have on one’s ability to cope with anxiety. As noted, anxiety about climate change is a rational and healthy response. To mitigate any debilitating



effects and to generate hope and momentum for change, however, space needs to be created in environmental programs to critically reflect on, discuss, and normalize these emotions (Ojala, 2016). While we used photovoice primarily for data collection and participant engagement, this methodology provided participants the aforementioned benefits by sending them outside to engage intentionally with nature, and reflect on their related emotional experiences in the community with others.

The second most prominent theme in our findings on resilience was social support and a sense of community. As we found in our photovoice activity, the collective identity found in group organizing can provide a new perspective and a sense of validation, as “personal problems are revealed as social patterns” (Summers-Effler, 2002, p. 51). A sense of community can reinforce and be reinforced by other sources of resilience, such as environmental and political action. In combination with recently published research (Clayton, 2018; Panu, 2020), our findings suggest that political or environmental activism may be an antidote to the mental health impacts of climate change. Community organizing helps foster interpersonal connectivity by creating “spaces where people can meet face-to-face, producing hope through joint action” (Kleres & Wettergren, 2017, p. 508), as they address the issues and stagnancy that underpin their distress.

Post-secondary institutions can optimize resilience by connecting students to local environmental organizations, providing opportunities to build community, breed hope, and create meaningful action on climate change (Kleres & Wettergren, 2017; Summers-Effler, 2002). A desire for these connections was expressed by participants and identified as an important source of resilience. Our findings, in this regard, suggest that course projects should strive to collaborate with centres of climate action within the university and surrounding community. Not only would this offer benefits to local organizations with limited resources but also provide students with opportunities to forge new connections, build community, and engage in meaningful, solutions-focused political and environmental action that breed resilience. Universities should also support students by optimizing the sustainability of their operations and by taking direct action on climate change by, for example, divesting from fossil fuels.

Our focus group data show that the photovoice activity and focus group was a subjectively validating and empowering experience for participants, which we believe is due to the benefits of time spent in nature, mindful reflection, creative self-expression, and community-building that this methodology provides. Photovoice represents an underutilized opportunity to apply the resilience-boosting power of all these strategies, folding them into one experience that could be employed in eco-therapy or course assignments. Our findings suggest, therefore, that photovoice methodology and other creative techniques should be used in the classroom – and in the context of action-oriented research – to openly discuss, normalize, and validate mental health experiences related to climate change and environmental education.

Our findings are further evidence of the importance of universities protecting green spaces on their campuses, as sites in which to engage in environmental education, to mitigate climate change, and to foster the mental health benefits that stem from nature immersion. Classes, field courses, and extracurricular workshops should be instructed outdoors whenever possible, particularly in environmental studies, to provide students with the mental health benefits of time spent in nature and offer experiential learning opportunities. Environmental courses should ensure a balanced approach to their curricula, thoroughly explaining the issues, but also the existing landscape of solutions and future pathways for transformation to manage despair and paralysis. Documented sources of resilience, including time spent in nature, mindful reflection, creative self-expression, community-building, and opportunities to take action, should be integrated into all aspects of environmental education.

### Challenges and limitations

The entirety of this study was carried out online during the COVID-19 pandemic. The lack of in-person community gatherings and high volume of competing digital communications during the pandemic undermined recruitment to our study. Recruitment opportunities were lost as many extracurricular organizations for youth paused programming. Public Health guidelines also limited the scope of potential photography subjects, as obtaining consent from subjects would have required participants to breach social distancing procedures. As an alternative, participants were given the option of using photographs taken by themselves prior to the study. The mixed-methods approach used in our research generated more rich and compelling data than would be possible in either a strictly quantitative or qualitative study. The quantitative data provided insight into the communality and severity of impacts, while the qualitative data provided powerful in-depth accounts of personal experiences. However, the convenience sampling method and small sample size meant that the quantitative data, while interesting for theory building, is not statistically significant and cannot be generalized confidently. Nonetheless, the findings show interesting trends that could be valuable to confirm through further research and exploration.

### Conclusion

“One of the penalties of an ecological education”, Aldo Leopold (1970) famously wrote, “is that one lives alone in a world of wounds” (p. 197). Based on data collected in this study, students in the University of Waterloo community experience various mental health impacts of climate

change, including eco-grief, eco-anxiety, guilt, hopelessness, anger, and functional impairment. Students experience these impacts through several pathways, including deterioration to places of personal importance, environmental education and media exposure to climate change information, and concern for future generations.

To foster resilience in this context, our study found that young people access several coping strategies that have been identified by other researchers, including spending time in nature, participating in the community, and taking political and environmental action. Relatedly, we found that participation in the photovoice process itself generated notable subjective improvements in mental health and well-being, and feelings of empowerment. As a process that incorporates several key coping strategies in one experience – including intentional time spent in nature, mindful reflection and self-expression, and engagement with others – photovoice represents a promising intervention for helping to manage the mental health impacts of climate change. Further research could be useful in verifying the potential of photovoice, as a PAR methodology, and in organizing political and environmental action as well. Our study identified several suggestions for fostering resilience among students, including supporting students directly, greening university campuses, and taking action to address climate change itself. Photovoice may be a useful pedagogical tool for organizations and post-secondary institutions to employ as they work towards this goal.

Though compelling findings emerged, the parameters of this study and the ongoing COVID-19 pandemic posed challenges, including the limited recruitment and participant experience of photovoice methodology. The lack of in-person programming and camaraderie may have dampened the development of collective identity and related feelings of resilience. The sampling methods utilized meant that the results were unrepresentative of the general population. Further research on the efficacy and feasibility of a variety of potential supports and interventions, including photovoice methodology, is necessary. More rigorous quantitative studies should be conducted to gain insight into the objective impacts of photovoice interventions on student mental health and well-being regarding climate change.

In the meantime, our findings suggest that institutions can take action now by increasing student access to nature, creating climate-specific mental health supports, connecting students to meaningful opportunities to take action, and fostering a sense of community and collective identity. Even in the case of successful progress on mitigation and adaptation, the effects of climate change will be felt worldwide for decades. As a society, we will be actively coping with the mental health impacts of the climate crisis for some time. Given these circumstances, it is of utmost importance that we better understand and acknowledge the unique experiences of these impacts and offer accessible and effective supports and interventions for today's youth battling climate change and for those yet to come.

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