HPJ

HEALTHY POPULATIONS JOURNAL

Volume 2 | No. 2
Fall 2022

ISSN: 2816-2536

Cover Photo by the *Breakfast and Beyond Program*. Read more about Rachel Waugh's trainee experience inside.

HPJ HEALTHY POPULATIONS JOURNAL

About the Cover

The Breakfast and Beyond Program: A Trainee's Experience

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DOI: https://doi.org/10.15273/hpj.v2i2.11463

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About the Author

Rachel is a Registered Dietitian (RD) and a student in the Master of Science in Applied Human Nutrition (MScAHN) program at Mount Saint Vincent University. Her graduate thesis is a mixed-form questionnaire exploring Canadian RDs' experiences, perceptions, and knowledge of weight-related evidence in practice, framed by the Nutrition Care Process. Outside of her studies, Rachel loves to cook, try new foods, spend time with her dog, and visit her family in New Brunswick.

Cover Photo Title: Roasted Root Vegetable Soup

Cover Photo by: Breakfast and Beyond Program

The Breakfast and Beyond Program is a nutrition and foods program housed in the Applied Human Nutrition (AHN) Department at Mount Saint Vincent University (MSVU), with a goal to deliver healthy, accessible, affordable, and community-focused recipes to youth and families across Canada. The recipes are developed in line with Canada's Food Guide, Canadian food labelling regulations, and the Food and Nutrition Policy for Nova Scotia Public Schools. Breakfast and Beyond grew out of a long-standing partnership with the Breakfast Program Association of Fairview, where AHN students and faculty have supported breakfast program delivery (i.e., food preparation and serving) on a volunteer basis since 2010, and it aims to create education opportunities relating to food knowledge and skills for youth and their families (Breakfast and Beyond Program – About, n.d.). Breakfast and Beyond aligns with several of the social determinants of health by creating and disseminating affordable, accessible, and culturally supportive recipes, while also engaging with community partners (e.g., The Breakfast Program Association of Fairview, Halifax Regional Centre for Education, and many others; Bambra et al., 2010; Esquius et al., 2021; Guptill et al., 2017; Heath, 2019; Sharma et al., 2020; World Health Organization, n.d.).

Figure 1 *Rachel Waugh and Lia Chin-Yet*

Photo by Antonia Harvey, team manager of Breakfast and Beyond's knowledge translation/education team.

Breakfast and Beyond provides training opportunities for student and interns in the AHN program at MSVU (Breakfast and Beyond Program – Our Team, n.d.). My first hands-on experience in research was as a research assistant for Breakfast and Beyond. I was able to learn various food and media-based skills including recipe development, food styling, and food photography and videography. I had the opportunity to star or co-star in seven of the cooking demonstrations (Figure 1), including for the Mexican Breakfast Corn Muffins recipe (Figure 2). All recipes and videos are available on the Breakfast and Beyond website (Beyond Breakfast, n.d.). As Breakfast and Beyond's target population includes school-aged children, I was able to learn more on health literacy and how to tailor educational materials to be accessible and age-appropriate. As a contributor to the Breakfast and Beyond Program resource library, I was able to co-develop age-appropriate scripts with other trainees and star in a knife safety and skills video for youth learning kitchen safety and cooking skills (Beyond Breakfast, 2021; Breakfast and Beyond Program – Resource library, n.d.).

In addition to these training benefits, being involved with this program exposes trainees like myself to the Knowledge-to-Action framework and integrated knowledge translation (iKT), creating transferable skills that are applicable to many areas and forms of health science research (Graham et al., 2006). In line with iKT, Breakfast and Beyond involves its community partners and participants at all stages of recipe, education material, and dissemination activities. As knowledge translation/education team supervisor, Dr. Shannan Grant often references in her lab and in the MSVU Medavie Community Kitchen, research is a continuum "from bench to bedside," or in the Breakfast and Beyond Program's case, "from bench to bellies" (Mount Saint Vincent University, 2019; Westfall et al., 2007).

Figure 2 *Mexican Breakfast Corn Muffins*

Photo by Lia Chin-Yet, assistant manager of Breakfast and Beyond's knowledge translation/education team.

Cover Photo

The Special Issue's cover image is of Roasted Root Vegetable Soup, a recipe created by Breakfast and Beyond for the Fairview Breakfast Program. The recipe can be found on the Breakfast and Beyond website (Breakfast and Beyond Program – Original recipes – Hot meals – Roasted root vegetable soup, n.d.).

Acknowledgements

The Breakfast and Beyond Program is funded by Medavie and led by co-principal investigators Dr. Shannan Grant, knowledge translation/education team supervisor, and Dr.

Bohdan Luhovyy, food development team supervisor. My comprehensive media training was supported by GrantLab (Sheila A. Brown Centre for Applied Research, MSVU) alumni and trainees, as well as external partners such as videographers Charles Currie and Matthew Stones from Quarry Video Productions. I would also like to acknowledge the Breakfast and Beyond Program's photographer, Lia Chin-Yet (assistant manager, food stylist, and videographer for the knowledge translation/education team) for styling, taking, and editing the beautiful cover image.

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Welcome from the Co-Editors-in-Chief and Managing Editor

We are so pleased to welcome readers to the fourth issue of the *Healthy Populations Journal* (HPJ), a special edition focusing on the social determinants of health. HPJ is a multi-faculty, student led, open access, peer-reviewed journal housed at HPI at Dalhousie University. The journal's mission is to support and disseminate research which advances knowledge on population health research and global health equity. HPJ also aims to provide a welcoming and accessible academic publishing experience for student authors by reducing barriers to publishing, sharing, and accessing research. Since the publication of our inaugural issue in Spring 2021, HPJ continues to receive positive feedback from readers and knowledge users about the diverse and creative articles, commentaries, infographics, and artwork we have published. HPJ is truly appreciative of the authors and reviewers that make this all possible.

On the cover of this issue, we highlight culinary creations from Rachel Waugh, a registered dietitian and MSc student at Mount Saint Vincent University and trainee in the *Breakfast and Beyond Program*. Rachel's reflections on her trainee experience demonstrate the importance of participatory research training opportunities for developing a robust knowledge translation skillset, among other professional competencies.

Research articles in this issue explore relevant and thought-provoking topics related to the social determinants of health including FitzGerald et al.'s qualitative exploration into the early impact of the COVID-19 pandemic on the experiences of critical care physicians and patient care; MacDonald et al.'s scoping review which synthesizes the literature on the relationship between nature and physical activity in older adolescent girls; and Dunbar Winsor et al.'s development of a FASD health promotion social media campaign in Atlantic Canada. This issue also features two review scoping protocols: *The Impact of Exercise on Cardiotoxicity in Pediatric Cancer Survivors* (Kendall et al.), and *Identifying and Mapping Canadian Registered Dietitians' Perceptions and Knowledge of, and Experiences with, Weight-Related Evidence in Nutrition Care* (Waugh et al.).

The fall issue also contains two timely commentaries: *Limits and Possibilities: Understanding and Conveying Two-Eyed Seeing Through Conventional Academic Practices* (Roher et al.) and *Moving Towards Meaningful Change, One Uncomfortable Conversation at a Time* (Leclair et al.). The latter serves as both an acknowledgement of the efforts of student trainees to engage with the concept of health equity and a call for submissions in our upcoming special issue in collaboration with the Student Working Group of The Canadian Association of Health Sciences and Policy Research (SWG-CAHSPR).

HPJ would not be possible without support from the Healthy Populations Institute and the guidance from the HPJ Editorial Board Members. We hope you enjoy reading volume 2, issue 2.

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HPJ HEALTHY POPULATIONS JOURNAL

Commentary

Moving Toward Meaningful Change, One Uncomfortable Conversation at a Time

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DOI: https://doi.org/10.15273/hpj.v2i2.11484

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Abstract

The concept of health equity in the management of the pandemic has captured the attention of many within the field of health services and policy research and has shaped the identity of a generation of young scholars. This commentary summarizes the work done by the Student Working Group of the Canadian Association of Health Services and Policy Research to meaningfully engage with the concept as part of a seminar series, as well as the limits of that work. As part of efforts to address those limits, the Student Working Group has joined forces with the *Healthy Populations Journal* to develop a special issue on health equity. We invite all trainees, patient partners, and knowledge users who are committed to moving the conversation on health equity forward to contribute to this special issue.

Je ne suis pas bien du tout assis sur cette chaise
Et mon pire malaise est un fauteuil où l'on reste
Immanquablement je m'endors et j'y meurs.

Mais laissez-moi traverser le torrent sur les roches
Par bonds quitter cette chose pour celle-là
Je trouve l'équilibre impondérable entre les deux
C'est là sans appui que je me repose.

Hector de Saint-Denys Garneau

I don't feel well at all sitting in that chair
My worst malaise an armchair made for resting
Inevitably I'll fall asleep and die there

But let me cross the rapids on the rocks
In short hops jump from this one leap to that
And find the mystic balance in between
That place of no support where I can rest

Hector de Saint-Denys Garneau
translated by George J. Dance

If one expression could capture the zeitgeist of the field of health services and policy research in the pandemic era, it would most certainly be "health equity." Within the situation related to COVID-19, the fragility of our health care systems was revealed (Haldane et al., 2021) as access to care became a unified challenge (Walker et al., 2021). For many minority and underserved population groups across Canada, such as Indigenous peoples (Hillier et al., 2020), visible minority groups and immigrants (Amoako & MacEachen, 2021; Greenaway et al., 2020), people with disabilities and mental illnesses (Fornaro et al., 2021; Gignac et al., 2021; Melamed et al., 2020; Zhand & Joober, 2021), gender identity minority populations (Slemon et al., 2022), and people experiencing socio-economic disadvantage (Abrams & Szefler, 2020), the conditions of the pandemic only further worsened the disparities in their social determinants of health. Despite the pandemic exposing the relative burden of these health inequities among many overlooked population groups, several initiatives to improve the burden have fallen short, as the term "equity" has increasingly become little more than a trendy buzzword.

As trainees in health services and policy research, we have conducted a large part of our doctoral studies during the COVID-19 pandemic. Our identity as emerging scholars has been shaped by the social dynamics and political decisions made with regard to the broader health and health system crisis being brought to the forefront alongside the COVID-19 pandemic. We witnessed the repeated evocation of health equity among senior researchers, administrators, clinicians, and policy- and decision-makers, in ways that used "equity" to characterize certain population groups in a deficit manner. By failing to engage with populations to identify and understand the underlying roots contributing to their health inequities, we have fallen into the cycle of embracing stereotypical and tokenistic ideas of support that do not reflect the needs of the community (Hyett et al., 2019). In this way, the growths and challenges that individuals have overcome and experienced have been minimized, and the role that institutions and decision-makers have played in perpetuating inequity has been left unexamined. To be blunt: given the undeniable health gaps highlighted throughout the pandemic, we expected more. We notably expected more sustained and meaningful engagement from our training institutions, where Indigenous and racialized faculty members continue to disproportionately shoulder the burden in advancing health equity research (Mohamed & Beagan, 2019). These gaps were not created by the pandemic, but simply heightened by it.

In line with these expectations for health equity research, we recognized the inherent need for more strength-based efforts to be introduced and the role that trainees could play to join existing leaders—several of whom act as mentors in our career paths—in moving the field of health services and policy research toward meaningful change. To address this aim, the Student Working Group (SWG) of the Canadian Association for Health Services and Policy Research (CAHSPR), a pan-Canadian, trainee-run, voluntary group, initiated the Health Equity Research Initiative. Up until 2020, the SWG's primary purpose was to enhance and facilitate graduate and post-graduate trainees' involvement in the annual CAHSPR conference. Following the impact of the pandemic, members of the SWG were enthusiastic to have the group evolve into a community of practice that offered an organic learning opportunity for diverse and multidisciplinary trainees focused on illuminating and addressing equity research challenges within training programs.

This group transformation led to the launch of a new health equity initiative: *Challenging the Traditional Views on Research and Applications of Health Equity: A Seminar Series.* This seminar series was, to our knowledge, the first of its kind in its focus on bringing together trainees and experts across various fields of health services and policy research and using a strength-based approach to broaden each other's understanding on the range and complexities of health inequities and the impact they have on different population groups. Although each seminar was hosted by a notable expert in health equity research, this seminar series provided a platform for students, clinicians, patient partners, and researchers to collaboratively discuss and challenge the misconceptions around applications of health equity and the top-down traditional manner in which research is conducted. This involved learning and embracing a wide range of methodologies and ways of knowing, from traditional Indigenous knowledge to art-based knowledge translation.

Our seminar series grappled with issues pertaining to cultural safety, homelessness, patient participation, Indigenous health, and knowledge translation. In the very first seminar of the series, Dr. Angela Mashford-Pringle led a workshop concerned with deconstructing ideas surrounding "vulnerability" and "marginalisation," inviting attendees to rethink the ways they may be, often unknowingly, doing research *on* people rather than *with* people. By exploring a different perspective on research, this seminar illustrated the pressures experienced by individuals to conduct research in the traditional Westernized mode taught within institutions.

Given our team's focus on exploring strategies for doing research *with* people, this topic was touched on as part of our pre-CAHSPR conference student panel on pressures of academia and research in conducting research on health equity. MSc student and patient partner Adhiyat Najam and PhD candidates Sahr Wali, Clara Bolster-Foucault, and Carolyn Gaspar (Melro) tackled the importance of ensuring that patient and community partners are full, equal members of the research team. They argued that, while it may require adaptations from the academic members of the team, it is essential to provide communities with a seat at the table to avoid tokenistic efforts of engagement. Notably, the acts of using layperson language, offering briefs on prior knowledge, and taking the time to build the relationship through informal, non-research-oriented discussions were highlighted as promising strategies that can be championed by trainees in their own institutions.

In "Being Poor, It's a Full-Time Job," led by Dr. Laurence Roy, we discussed the role of institutional norms and expectations put forth by health and social services systems in creating inequities. She highlighted how these norms are often incompatible with the mental, physical, and emotional state of service users who are chronically underserved and who may be dealing with issues such as lack of sleep or active trauma. When combined with the lack of social capital to engage with those services, this situation results in structural discrimination and stigmatization toward a segment of the population whose health, social, and behavioural needs are complex and chronically unmet.

With Dr. Lisa Richardson, we dismantled the health services and policy research holy grail that is "best practice," introducing the alternative of "wise practice." She argued that there are different approaches to health equity and that not all may be safe for Indigenous people. The seminar concluded on the importance of action-based accountability and of truly valuing the work of people on the ground trying to close the gap of health disparities.

These conversations gave light to the realization that equity is important not only in the way that research is co-created with equity groups, but also in how the findings from the research are shared back to community partners. Dr. Shelley Wall and Q. Jane Zhao hosted a session on the use of comics and graphic medicine for scientific knowledge translation. Graphic medicine uses comics to communicate about health and medicine. They showed how graphic medicine and storytelling can be used for meaningfully building bridges in research and advocacy. The session offered some reflections to deepen our practice of knowledge translation: the practice of moving research from the lab to larger circles within academia and beyond.

Finally, at the last CAHSPR conference in May 2022, we had the privilege of welcoming Clifford Ballantyne (patient partner), Dr. Jai Shah, Dr. Lucy Barker, Dr. Shelley Wall, and Q. Jane Zhao for a keynote panel discussion entitled "Moving Towards Meaningful Change, One Uncomfortable Conversation at a Time." The conversation was rich and often challenging, as we approached the ways in which well-intentioned research teams often put patient partners in a difficult position through expectations of displayed vulnerability—and it transpired that we at the SWG were no strangers to that fault. This conversation shed light on our role in sometimes reinterpreting the perspectives of those who are at the centre of conversations on health equity. We may not have come out of the panel with a clear way forward, but we did gain a clear intention of opening the discussion outside of the SWG to address our blind spots.

So, this is how our commentary ends: we extend a hand to other trainees, patient partners, and knowledge users who are committed to moving the conversation on health equity forward in the most uncomfortable of places. In collaboration with the *Healthy Populations Journal*, the SWG is developing a special issue on health equity that will be published in May 2023, with a launch at CAHSPR's annual conference. We invite all to contribute to this special issue by submitting a contribution centring around underexplored topics of health equity in research and clinical practice and community involvement before the deadline of January 31, 2023. We welcome all types of contributions in French, English or Indigenous languages, including comics, infographics, videos and apps to be accessed through QR codes, commentaries, and traditional research papers. We look forward to having those uncomfortable conversations with you, and hopefully moving toward meaningful change.

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Commentary

Limits and Possibilities: Understanding and Conveying Two-Eyed Seeing Through Conventional Academic Practices

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DOI: https://doi.org/10.15273/hpj.v2i2.11295

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Abstract

This article offers conceptual and theoretical insights that we gained in a scoping review project to understand the Mi’kmaw guiding principle Two-Eyed Seeing/Etuaptmumk. Reflecting on the experiences and outcomes of the scoping review project, we explore the following questions: (a) To what extent can we rely only on written works and the English language to understand Two-Eyed Seeing? (b) How do academia’s conventional ways of thinking and sharing knowledge shape our abilities to understand and convey Two-Eyed Seeing to others? (c) What strategies can academics draw upon to better understand Two-Eyed Seeing? Ultimately, we contend that, to develop a richer and more nuanced understanding of Two-Eyed Seeing, we need to move beyond academic conventions and engage with a multiplicity of knowledge systems, approaches, and methods, including dialogical, visual, and experiential practices.

Etuaptmumk, the Mi’kmaw word for Two-Eyed Seeing, more closely translates to the “gift of multiple perspectives” (Marshall, Marshall, & Bartlett, 2018, p. 17) and is grounded in Mi’kmaq language, epistemologies, and culture (Iwama et al., 2009; Marshall, Marshall, & Bartlett, 2018). It was first brought into academia in 2004 by Mi’kmaq Elders Albert and Murdena Marshall and Dr. Cheryl Bartlett. They described Two-Eyed Seeing as “learning to see from one eye with the *strengths* of Indigenous knowledges and ways of knowing and from the other eye with the *strengths* of Western knowledges and ways of knowing and

… using both these eyes together, for the benefit of all" (Bartlett et al., 2012, p. 11). Two-Eyed Seeing has become widely used in Indigenous health research; however, it is sometimes described inconsistently or without sufficient detail (Marshall & Bartlett, 2018; Marshall, Knockwood, & Bartlett, 2018; Roher et al., 2021; Sylliboy et al., 2021; Wright et al., 2019). Elder Albert Marshall has expressed concern that when Two-Eyed Seeing is not meaningfully described and used, it risks being watered down or tokenized (Marshall, 2018).

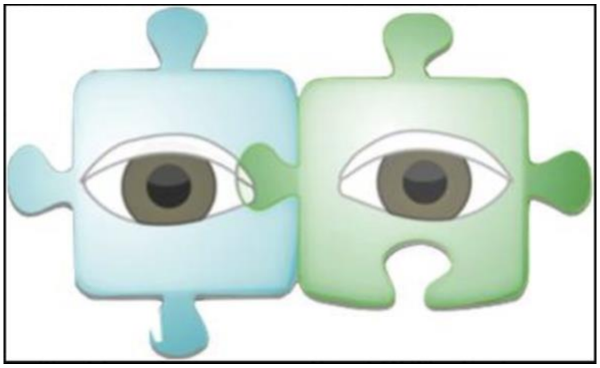

Image credit: Team of the Canada Research Chair in Integrative Science in collaboration with Mi'kmaw Elders in Unama'ki / Cape Breton

From 2018 to 2021, two Indigenous professors and two non-Indigenous students—all of whom had previous experiences thinking about and "using" Two-Eyed Seeing in health research projects—joined together to undertake a scoping review to better understand how Two-Eyed Seeing is described in Indigenous health research. Dr. Anita Benoit is a Mi'kmaw scholar who began using Two-Eyed Seeing in her Indigenous health research as early as 2012; Dr. Debbie Martin is Inuk and is a Canada Research Chair in Indigenous Peoples' Health and Well-Being; Sophie Roher is a Jewish settler scholar who used Two-Eyed Seeing as a guiding principle in her PhD research; and Ziwa Yu is a first-generation Chinese immigrant who focused on cervical cancer prevention and treatment in Inuit communities in her Master's research. In the scoping review, we compared descriptions of Two-Eyed Seeing from the "original" authors (i.e., Elders Albert and Murdena Marshall and Dr. Cheryl Bartlett) and "new" authors (Roher et al., 2021). While the scoping review methodology deepened our understandings of Two-Eyed Seeing, we also found limitations and challenges in making sense of the Mi'kmaw principle from within the Euro-Western academic customs and protocols of a scoping review. In this commentary, we reflect on these limitations and consider strategies that we, as academics, can draw upon to better understand Two-Eyed Seeing.

To what extent can we rely only on written works and the English language to understand Two-Eyed Seeing?

In our scoping review methodology, we used JBI scoping review guidelines and abided by a rigorous search strategy to find 71 written works by new authors and nine by the original authors (for details of our search strategy see Roher et al., 2021). We observed that the original authors' texts did not capture the same depth of information as their talks, images, and presentations available online at the Institute for Integrative Science and Health website (www.integrativescience.ca). Our instincts were affirmed in a conversation with Elder Albert Marshall and Dr. Cheryl Bartlett (personal communication, October 7, 2020), who expressed the view that a certain depth and richness of Two-Eyed Seeing was lacking in written articles. They drew our attention to the over 150 presentations given between 2002 and 2019 to local, national, and international audiences; 10 years of teaching the principle; and the images and videos they had created. Two-Eyed Seeing was conveyed in multi-dimensional ways that went far beyond the limited "scope" of academic literature (A. Marshall & C. Bartlett, personal communication, October 7, 2020). As an action-oriented, dialogical, and spiritual principle, perhaps it is not meant to be left static on paper. Two-Eyed Seeing is active, alive, and changing. It relies on multiple perspectives being shared and individuals building relationships and learning together (Roher et al., 2021). The scoping review methodology included only written understandings, providing a *partial* understanding of the original authors' characterizations of Two-Eyed Seeing.

We also reflected on the fact that the meanings and ideas represented through Two-Eyed Seeing come from the Mi'kmaw language, which may not be easily communicated in English (Roher et al., 2021). For instance, Dr. Bartlett clarified in our discussion that the Mi'kmaw word Etuaptmumk is commonly misunderstood as translating directly to "Two-Eyed Seeing" when, in fact, it translates to "the gift of multiple perspectives." According to Dr. Bartlett, Elders Albert and Murdena Marshall used the term "Two-Eyed Seeing" when describing the guiding principle to English audiences because they felt that it could better represent the *meaning* behind Etuaptmumk (C. Bartlett, personal communication, October 7, 2020). Even this seemingly simple linguistic difference demonstrates the ways that certain decisions around language use and translation may be misunderstood across time, space, relationships, and languages, particularly as we rely on words to represent ideas. In a similar way, the original and new authors' English-language characterizations of Two-Eyed Seeing shaped our interpretations as we tried to make sense of their English representations of Mi'kmaq concepts, values, and ways of thinking and being.

How do academia's conventional ways of thinking and sharing knowledge shape our abilities to understand and convey Two-Eyed Seeing to others?

In our scoping review, we found that many new authors described Two-Eyed Seeing using the academic terminology of "methodology," "epistemology," *or* "ontology." However, Dr. Bartlett has emphasized that Two-Eyed Seeing is all three of these at once (Roher et al., 2021). Two-Eyed Seeing is a way of being and living that is not limited by academic boundaries. For example, when limited to "methodology," Two-Eyed Seeing is understood only insofar as it can help generate data. It is not viewed as an expansive and spiritual guide for life, but rather as a tool or strategy that lends itself to a specific research method (Roher et al., 2021). Given the tendency in academia to filter principles through pre-existing scholarly categories and concepts, it can be difficult to "see" the richness of the guiding principle and to convey it to others.

Additionally, the conventions of peer-reviewed journal articles may shape one's ability to communicate Two-Eyed Seeing to others. Authors may be constrained by journal requirements, such as word limits, pre-set headings, or policies around language use. In our scoping review, many scholars described Two-Eyed Seeing in one or two short sentences. We wondered if authors were catering to an audience used to seeing ideas broken into structured academic frameworks (Roher et al., 2021). Authors may also be deciding against using more space to describe Two-Eyed Seeing because they are uncomfortable or unable to describe the guiding principle. When Two-Eyed Seeing is not described in research articles, it can contribute to the "watering down" of the principle, which Elder Albert Marshall expressed concern about (Marshall, 2018). Thus, it is important for researchers to intentionally describe how they conceive Two-Eyed Seeing in their respective projects and for journal articles to open up space for these descriptions.

What strategies can academics draw upon to better understand Two-Eyed Seeing?

Elders Albert and Murdena Marshall and Dr. Cheryl Bartlett went to great lengths to communicate Two-Eyed Seeing to diverse audiences. In keeping with Indigenous epistemologies, they shared teachings orally (http://www.integrativescience.ca/; Bartlett, 2012; Humber College, 2020; Samuel Centre for Social Connectedness, 2019). Although we only uncovered nine written academic works by the original authors, Two-Eyed Seeing has been taken up worldwide, speaking to the fact that oral transmission matters—not just for Indigenous peoples but for everyone (McKivett et al., 2020; Michie, 2013; Sivertsen et al., 2020). The Mi'kmaw epistemology from which Two-Eyed Seeing originates understands knowledge as constructed through storytelling (Cajete, 2017; Gough, 2011; King, 2003). Sharing through storytelling is more "alive," dialogical, and experiential. Relationships are fostered and created through storytelling and story listening. As stories are told over again, our relationships and contexts change. A listener can hear the same stories time and time again but take different meanings from it each time.

Artist credit: Integrative Science Vision, aka Common Ground, painting by Basma Kavanagh, artist within the team of the Canada Research Chair in Integrative Science, in collaboration with Mi'kmaw Elders in Unama'ki / Cape Breton

Elders Albert and Murdena Marshall and Cheryl Bartlett also invested time and energy into appropriate imagery and artwork to relay the meaning of Etuaptmumk. They offered the image of two eyes shaped like puzzle pieces, fitting together to show the distinct and whole nature of both Indigenous ways of knowing and Western ways of knowing. They also commissioned an art piece by Basma Kavanagh portraying two people facing each other and kneeling in front of a sacred fire to convey the process and values that are required for co-learning. The kneeling position represents humility, mutual trust, and "extreme vulnerability" (Bartlett et al., 2012, p. 19). Once mutual trust is offered and invited, co-learning and sharing can begin. Two spheres around the kneelers represent their respective worldviews being brought together; the distinctions and differences between them are also respected.

Given the original authors' emphasis on oral communication and visual imagery to relay the spirit of Two-Eyed Seeing, it is important to learn and experience Two-Eyed Seeing through visual and relational means grounded in Indigenous ways of living, seeing, and being. Storytelling methodologies, arts-based methods, and other land-based and collaborative research methodologies may align with Two-Eyed Seeing, given that they are commonly used in research projects together (Fontaine et al., 2019; Martin, 2009; Rand, 2016; Vukic, 2014). We are not suggesting these methodologies offer a "more complete" understanding of Two-Eyed Seeing, but rather that each understanding is partial. A richer and more nuanced understanding of Two-Eyed Seeing is developed by critically engaging with multiple methods, knowledge systems, and ways of knowing.

Conclusion

We build academic work from academic work; we look at the ways that people have thought about ideas in previous studies and articles, and we work to expand and broaden what we already know about a subject. As we build on previous descriptions of Two-Eyed Seeing, it is important for us to be mindful of the ways in which academia's dependence on written works to understand and share ideas and its tendency to place ideas into categories can limit researchers' abilities to both understand Two-Eyed Seeing and convey it to others. To tap into the richness and strengths of Two-Eyed Seeing, we need to push beyond academic customs and embrace new ways of understanding, learning, and conveying Two-Eyed Seeing, such as dialogical, relational, and arts-based practices.

Funding

Author DM is supported by a Tier II Canada Research Chair in Indigenous Peoples' Health and Well-Being through the Canada Research Chairs Program (grant # CRC-2016-00076; https://www.chairs-chaires.gc.ca/home-accueil-eng.aspx); AB was supported by an OHTN-CIHR New Investigator Award through the Canadian Institutes of Health Research (grant #APP268899; https://cihr-irsc.gc.ca/e/44181.html); and SR is supported by a Patient-Oriented Research Fellowship Award through the Canadian Institutes of Health Research's Strategy for Patient-Oriented Research (grant # CIHR/440773; https://cihr-irsc.gc.ca/e/41204.html). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Declaration of Conflicting Interests

The authors declare that there are no conflicts of interest.

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Research Article

Exploring the Impacts of the Beginning of the COVID-19 Pandemic on Critical Care Physicians and the Delivery of Patient Care in Eight Countries: A Qualitative Interview-Based Study

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DOI: https://doi.org/10.15273/hpj.v2i2.11319

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Abstract

Purpose: To understand critical care physician experiences across multiple countries with the COVID-19 pandemic to inform future pandemic preparedness planning. **Methods:** In this qualitative descriptive study, 16 critical care physicians (from eight countries) identified in convenience and purposive sampling took part in individual semi-structured interviews from April 7, 2020 to August 27, 2020 that captured the first wave of the pandemic. Open coding was conducted by two researchers who facilitated inductive thematic analysis. **Results:** Key themes identified following thematic analysis included the following: (a) sourcing and implementation of trusted information; (b) health systems–level preparedness with accessible supports; (c) institutional adaptations, including changes to patient care; (d) professional safety and occupational well-being; (e) triage and restricted visitation policies; and (f) managing personal familial responsibilities. **Conclusion:** The COVID-19 pandemic transformed the ways in which critical care physicians cared for their patients and personally coped with challenges. Perspectives of critical care physicians are important for ongoing pandemic planning and should be included in future pandemic policy development.

Keywords: critical care, COVID-19, pandemic, interviews, preparedness

Introduction

Shortages in life-saving interventions such as personal protective equipment, hospital and intensive care unit (ICU) beds, and mechanical ventilators emerged globally in the first wave of the COVID-19 pandemic, driving many health care systems to rapidly develop triage plans to support the allocation of these limited resources (Cag et al., 2021; Maves et al., 2020; Ng-Kamstra et al., 2020; Parsons Leigh et al., 2021). Human resources have also been in high demand throughout the pandemic, resulting in health care professionals being redeployed to emergency departments and ICUs from other areas of the health care system to avoid acute services being overwhelmed by surges in COVID-19 case numbers (Haldane et al., 2021; Kaye et al., 2021). Emerging research has shown increased stress and strain for patients, families, and health care professionals during the COVID-19 pandemic (Cag et al., 2021; Cattelan et al., 2021; Fiest, Krewulak, et al., 2021; Fiest, Parsons Leigh, et al., 2021).

Critical care medicine continues to be at the forefront of the pandemic response, given that the most severely ill patients diagnosed with COVID-19 were, and continue to be, cared for in ICUs by critical care physicians (Hajjar et al., 2021). Multiple studies conducted in Europe, North America, and Asia have demonstrated the mental health burden of the pandemic on front line health care professionals, especially those working in ICUs, where burnout was prevalent pre-COVID-19 (Di Tella et al., 2020; Pappa et al., 2020; Peng et al., 2021; Van Steenkiste et al., 2021). In Canada, the fear of anticipated or realized resource strain during the pandemic was shown to heighten psychological distress in critical care physicians that included concerns related to personal and familial safety (Parsons Leigh et al., 2021). An international survey of critical care health care professionals also described how the COVID-19 pandemic has impacted resources, staffing, and patient care globally, demonstrating that interventions tailored to health care professionals' needs are required to ameliorate their stress and burnout from working during a pandemic (Wahlster et al., 2021). Guidelines for preparation and management of ICUs during emergency situations such as the COVID-19 pandemic are increasingly being developed, and include specifics such as promoting infection prevention, increased infrastructure and staffing preparations, ICU capacity building, triage policies, and research development (Phua et al., 2020).

Research is emerging on the multi-faceted impacts of the pandemic on critical care physicians and the delivery of patient care

(Pendharkar et al., 2021). Health care professionals are on the front lines of public health crises, and their perspectives are invaluable when assessing the impacts and areas of improvement required within health care systems. Their experiences can provide insight on the impacts of the pandemic on patients, families, providers, and the health care system. Understanding these impacts will aid in the creation of effective evidenced-based pandemic preparedness planning. Therefore, the objective of this study was to understand how critical care physicians, their clinical practice, and the hospitals in which they work, were impacted by the initial stage of the COVID-19 pandemic across multiple countries. Our aim was to understand shared preparedness needs to inform future stakeholder-driven pandemic preparedness planning for the COVID-19 pandemic and future pandemics.

Methods

Study Design

We conducted a qualitative descriptive study (Kim et al., 2017) executed in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ; Appendix A). The University of Calgary Conjoint Health Research Ethics Board (Ethics ID#: REB20-0377) and Dalhousie University Research Ethics Board (Ethics ID#: 2020-5106) approved this study.

Participants

FR applied a purposive and convenience sampling strategy, using personal contacts to recruit critical care physicians from the United States of America (USA), Canada, Turkey, England, Scotland, Italy, Spain, and Pakistan. These countries were chosen based on the location of pre-existing contacts of the research team. Participants were eligible if they were English-speaking critical care physicians (≥18 years) and able to provide informed consent. We aimed to recruit three participants from each location (n=24 total). We were prepared to continue sampling until data saturation was reached and no new themes relevant to the research questions were identified.

Interview Guide

The semi-structured interview guide explored three overarching topics: (a) the impact of COVID-19 on the health care system and its capacity to respond, (b) information needs, access, sharing, and dissemination; and (c) direct impact of COVID-19 on participants. The interview guide was developed iteratively through a series of working group meetings that included research assistants (RBM, CD, ES, LK), a qualitative research expert (JPL), and a physician assistant (CH). The interview guide was informed by news topics and clinical discussions, particularly grand rounds at a tertiary academic teaching hospital in Alberta, Canada, through March 2020. We pilot tested the interview guide with three critical care physicians to ensure the questions were appropriate in content and flow (Appendix B). The interview guide was refined after each pilot interview and was designed to focus on the first wave of the pandemic. Changes to the interview guide included removing two questions that were found to be redundant and improving the transition between the ice breaker question and the first question. Interviews were scheduled for 30 minutes and were closed by soliciting suggestions to enhance the response, including preparedness needs for COVID-19 in participants' hospitals.

Data Collection and Analysis

FR emailed invitations to critical care physicians, identified by both FR and JPL (a senior consultant in critical care medicine, and an expert in qualitative research, respectively). Participants provided written, informed consent prior to participating in the interview. Two investigators (CD, CH) conducted semi-structured interviews via telephone between April 7, 2020, and August 27, 2020. Investigators administered a short demographics questionnaire at the end of the interview (Appendix B). Audio recordings were transcribed verbatim by a professional transcription company (https://www.rev.com/) and were quality checked and de-identified (names and context) in duplicate by two co-authors (CD, CH). Participants had the option to complete the interview by returning a written response format of the semi-structured questions. All participants were offered the opportunity to review their de-identified transcript as a form of member checking.

Two researchers (CD, AD) used NVivo 12 (https://www.qsrinternational.com/) to manage the data and facilitate thematic analysis (Braun & Clarke, 2006). Two investigators (CD, AD) independently reviewed a single transcript to generate an initial list of codes based on developing patterns and key ideas. The same two investigators then collaboratively developed a coding framework based on the outcomes of the initial open coding. They further analyzed the coding framework on an additional three transcripts, iteratively refining the codebook until all relevant ideas were included. A coding framework based on the outcomes of the open coding process was then collaboratively developed by the same two investigators, who continued to meet weekly after coding consecutive groups of three transcripts to discuss themes and coding discrepancies and refine the coding framework. With every adjustment to the framework, investigators re-coded previous interviews to maximize analytic integrity. The investigators conducted a secondary stratified analysis of textual data to further examine the interview data; one investigator (CD) analyzed by sex, marital status, and parental status, and the other investigator (AD) analyzed by age, country, and (private or public) health system. After independent analysis, investigators met to discuss findings and implications. Discrepancies in analysis were addressed through discussion in meetings between the coding investigators (CD, AD) and a qualitative research expert (JPL).

Results

Of the 32 critical care physicians who were emailed, 15 did not respond, one declined, and 16 (50%) consented to be interviewed, representing eight countries (USA, Canada, Turkey, England, Scotland, Italy, Spain, and Pakistan; Table 1). Six participants were interviewed during the first wave of the pandemic (Canada n=2; Turkey, Spain, England, and Scotland n=1 each), while 10 participants were interviewed within the interim between the first and second waves of the pandemic (USA and Italy n=2 each; Canada, Turkey, England, Scotland, Spain, and Pakistan n=1 each). The interviews averaged 29.3 minutes (standard deviation, 9.7 minutes); one participant completed the interview by returning a written response format of the semi-structured questions. Nine (56%) participants were female, and the median age of participants was 45.5 (interquartile range, 38.5, 56.75).

Physicians unanimously shared their perceptions on the importance of building pandemic preparedness from the experiences of the COVID-19 pandemic to adequately prepare for future public health crises and events that may be associated with strain on health care systems. Within this data, researchers (CD, AD) identified six recurring themes that included the following: (a) sourcing and implementation of trusted information; (b) health systems–level preparedness with accessible supports; (c) institutional adaptations, including changes to patient care; (d) professional safety and occupational well-being; (e) triage and restricted visitation policies; and (f) managing personal familial responsibilities. Exemplary quotations are provided in Appendix C.

Table 1

Demographic and Clinical Characteristics of the Critical Care Physician Participants

Demographic and Clinical Characteristics	*Critical Care Physicians (n=16)*
Age category, years, n (%)	
30–39	4 (25)
40–49	6 (37.5)
50–59	3 (19)
60–69	2 (12.5)
70–79	1 (6)
Female, n (%)	9 (56)
Marital Status, n (%)	
Married	15 (94)
Dependents, n (%)	
Children	13 (92)
Clinical Specialty, n (%)	
Critical Care	8 (50)
Critical Care & Anaesthesiology	6 (37.5)
Infectious Disease	1 (6.25)
Emergency Medicine	1 (6.25)
Type of Institution, n (%)	
Academic	14 (88)
Non-academic	1 (6)
Community	1 (6)
Country, n (%)	
Canada	3 (19)
Spain	2 (12.5)
Turkey	2 (12.5)
Scotland	2 (12.5)
England	2 (12.5)
USA	2 (12.5)
Italy	2 (12.5)
Pakistan	1 (6)

Sourcing and Implementation of Trusted Information

Participants from all interviews provided their perspectives on the challenge of sourcing and implementing trusted information regarding the COVID-19 pandemic. Most critical care physicians regarded the importance of reliable, evidence-based data: "I found the epidemiological data is the most helpful for understanding the most common patient, what they will look like."

Some critical care physicians created intentional distance from informational platforms in the interest of decreasing the visibility of information. Additionally, some participants noted the importance of limiting reliance on specific information sources:

> *I don't rely too much on social media to gather information. I can't say that I spend too much time focusing on what's posted on social media or text threads or chats or that type of thing. I kind of take them with a grain of salt.*

However, despite creating boundaries, critical care physicians recognized the difficulty in navigating the challenging and changing pandemic. Participants unanimously described the burden of having to constantly correct misinformation, such as information about masking, and found this task exhausting. One critical care physician recounted their experience with misinformation on social media platforms:

> *There was so much junk in the media about doctors, usually male, in fact let's be honest, always male, who thinks that they have the answer to everything, and their latest wonder cure, many of which were then proven to be pretty worthless.*

Health Systems–Level Preparedness with Accessible Supports

Participants shared their need to receive regular and clear information from leadership within their health systems regarding pandemic planning and policy changes. One critical care physician remarked on the clarity and efficiency of the preparedness within their health system:

> *When the [first] wave started there was a staged approach—coordinated, very clear communication. I think that the management of that went very smoothly actually in such a way that nobody was overwhelmed in terms of providing care.*

In contrast, one critical care physician described feeling distressed about the transmissibility of the virus that was perceived to be exacerbated with lack of health system preparedness:

> *Just the emotional toll that it's taking on a personal level for people to be walking in these rooms where you know that there's a risk of having that disease transmitted on to yourself. So emotionally, I think people are probably a little bit more taxed, certainly than usual, we were not prepared.*

Participants unanimously commented on the lack of systems-level accessible supports for staff. For example, participants noted a lack of available staff testing, which contributed to increased anxiety and worry of disease transmission.

Institutional Adaptations, Including Changes to Patient Care

All critical care physicians who participated shared logistical adaptations to patient care within their institutions. For example, one participant described their ICU being dedicated solely to coronavirus patients, while a previous recovery area was adapted to accommodate coronavirus negative ICU patients. Some physicians described their experiences with being involved in pandemic response teams:

> *I recommended to the administration that we have to form what we call a COVID-19 team. That was basically infectious disease, pulmonologists, hospitalists, pharmacists, nurses, infection prevention. So, we would round*

> *on actually each patient quickly for one to two minutes and make up a treatment plan for that day, for that specific patient.*

In the end, critical care physicians, tired and burnt out, described the impact of adaptations within their institution that at times involved drastic changes to patient care: "Care admissions are being treated as positive and isolated until we can prove they are negative. We never would've isolated patients until we proved they haven't got a disease."

Professional Safety and Occupational Well-Being

Participants shared their perspectives on the challenge of adhering to policies that jeopardized their safety at work:

> *I think the problem of the mixed messages is in the beginning [of the pandemic]. From the hospital administration, they were getting scared they will have shortage of health care workers, or nurses, or physicians. So, the message was, even if you're sick, you can come to work.*

Critical care physicians described their experiences with having to adapt to a workforce that was reduced purposefully to maintain physician safety. For example, one participant noted hospital leadership moving pregnant physicians and those 65 and older to administrative tasks during the pandemic. One critical care physician also described the impact of the pandemic on their training environment, opportunities, and career trajectory. Another shared a renewed sense of purpose in their clinical practice:

> *I mean, I think I would have had a really hard time if I was in a different specialty, or I wasn't able to directly participate, because part of it is it gave me a sense of purpose and feeling like I was doing something for the greater good during a really bad time.*

All critical care physicians shared their perspectives on the unintended positive impact of the pandemic regarding shared lessons for future pandemic preparedness planning:

> *We've managed to recruit some of those [temporary] nursing staff to join our facility permanently. So, critical care at our site has come out of it [the pandemic] better equipped and much more cohesive, and more highly skilled with some additional workforce.*

Triage and Restricted Visitation Policies

Critical care physicians shared that withholding and withdrawing life-sustaining treatment while mitigating suffering in the ICU during the COVID-19 pandemic was extremely complex. One participant reflected on the mental and ethical demands of triage:

> *We have to do a triage and that was the worst part and that was the really difficult part. I have [had a] hard time to deal with that because we sometimes we have to say no to patients that were 75 years old that were in a really good shape and no comorbid conditions. But I have another one of 68 that was in the same situation, and I had to decide to intubate the one of 68 and not intubate the one of 75 because we didn't have ventilators.*

Participants also made note of the impact of restricted visitation policies that prevented family members from visiting their loved ones at end of life. They discussed the emotional distress caused by these policies for both families and physicians alike. One participant described these challenges as something physicians would carry with them for years to come. Another participant further described this challenge:

> *To tell the family that the husband or the wife or the father was dying in the ICU and they cannot come to see them. They cannot hold their hand, they cannot be with them. And I don't know, that was really tough.*

The absence of patients' family members in the ICU was significant. One participant described the challenges of updating families via Zoom or phone and expressed that the process was exhausting and impactful to their patient care.

Managing Familial Responsibilities

Participants described their perspectives on the challenge of managing personal familial responsibilities as they battled with increased demands in the ICU. Difficult for all, this was especially burdensome on families with young children:

> *I was watching my wife suffering the quarantine alone with the two boys with a lot of energy and she hardly had any time to sleep. And she, we have a little one, two years old that he's not sleeping well and she was not sleeping well and I couldn't help her because I was in the hospital almost every day, almost 20 hours a day and I couldn't be at home.*

Most participants agreed about the guilt felt when absent from their home:

> *I'm a mom with a four-year-old and a one-year-old. My husband is a physician as well, so we initially had a lot of concerns about how we were both going to continue to work full time. That was, I think, a particularly unique challenge for me, different than many of my colleagues who do not have young children, and most of them are male.*

Physicians also took opportunities to be actively involved in the care of extended family. One participant described taking on the additional task of shopping for their parents, to provide them with additional safety during the pandemic.

Discussion

We conducted a qualitative descriptive interview-based study across eight countries to explore how critical care physicians, their clinical practice, and the hospitals in which they work were impacted by the initial stage of the COVID-19 pandemic. Our findings indicate that changes and adaptations at the health system, institutional, and personal level, implemented to control spread of the SARS-CoV-2 virus, impacted the way critical care physicians cared for their patients and coped with the overwhelming emotional demands of the pandemic. These changes led to complex situations that have professional and personal consequences for physicians. The unintended consequences experienced by critical care physicians largely hinged on the notion that, despite seeking evidence-based information and receiving updates from leadership, critical care physicians experienced challenges related to restricted visitation and resource availability, and felt guilt related to leaving their families at home for extended periods of time. Our data highlight the importance of creating evidence-based pandemic planning from which we can adequately prepare for future public health crises and events that may be associated with strain on the health care system and challenges faced by critical care physicians.

Emerging research has demonstrated a significant emotional burden on front line health care workers (Cag et al., 2021; Pappa et al., 2020), including critical care physicians (Azoulay et al., 2020; Wahlster et al., 2021), during the COVID-19 pandemic. Potential resource shortages or circumstances outside of a physician's realm of (clinical) control were of particular concern to participants in our study (Parsons Leigh et al., 2021). This issue played out in real time as some were forced to triage critical care resources for patients, due to high patient volumes and a lack of solidified or actualized triage policies (White & Lo, 2020). Participants in our study expressed the immense emotional difficulty involved in making these decisions, particularly in an environment where efficient decisions needed to be made. This moral distress is described in literature where clinicians were fearful of having to ration resources (Solomon et al., 2020; Wynia, 2020). Earlier studies have also demonstrated the need for ethical and legal parameters in triaging practices to support physicians in vulnerable triaging scenarios, particularly during crisis surge responses (Arabi et al., 2021; Aziz et al., 2020; Phua et al., 2020). Given the prevalence of symptoms of depression, anxiety, and burnout among physicians (Azoulay et al., 2020), our data underpins the need for attaining and maintaining good mental health and emotional well-being.

The preparedness of health systems to respond to the COVID-19 pandemic has been questioned by health care professionals around the world (Lal et al., 2021; Phua et al., 2020; Wahlster et al., 2021). In the current study, participants spoke about the need to reorganize ICUs to accommodate COVID-19 patients, redeploy high-risk staff into administrative roles, or train additional staff in the support of critically ill patients. In 2007, the World Health Organization published a framework with six building blocks (service delivery, health workforce, information, medical products, vaccines and technologies, financing, and leadership and governance [stewardship]) directed toward strengthening health systems globally (World Health Organization, 2007). Researchers have since proposed methods of approach to health systems resilience during shock scenarios, wherein systems see a rapid increase in the volume of critically ill patients (Blanchet et al., 2017; Hanefeld et al., 2018; Lal et al., 2021). Our findings illustrate that gaps remain in the strength and resilience of health systems globally, such as in the health systems building blocks of service delivery and health workforce, specifically within the ICU setting. The COVID-19 pandemic has revitalized the need for global health systems to plan and prepare for possible scenarios of surge and emergency situations.

Our findings highlight that policy changes, while necessary from a public health perspective, had unintended deleterious consequences on health care professionals working in the ICU during the COVID-19 pandemic. The COVID-19 pandemic resulted in limitations on patient family engagement in the ICU and participation in care that completely re-engineered physicians' methods to practice and had potential implications on their well-being (Cattelan et al., 2021; Kent et al., 2020; Leggett et al., 2020). Supporting a patient's family members is foundational to the practice of critical care medicine (Davidson et al., 2017); this aspect is rarely easy (Brown et al., 2018) and has been made more challenging in the COVID-19 pandemic, especially at end of life (Andrist et al., 2020). This includes patients dying alone due to restricted visitation policies in the ICU—the detrimental implications of this reality for patients, families, and critical care physicians cannot be understated (Moss, Krewulak, et al., 2021; Moss, Stelfox, et al., 2021).

Our findings can be used to prioritize strategies to combat the challenges faced by ICU physicians during the COVID-19 pandemic and future public health emergencies. For example, policy and research development should further examine and address the deleterious impacts of restricted visitation policies on both patient, family, and physician well-being. Utilizing evidenced-based information to improve public health and pandemic planning and preparedness can result in better patient care, physician well-being, and health systems functioning in the ICU environment. Capturing the lived experiences of stakeholders across health care jurisdictions and infusing these findings into future pandemic preparedness planning is an attractive area for future work.

Our co-designed interview guide was informed by narratives reported in the COVID-19 pandemic (Benatti, 2020; Landry & Ouchi, 2020; Neville, 2020; Rose et al., 2020) and tested in pilot interviews with critical care physicians. Interviews were conducted individually and at length, which allowed physicians time and space to describe experiences and offer important insights into the psychological burden that afflicts their practice in the ICU.

There are limitations to consider when interpreting the findings of our study. As cases of COVID-19 fluctuated globally, health systems, access to resources, and experiences of critical care physicians may have differed, limiting the transferability of our work. Additionally, participants were also not systematically sampled, and interviews were conducted in the English language. However, we purposively recruited critical care physicians from countries with varied case counts and health systems to promote transferable findings. This study was conducted at the beginning of the pandemic prior to variants of concern and the development and implementation of vaccinations. Our small sampling frame limited our ability to achieve data saturation in our analysis; it was difficult to recruit critical care physicians during the first wave of the pandemic. Additional interviews to collect data past code saturation in order to assess meaning saturation are required for transferability of our results (Hennink et al., 2017).

Conclusion

The data from our qualitative descriptive interview-based study with critical care physicians across eight countries indicate that changes and adaptations at the health system, institutional, and personal levels to control spread of the SARS-CoV-2 virus transformed the way critical care physicians cared for their patients and coped with emotional demands of the COVID-19 pandemic. Contributing to the pandemic response, critical care physicians experienced challenges associated with restricted visitation policies and resource availability, as well as guilt about continuously leaving their families at home. Preparedness planning for future health crises and events that may be associated with strain on the health care system should include the experiences and perspectives of critical care physicians.

Acknowledgements

We would like to thank the research assistants Laryssa Kemp and Emma Sypes for helping develop the interview guide for this study, as well as Carmen Hiploylee for conducting qualitative interviews.

Ethics Approval and Consent to Participate

The University of Calgary Conjoint Health Research Ethics Board (Ethics ID#: REB20-0377) and Dalhousie University Research Ethics Board (Ethics ID#: 2020-5106) approved this study.

Consent for Publication

Not applicable.

Availability of Data and Materials

The data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The authors are unaware of any competing interests.

Funding

This original research study is funded by the Canadian Institutes of Health Research Operating Grant: Socio-Cultural Implications of COVID-19: Educating, Engaging & Empowering the Public (Application Number: 40241). The funders had no role in protocol design, data collection and analysis, decision to publish, or preparation of the manuscript; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; and no other relationships or activities that could appear to have influenced the submitted work.

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Appendix A

Consolidated Criteria for Reporting Qualitative Research (COREQ): 32-item checklist

No. Item	Guide questions/description	Responses	Reported in Section
Domain 1: Research team and reflexivity			
Personal Characteristics			
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	CD, CH	Methods
2. Credentials	What were the researcher's credentials? E.g., PhD, MD	Jeanna Parsons Leigh (PhD), Chloe de Grood (MSc), Alexandra Dodds (MSc), Francesca Rubulotta (PhD, MD), Emily A. FitzGerald (MSc), Sara J. Mizen (MA), Karla D. Krewulak (PhD), Stephana J. Moss (PhD), Henry T. Stelfox (PhD), Kirsten M. Fiest (PhD).	Not reported
3. Occupation	What was their occupation at the time of the study?	Jeanna Parsons Leigh (Associate Professor), Chloe de Grood (Project Coordinator), Alexandra Dodds (Research Assistant), Francesca Rubulotta (Professor), Emily A. FitzGerald (Research Assistant), Sara J. Mizen (Research Assistant), Karla D. Krewulak (Senior Research Associate), Stephana J. Moss	Not reported

		(Senior Research Associate, Team Lead), Henry T. Stelfox (Professor, Director), Kirsten M. Fiest (Assistant Professor).	
4. Gender	Was the researcher male or female?	Female: JPL, CD, AD, FR, EF, SMi, SJM, KF, KK Male: HTS	Not reported
5. Experience and training	What experience or training did the researcher have?	All researchers had experience with qualitative research methods.	Not reported
Relationship with participants			
6. Relationship established	Was a relationship established prior to study commencement?	Yes	Methods
7. Participant knowledge of the interviewer	What did the participants know about the researcher? E.g., personal goals, reasons for doing the research	Participants were informed of the study's goals.	Not reported
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? E.g., bias, assumptions, reasons and interests in the research topic	None	Not reported
Domain 2: Study design			
Theoretical framework			
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? E.g., grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Thematic analysis	Methods
Participant selection			

10. Sampling	How were participants selected? E.g., purposive, convenience, consecutive, snowball	Convenience and purposive sampling	Methods
11. Method of approach	How were participants approached? E.g., face-to-face, telephone, mail, email	FR emailed invitations to critical care physicians identified by JPL and FR.	Methods
12. Sample size	How many participants were in the study?	16	Results, Table 1
13. Non-participation	How many people refused to participate or dropped out? Reasons?	1	Results
Setting			
14. Setting of data collection	Where was the data collected? E.g., home, clinic, workplace	Interviews were conducted over the phone.	Methods
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	No	Not reported
16. Description of sample	What are the important characteristics of the sample? E.g., demographic data, date	Demographic data was recorded.	Results (Table 1)
Data collection			
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	The guide was pilot tested with three critical care physicians.	Methods
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	No	Not reported
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Audio recordings of the interviews were taken.	Methods
20. Field notes	Were field notes made during and/or after the interview or focus group?	No	Not reported
21. Duration	What was the duration of the interviews or focus group?	30 minutes	Methods
22. Data saturation	Was data saturation	Yes	Methods

	discussed?		
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	Participants were provided with that option.	Not reported
Domain 3: Analysis and findings			
Data analysis			
24. Number of data coders	How many data coders coded the data?	Two data coders	Methods
25. Description of the coding tree	Did authors provide a description of the coding tree?	No	Not reported
26. Derivation of themes	Were themes identified in advance, or derived from the data?	Derived from the data.	Methods
27. Software	What software, if applicable, was used to manage the data?	NVivo 12	Methods
28. Participant checking	Did participants provide feedback on the findings?	No	Not reported
Reporting			
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? E.g., participant number	Participant quotations were presented to illustrate the themes/findings.	Results, Appendix C
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes	Results
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes	Results
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes	Results

Note. Developed from “Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups,” by A. Tong, P. Sainsbury, and J. Craig, 2007, *International Journal for Quality in Health Care, 19*(6), pp. 349–357. https://doi.org/10.1093/intqhc/mzm042

Appendix B

Interview Guide

***If on Zoom: ***
–Do not allow to join by video (Audio only)
–Enable wait room and use password for security

Introduction:
Thank you for agreeing to speak with us today. This study aims to investigate the global impact of COVID-19 on health care providers and health systems. We are conducting interviews around the world with critical care physicians as well as other health care providers who have been deployed from other medical specialties to work in an ICU during this time.

This interview will centre on your perceptions and behaviours regarding work on the front lines of a global pandemic. We look forward to the opportunity to learn from your insights. These topics serve as a guide only. If there are other insights you would like to offer, we would like to hear them.

Participation in this interview is completely voluntary. If at any point you feel uncomfortable with the process and wish to end your participation you are free to do so. If you would like to skip a question or end the interview early, feel free to let me know. If you do wish to withdraw your data you will have one week following the interview to do so, after which point due to the fragmentation of data in qualitative thematic analysis it will no longer be possible to remove your data.

Do you have any questions?
Do you agree to be recorded for research purposes?

<If participant has provided informed consent, start recording>

Thank you for participating.

Semi-structured interview questions
Discussion points: knowledge, experiences, perceptions, behaviours, underlying drivers, and implications

---

Thank you for joining us. Today we will discuss health care providers' perceptions, experiences, and behaviours during the COVID-19 outbreak.

<u>Topic 1: Perceived Impact of COVID-19 on Health System and Capacity to Manage and Respond?</u>

1. Can you please describe your country's experience of the COVID-19 outbreak?
    - Stage of outbreak;
    - Degree of preparation;
    - Response and management

Now I would like you to think about the level of preparedness and impact of COVID-19 more locally. Can you begin by telling me about…

2. [What is] the impact of COVID-19 on your hospital and unit compared to routine operations?
   - Does your hospital have additional capacity to manage patients compared to normally?
   - Under normal circumstances, how full is the ICU at this time of year compared to now?
   - What is your [*hospital/unit*] capacity to meet and manage needs of ICU clinicians during the current pandemic?

3. What factors might jeopardize an ICU's capacity to safely manage COVID-19 cases during a pandemic? (Conditions leading to resource scarcity?)

Interviewer can use probes below for emergency and critical care if physician has been redeployed there.

4. What are the unique issues you are dealing with as a [*critical care clinician / redeployed clinician*] in response to COVID-19?
   - How are you dealing with these issues?
   - Critical care – ventilators, space, lack of treatment protocol
   - Redeployed – training, comfort, safety, changed environment, autonomy

<u>Topic 2: Information Access and Information Sharing/Dissemination</u>

1. How do you get your information about COVID-19?
   - Key sources for information (e.g., government, social media)?
   - How do you vet credibility of information?
   - What about your capacity to stay up to date and informed?
   - What about social media information about COVID-19?
     - Is it helpful, distracting, detrimental?
2. How are you using information that you receive about COVID-19?
   - Patient care, Family care, Self-care
3. What do you think are key messages of misinformation about COVID-19?
   - How do you feel this has impacted your response?
   - Your colleagues?
   - Public response?

<u>Topic 3: Direct Impact of COVID-19 on Self?</u>

1a. [REDEPLOYED ONLY] How did you make the decision to join the critical care or emergency department workforce?
   - Professional considerations
   - Personal considerations

1. How has COVID-19 directly impacted your <u>professional</u> and <u>personal</u> life?
   - From an emotional perspective how does this make you feel [coping, stress, fear, uncertainty, predictability]?
   - How is your household making decisions to manage during this time?
2. What responsibilities should local health authorities have to their employees' families during the COVID-19 outbreak?
3. How do you think providers are making decisions about whether or not to go to work during the current infectious disease outbreak?
   - How does this normally work when you/colleagues are sick?

- Has this changed given the current situation?

Closing

1. What is one unique thing (outside of usual care) that your unit or hospital are doing right now to aid the current situation?

Do you have any final thoughts?
Thank you for participating in our COVID-19 study.
<turn off recorder>

Administrative Questions

1. Would you like to review your transcript for potentially identifying information?

If yes: What email address should we send it to?

2. Is there anyone else you think we should speak to about this topic?
    a. Could we please have their contact information or could you please pass on our email invitation to them?

Structured Demographic Questions

We are collecting personal and family demographic information in order to describe our participants in aggregate. Contact information is only for us if you would like to review the report generated from this work to ensure that it reflects your experiences. Please note that your demographic information and contact info will be stored in a password-protected database that is only accessible to the study research team. If you are not comfortable answering any of the below questions, you are welcome to skip any or all of those you do not wish to answer.

If applicable: At what email address/mailing address do you wish to receive your transcript?

1. What is your age, sex, and marital status?
2. What is your profession?
3. How many years has it been since you finished residency?
4. What is your current role? (e.g., intensivist, department head)
5. How many years have you been in your current role?
6. What is your clinical specialty?
7. Do you have any children?
8. Do your children live with you?
9. What are your child(ren) ages?
10. What is your country of residence (e.g., where are you currently working)?
11. What type of institution are you currently working in (academic, non-academic, regional, urban)?
12. How many beds in total does your hospital have?

☐ ≤250 ☐251–499 ☐ 500–1000 ☐ >1000

13. How big is the population your hospital serves?
14. How many COVID-19 positive patients have been in your hospital (to date)?

Appendix C

Perspectives of Critical Care Physicians Working in the Intensive Care Unit During the Initial Stage of the COVID-19 Pandemic

Themes	*Quotes*
Sourcing and Implementation of Trusted Information	"I deliberately made a disconnect because I would read all the time, the *New York Times* and the newspaper. I've stopped all that, deliberately because I don't want to see it." "I found the epidemiological data is the most helpful for understanding the most common patient, what they will look like." "There's a lot of weird messages about masks. I think that misinformation is harmful. I feel the need to constantly correct any misinformation to my family, to my patient's family, which is exhausting." "It's not outward misinformation but trying to sort through a new disease for which there's been no previous precedent to work by."
Health Systems–Level Preparedness With Accessible Supports	"When the [first] wave started there was a staged approach—coordinated, very clear communication. I think that the management of that went very smoothly actually in such a way that nobody was overwhelmed in terms of providing care." "We didn't have staff testing at the time, so I have to rely just on symptomatology. I was really quite anxious about being a spreader. Could I spread this amongst my colleagues?"
Institutional Adaptations Including Changes to Patient Care	"Our ICU is now purely for coronavirus patients. We are now completely dedicated to coronavirus patients. Our operating suite recovery area has been turned into the non-coronavirus ICU, so patients go there if they require critical care services but are coronavirus negative." "Our hospital had this floor labelled with 'critical care' and made that into a completely COVID ICU and they made a separate ICU for other patients that are non-COVID but require critical care for other reasons."
Professional Safety and Occupational Well-Being	"The decision our [hospital] leadership made was to remove the older folks. I think anyone 65 and older. Then we had two pregnant physicians at the time from service and I think that was a hard decision for them to make. It was a challenging decision across the board." "From a professional standpoint as a resident, it has taken us away from our training a little bit. Our training opportunities." "And I think the things that they [physicians] will think about in the years to come will be those deaths. They've been horrible. They've been really hard."
Triage and Restricted Visitation Policies	"After I round in the morning, I have to come back to my office and I just call families on the phone or on Zoom. I find it exhausting and not nearly as personally satisfying as it would be if I was in the room talking to them or updating them in the ICU. It pulls me away from direct patient care because I'm trying to update families and I think that's I would say pretty draining." "To tell the family that the husband or the wife or the father was dying in the

	ICU and they cannot come to see them. They cannot hold their hand, they cannot be with them. And I don't know, that was really tough." "one thing we think we can do in ICU … is you can do everything you can to give people a good death, and that I think is one of the most important things you can do as an intensive care doctor or nurse. And I feel that a good death involves the family and giving the family an experience of a good death. And I think we're really limited in how we can do that [during the pandemic]. And I think the things that they [physicians] will think about in the years to come will be those deaths. They've been horrible. They've been really hard."
Managing Familial Responsibilities	"My parents live on the other side of town. They're in their seventies and have the usual collection of comorbidities of people in their seventies, so they've not been out shopping, so I do the shopping for them and drop it off with them and so forth."

HPJ HEALTHY POPULATIONS JOURNAL

Research Article

Understanding the Relationship Between Nature and Physical Activity in Older Adolescent Girls: A Scoping Review

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DOI: http://doi.org/ 10.15273/hpj.v2i2.11416

Abstract

Adolescent girls are subjected to gender norms and stereotypes regarding their health and well-being. Research has indicated that women and girls are exposed to unrealistic and unattainable body ideals that affect their relationship with physical activity (PA). In addition, despite suggestions that nature is important for health and well-being, women and girls experience barriers in accessing and connecting with nature due to gender expectations and stereotypes. The purpose of this review is to determine what is known from the existing literature about older adolescent girls' relationship with nature and PA. This scoping review follows the framework of Arksey and O'Malley. In total, 39 studies were reviewed, and their characteristics were summarized quantitatively and qualitatively. Five themes were identified: (a) Active transportation provides an opportunity for girls to connect PA with nature, (b) Adolescent girls' navigation of gender norms and barriers while connecting with PA and nature, (c) Perceived safety influences adolescent girls' relationship with PA and nature, (d) Infrastructure and aesthetics can impact adolescent girls' connection between PA and nature, and (e) The relationship between PA and nature intersects with girls' mental well-being. Gaps in the literature are identified and discussed. It is concluded that older adolescent girls' relationship with nature and PA is influenced by gender norms and perceptions of aspects of their environment, such as safety and aesthetics.

Introduction

Physical inactivity has been identified by the World Health Organization (WHO) as a worldwide problem and one of the leading risk factors for global mortality (WHO, 2020). As youth age, their levels of physical activity (PA) decrease, and adolescent girls between the ages of nine and 19 are the most susceptible to this decline, as their PA levels descend by approximately 83% (Dwyer et al., 2006; Guthold et al., 2020; ParticipACTION, 2020; Russell et al., 2008; WHO, 2020). Further, in Canada, only 2% of girls aged 12–17 meet movement guidelines (Colley et al., 2017; Guthold et al., 2018; ParticipACTION, 2020; WHO, 2020). As young girls mature into adolescents, they are faced with numerous challenges, contradictions, and double standards regarding their bodies (Spencer et al., 2021). It is therefore not surprising that women and girls have a complex relationship with PA due to the need to navigate gender norms and stereotypes (Beltrán-Carrillo et al., 2018; Dwyer et al., 2006; Lee & Macdonald, 2010; Rosselli et al., 2020; Wesely & Gaarder, 2004).

At a young age, girls can be impacted by media platforms and images centred around gender norms that promote unrealistic standards about what it means to identify as a girl. For example, the media can influence girls to assume they need to be thin, slender, and pretty (Beltrán-Carrillo et al., 2018; Rosselli et al., 2020). Misogynistic stereotypes and norms sometimes value certain traits in girls and women such as being carefully groomed, compliant, sweet, pleasant, co-operative, upbeat, and polite (Whittington, 2006). Stereotypes and norms can also extend to how girls should dress, speak, and pursue interests (Beltrán-Carrillo et al., 2018; Lee & Macdonald, 2010; Rosselli et al., 2020). The pressure to adhere to these norms can impact adolescent girls' experiences with PA. For example, traditional stereotypes position PA as masculine (Warren, 2015; Whittington, 2006), resulting in contradictions between typical standards of femininity and PA (Beltrán-Carrillo et al., 2018; Dwyer et al., 2006; Lee & Macdonald, 2010; Rosselli et al., 2020; Wesely & Gaarder, 2004). Further, the pressure to adhere to specific feminine standards, such as to be pretty and thin, can lead adolescent girls to avoid participating in PA due to fear of being criticized or being perceived as too masculine by their peers (Beltrán-Carrillo et al., 2018; Dwyer et al., 2006; Lee & Macdonald, 2010; Rosselli et al., 2020; Wesely & Gaarder, 2004).

Girls' experiences in nature are often affected by constraining social norms about what girls can and cannot, or should and should not, do in nature (Brussoni et al., 2020; Lee et al., 2015; Marzi et al., 2018; McAnirlin & Maddox, 2020). Traditional gender norms suggest that women and girls should be warm, sensitive, and co-operative, be attractive, be thin, nurture others, be silent, defer to men, and avoid dominance, just to name a few (Kavasoğlu & Yaşar, 2016; Metcalfe, 2018; Prentice & Carranza, 2002; Rudman et al., 2012). This focus on girls and their aesthetic hinders their potential to be physically athletic and active (Metcalfe, 2018). The belief and attitude that some nature activities, such as scouting, hunting, and hiking, are not appropriate for girls perpetuates the lack of support that girls receive to engage in nature activities (Ghimire et al., 2014; Henderson & Shaw, 2006; Lee et al., 2015). These gender stereotypes can result in confusing messages and narratives for girls and women concerning PA and nature.

Nature and PA stereotypes do not promote adolescent girls' PA and outdoor pursuits. Over the past decade, it has been found that adolescents have been spending less time outside, specifically older adolescent girls (Larson et al., 2011; McNiel et al., 2012; Roth & Basow, 2004). The stereotype that nature is a masculine domain reinforces the idea that outside spaces are not for girls, leading girls to limit their connections between PA and nature (Hively & El-Alayli, 2014; McNiel et al., 2012). When girls do connect with PA and nature, they may face a complex dilemma of resisting oppressive stereotypes of femininity while also trying to conform to traditional gender norms (Lugg, 2003). When girls challenge assumptions about their abilities, appearance, and behaviours, they disrupt misogyny (McNiel et al., 2012; Whittington, 2006; Wittmer, 2001). Social and cultural norms can impact adolescent girls' relationships with nature and PA.

The relationship older adolescent girls have with PA has been under-explored, as most of the PA literature is focused on early-to-middle adolescents (Richman & Shaffer, 2000; Spencer et al., 2015). This gap is necessary to fill as older adolescent girls become more sedentary and less active as they age (Guthold et al., 2020; ParticipACTION, 2020). In addition, there has been limited research on the relationship girls form with nature and PA (Evans, 2006; Gray et al., 2015; White et al., 2019). This is a critical gap to address, as the stereotypes and gender norms older girls face may be impacting their well-being and their ability to form a relationship with nature and PA.

The purpose of this scoping review is to determine what is known from the existing literature about older adolescent girls' relationship with nature and PA. For this review, older adolescent girls are defined as girls and young women between the ages of 16 and 19, in accordance with WHO (2020). The gender terms "women" or "girls" will be used in this study, as gender refers to socially constructed characteristics of behaviours and roles associated with self-representation, such as being a girl or boy. PA will be broadly defined as a wide range of activities that require movement produced by skeletal muscles, such as walking, cycling, sports, and recreation (WHO, 2018, 2020). Humans can interact with nature in many different ways, through spending time outdoors in built environments or undeveloped environments containing natural vegetation (MacBride-Stewart et al., 2016). The term nature describes the natural environment, developed or undeveloped, green or blue space, or landscape that includes plants and wildlife (Centers for Disease Control and Prevention, 2009). These spaces can include parks, forests, and playing fields, where outdoor recreation, sports, and activities occur (Britton et al., 2020; Völker & Kistemann, 2011). Nature can be seen as an open and constantly changing environment, where it is possible to experience freedom, active movements, and contact with natural elements (Bilton, 2010; Dyment & Bell, 2008; Hunter et al., 2016).

Objectives

This review will take the approach of a scoping study using the methods of Arksey and O'Malley (2005). Scoping reviews are used to examine a broad range of literature while focusing on breadth instead of depth (Arksey & O'Malley, 2005; Munn et al., 2018; Pham et al., 2014). This review will apply the five-stage framework proposed by Arksey and O'Malley (2005), which includes defining the research question; identifying relevant studies; study selection; charting the data; and collecting, summarizing, and reporting the results. The research question for this review is as follows: What is known from the existing literature about older adolescent girls' relationship with nature and PA?

Methods

Identifying Studies

The search strategy was developed in consultation with a subject specialist health librarian. Guided by the research question, a list of key search concepts was developed: adolescent girls, nature, and PA. The electronic databases Academic Search Premier, CINAHL, Gender Studies Database, APA PsycInfo, SPORTDiscus, and PubMed were used for this search. Our keyword search strategy (Table 1) for all databases included key terms centred around "adolescent girls" or "women," "physical activity" or "exercise," and the "outdoors" or "nature." Additionally, database-specific subject headings were used, such as "movement," "recreation," or "sports." Articles were imported

Table 1

Keyword Search Strategy

Key search term 1	(adolescen* or teen* or youth* or young*) N3 (women or woman or girl* or female*)
Key search term 2	(physical* N2 (activ* or fit*)) OR exercis*
Key search term 3	outdoor* or outside or natur* or (green N2 spac*)
Final search terms	1 AND 2 AND 3

Table 2

Inclusion and Exclusion

Criteria	Inclusion	Exclusion
Location	Worldwide	
Gender	Adolescent girls or young women	Adolescent boys or young men
Focus	Girls' connection to nature through physical activity	Indoor PA or boys' connection to nature and/or physical activity
Age	Primary participants aged 16–19 (with larger ranges included if relevant results could be identified)	Primary participants aged outside 16–19
Language	English	Any language other than English
Publication type	Peer-reviewed original research	Publications that did not report on original research, such as reviews, discussion papers, book reviews, conference proceedings, and dissertations
Publication date	2008–June 2022	Prior to 2008

to Covidence, a software that allowed the first and second authors to screen each study. Each study was screened using the inclusion and exclusion criteria described in Table 2 (Arksey & O'Malley, 2005). Appendix B contains a sample search strategy from APA PsycInfo database.

Inclusion and Exclusion Criteria

This review included studies published between 2008 and June 2022 (when the search was conducted) that discussed adolescent girls' or young women's relationship with PA and nature. We selected 2008 as a relevant time frame because in 2008 the WHO produced the first set of international estimates on insufficient PA, providing the first compilation of global data on the prevalence of insufficient physical activity (Guthold et al., 2018). Gender as an inclusion criterion for this study included feminine identities, such as women and girls. As gender is a socially-constructed self-representation, participants who self-identified as a women or girl were taken into consideration. Studies with mixed genders were included if we could isolate the relevant findings specific to women and girls. In addition, articles were included if the primary participants were aged 16–19, as this is the age range the WHO used to define older adolescent girls. Articles with a larger age range were included if findings specific to the age range of 16–19 could be isolated. A preliminary search was conducted prior to this review to ensure that no duplicative evidence syntheses have been previously done. Reviews were excluded to focus on primary sources; however, during full text review the reference lists of any notable reviews were scanned for relevant articles, though no additional articles were added this way. A preliminary scan of the grey literature did not result in additional sources. Studies were first screened based on title and abstract using Covidence. During the full-text review, articles were screened by the first and second authors, while the third author assisted in resolving conflicts.

We used Arksey and O'Malley's (2005) descriptive-analytical approach to systematically extract and chart data from the studies that met the inclusion criteria. Data were interpreted and synthesized through charting using Microsoft Excel by the first author and then reviewed and refined by the last author. Study characteristics that were charted included the following: author(s), publication year and location, study purpose, methods, design, population, key findings, and conclusions (Levac et al., 2010). Results were summarized in order to present an overview of the evidence (Appendix A; Arksey & O'Malley, 2005). Appendix A summarizes study characteristics such as authors, year, and country; objective/aim; population; design: methodology; and study findings.

Themes were developed iteratively by the first author using guidance from the Braun and Clarke method for reflexive thematic analysis, and later reviewed by the last author (Arksey & O'Malley, 2005; Braun & Clarke, 2006, 2019, 2021). Reflexive thematic analysis involves systematically exploring, interpreting, and reporting patterns from the data set (Braun & Clarke, 2019, 2021). First, the authors familiarized themselves with the data set, where they read the included studies and created the chart to become immersed in and familiar with the content (Arksey & O'Malley, 2005; Braun & Clarke, 2019). We then coded the data by reviewing the chart and systematically generating and applying labels to identify concepts and trends that help address the research question (Braun & Clarke, 2019). Then, we examined the codes to explore patterns leading to potential themes (Braun & Clarke, 2019). All authors came together to discuss and refine potential themes as they developed (Braun & Clarke, 2019). We considered our positions reflexively throughout this process, reflecting on our own positions, education, and upbringing and remaining mindful of them through our analysis.

Results

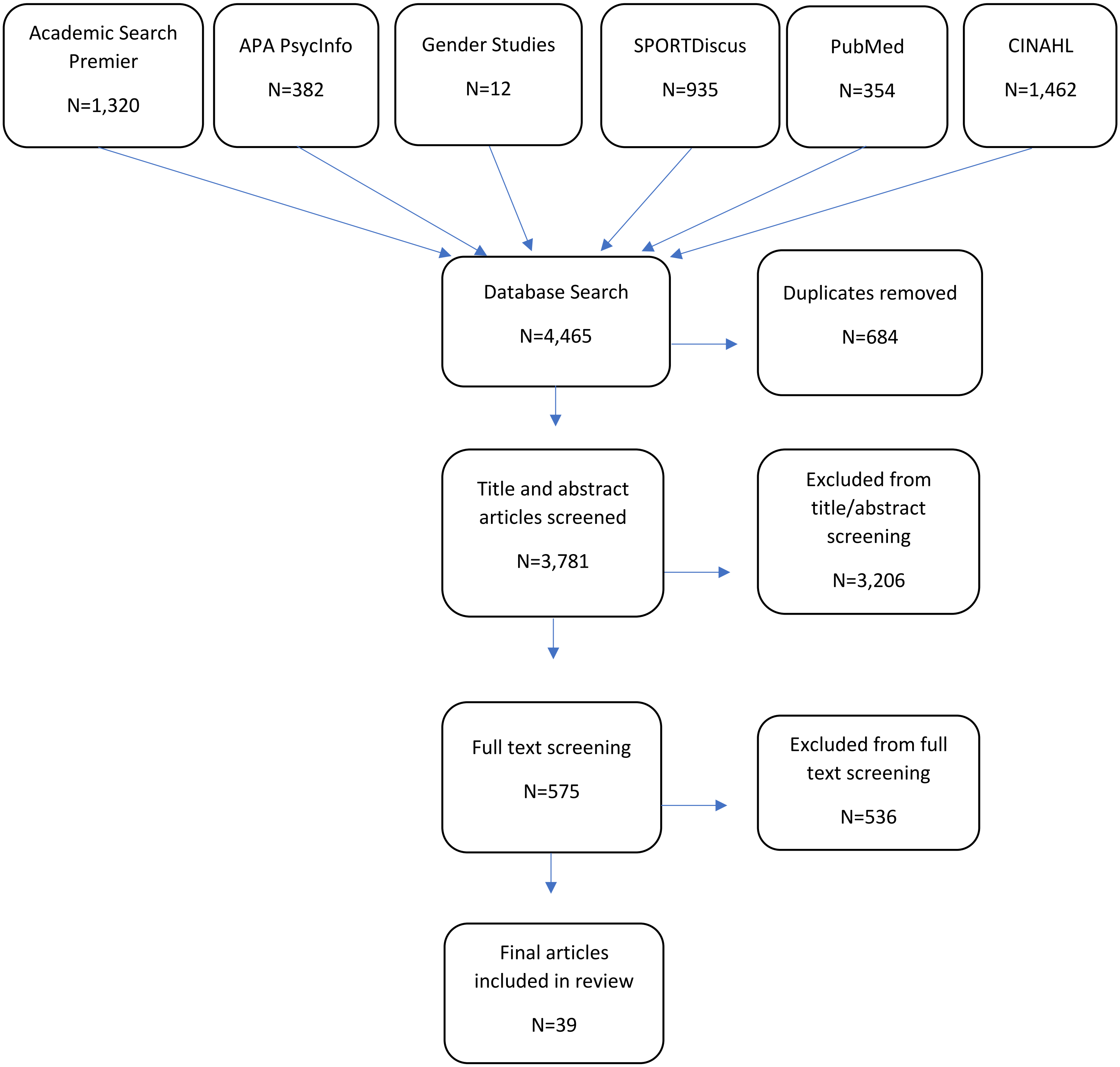
Search Outcome

The database search was originally executed in February 2021, resulting in 4,465 studies being identified; 684 duplicates were removed, resulting in a total of 3,781 studies to be screened. Following the title and abstract screening, 3,206 studies were excluded leaving 575 studies to full-text screen. During full-text screening, 536 studies were excluded, leaving 39 for inclusion in this scoping review. The search was run again in June 2022 with no additional articles identified for inclusion (200 articles identified, 15 full-text reviews, no new articles added). Figure 1 further describes this process.

Of the 39 articles that met the study inclusion criteria, 15 were published between 2008 and 2012, 12 between 2013 and 2017, and 12 in the last four years. The reviewed articles were relatively evenly distributed throughout the years, indicating that the concepts of nature and PA have been proportionally researched over time. North America reported the greatest number of articles (19), followed by Europe (10), South America (six), and Asia (two). There was one article from Australia and one from New Zealand. The settings of reviewed articles included parks (nine), neighbourhoods (six), schools (nine), and open spaces (six), while others did not specify (nine). Quantitative designs were the main form of data collection (30), followed by qualitative (six) and mixed methods approaches (three). Self-reported data was the primary form of data collection for quantitative studies, as the majority used surveys, questionnaires, or scales (19). Secondary analysis was also used commonly in quantitative studies (nine). A range of additional quantitative measures were used, including anthropometric measures (four), fitness testing (four), pedometers (one), accelerometers (one), and observations (eight). The primary data collection method for qualitative and mixed methods studies were interviews or focus

Figure 1

Search Outcome



groups (seven). One study used photovoice.

While this scoping review's intended participant age range was older adolescent girls aged 16–19, only two articles were focused on this specific age range. Articles that included a broader age range were included if findings specifically relevant to our age of interest could be isolated. Most included articles contained adolescents between the ages of 12–17 or had a broader range, such as 9–18 or 18+; however, they had smaller age brackets for reporting, such that we could isolate findings relevant to our population of interest. Additionally, most studies (36) included multiple genders, with only three studies focusing on girls or women specifically. Studies with mixed genders were also only included if we could isolate findings specific to our population of interest. Table 3 summarizes the characteristics of reviewed studies.

Table 3

Study Characteristics

Methodology	Qualitative	6
	Quantitative	30
	Mixed	3
Year Published	2008–2012	15
	2013–2017	12
	2018–2021	12
Setting	Neighbourhood	6
	Park	9
	Open Space	6
	School	9
	Not Specified	9
Location	North America	19
	South America	6
	Europe	10
	Asia	2
	Australia	1
	New Zealand	1

Themes Identified

Five themes were identified through conducting reflexive thematic analysis of the charted data. First, active transportation can provide girls with an opportunity to connect PA with nature. Second, aspects of PA in nature can help girls navigate gender norms. Third, adolescent girls' perceived safety can influence their relationship with PA and nature. Fourth, adolescent girls' connection between PA and nature is impacted by infrastructure and aesthetics. Finally, PA and nature can have an effect on adolescent girls' mental well-being.

Active Transportation Provides an Opportunity for Girls to Connect Nature With PA

Many reviewed studies emphasized active transportation as a common form of PA that connects adolescent girls to nature. Studies indicated walking and biking as the primary forms of active transportation for girls (Boone-Heinonen et al., 2010; Chillón et al., 2013; Janha et al., 2020; Nelson et al., 2008; Ramírez-Vélez et al., 2017; Thomas, 2015; Ward et al., 2018). One study found that cycling as a form of active transport helped girls incorporate natural environments into their daily routines (Thomas, 2015). Additionally, researchers found that, while using active transportation, aspects of nature such as vegetation provided girls with familiarity, reassurance, and comfort (Boone-Heinonen et al., 2010; Janha et al., 2020; Thomas, 2015). Further, studies found that active transportation also resulted in girls feeling more connected to nature, as they could reflect and reconnect with their surroundings and themselves (Janha et al., 2020; Thomas, 2015). Several studies noted that girls associate active transportation with well-being, as they can socialize in natural environments while engaging in PA (Dunton et al., 2010; Kudlacek et al., 2020; Ries et al., 2008; Ward et al., 2018). Additionally, researchers found that having peer support while using active transportation encouraged girls to spend more time in natural environments and facilitated more time for PA (Chillón et al., 2013; Dunton et al., 2010). In addition, researchers found that when girls use active transportation, they are able to engage in PA while connecting with nature (Chillón et al., 2010; Martínez-Gómez et al., 2011; Ramírez-Vélez et al., 2017).

Girls Have to Navigate Gender Norms to Connect PA and Nature

Reviewed articles discuss gender-specific challenges related to nature and PA. Studies highlighted challenges that can impact adolescent girls' connection with PA and nature, such as school uniforms, skirts, footwear, and cultural pieces, as these items may make it difficult for girls to use active transportation or participate in outdoor activities (Rothe et al., 2010; Ward et al., 2018). Several studies indicated that girls reported prioritizing studying, chores, babysitting, or other jobs as they aged, which led to less time available for PA and exploring natural environments (Janha et al., 2020; Rothe et al., 2010; Tannehill et al., 2015). Further, researchers found that expenses such as transportation fees and outdoor clothing resulted in girls choosing to participate in indoor activities, at facilities close to their homes, or at home (Humbert et al., 2008; Rothe et al., 2010). Several articles discussed how sports facilities, parks, and open spaces tend to be dominated by men, which can result in girls feeling intimidated or unwelcome (Babey et al., 2015; Dias et al., 2019; Floyd et al., 2011; Kudlacek et al., 2020; Ries et al., 2008; Spencer et al., 2021; Van Hecke et al., 2018).

Although women and girls may face gender-specific challenges in connecting PA and nature, some aspects of nature were found to help girls navigate these gender norms. For example, Spencer et al. (2021) found that being outside in nature provided adolescent girls with a positive environment to navigate gender norms and stereotypes regarding their health. Researchers also found that social and emotional support from family and friends gives girls the ability to navigate gender norms, such as those relating to PA and nature (Chillón et al., 2013; Dunton et al., 2010; Spencer et al., 2021). Further, researchers found that girls are more open to challenging gender norms when they are with friends, as they feel less vulnerable performing activities in nature with the support of their friends (Janha et al., 2020; Kudlacek et al., 2020; Tannehill et al., 2015).

Perceived Safety Influences Adolescent Girls' Relationship With PA and Nature

Many of the reviewed studies noted the critical role perceived safety and security plays in girls' connection between nature and PA. Studies indicated that perceptions of park safety and park accessibility are important predictors of engaging in park-based PA among adolescent girls (Babey et al., 2015; Humbert et al., 2008; Ries et al., 2008). Researchers also noted that road safety and accessibility issues, such as inadequate crosswalks, sidewalks, and bike lanes, were associated with avoidance of parks, facilities, open spaces, and active transportation (Boone-Heinonen et al., 2010; Carver et al., 2012; Dias et al., 2019; Humbert et al., 2008; Oliveira et al., 2020; Rothe et al., 2010; Schultz et al., 2017). In addition, researchers suggested that parents' perception of neighbourhood safety, such as low traffic and crime rate, increases the likelihood of girls' outdoor PA (Oliveira et al., 2020; Perez et al., 2017).

Parental perceived risk was highlighted as a significant influence on adolescent girls' ability to form a relationship with nature and PA. Several studies indicated that parents perceive their daughters to be at risk of harm, especially in outdoor settings (Carver et al., 2012; Ding et al., 2012; Perez et al., 2017). Researchers suggested that when parental perceived risk is high, adolescent girls' opportunities to connect PA and nature are limited (Carver et al., 2012; Ding et al., 2012; Perez et al., 2017). Further, studies found that perceived risk significantly affects girls' PA, as girls who have high levels of fear or are exposed to crime within their neighbourhood were less likely to engage in outdoor PA and felt unsafe using active transportation (Chaparro et al., 2019; Ding et al., 2012; Perez et al., 2017; Rišová & Sládeková Madajová, 2020; Roman et al., 2013). In addition, one study found that the pursuit of independent activity, such as walking or hiking, could be limited as travelling alone presents a challenge to adolescent girls (Spencer et al., 2021).

Infrastructure and Aesthetics Impacts Adolescent Girls' Connection Between PA and Nature

Reviewed studies identified specific factors such as proximity, characteristics of facilities, and environmental aesthetics as influencing girls' connection between nature and PA. For example, several studies indicated that neighbourhoods with access to parks were associated with increased PA in girls, as they have more options close by (Babey et al., 2015; Humbert et al., 2008; Mitra et al., 2020; Oliveira et al., 2020; Schultz et al., 2017). Other studies found that built environments consisting of multiple facilities, such as PA clubs, courts, playgrounds, swimming pools, open fields, trails, and tracks, result in a higher percentage of adolescent girls participating in PA (Cohen et al., 2017; Dunton et al., 2010; Floyd et al., 2011; Hunter et al., 2016; Kaczynski et al., 2011; Ries et al., 2008; Sarmiento et al., 2017; Van Hecke et al., 2018). Studies found that when natural environments can support a variety of ages, PA levels increase across age groups, including for adolescent girls (de Paula da Silva et al., 2019; Kaczynski et al., 2011; Thomas, 2015; Van Hecke et al., 2018). In addition, studies indicated that the aesthetics of the park or the natural environment, along with the park's facilities, could enhance PA (Cohen et al., 2017; Floyd et al., 2011; Reed et al., 2012; Ries et al., 2008; Wilhelm Stanis et al., 2014).

The aesthetics of natural environments was highlighted as a significant influence on adolescent girls' PA. Two studies noted that when a natural environment is aesthetically pleasing, older adolescent girls are more likely to visit these spaces, connect with their surroundings, and engage in PA (Oliveira et al., 2020; Roman et al., 2013). Additionally, studies indicated that girls are more likely to visit parks and outdoor areas that contain flowers and trees, as they associate nature with beauty, scenery, colour, and views (Ries et al., 2008; Shan, 2014; Spencer et al., 2021). Reviewed articles also noted that girls describe the aesthetics of their natural environments through language centred around positivity and health (Shan, 2014; Thomas, 2015). Other studies found that natural environments provided girls with a place to engage in PA, reflect, and connect with their surroundings (Shan, 2014; Spencer et al., 2021; Thomas, 2015). Finally, studies suggested that some girls connected being outside in nature directly to PA, while others connect nature more broadly to well-being, which may include PA (Spencer et al., 2021; Thomas, 2015).

The Relationship Between Nature and PA Intersects with Girls' Mental Well-Being

Adolescent girls also relate the natural environment to their mental well-being and PA. Several studies indicated that natural environments or spaces can positively influence mental health and well-being, especially when connected with PA (Bojorquez & Ojeda-Revah, 2018; Cobar et al., 2017; Shan, 2014; Tannehill et al., 2015; Thomas, 2015). Reviewed studies found that girls emphasize the importance of being outside to get fresh air, enjoy the surroundings, clear their heads, express emotions, and engage in PA (Tannehill et al., 2015; Thomas, 2015). Further, studies identified that walking in parks or green spaces improved mental health in women, especially younger women and adolescent girls (Bojorquez & Ojeda-Revah, 2018; Cobar et al., 2017). Other studies described natural green spaces as therapeutic, as they were found to help girls restore their well-being and engage in PA (Cobar et al., 2017; Tannehill et al., 2015; Thomas, 2015).

Girls are more inclined to engage in PA when they are in a familiar and comfortable atmosphere. Studies noted that natural environments that had a comfortable atmosphere provided girls with feelings of fulfillment, accomplishment, reassurance, and comfort, leading them to express emotions, connect with their mental well-being, and participate in PA (Bojorquez & Ojeda-Revah, 2018; Tannehill et al., 2015; Thomas, 2015). In addition, studies found that participating in activities in natural spaces played a role in stress and anxiety reduction, and improved attention restoration and mindfulness (Cobar et al., 2017; Tannehill et al., 2015; Thomas, 2015). Studies found that when natural environments provided adolescent girls with familiarity and comfort, they were able to focus on their well-being and were more inclined to engage in PA (Tannehill et al., 2015; Thomas, 2015). Overall, researchers highlighted that girls' well-being can be improved through visiting natural environments that provide a comfortable atmosphere, as they allow girls to perform PA, reflect, and reconnect with themselves (Bojorquez & Ojeda-Revah, 2018; Shan, 2014; Tannehill et al., 2015; Thomas, 2015).

Discussion

This scoping study reviewed 39 articles exploring older adolescent girls' relationship with nature and PA. Five themes were developed through reviewing the existing literature. Themes focused on how adolescent girls' relationship with nature and PA can be influenced by active transportation, gender norms, perceived safety, infrastructure and aesthetics of natural environments, and mental well-being. Themes detail adolescent girls' experiences with PA and nature, including the barriers they face and the benefits associated with PA and the outdoors. The themes identified in this study are interrelated, align with the broader literature, and provide new insight into adolescent girls' relationship with PA and nature. This review contributes to the literature by summarizing what is known about adolescent girls' relationship with PA and nature for the first time.

The themes in this review are distinct but deeply intertwined in instances. For example, the theme of mental well-being intersects with the themes related to the impact of gender norms, the influence of environment aesthetics, and the effect of infrastructure on adolescent girls' well-being and their connection between PA and nature. Further, the influence of peers and family on adolescent girls' relationship with nature and PA was apparent across the first and second themes, as social and emotional support from family and friends is important for girls' relationship with nature and PA. These findings align with previous research that indicates the importance of social support for PA, especially for girls (Allison et al., 2005; Brockman et al., 2011; Laird et al., 2016). Findings that align with the literature provide a stronger evidence base for emerging information on girls' relationship with nature and PA.

Another theme well aligned with other literature was the association between mental well-being and the connection between PA and nature. For instance, much of the current literature suggest that natural environments are essential for releasing stress and promoting relaxation (Birch et al., 2020; Bojner Horwitz et al., 2020; Cheesbrough et al., 2019; Hammer et al., 2013). Previous research has suggested that when people have the opportunity to visit natural environments they are able to better cope with various life challenges (Degenhardt & Buchecker, 2012; Korpela & Ylén, 2009). The studies in this review are in keeping with the literature, while also providing new insight by further highlighting women and girls' connection with mental well-being in nature settings.

Themes connecting well-being and gender norms are also consistent with the broader literature. For example, previous studies suggest that young girls' PA can be limited due to the opportunities available to them and by the complex gender expectations of society (Coleman et al., 2008; Cowley et al., 2021; Rogers & Rose, 2019; Spencer et al., 2015; The Lancet Public Health, 2019; Warren, 2015). While these publications have begun to identify that girls' connection with PA and nature is influenced by gender norms, the overall relationship between PA and nature has not been previously reported. Findings from this review further highlight how gender norms can affect how girls are able to form a relationship with PA and nature, which influences their overall well-being.

This review identified that perceived safety of an environment can affect older adolescent girls' connection between nature and PA. These findings align with literature that suggests girls feel unsafe in natural environments due to fears of harassment, leading them to refrain from connecting with PA and nature (Dunton et al., 2010; Kilgour & Parker, 2013; Plane & Klodawsky, 2013). Additionally, previous literature suggests that fear of harassment can deter women and girls from using active transport (Gekoski et al., 2017; Iqbal et al., 2020; Phadke, 2013); however, many studies in this review emphasized active transportation as an important form of PA that connects adolescent girls to nature. The findings from this study contrast previous literature by revealing how girls use active transportation to connect with nature.

Gaps in the Literature and Suggestions for Future Research

As is common in scoping reviews (Arksey & O'Malley, 2005), this study helps identify several gaps in the literature. First, reviewed studies focused primarily on early-middle adolescents (10–16 years) or women (18+ years), while very few specifically focused on older adolescent girls (16–19 years). This is common in much of the PA literature, where studies tend to focus on early-middle adolescents or older adults (Richman & Shaffer, 2000; Spencer et al., 2015). This offers an interesting opportunity for future research addressing this population, as girls in the older adolescent age group may have unique experiences and perspectives given the gender norms they face and their relationship with PA and nature (Rosselli et al., 2020).

In terms of methodology, most of the articles included in this review used a quantitative approach, which, while appropriate for measuring PA, may not provide a comprehensive understanding of adolescent girls' experiences and perceptions (Curry et al., 2009). Future research should utilize qualitative methodologies and/or creative, participatory, visual, or arts-based methodologies to gain valuable insight regarding the lived experiences of older adolescent girls and how they perceive the relationship between nature and PA (Dunn & Mellor, 2017).

A significant gap in the literature is that studies often focus on PA that takes place outside, with little emphasis on analyzing the connection between adolescent girls' PA and nature. Of the 39 peer-reviewed research articles reviewed, only seven explicitly focused on the connection or relationship between nature and PA. Further, there was a substantial focus on PA rather than nature. Most of the reviewed articles focused on PA with nature either mentioned (10) or as an underlying concept (eight). Lastly, just four publications focused on women and girl participants specifically, without comparison to men. In other publications, either women and girls were directly compared to men or gender was only briefly mentioned in the analysis. Studies should refrain from simply comparing women and girls to men and boys, and should recognize the importance of the specific experiences of historically marginalized gender identities (Tannenbaum et al., 2016). Further, there are additional gender identities that have faced more problematic historical marginalization and warrant future research as well. As little research explicitly examined older adolescent girls' relationship with nature and PA, there is an opportunity for future research to explore adolescent girls' relationship with PA and nature.

Strengths and Limitations

One of the review's strengths is that we employed a comprehensive search strategy resulting in the inclusion of a variety of studies focused on nature, adolescents, and PA. The Arksey and O'Malley (2005) framework was used to strengthen the process of identifying, extracting, and analyzing publications for this review. Another strength of this review is that it allowed us to identify gaps in the existing literature that can be used to guide future research. Finally, this work was conducted by a team of researchers with expertise in scoping reviews and gender research.

A potential weakness of scoping reviews is that they focus on breadth rather than depth, resulting in a lack of quality assessment (Arksey & O'Malley, 2005; Levac et al., 2010). Although scoping reviews aim to conduct an extensive and comprehensive search on a specific topic, this is not always possible, resulting in the likely exclusion of some relevant studies (Anderson et al., 2008; Arksey & O'Malley, 2005; Brien et al., 2010; Levac et al., 2010; Pham et al., 2014). A potential limitation of this review is that, given the focus on girls between the range of 16–19, articles that have a broader age range or did not specifically indicate their age range were excluded. In addition, the review was limited to articles published in English and did not explore grey or unpublished literature, although we recognize they constitute an important source of information. Finally, the exclusion and inclusion criteria used in the study selection reflects our subjectivity, which influenced our decision-making when deciding which articles are relevant for this review.

Conclusion

In conclusion, this scoping review has summarized what is known from the existing literature about older adolescent girls' relationship with nature and PA. The results of this review emphasize that active transportation, social and emotional support, perceived safety, gender norms and barriers, and aesthetics are factors that impact adolescent girls' relationship with nature and PA. While there appears to be many ways for adolescent girls to form a relationship with nature and PA, they may also experience gender norms and stereotypes that influence their engagement with nature and PA, which requires further investigation. There is a need for research focusing on older adolescent girls, exploring the relationship between PA and nature, while employing a qualitative methodology. Future research should utilize qualitative methodologies and/or creative, participatory, visual, or arts-based methodologies and explore additional gender identities. As little research explicitly examined older adolescent girls' relationship with nature and PA, there is an opportunity for future research to explore older adolescent girls' perspectives of their relationship with nature and PA in more depth.

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Appendix A

Summary of Charting Process

Authors (Year); Country	Objective/Aim	Population	Design: Methodology	Study Findings
Babey, Tan, Wolstein, Diamant (2015); USA	To examine how adolescents' sociodemographic, family, and neighbourhood characteristics influence their park-based PA.	3,638 participants; 1,823 girls Age 12–17	Quantitative. The data was obtained from the 2007 California Health Interview Survey and adolescents' demographics of park-based PA.	Park availability and perceptions of park safety are important predictors of engaging in park-based PA among adolescents, especially women.
Bojorquez, Ojeda-Revah (2018); Mexico	To explore the association between public park green coverage and mental health in women.	2,345 women participants; Age 18–65	Quantitative. Data was obtained from household surveys and previous studies regarding the distribution and quality of public spaces.	Green coverage in parks was associated with being active in public spaces for the women in this study. Participants had lower mental health scores when there was more green space in the park.
Boone-Heinonen, Casanova, Richardson, Gordon-Larsen (2010); USA	To estimate different behaviour-specific effects that occur in outdoor spaces and the level of PA (moderate to vigorous) in different outdoor settings.	10,773 adolescents; 5,382 girls; Age 11–21; 48.2% 11–15; 34.2% 16–17; 17.7% 18–21	Quantitative. Cross-sectional data from Wave I of The National Longitudinal Study of Adolescent Health were used.	Females living closer to a major park were associated with higher moderate to vigorous physical activity levels. Larger areas of green space were related to high levels of leisure and exercise in girls. Green spaces provide higher benefits for girls who were previously less

				active. Girls connected being in outdoor spaces to social support and feeling safer. Green spaces provide girls with the space to perform PA and act as a safe place to feel supported.
Carver, Timperio, Hesketh, Crawford (2012); Australia	To examine the association between perceived risk and parental constraint behaviours.	270 adolescents; 57% girls; Age 15–17	Quantitative, Cross-sectional design. Data was obtained from the Children Living in Active Neighborhoods Study and a questionnaire.	Perceived risk was a significant mediator of associations between perceived road safety and avoidance behaviour. On average girls had more parental restrictions.
Chaparro, Bilfield, Theall (2019); USA	To investigate if exposure to neighbourhood crime was associated with PA and overweight/obesity adolescents.	15,261 adolescents; 50.5% girls; Age 12–20	Quantitative. Data consisted of Georeferenced data from the National Health, the Nutrition Examination Survey, and the Federal Bureau of Investigation.	Adolescent girls who are exposed to high levels of crime within their neighbourhood are less likely to engage in PA and have a higher rate of being overweight/obese.
Chillón, Martinez-Gómez, Ortega, Pérez-López, Díaz, Veses, Veiga, Marcos, Delgado-Fernández (2013); Spain	To examine the trend of active commuting to school in Spanish adolescents over a 6–year period (2001–2002 to 2006–2007).	Study 1: 415 adolescents, 198 girls; Age 13–17 Study 2: 891 adolescents, 448 girls; Age 13–17	Quantitative. Questionnaires and data were obtained from two previous studies.	Active commuting in girls decreased significantly from 2001/2002 to 2006/2007. Belonging to a large family was related to higher active commuting in girls. The percentage of active girls decreased, but their journey duration increased.

Chillón, Ortega, Ruiz, Veidebaum, Oja, Mäestu, Sjöström (2010); Europe	To examine the mode of commuting to school and its association with PA and cardiorespiratory fitness.	2,271 participants; 1,218 girls; Ages 9–10 & 15–16	Quantitative. A questionnaire, accelerometry, and cycle ergometer test were used to collect data on participants.	Activity commuting to schools results in higher levels of PA and better cardiorespiratory fitness.
Cobar, Borromeo, Agcaoili, Rodil (2017); Philippines	To examine how birdwatching as a form of PA can immediately affect high school seniors' mood states and determine if gender affects these mood state differences.	30 students; 16 girls Age 16–17	Quantitative, Cross-sectional design. Abbreviated Profile of Mood States questionnaire was used to obtain data.	Walking and watching birds while walking can help decrease negative moods for girls. When picking between activities, it depended on which mood disturbances each girl was looking to decrease.
Cohen, Han, Evenson, Nagel, McKenzie, Marsh, Williamson, Harnik (2017); USA	To compare parks with walking loops to parks without walking loops. To determine if walking loops increase park users' PA levels in urban neighbourhood parks.	Boys and girls; Age 0–19 N=NA	Quantitative. Data from the National Study of Neighborhood Parks, The System of Observing Play and the Recreation in Communities (SOPARC) was used to document facilities and park users by age group, sex and PA levels.	Parks with walking loops had more female visitors than parks without them. Access to walking loops supports more moderate to vigorous PA in both boys and girls.
de Paula da Silva, de Camargo, da Silva, Silva, Hino, Reis (2019); Brazil	To describe the places, types, weekly frequency, duration, and volume of physical activities performed by Curitiba, Brazil adolescents.	495 adolescents; 251 girls; Age 12–17 130 girls; Age 16–17	Quantitative. Household surveys from a cross-sectional study conducted in 2013–2014 and a PA questionnaire were utilized to collect data.	Girls participate in fewer sports and more activities like walking and biking while outdoors. Girls prefer to visit parks where they can perform a wide variety of activities.
Dias, Gaya, Brand,	To determine whether	1,130 adolescents; 596	Quantitative.	There is a positive

Pizarro, Fochesatto, Mendes, Mota, Maia Santos, Gaya (2019); Brazil	adolescents' perception of road safety impacts the association between the distance from home to the nearest park and the use of the parks for PA.	girls; Age 14–20	The neighbourhood environment walkability scale, demographic questionnaire, and geographic information system were used to determine the distance from home to the nearest park.	relationship between road safety perception and PA. Understanding the characteristics of the places that may facilitate PA among girls should be a priority for health promotion.
Ding, Bracy, Sallis, Saelens, Norman, Harris, Durant, Rosenberg, Kerr (2012); USA	To assess the reliability of the new Fears of Stranger Danger scale and determine the associations of Fears of Stranger Danger with PA.	Parent-adolescent pairs=5,171; Adolescents age 12–18; 51% girls	Quantitative, Cross-sectional design. The neighbourhood environment walkability scale and the self-reported survey of stranger danger were used to collect data.	Outdoor PA within a neighbourhood is significantly affected by fear of stranger danger. Due to high levels of Stranger Danger in girls, they have lower levels of PA, especially in high crime areas.
Dunton, Berrigan, Ballard-Barbash, Perna, Graubard, Atienza (2010); USA	To describe demographic and temporal patterns in the social and physical contexts of PA among adolescents.	3,051 Participants; 1,497 girls; Age 15–18	Quantitative. Data came from the Nationally Representative American Time Use Survey (2003–2006) and telephone interviews from the Current Population Survey.	Girls participate in less PA outside due to perceived risk and fear due to several factors such as parental safety concerns.
Floyd, Bocarro, Smith, Baran, Moore, Cosco, Edwards, Suau, Fang (2011); USA	To examine the connection between parks and neighbourhood environments on children's and adolescents' PA.	2,712 children; 1180 girls; Age 0–18	Quantitative, Cross-sectional design. Data came from SOPARC of 20 randomly selected neighbourhood parks.	Girls enjoy playing on playgrounds more than on the courts or opened spaces. Overall, girls have low levels of PA in natural environments.

Humbert, Chad, Bruner, Spink, Muhajarine, Anderson, Girolami, Odnokon, Gryba (2008); Canada	To examine the intrapersonal, social, and environmental factors influencing youth PA.	160 youth; 80 girls; Age 12–18	Qualitative with an ecological framework. Semi-structured group interviews.	Girls identified that to perform PA outdoors, the environment needs to feel safe, and they need to be with friends. Being able to access facilities in their neighbourhood was important
Hunter, Leatherdale, Storey, Carson (2016); Canada	To examine how changes to school-based policies around PA, recreational programming and public health resources affect adolescents' level of PA.	18,777 participants; 53.6% girls; Grades 9–12; Age 14–18	Quantitative, Longitudinal Quasi-experimental. Data came from the COMPASS study, a self-reported questionnaire on PA, and the COMPASS School Environment Application to evaluate PA facilities.	To increase adolescents PA, schools need to increase access to multiple opportunities and facilities within the schoolyard. Schools that had their gym opened at lunch, had a bike rack, organized monthly hikes, had an outdoor basketball court, a weightlifting club, a walking club, or enabled access to the sports field at lunch had the highest levels of PA among girls.
Janha, Hardy-Johnson, Kehoe, Mendy, Camara, Jarjou, Ward, Moore, Fall, Barker, Weller (2020); Africa	To understand the perspectives of adolescents and caregivers on adolescent diet and PA in Gambia.	80 adolescents; Age 10–19, divided into 10–12 years and 15–17 years; 19 girls age 10–12; 18 girls age 15–17	Qualitative. Contextual data was used from cross-sectional surveys that focused on adolescents' height, weight and BMI; Data was also obtained from the Demographic Surveillance	For young girls, PA was done in groups and consisted of dance, playing outdoors at school, riding a bike or walking. Availability of outside space was seen as an opportunity for PA to all

			Study Database and Semi-structured focus groups interviews.	participants.
Kaczynski, Wilhelm Stanis, Hastmann, Besenyi (2011); USA	To examine the association between park users, demographic characteristics, and PA levels.	8,612 individuals; 50.1% girls; 5.7% teens Ages were grouped as child 1–12 years, teen 13–20 years, adult 21–59 years, or senior 60+ years	Quantitative. SOPARC was used to observe four parks, and demographics were taken of all park users.	This research speaks to the importance of identifying features that are important for females' PA in parks.
Kudlacek, Fromel, Groffik (2020); Central Europe	To examine the difference in weekly PA among adolescents according to their level of preference for fitness PA.	9,513 participants; 5,535 girls; Age 15–18	Quantitative. IPAQ-Long Form was used to self-reported PA and Pedometers to report PA.	Girls preferred dance, outdoor PA, running aerobics and water-based activities. For girls, an increasing trend was observed in the preference for fitness PA.
Martínez-Gómez, Ruiz, Gómez-Martínez, Chillón, Rey-López, Díaz, Castillo, Veiga, Marcos, AVENA Study Group (2011); Spain	To explore the connection between active commuting to school and cognitive performance in adolescents.	1,700 adolescents; 892 girls; Age 13–18.5	Quantitative, Cross-sectional design. Self-reported data on extracurricular PA and patterns of commuting to school and the Standardized Reading Ability Test of Educational was used to obtain data.	Actively commuting to school was found to be positively associated with cognitive performance in adolescent girls. Girls who actively commuted to school for longer than 15 minutes had higher scores in numeric ability, verbal ability, reasoning ability, and overall cognitive performance than the group of girls whose active transport was 15 minutes

				or shorter.
Mitra, Moore, Gillespie, Faulkner, Vanderloo, Chulak-Bozzer, Rhodes, Brussoni, Tremblay (2020); Canada	To examine if COVID-19 created distinct patterns of increased or decreased PA among children and adolescents. To determine how these changes are related to children and adolescents' built environment.	1,456 adolescents; 47% girls; Age 12–17	Quantitative. ParticipACTION survey and a survey to collect self-reported data were used to obtain data.	Children and youths' mobility has been affected due to the closure of schools, playgrounds and recreational facilities. More youth than children experienced decreased PA-related movements during the pandemic, including walking/biking, outdoor or indoor physical exercise and outdoor play. In contrast, some children and youth have become more active through walking/biking, playing more, and increased outdoor PA.
Nelson, Foley, O'Gorman, Moyna, Woods (2008); Ireland	To determine if the distance to activities was a barrier to commuting among adolescents. To identify if there is a predestined distance which adolescents choose not to walk or cycle.	4,013 adolescents; 48.1% girls; Age 15–17	Quantitative, Cross-sectional design. Data was used from part of the PA Research in Teenagers study, self-reported questionnaires, and anthropometric measures.	Girls travel further by bicycle than walking. Girls who perform active transport and live further away prefer to bike. Overall, for girls walking is the main form of active transport.
Oliveira, Lopes, Abreu, Moreira, Silva, Agostinis-Sobrinho, Oliveira-Santos,	To examine if physical fitness and body composition are associated with	583 adolescents; 299 girls; Age 12–18	Quantitative. Data were obtained from the ALPHA (Assessing the Levels of Physical Activity	Girls had significantly higher environmental perceptions. Higher distance to local

Mota, Santos (2020); Portugal	environmental perceptions in adolescents.		and Fitness) health-related fitness battery, anthropometric measures, the ALPHA questionnaire and the Family Affluence Scale to assess socioeconomic status.	facilities, the presence of sidewalks, and a positive aesthetics perception were associated with a lower percentage of body fat in girls. At baseline, positive environmental perceptions are associated with better physical fitness and body composition at follow-up.
Perez, Conway, Arredondo, Elder, Kerr, McKenzie, Sallis (2017); USA	To identify the connection between neighbourhood environmental and psychosocial factors in adolescents, specifically in PA.	910 participants; 454 girls; Age 12–16	Quantitative, Cross-sectional design. Data from the Teen Environment and Neighborhood study consisting of self-report neighbourhood leisure-time PA and accelerometer-based non-school moderate to vigorous physical activity was used.	Parent/guardian-perceived neighbourhood safety from crime was related to girls PA in non-neighbourhoods and non-school areas. Girls who had parents with higher perceived neighbourhood safety had higher levels of PA beyond the neighbourhood and school hours. Girls had significantly more parental rules, as parents perceive girls to be at greater risk of harm such as molestation or assault. Weighing the pros and cons of PA was found to affect recreation facility density and neighbourhood PA among girls. Girls with low decisional

				balance reported more cons than pros towards PA and had less motivation to engage in PA due to their perceived risk.
Ramírez-Vélez, García-Hermoso, Agostinis-Sobrinho, Mota, Santos, Correa-Bautista, Amaya-Tambo, Villa-González (2017); Colombia	To investigate the association between cycling to and from school and adolescent body composition, physical fitness, and metabolic syndrome.	2,877 participants; 54.5% girls; Age 9–17.9	Quantitative. The Health Behaviour in School-Aged Children questionnaire and different measurements from physical fitness testing such as anthropometric, musculoskeletal, motor, and cardiorespiratory data were used.	Regular cycling to school may be associated with better physical fitness and a lower incidence of metabolic syndrome than passive transport, especially in girls.
Reed, Price, Grost, Mantinan (2012); USA	To determine park user demographics and examine PA levels of park users.	4,359 participants; 1,951 girls; 1,116 teens; Age 13–20	Quantitative. SOPARC at parks was used to collect data.	Promoting park usage may be an effective strategy for increasing PA in communities, especially girls.
Ries, Gittelsohn, Voorhees, Roche, Clifton, Astone (2008); USA	To explore environmental factors influencing PA performed in recreational facilities by urban African-American adolescents.	48 participants; 24 girls; Age 14–18	Qualitative. In-depth interviews and direct observations of recreational facilities were used to obtain data.	Neighbourhood parks were found to be designed for young children and do not have facilities that attract adolescents. Adolescents had a greater presence at parks that offer more athletic facilities such as basketball courts, tennis courts, swimming pools, open fields, and tracks. Young women described neighbourhood sports

				facilities as male dominant. Safety concerns largely determine the use of the facilities for adolescent girls. It is important to look at additional characteristics that facilities need to consider to promote PA in environmental settings. Parks with flowers and trees attracted young women. Young women were more attracted to parks with security, places where they could hang out with friends, and parks with flowers and trees.
Rišová, Sládeková Madajová (2020); Slovak Republic	To determine the relationship between perceived safety and walkability. To examine adolescents' level of fear in different locations.	303 adolescents; 55.45% girls; Age 13–16	Quantitative. Self-reported walkability perception and safety perception and a mapping exercise were used to collect data.	Girls feel unsafe in public spaces both at night and during the day. Girls most commonly reported feeling threatened when they were near abandoned places, areas with a lack of people, and unfamiliar areas. Girls wrote more responses about their feelings and emotions instead of specific threats. It is important to

				limit/eliminate threats reported by the girls, as girls report feeling more fearful than boys. Girls' level of fear significantly affects where they walk and when they walk, leading to a reduced amount of PA in the form of walking.
Roman, Stodolska, Yahner, Shinew (2013); USA	To determine if fear, victimization, and perceived rudeness are related to outdoor PA among Latino youth.	390 youth; 206 girls; Grades 6–12 Age 13–18	Quantitative. Data came from school-based surveys and the Multicultural Scale for Adolescents to assess assimilation.	Adolescent girls who expressed greater fear of crime also reported engaging in significantly less PA and outdoor recreation. Girls are more attuned to the aesthetics of their environment. Increased assimilation into US culture corresponded to a reduction in youth's outdoor recreation.
Rothe, Holt, Kuhn, McAteer, Askari, O'Meara, Sharif, Dexter (2010); USA	To determine how Somali families' beliefs, barriers, and cultural issues impact youth's ability to be active outdoors in winter.	61 participants; 40 women; 11 teenage girls; Age 13–19	Qualitative. Data was obtained through focus groups.	Lack of transportation was cited as a barrier to outdoor activity. Outdoor clothing can be expensive, and some families found the cost to prohibit PA. Girls followed particular behavioural norms that excluded them from

				outdoor activity, such as wearing a skirt and hijab. The Somali community voiced a concern that girls should not interact with boys over a certain age, limiting their PA. This decrease in winter outdoor activity was related to social norms and intention to participate in outdoor PA. Understanding barriers to outdoor PA among Somali children is the first step to developing programs that may support increased outdoor activity.
Sarmiento, Rios, Paez, Quijano, Fermino (2017); Colombia	To examine the PA levels, amount used, and characteristics of public parks with and without Recreovía.	4,925 individuals; All ages; Ages were grouped as child 1–12 years, teen 13–20 years, adult 21–59 years, or senior 60+ years	Quantitative. The PA Resource Assessment described the type, features, amenities, and quality of PA resources in each park; The SOPARC of parks and the demographics of park users were also collected.	The percentage of women was higher in parks with Recreovía, compared to parks without Recreovía. The Recreovía is a promising strategy to promote park use and PA, especially among women who are less likely to meet PA recommendations during their leisure time.
Schultz, Wilhelm Stanis, Sayers, Thombs, Thomas (2017); USA	To evaluate the impact of street crossing modifications on park use and park-based PA	3 years respectfully N=2,080, N=2,275, N=2,276 All ages;	Quantitative. SOPARC was used to collect data before the crosswalk installation and after the	Women reported safe access to be a concern or barrier to performing PA. Women showed a

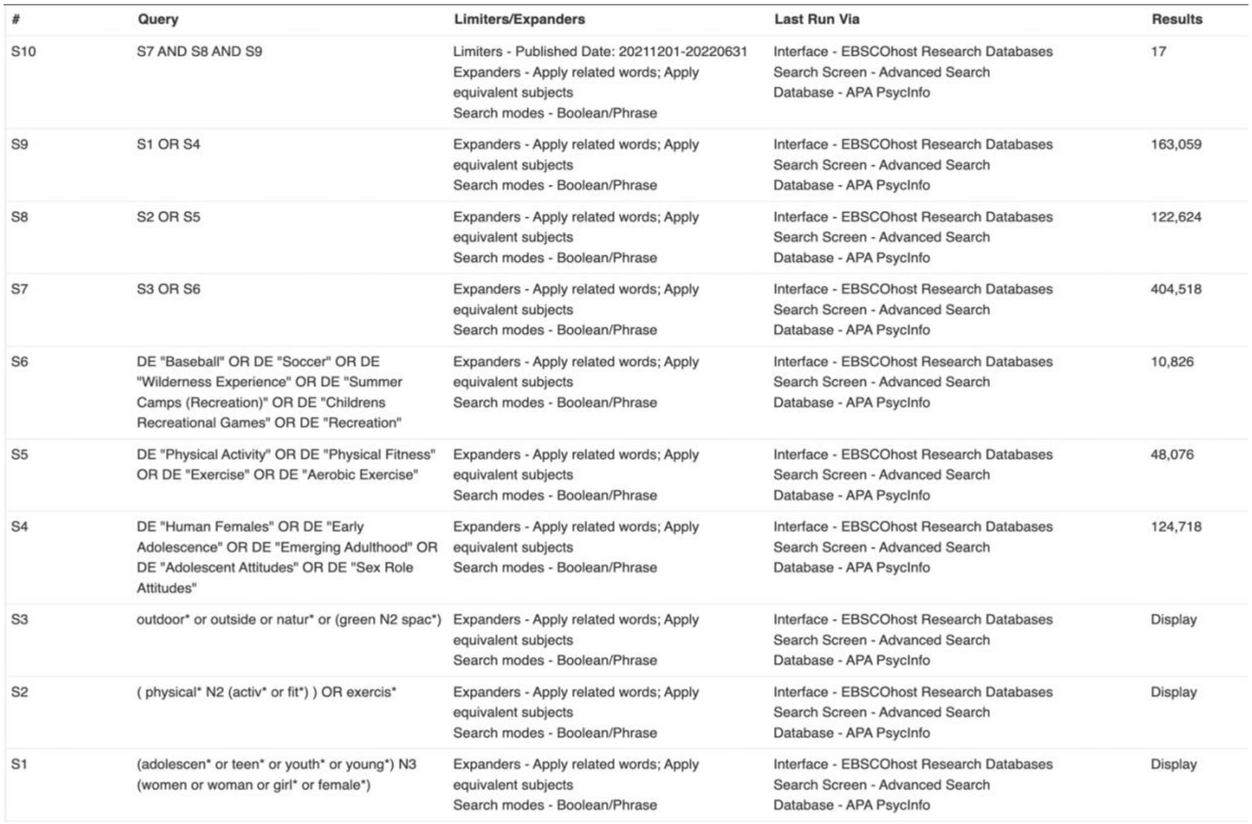
	in a low-income and African American community.	Ages were grouped as child 1–12 years, teen 13–20 years, adult 21–59 years, or senior 60+ years	installation.	significant increase in park use with the crosswalk installation. Environmental impacts on PA engagement in parks were only found for specific demographic groups. Gender was found to have the most impact on variables.
Shan (2014); China	To identify the motives for visiting urban green spaces. To determine if different social groups in Guangzhou, China have different motives.	595 visitors; 263 girls; 176 aged 15–24	Mixed methods. Stratified random sampling based on the 2000 Guangzhou census data and questionnaires were used to obtain data for the study.	Nature and exercise were a motive for visiting urban green spaces. The most frequently selected motive was to enjoy the fresh air and beautiful scenery and connect to nature.
Spencer, Numer, Rehman, Kirk (2021); Canada	To explore the relationship between gender, PA, and nutrition in adolescent girls and young women.	Seven girls; Age 13–26	Qualitative, Feminist post-structural approach. Photovoice and group discussions were used to obtain data.	Connections between nature, PA, and confidence allowed girls to find emotional safety. Girls were able to negotiate complex gender stereotypes, conflicts, and contradictions and engage in healthy behaviours. Being outside in nature provides an important context for girls and young women to engage in the complex navigation of competing discourses

				surrounding health.
Tannehill, MacPhail, Walsh, Woods (2015); Ireland	To identify youth experiences and how they might increase or decrease levels of PA.	124 participants; Age 12–18 N girls NA	Mixed methods. Data were collected through self-reported questionnaires and focus groups.	Girls linked PA to socializing with friends through activities such as walking and talking, walking the dog, and walking to each other's houses. Adolescents have a positive attitude toward PA, which does not diminish as they age despite activity levels decreasing.
Thomas (2015); Denmark	To examine how different green and blue spaces improve women's health and well-being. To identify how these areas can restore mental health.	25 interviews; 4 focus groups; Women age 18–60	Qualitative. 25 semi-structured interviews.	Therapeutic landscapes, such as open green spaces, demonstrate how perceptions of space can impact women's health and well-being. Being in natural spaces played a crucial role in stress and anxiety reduction. All women reported being in natural settings to provide them with different physical or mental benefits and play a key role in stress and anxiety reduction. Cycling helped women incorporate natural environments into their daily routines.

Van Hecke, Verhoeven, Clarys, Van Dyck, Van de Weghe, Baert, Deforche, Van Cauwenberg (2018); Belgium	To determine the prevalence, frequency and context of open public spaces. To examine the individual, social, and physical factors of open public places on adolescents.	173 adolescents; 54.4% girls; Age 12–16	Mixed Methods. An ActiGraph GTX-3 device was used to measure PA levels, a GPS device to track locations, a questionnaire was used to collect demographics, and individual interviews were used to collect spoken word data.	Public open spaces may be effective areas to promote PA among groups at risk for physical inactivity. In order to encourage PA among girls and older adolescents in public open spaces, urban planners should consider adding attractive features.
Ward, McGee, Freeman, Gendall, Cameron (2018); New Zealand	To determine transport behaviours and activities of teenagers and the implications of these for public health and policy.	775 participants; 395 girls; Age 16–19	Quantitative. Online surveys were used to collect data.	For girls, unactive transportation was the top reported response. School uniforms were reported as a barrier to active transportation.
Wilhelm Stanis, Oftedal, Schneider (2014); USA	To examine youth PA and weight status in connection to the availability of outdoor recreation resources.	130,908 students; Grade 9 & 12 students Age 14–18	Quantitative. Data were obtained from the 2010 Minnesota Student Survey, where students self-reported their PA levels and BMI.	When it comes to outdoor PA, parks should not be the only places considered as various recreational land, and trail types may be associated with increased PA.

Appendix B

Search Strategy From APA PsycInfo Database



#	Query	Limiters/Expanders	Last Run Via	Results
S10	S7 AND S8 AND S9	Limiters - Published Date: 20211201-20220631 Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	17
S9	S1 OR S4	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	163,059
S8	S2 OR S5	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	122,624
S7	S3 OR S6	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	404,518
S6	DE "Baseball" OR DE "Soccer" OR DE "Wilderness Experience" OR DE "Summer Camps (Recreation)" OR DE "Childrens Recreational Games" OR DE "Recreation"	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	10,826
S5	DE "Physical Activity" OR DE "Physical Fitness" OR DE "Exercise" OR DE "Aerobic Exercise"	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	48,076
S4	DE "Human Females" OR DE "Early Adolescence" OR DE "Emerging Adulthood" OR DE "Adolescent Attitudes" OR DE "Sex Role Attitudes"	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	124,718
S3	outdoor* or outside or natur* or (green N2 spac*)	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	Display
S2	(physical* N2 (activ* or fit*)) OR exercis*	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	Display
S1	(adolescen* or teen* or youth* or young*) N3 (women or woman or girl* or female*)	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	Display

HEALTHY POPULATIONS JOURNAL

Research Article

Developing an FASD Health Promotion Social Media Campaign Using Community-Based Participatory Peer Review: Notes From Atlantic Canada

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DOI: https://doi.org/10.15273/hpj.v2i2.11421

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Abstract

Introduction: Health promotion awareness activities by health agencies, such as those by the Public Health Agency of Canada, aim to increase health literacy, often using social media campaigns to reach large audiences. **Objectives:** The objective of this research was to explore how community peer-reviewed social media content can facilitate the reach of health promotion campaigns, with specific regard to awareness around fetal alcohol spectrum disorder (FASD), alcohol, and pregnancy in Atlantic Canada. **Methods:** We developed a health promotion social media campaign consisting of 16 digital posters, then implemented a community-based participatory peer-review process to request input and feedback from individuals with lived experiences, caregivers, professionals who work with individuals with FASD, and various advocates for FASD throughout Atlantic Canada. Reviewer comments were then directly applied to update poster content, which was redistributed for secondary approval before circulation on Facebook and Instagram. **Results:** Reviewer feedback was constructive, with various suggestions for updates being applied to images and text choices. Once posted, the health promotion campaign was well received and reached over half a million viewers across the two platforms in the first three months. Engagement and interactions were overall positive, with minimal negative responses and only one post flagged by the platform as a social issue advertisement. **Discussion/Conclusion:** With the inclusion of diverse voices from the FASD community in the co-creation of the content, we argue that the campaign's style, messaging, and language more accurately reflected the intended audiences and was made accessible to a wider demographic, thus strengthening awareness and prevention messages. We explore a health promotion social media campaign development process, providing valuable examples of how to encourage and create more safe spaces that promote open conversations about health and gradually dismantle outdated ideas and systems so we can begin addressing stigma by delivering accurate, non-judgmental health information.

Keywords: health promotion, social media, fetal alcohol spectrum disorder, Atlantic Canada

Introduction

Health promotion is a key mechanism for educating the general public about issues and topics related to individual and societal health. With the expansion of social media in recent years, digital health promotion campaigns are now being launched online to reach broader and more diverse audiences than previously available. In this paper, we highlight literature on health promotion and the role of the Public Health Agency of Canada (PHAC) in these initiatives. We provide an example for discussion: the development of a social media campaign created for and by Atlantic Canadians around fetal alcohol spectrum disorder (FASD), alcohol, and pregnancy, and addressing associated stigma. In describing the development of a digital prevention and awareness social media campaign, we discuss implementing a community peer-review process to solicit input and feedback from individuals with lived experiences and various advocates and champions for FASD in Atlantic Canada. We argue that the campaign was strengthened and made more accessible by including these diverse voices. Finally, we discuss the implications of community peer review as a framework that can be engaged by organizations and working groups aiming to develop health promotion campaigns, as well as the importance of such campaigns regarding FASD prevention, awareness, and stigma reduction and their relevance in Atlantic Canada.

Literature Review

Health Promotion and FASD

Health promotion has been identified as a key area of public health. The use of health promotion and awareness activities is intended to broaden individual understanding of health-related information and is commonly state-sponsored (Epp, 1986). Health promotion activities and tools include posters, pamphlets, radio, television, and social media ads, and have been developed to educate the public about the potential harms of substance use and related practices—such as alcohol and tobacco use—and the importance of safe sex practices, among other topics. Health promotion is an important theoretical and practical theme worth reflection and examination: according to the participants of the 6th Global Conference on Health Promotion, health promotion is a "process of enabling people to increase control over their health and its determinants, and thereby improve their health" (The Bangkok charter for health promotion in a globalized world, 2005, p. 10). During the COVID-19 pandemic, more people moved many of their daily activities online, including health-information seeking and service accessing. As an enduring result, much of what we began, and are still, consuming and learning is accessed through online platforms and sources. However, health promotion activities have been critiqued for individualizing health practices and outcomes and overlooking socio-economic factors and social exclusion as contributors to health issues and mortality rates (Hankivsky & Christoffersen, 2008; Raphael et al., 2008). Online campaigns in particular are restricted, as they require internet and/or social media access and user knowledge to benefit from these types of messages; this technology-based exclusion can impact persons living in rural and remote regions in Canada, which disproportionately impacts Indigenous communities (Canadian Radio-television and Telecommunications Commission, 2019). Still, as these inequities have become magnified through the COVID-19 pandemic and access to the internet has been expanding, health promotion remains and will likely become a more and more useful mechanism for increasing health literacy among the general population; this has also been successfully demonstrated in other regions with high internet access and use among Indigenous communities (Hefler et al., 2019).

In Canada, PHAC is the federal government agency responsible for public health, and health promotion is among its initiatives. As part of this work, PHAC is the national lead on FASD prevention and the improvement of outcomes of individuals affected (PHAC, 2014). FASD is a lifelong neurodevelopmental disability impacting individuals' brains and bodies among those exposed to alcohol before birth (Cook et al., 2016). FASD is a health promotion issue unparalleled in complexity due to social drinking practices, stigma, myths, and misunderstandings about alcohol both generally and during pregnancy (Choate & Badry, 2019; Dej, 2011; Greaves & Poole, 2005). Prevalence estimates indicate that approximately 4% of Canada's general population has FASD, a leading cause of developmental disability in the country (Popova et al., 2019), which translates to over 96,000 people in the Atlantic provinces based on 2021 Census data (Statistics Canada, 2022).

As demonstrated through widespread research across various disciplines (Comack, 2018; Nathoo et al., 2013; Rutman & Hubberstey, 2020), individuals use alcohol and, in some cases or instances, consume alcohol at high levels, for a multitude of complex and intersecting reasons: this can include everything from dealing with the strains of poverty and unemployment, coping with trauma from historical and/or ongoing experiences of abuse and family violence, or navigating feelings of loneliness and isolation, among other increasingly common stressors and strains (PHAC, 2016; Rutman & Hubberstey, 2020). These factors typically result from larger societal issues, including systemic inequities, thereby increasing the complexity of alcohol consumption during pregnancy. Individuals who consume alcohol may commence or cease doing so at various life stages, including during pregnancy. Many of the above strains and stressors can increase someone's likelihood of continuing to drink during pregnancy (Greaves & Poole, 2005; Roche et al., 2015). Although there is no timing or amount of alcohol that has been found safe to consume during pregnancy, there continue to prevail many myths about the effects of alcohol on our bodies and on a developing fetus, combined with myths about alcohol and addiction (Drabble et al., 2011; Poole & Greaves, 2013; Stewart, 2016). It is thus critical that social media campaigns and awareness and prevention efforts are trauma-informed, culturally appropriate, and also take into account their own potential role in perpetuating any ideas, images, or symbols of stigma and/or shame, not only around alcohol but any themes, due to any unconscious biases or inadvertent oversights.

A multi-pronged approach that takes social determinants of health into account is necessary to effectively address FASD, and prevention is an essential component of such work. Work by Poole (2008) for PHAC outlined a four-part FASD prevention model under which various activities and services can be undertaken. The multi-level prevention framework has been widely implemented and discussed since its conception (Hubberstey et al., 2019; Poole et al., 2016; Thomas et al., 2014). The first level of the prevention model is broad awareness, which informs our current approach and refers to campaigns and other promotional strategies supporting the health of people who can become pregnant. Further, Poole (2008) outlines level-one activities benefiting and engaging the broader community. The type of information included in level-one activities should provide information to the general public about alcohol and health, including risks associated with alcohol during pregnancy; provide information about where additional information and support can be found; and encourage and promote the community to be active supporters of healthy pregnancies and FASD prevention (Hubberstey et al., 2019; Poole, 2008; Rutman & Hubberstey, 2020).

FASD and Atlantic Canada

In Atlantic Canada, FASD awareness and prevention work has long been championed through community-level work, such as efforts led by family resource centres and advocates across the region. Work has accelerated in recent years with an Atlantic FASD conference held in Nova Scotia in 2017, the formation of the Atlantic FASD Community Network in 2020, and core funding and policy action enacted by provincial governments (Dunbar Winsor & Morton Ninomiya, 2018; Dunbar Winsor & Ward, 2022; Government of Newfoundland and Labrador, 2022). Further, needs assessment research began in 2021 in Newfoundland and Labrador and has now expanded into Nova Scotia, Prince Edward Island, and New Brunswick to include all four Atlantic provinces (Dunbar Winsor & Ward, 2022; also see fasdNL, n.d.). Yet, despite these advancements in Atlantic Canada, FASD remains underdiagnosed and under-resourced. In particular, families and individuals impacted by and/or diagnosed with FASD experience a lack of resources and support (Dunbar Winsor, 2020).

In 2021, fasdNL, a pan-provincial FASD organization in Newfoundland and Labrador and lead of the Atlantic FASD Community Network, was awarded funding by PHAC's FASD National Strategic Projects Fund for a three-year Atlantic-wide project titled Toward Prevention: An Atlantic FASD Awareness and Collaborative Action-Building Initiative (Public Health Agency of Canada, 2021). The main focus of this project is the promotion of awareness about FASD and alcohol use during pregnancy, dispelling common myths about the diagnosis and prevention of FASD. In this paper, we discuss in detail the co-development and release of one of the project's deliverables: a social media campaign aimed at increasing FASD prevention and awareness across the four Atlantic provinces, using sponsored social media images that have been reviewed by FASD "experts," which for our current research purposes refers to individuals living with FASD and/or caregivers and community-based professionals working with individuals diagnosed with and/or impacted by FASD.

Methods

Community-based participatory research (CBPR) is an approach implemented in health promotion research designed to improve the health of various populations by connecting researchers with communities and sharing knowledge in partnership (Jull et al., 2017; Viswanathan, 2004). CBPR encourages the co-creation of knowledge between researchers and community members in a way intended to minimize potential harms and improve the accuracy and accessibility of health information being shared (Hacker, 2013; Israel et al., 2005; Jull et al., 2017; Wallerstein & Duran, 2010). CBPR revolves around teamwork and aims to include the community, researchers, and representatives at all points during a research project, from the development of the question to research dissemination (Hanson & Weber, 2018; Montag et al., 2017). We utilized CBPR to inform the development of the social media campaign and as a mechanism of centring place-based knowledge from Atlantic Canada. This approach was accomplished through a convenience sample of individuals with lived and "expert" experiences recruited by email, and it provided feedback that fundamentally shaped the development of the campaign.

Researcher Positionalities

Research positionality and the social location of individuals warrants acknowledgement and discussion (McCorkel & Myers, 2003; Rice, 2009). We approached the development of this campaign and the community-based participatory peer review process with recognition and appreciation for collaborative input and dialogue about the campaign. We engage in FASD work and research—and this project specifically—as white settlers, feminists, and individuals with various years of community, academic, and lived experience. Our community work centres lived experiences around FASD through dialogue, organization governance, and supportive approaches and resources. These identities shape how we interact with this work and research and how we view our contribution as strengthened by meaningfully including the contributions of others through community-based participatory peer review (McCorkel & Myers, 2003).

Drafting the Campaign and Community-Based Participatory Peer Review

The decision to conduct a community-based participatory peer review for this campaign was driven by several factors and included logistical challenges. First, FASD is a stigmatizing topic; we wanted to create a respectful process whereby the wisdom of community members is adequately represented (Corrigan et al., 2019). The project was initiated following consultation with and/or feedback from community members where a need for prevention material was established, and was inherently designed to feature community feedback throughout, recruiting community members who are seen as FASD "experts" in various capacities to be involved. The final campaign images were shared with these experts for approval before being shared publicly and widely in various formats and languages, to make them as accessible and equitable as possible. This chosen process aligns with the use of CBPR (Hacker, 2013; Israel et al., 2005; Jull et al., 2017; Wallerstein & Duran, 2010), specifically when working with populations who may be stigmatized (Corrigan et al., 2019; Wallerstein & Duran, 2010).

The CBPR approach is also a valuable method in research and work involving Indigenous communities; our awareness and prevention campaign was guided by the Truth and Reconciliation Commission of Canada's (TRCC; 2015) final report call to action #33, asking for federal, provincial, and territorial governments to recognize the need to address and prevent FASD in collaboration with Indigenous groups. This call to action was a critical focus for this campaign, which is also informed by and follows the eight evidence-based tenets (as applicable for our campaign and continued health promotion work), to guide the creation of community-based, cultural-led FASD prevention programs in Indigenous communities (see also in Wolfson et al., 2019); these programs were co-developed based on the perspectives shared by diverse Indigenous and non-Indigenous participants, and reflect Indigenous values and beliefs and practices around health and wellness. One primary goal with this approach and the resulting awareness and prevention campaign was to build a stronger understanding of how long-standing colonial practices and systems of education and health have led to gaps in Indigenous health promotion, based on direct input from Indigenous and non-Indigenous persons and groups. A further aim was to ensure our messaging avoided negative messaging that perpetuates alcohol, pregnancy, FASD, and/or cultural myths, reproducing stigma, shame, and poorer health access and outcomes.

By providing an opportunity for community-based participation, we sought meaningful input and feedback from individuals personally impacted by FASD (see Burgess-Proctor, 2015; Green & Mercer, 2001; Jull et al., 2017). We involved a diverse group of individuals within Atlantic Canada who either live with FASD, have been engaged in FASD work in various capacities, or are seen as "experts" in the FASD community. We invited these individuals to be transparent and open about the campaign development and to create a campaign in which individuals, groups, and communities recognized themselves via representation in the images and text (Israel et al., 2005). Finally, we aimed to create a versatile campaign that can be used in various contexts and by many different groups across Atlantic Canada in the future.

A key goal of the campaign development was to ensure that individuals in the community had an opportunity to review and provide feedback before its release. Accordingly, individuals and organizations were identified and invited via email using the community organizations' respective email contact lists to review the drafted campaign images and text. Organizations included project partners Kids First Association, Mi'kmaq Family Resource Centre, NB FASD Centre of Excellence, Daybreak Parent Child Centre, and Exploits Valley Community Coalition. Further individuals included Indigenous Elders and young people, parents and caregivers of individuals with FASD, people with FASD, and community service providers who work with individuals with FASD.

Social Media Campaign Development

The overarching goal of the social media campaign was to develop and deliver accurate information about FASD, alcohol, and pregnancy through sponsored posts on Facebook and Instagram as part of the PHAC *Toward Prevention* Atlantic Canada project (2021–24). Campaign development focused on diversity among the individuals portrayed in the campaign images. For example, images were chosen to show same-sex partners, multi-generational families, gender- and racially-diverse individuals, Indigenous people, and connections to the land. Additional goals of the campaign included showcasing southern and Northern contexts and providing meaningful examples about supporting healthy pregnancies that were partner and community-focused, thereby not placing responsibility solely on pregnant people. Research from Australia that explored the use of social media–based health promotion among Indigenous people found that, although most examined approaches have generally focused on behavioural and not structural health promotion and prevention (Stark et al., 2022), approaches that centred on cultivating strong, supportive online communities (effectively fostering the development and/or growth of social capital) appeared to have a more pronounced positive effect on users' information-sharing practices compared to those that commonly rely on more aggressive, blame-based, and emotion-inducing approaches often employed in alcohol and smoking mass media campaigns (Hefler et al., 2019). It is important to note that the main target audience of the campaign was not specifically Indigenous individuals but individuals with FASD, including individuals who may identify as Indigenous. This is another reason we chose CBPR, as it is frequently used in health promotion research including Indigenous populations (Gonzales et al., 2021; Montag et al., 2017), and we made sure to seek out and include feedback from Indigenous individuals.

Each digital campaign poster was accompanied by text about FASD prevention or awareness. Font and colour (e.g., predominantly dark background colour with lighter font colour) were chosen based on accessibility best practices for ease of reading and viewing, alongside using CamelCase (capitalizing the first letter of each word) for hashtags (Garcia-Cabot et al., 2015; Government of Canada, 2022;

Princeton University, 2022). The campaign seeks to adopt an inclusive, representative, strength-based approach that avoids stigmatizing, blame-based, or otherwise harmful messaging about alcohol use—both generally and during pregnancy especially—and FASD. Both scholarly/academic (e.g., peer-reviewed publications) and grey literature (e.g., government and organizational reports, academic institutions) were used to identify and select "best practices" to include in the campaign. The campaign development began by identifying key messages related to the prevalence of FASD, its underdiagnosis, ways to provide tangible support during pregnancy, and the benefits of implementing strategies to support individuals with FASD. In the following discussion, we address how we integrated best practices into various campaign development and release components.

Peer Review Feedback

In total, 29 individuals were invited to provide feedback. Of those invited, 17 were from Newfoundland and Labrador as a result of the organization leading the project being located in this province and the campaign being reviewed internally by fasdNL's board of directors (composed of 12 individuals at the time of review). Three people were invited from Prince Edward Island, five from Nova Scotia, and four from New Brunswick. Twenty-two people from the Atlantic provinces reviewed the campaign and provided their feedback. Despite knowing who had been invited to provide feedback, the online form into which reviewers entered their feedback afforded them anonymity in their responses. Thus, we did not track how many reviewers resided in each Atlantic province.

The feedback comments ranged from minor (e.g., advising against the use of italics) to more significant (e.g., language choice). In addition, there were instances in which campaign images solicited polarizing responses from reviewers. For example, the digital poster showing a young white mother with tattoos received negative feedback (e.g., "hate the tattoos") and also positive feedback (e.g., "I love this picture"). The project/research team read, discussed, and addressed all peer-review feedback. Most of the feedback was integrated into the final version of the campaign, although in some cases the project team ultimately decided to keep the original content despite a minor feedback comment that had suggested change. The revised campaign was then recirculated to partner individuals and organizations for the second round of feedback. Finally, following community peer-review approval, the campaign was translated into French, Inuktitut, and Mi'kmaq.

Final Campaign and Dissemination

The final development of a thoughtful, long-lasting campaign required the creation of 16 digital posters, each delivering evidence-based and non-stigmatizing messaging about alcohol, pregnancy, and FASD. Four digital posters were launched on Facebook and Instagram as sponsored posts targeting individuals 18+ in the Atlantic provinces for eight-week periods in both English and French. Following the eight weeks of posts circulated, a two-week break was observed, and another set of four digital posters was launched. fasdNL, the project's lead organization, was responsible for launching and rotating the campaign posters.

Ensuring that we had created an inclusive social media campaign for the four Atlantic provinces (Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick) also required translating English material into some of the various languages spoken across the region, including French, Inuktitut, and Mi'kmaq. As part of the response to the TRCC's (2015) Calls to Action, specifically around language and culture as well as health (see, for example, calls 13, 18, 19), our work can begin to acknowledge and gradually start addressing the racism that has been impacting the health of Indigenous peoples in Canada, including Atlantic Canada, as a result of colonization. These significant impacts have been demonstrated in not only our health care systems and settings but also in FASD work (from prevention to diagnostics to supports) that has often linked this diagnosis to Indigenous communities in dangerous ways. This claimed link, however, is not based on any current empirical evidence and is instead a racist outcome of these systems and models that have negatively impacted the health outcomes and lives of any individual who is suspected to be impacted by and/or has been diagnosed with FASD, and this has been particularly harmful to Indigenous communities and the re-traumatization and shaming of Indigenous peoples in Canada.

Social media was chosen as the avenue of campaign delivery over print-based options for several reasons, including its ability to target a wide age range of individuals living in Atlantic Canada, its usefulness for gauging the reach of the campaign over time, and its accessibility in rural and urban areas as well as remote parts of Atlantic Canada. For example, on Labrador's north coast, cell phone service is virtually unavailable, so residents and visitors rely heavily on Wi-Fi and the Facebook Messenger app to communicate with one another. More broadly, Facebook has become used by many different users and is no longer considered a social media site only for young people as it was in its early years (Pew Research Center, 2021). As a result, social media has become an increasingly helpful tool for health promotion campaign delivery, despite it not being used or accessible universally. To reach broader audiences, including individuals who do not have consistent internet access or do not use social media, a radio ad campaign was also developed and aired on radio stations across Atlantic Canada.

Limitations of digital health promotion campaigns mean that some groups (e.g., older adults or those who do not use social media) and regions (e.g., areas in rural, remote, or Northern contexts without regular access to the internet) may not view the campaign. However, the creation and release of a corresponding radio ad campaign helped to mitigate this limitation. Additional limitations included the lack of alt text for individuals with visual impairments to accompany the campaign in its initial launch. This will be included in subsequent campaign rotations during the ongoing PHAC-funded project.

Discussion

Lessons from Campaign Development and Community-Based Participatory Peer Review

The FASD health promotion social media campaign was launched in December 2021 and is ongoing until 2024 through sponsored posts on Facebook and Instagram (see Figures 1, 2, and 3 for digital poster examples). The campaign targets individuals aged 18 to 65 living in Atlantic Canada and has been positively received thus far, as measured by online comments and feedback from community members and partners. The campaign's reach has extended to over half a million Atlantic Canadians in the first three months following its launch. Our use of community-based participatory research through a peer review process was to create a campaign that could have a greater and wider impact on the communities it intends to serve—all communities in Atlantic Canada—than had we not used such an approach. The added focus on sociologically, culturally informed and structural factors (see Wolfson et al., 2019), which are still often overlooked in much of the published work coming from other disciplines in health prevention and promotion (e.g., medicine, health care, psychology), can also assist in its reach and impact and in recognizing the TRCC's Calls to Action.

Figure 1
FASD Digital Campaign Poster in English

Note. A digital campaign poster presented in English highlights the importance of FASD prevention as a shared responsibility and gives tangible ways to support healthy pregnancies.

In addition to the successes, there have also been unexpected challenges. For example, Facebook's sponsored posts go through a review period before publishing, and one of the digital campaign posters was denied in English only because it was flagged as being an advertisement about "social issues." The poster read thus: "Nearly half of Canadian pregnancies are unplanned. Communication and birth control can help prevent unintended pregnancies." Despite the message being accurate as based on Canadian data and approved by community peer-review partners, the sponsored post was still rejected after filing for a review. Despite some challenges and limitations for access, social media awareness campaigns remain an important, accessible venue for health promotion due to the ability to reach rural, urban, remote, and Northern locations as well as a wide age range of viewers, particularly during the COVID-19 pandemic when many in-person activities were suspended. Further, health promotion campaigns delivered through social media allow readers to learn more about health-related topics, improving their health literacy around topics such as alcohol and pregnancy with the added ability and privacy to access additional information and resources online.

As outlined by Poole (2008), level-one prevention work is part of the diverse and multi-layered work required to prevent FASD and to support people who can become pregnant with safe alcohol use, pregnancy, and health literacy more broadly. Therefore, in developing this campaign, we sought to expand level-one prevention work by developing a health promotion that is supportive of everyone's health collectively and from a community public health approach that includes gender and sexual identities with an emphasis on pregnant people's health.

The next steps include measuring the uptake of the campaign through survey delivery to evaluate the campaign's reach across sectors and regions. Added benefits of such an evaluation survey will provide additional information on the benefits, limitations, and overall impressions of social media as an avenue for health promotion.

Figure 2

FASD Digital Campaign Poster in Inuktitut

Sukkuinik nutagatsaKatluni imigannikut:
Kaujisagit tamatsuminga pigasuattailinnimik.
kamagitsiagialivut.

Aippaget, ilannâget ilagellu ikajugunnatut sukkuitailigasuannimk nutagatsaKatluni imigannikongituk. Isumagillugu pisugajannik, taggajâliannik sananguagalannilu.

Mâni Kagitaujattigut: fasdNL.ca/prevention fasdATLANTIC

Note. A digital campaign poster presented in Inuktitut reads, “Partners, friends and family can support healthy pregnancies with alcohol-free activities. Consider taking a walk, watching a movie, or making arts and crafts.” The image shows the importance of connection to the land relevant to Indigenous and non-Indigenous contexts and offers suggestions for indoor and outdoor alcohol-free activities.

Figure 3

FASD Digital Campaign Poster in French

TSAF : Apprenons la prévention
C'est notre responsabilité collective

Près de la moitié des grossesses au Canada ne sont pas planifiées. La communication et les méthodes de contraception peuvent aider à prévenir des grossesses imprévues.

Apprendre TSAF : fasdNL.ca/prevention tsafATLANTIQUE

Note. A digital campaign poster presented in French reads, “Nearly half of Canadian pregnancies are not planned. Communication and birth control can help prevent unplanned pregnancies.” The image shows a diverse group of young adults socializing (a demographic for increased alcohol consumption). It underlines the importance of communication and birth control practices as a shared responsibility.

The community-based participatory peer-review process that was used to develop the campaign provides a framework to address important questions in the development and circulation of health promotion campaigns and materials. For example: who is represented in the campaign images, what type of language is used or not used and the influence of literacy, who has an opportunity to provide meaningful input, and how research and knowledge translation and mobilization activities can remain equitable and accessible to individuals and communities.

Conclusion

The Atlantic-wide social media campaign discussed here is intended to address FASD prevention and awareness with a strength-based approach supported by evidence and community members. This campaign aims to address the stigma associated with FASD by promoting public awareness and delivering accurate and consistent information by reframing alcohol use during pregnancy to include partners, friends, and family members. Moreover, in doing so, it highlights how partners, families, and communities can support healthy pregnancies rather than placing the responsibility on pregnant people alone.

As described in this paper, developing an FASD prevention and awareness campaign for social media highlights opportunities to improve awareness and understanding about complex, sensitive, and stigmatized topics such as alcohol and pregnancy. The use of community peer review provided opportunities to engage individuals with lived experience and communities in developing health promotion materials. Further, in doing so, the act of highlighting community voices through review and input helped ensure individuals' and organizations' voices are represented and heard.

Acknowledgements

The authors wish to thank Jillian Peddle for her work on the social media campaign development.

Funding

The project described in this article has been made possible through a financial contribution from the Public Health Agency of Canada. The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada.

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HEALTHY POPULATIONS JOURNAL

Research Protocol

The Impact of Exercise on Cardiotoxicity in Pediatric Cancer Survivors: A Scoping Review Protocol

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DOI: https://doi.org/10.15273/hpj.v2i2.11294

Abstract

Introduction: Childhood and adolescent cancer survivors treated with anthracyclines and chest-directed radiation therapy have a much higher risk of developing cardiovascular complications into adulthood. Exercise is one intervention that may mitigate some of these adverse treatment-related effects. Nevertheless, efforts to consolidate this evidence are limited, and a review is required to summarize the impact of current exercise interventions on managing cardiac-related side effects of cancer treatments in pediatric cancer survivors. ***Objective:*** This scoping review protocol describes the methods used to explore the current literature characterizing exercise interventions and their reported cardiac-related outcomes for managing cardiotoxicity in childhood and adolescent cancer survivors. ***Methods:*** Joanna Briggs Institute guidelines for conducting and reporting scoping reviews will be followed. Studies considered for this review must include an exercise intervention with cardiac surveillance conducted at two or more time points. Intervention participants must have received a cancer diagnosis ≤19 years of age and received anthracyclines or chest-directed radiation therapy. ***Conclusion/Discussion:*** This scoping review protocol provides extensive details regarding the methods used, will enhance the transparency of reporting, and will improve the quality of the final scoping review manuscript. Outputs from the completed scoping review manuscript will summarize the breadth of literature reporting on exercise interventions used to manage treatment-related cardiotoxicity in childhood and adolescent cancer survivors.

Introduction

A significant long-term health issue for childhood and adolescent cancer survivors (CACS) is a heightened cardiovascular disease risk due to cancer therapy (Bansal et al., 2014; Hausner et al., 2008). CACS who receive cardiotoxic cancer therapies, such as anthracyclines and chest-directed radiation therapy, experience a greater risk of heart dysfunction and cardiovascular disease (CVD) later in life (Armenian et al., 2018; Chow et al., 2019; Hausner et al., 2008; Lipshultz et al., 2013; McGowan et al., 2017). Specifically, the long-term impact of cardiotoxic treatments on the heart includes decreased left ventricular (LV) mass, wall thickness, contractility, and fractional shortening (Scott et al., 2011). When CACS are compared with their healthy siblings, above-normal LV afterload has been reported in the CACS (Lipshultz et al., 2012). Together, these effects place CACS at twice the risk for developing CVD than their siblings (Chao et al., 2016). Additionally, CACS with CVD have an 11-fold increase in overall mortality risk, making CVD the leading cause of non-malignant death in this population (Armenian et al., 2018; Chao et al., 2016). Effective non-cardiotoxic treatments and interventions are needed to decrease the impact of cardiotoxic agents on heart health among CACS.

Few strategies are available to mitigate cardiotoxicity in CACS. For example, administering less cardiotoxic treatments (e.g., synthetic analogues of natural compounds vs. organic versions such as doxorubicin) is an option, but these treatments are not always used in CACS (Sun et al., 2014; Xu et al., 2015). As another example, dexrazoxane administered concurrently with anthracycline treatments has cardioprotective effects in CACS (Asselin et al., 2016; Kopp et al., 2019; Reichardt et al., 2018). However, this pharmaceutical approach is associated with additional adverse effects, such as decreased fertility and possibly an increased risk of developing secondary malignant neoplasms (Eneh & Lekkala, 2022).

In light of the tremendous CVD burden among CACS and limited pharmaceutical strategies to reduce risk, current guidelines suggest screening for CVD (Armenian et al., 2015; Lipshultz et al., 2012; Mulrooney et al., 2009; Tukenova et al., 2010). CVD risk screening commonly includes cardiac imaging, such as two-dimensional echocardiography, and may include cardiopulmonary exercise testing or serum cardiac biomarker analysis (Armenian et al., 2015; Wolf et al., 2020). Unfortunately, many CACS are not closely monitored after being transferred to adult care, despite these recommendations. Complementary interventions may be one way to improve cardiotoxicity management in CACS.

Using exercise therapy as a means of managing cardiotoxicity is emerging as a promising strategy that is supported by preclinical research. Indeed, studies using animal models treated with cardiotoxic agents suggest that exercise reduces cardiotoxicity by minimizing cardiovascular risk factors through improving cardiovascular fitness, preserving cardiac structure and function, minimizing inflammation and preventing oxidative stress of heart tissue (Avila et al., 2019; Chao et al., 2016; Chicco et al., 2005; Greene & Hennessy, 2015; Guo & Wong, 2014; Hayward et al., 2012; Hofmann & Franz, 2013; Hydock et al., 2008; Jones et al., 2013). Notably, both light and voluntary exercise have been demonstrated to mitigate cardiotoxicity pre-, during, and post-treatment in animal models (Hydock et al., 2012). This preclinical research justifies subsequent clinical research studies.

While limited, early clinical research in CACS indicates that exercise may be essential in preventing and managing cardiotoxicity. Jones et al. (2014) found that high activity levels are associated with fewer adverse cardiovascular outcomes in a dose-response. Specifically, ≥9 metabolic equivalents of task hours per week of physical activity was associated with a 7%

absolute risk reduction in poor cardiovascular outcomes in adult survivors of childhood Hodgkin lymphoma (Jones et al., 2014). More recently, Morales et al. (2020) demonstrated that CACS maintained a healthy LV ejection fraction during a supervised in-hospital exercise intervention, while the standard care group did not show the same effects. These findings are consistent with the available data suggesting the cardioprotective impact of exercise in the general population and the growing evidence base among adult cancer survivors showing a decreased risk of adverse cardiac effects among those who partake in exercise interventions (Keats et al., 2016; Kirkham et al., 2017; Manson et al., 2002; Tian & Meng, 2019). Notably, no corollary evidence exists that exercise in CACS is unsafe or increases cardiovascular risk (Wurz, McLaughlin, Lategan, Chamorro Viña, et al., 2021; Wurz, McLaughlin, Lategan, Ellis, & Culos-Reed, 2021).

Exercise interventions for CACS can be characterized by the FITT (frequency, intensity, time, and type) principle. The FITT principle can be used to prescribe the exercise dose (Billinger et al., 2015). The frequency is the number of sessions per week, the intensity is how hard the individual should exercise, time is the number of minutes per session, and type is the exercise modality (e.g., walking, resistance training).

Based on a preliminary search of MEDLINE, the Cochrane Database of Systematic Reviews, and *JBI Evidence Synthesis* (Peters et al., 2020), no systematic or scoping reviews have been published, and no reviews are currently underway exploring exercise interventions to manage cardiotoxicity among CACS. A scoping review on the topic could provide important information about the breadth of evidence available, offer guidance for future exercise interventions designed to prevent cardiotoxicity in CACS, and identify where more research is necessary. While several reviews are available, none have explored the impact of exercise interventions on heart health in CACS (Huang & Ness, 2011; Upshaw, 2020; Varghese et al., 2021; Wogksch et al., 2021; Wurz, McLaughlin, Lategan, Ellis, & Culos-Reed, 2021).

This scoping review aims to fill a significant gap in knowledge by summarizing the breadth of exercise-based interventions targeting cardiac health in CACS and charting the outcomes of the interventions on cardiac health. This protocol paper, in turn, seeks to detail the scoping review methodologies to improve the transparency and quality of the final review manuscript.

Research Question

1. What is the breadth of exercise interventions available to manage cardiotoxicity in CACS?
    a. How are the exercise interventions described regarding the FITT (Frequency, Intensity, Time, and Type) principle?
2. How does the current literature describe the outcomes of exercise interventions on cardiac health among CACS?

Inclusion and Exclusion Criteria

Participants

This review includes studies involving CACS diagnosed at 19 years of age or younger, as defined by the Canadian Cancer Society, who have received treatments warranting cardiac surveillance (Canadian Cancer Statistics Advisory Committee et al., 2021). These treatments include anthracycline administration, chest-directed radiation, or a combination of anthracycline treatment and chest-directed radiation (Armenian et al., 2015). CACS may be currently receiving treatment or have received treatment in the past.

Concept

The core concept of this scoping review is to summarize the content, nature, and outcomes of any exercise interventions that target individuals who survived childhood or adolescent cancer, intending to decrease treatment-induced CVD during childhood and into adulthood. Exercise interventions of all durations will be included in the review and must include at least a baseline (pre-) and post-intervention measurement of cardiac health. Exercise interventions with measurements conducted at more than two-time points will also be included.

Context

This review will consider exercise interventions performed in any setting, including, but not limited to, a participant's home (i.e., self-directed or online), community facilities, and hospitals. Additionally, studies must include a measure of cardiac surveillance at two different time points. Cardiac surveillance may include but is not limited to two-dimensional echocardiography, multigated acquisition, or cardiac magnetic resonance (Awadalla et al., 2018).

Exclusion Criteria

Studies without an exercise intervention (e.g., physical activity recall studies, reviews).

Types of Sources

This scoping review will consider experimental and quasi-experimental study designs, including randomized controlled trials, non-randomized controlled trials, pre-post studies, and interrupted time-series studies. Researchers will review the reference lists of relevant systematic and scoping reviews to look for primary studies. Finally, researchers will consider conference papers with sufficient data to extract. If data is insufficient, researchers will attempt to contact the conference paper authors.

Methods

The proposed scoping review will be conducted following the Joanna Briggs Institute (JBI) methodology for scoping reviews (Peters et al., 2020). There are no patient participants and no public involvement in this research's design, conduct, reporting, or dissemination plans. The search for this review was conducted on October 12, 2021.

Search Strategy

Researchers followed JBI's three-step search strategy, including a trial of the search strategy in MEDLINE and Cumulative Index to Nursing and Allied Health Literature (CINAHL), identifying keywords and examining included studies' reference lists (Peters et al., 2020). A health librarian reviewed the keywords (Appendix A) alongside the researchers using the Peer Review of Electronic Search Strategies (PRESS) guidelines (McGowan et al., 2016). Next, the keywords were used to search for other published and unpublished studies.

Information Sources

Researchers searched the following databases: MEDLINE, CINAHL, Embase, Scopus, SPORTDiscus, and PsycInfo, using the finalized search strategy. Additionally, the researchers searched sources of unpublished studies and grey literature, including ProQuest Dissertations and Theses Global and the first 10 pages of Google Scholar. Finally, researchers searched for grey literature (Appendix B) using the Canadian Agency for Drugs and Technologies in Health grey literature checklist *Grey Matters: A Practical Tool for Searching Health-Related Grey Literature* (Canadian Agency for Drugs and Technologies in Health, 2019). Relevant organizational, governmental, and health care association websites were reviewed, including the Children's Oncology Group, PanCare, Canadian Cancer Society, American Cancer Society, National Cancer Institute, Cancer Research UK, and National Health Institute. Researchers also screened the reference lists of all included sources of evidence for additional studies. Only studies published in English were included, as this is the language of the study team. The reviewers contacted the corresponding authors when there was insufficient information in the articles.

Study/Source of Evidence Selection

Following the search, researchers will collate all identified citations and upload the citations into Covidence (https://www.covidence.org/), removing the duplicates. Covidence is a systematic review software commonly used to conduct and organize reviews. Two independent reviewers will screen titles and abstracts for assessment against the inclusion criteria. Reviewers will retrieve potentially relevant sources and import their citation details into Covidence. Next, two independent reviewers will assess the full text of selected citations in detail against the inclusion criteria. Reviewers will record and report the reasons for excluding sources of evidence during the full-text screening that do not meet the inclusion criteria. If any conflicts arise, reviewers will meet and discuss whether the citation meets the inclusion criteria. The full report will use the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) flow diagram (Tricco et al., 2018) and the PRISMA 2020 guidelines (Page et al., 2021).

Data Extraction

Two independent reviewers will extract data from papers included in the scoping review using a data extraction tool developed by the reviewers (Appendix C). These data will include specific details about the author(s), year of publication, study aim/purpose, study population, concept, context, study methods, outcomes, and key findings relevant to the review questions. Before data extraction begins, a minimum of two independent reviewers will pilot the data extraction tool for five articles and discuss any additional information that needs to be extracted.

The draft data extraction tool will be modified and revised as necessary while extracting data from each included evidence source. The scoping review will detail any modifications made to the tools after pilot testing. Reviewers will meet to resolve any conflicts.

Data Analysis and Preparation

Researchers will follow the PRISMA-ScR reporting guideline for this scoping review (Tricco et al., 2018). The researchers will present the data in a tabular form that aligns with the study's objective. A narrative summary will accompany these presentations and describe how the findings relate to the review's objectives. Researchers will classify results under specific conceptual categories: study characteristics (including country of origin, study population, study setting, and design); outcomes measures; available interventions (FITT); reported key findings; and implications.

Conclusion

Researchers will conduct the review described in this protocol paper to map the current literature regarding exercise interventions for CACS. This review protocol is essential to enhance the transparency of the scoping review and improve reporting. The resultant full scoping review will identify the breadth of exercise interventions, including the FITT, and the impact of the intervention on the heart health of CACS to guide future research efforts and make recommendations. The search strategy followed the JBI guidelines, and the resultant full scoping review will use the PRISMA-ScR reporting guidelines. The researchers hope that the results of this review will advance the study as a strategy to mitigate cardiac damage among CACS.

Acknowledgements

Shelley McKibbon from Dalhousie University's W.K. Kellogg Health Sciences Library provided extensive knowledge and generous assistance with the search protocol.

Funding

This paper was not funded. However, the following authors are students supported in their programs via the stated funders. Stephanie Kendall is a trainee in the Cancer Research Training Program of the Beatrice Hunter Cancer Research Institute, with funds provided by Saunders Matthey. Jodi Langley is a trainee in the Cancer Research Training Program of the Beatrice Hunter Cancer Research Institute, with funding provided by the Canadian Cancer Society's Carol Ann Cole Graduate Studentship. Will Johnston is a trainee in the Cancer Research Training Program of the Beatrice Hunter Cancer Research Institute, with funds provided by CIBC.

Conflict of Interest

There are no conflicts of interest in this project.

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Appendix A

Search Strategy

1	(Cancer* OR Neoplas* OR Leukemia* OR Leukaemia* OR Tumor* OR Tumour* OR Lymphoma* OR Chemotherap* OR Malignanc* OR Anthracycline* OR "Antineoplastic Agent*" OR Immunotherap* OR "Monoclonal Antibod*" OR "Tyrosine Kinase Inhibitor*" OR Radiation OR Radiology)
2	Child* OR Adolescent* OR Teen* OR "Young Adult*" OR "Early Child*" OR Pediatric* OR Paediatric* OR Infant* OR Toddler* OR Bab* OR Juvenile* OR "Pre Pubescent*"
3 cancer and child	1 AND 2
4	Exercise* OR "Resistance Training*" OR Aerobic* OR "Motor Activity" OR "Exercise Therap*" OR "Physical Activit*" OR Training OR "Physical Fitness" OR Exertion OR Yoga OR Pilates OR "Dance Therap*" OR "Tai Ji" OR Qigong
5	Exp Exercise/
6 exercise	4 OR 5
7 cancer and child and exercise	3 AND 6
8	Myocarditis* OR "Heart Failure" OR Cardiotoxic* OR Cardiomyopath* OR Heart* OR "Radiation Injury*"
9 Cancer and child and exercise and heart	7 AND 8

Appendix B

Grey Literature Check

Google
Cancer AND Child AND Exercise AND Cardio*
Cancer AND Pediatric AND Exercise AND Cardio*
Cancer AND Child AND “Physical Activity” AND Cardio*

ProQuest
cancer AND child AND exercise AND cardiotoxicity
cancer AND pediatric AND exercise AND cardiotoxicity
cancer AND child AND “Physical Activity” AND cardiotoxicity

Websites
Canadian Cancer Society, American Cancer Society, Cancer Research UK, National Health Institute, American College of Sports Medicine, Canadian Society for Exercise Physiologists, and Canadian Cardiology Society

Appendix C

Data Extraction Template

Study ID	
Title	
Author	
Year	
Country	
Aim	
Inclusion criteria	
Exclusion criteria	
Method of recruitment	
Cancer type	
Cancer treatment	
Time since diagnosis	
Number of participants	
Age	
FITT of exercise intervention	
Duration of exercise intervention	
Setting of exercise intervention	
Instructor of exercise intervention	
Outcome measures	
Key results	
Implications	
Limitations	

HPJ HEALTHY POPULATIONS JOURNAL

Research Protocol

Identifying and Mapping Canadian Registered Dietitians' Perceptions and Knowledge of, and Experiences with, Weight-Related Evidence in Nutrition Care: A Scoping Review Protocol

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DOI: https://doi.org/10.15273/hpj.v2i2.11462

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Abstract

Objective: The objective of this scoping review is to identify and map the currently available peer-reviewed and grey literature exploring Canadian registered dietitians' (RDs') perceptions and knowledge of, and experiences with, weight-related evidence in nutrition care. **Introduction:** Weight, skin fold calipers, body mass index (BMI), and other means of measuring and describing body size, have been associated with risk, progression, and nutrition intervention success with several disease states. Interpretation and application of weight-related evidence can be impacted by several non-medical factors, including practitioner perspective, evidence interpretation and application, lived experience, and bias. Each of these outcomes may differ between RDs and are not easily described or understood. **Inclusion Criteria:** Original peer-reviewed studies and grey literature published in English that explore Canadian RDs' perceptions of, knowledge of, and experiences with weight-related evidence in nutrition care will be included. **Methods:** Following the JBI scoping review design and associated methodology, including the three-step search strategy process, four databases will be searched: CINAHL (EBSCO), MEDLINE (Ovid), Embase (Elsevier), and Scopus (Elsevier). Grey literature will be searched using Google Scholar, Google, and Microsoft Bing, and a search strategy specific to grey literature has been developed in partnership with the research team's librarian (MR). Screening and extraction will be led by two independent reviewers (RW, AM), and conflicts will be resolved either by discussion or through a third reviewer (SG). Data will be presented using diagrams and/or tables, including a narrative summary. The Delphi method will be used for community consultation, that will occur throughout this study.

Keywords: dietitians, weight evidence, perception, experience, knowledge

Introduction

Body weight or mass, as measured in pounds or kilograms, can be influenced by several factors, including psychological, physiological, environmental, societal, and economic factors (Kopelman, 2010; Vandenbroeck et al., 2007). Non-medical factors impacting health and disease risk, or social determinants of health (SDoH), also impact body weight, but are often excluded in body size assessment, wellness programming, and policy (Alberga et al., 2018; Chumpunuch & Jaraeprapal, 2022; Medvedyuk et al., 2018; World Health Organization, n.d.; Young et al., 2016). SDoH exclusion has been associated with weight bias and discrimination in the health care system, both of which are associated with unfavourable health outcomes and reduced person-centred and accessible care (Obesity Canada, n.d.). Several health care professions are taking strides to address weight bias. For instance, Dietitians of Canada and several other groups have publicly endorsed the *Joint International Consensus Statement for Ending Stigma of Obesity* (Rubino et al., 2020) and made pledges to address and/or eliminate weight bias within and beyond their profession(s).

Weight and size are conceptualized, measured, and described in several ways. For instance, body mass index (BMI; weight in kilograms divided by height in metres squared) has been associated with disease risk (Davies et al., 2022; Health Canada, 2021; Khan et al., 2018; National Heart, Lung, and Blood Institute, n.d.). Originally developed by insurance companies as part of enterprise risk management and client assessment, when BMI categorizes bodies as "obese" and "underweight," they are deemed to have higher risks. Body weight, and thus BMI, is one of many markers of nutrition status and/or risk, including for malnutrition and being underweight, often included in all components of nutrition care (Raymond & Morrow, 2020). Nutrition care is often guided by the Nutrition Care Process, which includes four steps: nutrition assessment, diagnosis, intervention, and monitoring/evaluation. Nutrition care is provided in diverse practice settings such as clinical, public health, private practice, community, industry, and not-for-profit food settings. Dietetic practice is rooted in common core competencies, as defined by Partnership for Dietetic Education and Practice (Partnership for Dietetic Education and Practice, 2020). There are seven main competency areas (2020), and body size and weight can be relevant to all practice and competency areas (Swan et al., 2017).

Interpretation and application of current weight-related evidence is a point of divergence and debate within the dietetic profession, as both interpretation and application can be impacted by practitioner perspective, awareness of evidence, lived experience, and bias. For instance, some registered dietitians (RDs) view obesity as a disease and a significant risk factor for other chronic disease and medical diagnoses, associated with complications and decreased quality of life, while other RDs reject the concept of increased weight and size as an indicator of health and promote body acceptance (Mechanick et al., 2017; Penney & Kirk, 2015).

Clinical practice guidelines (CPGs) inform dietetic practice (Hand et al., 2021; Wharton et al., 2018). RDs rely on several CPGs as their primary reference to support and provide guidance for best practices in many clinical areas of practice (Maxwell et al., 2019a, 2019b; Rasmussen & Yaktine, 2009; Wharton et al., 2018, 2020). Recent CPG updates from Diabetes Canada (2018), the Society of Obstetricians and Gynaecologists of Canada (2019), and the Canadian Association of Bariatric Physicians and Surgeons and Obesity Canada (2020; Maxwell et al., 2019a, 2019b; Wharton et al., 2018, 2020), devote multiple chapters to the topic of weight and "weight management." Despite this, evidence continues to suggest health care providers do not feel comfortable with or capable of discussing weight with patients, and/or are struggling to avoid harmful bias during these discussions (Alberga et al., 2019; Brown & Flint, 2013; Dewhurst et al., 2017; Huang et al., 2004). For example, a recent questionnaire (2021) of Canadian RDs, as part of Dietitians of Canada's endorsement process of the new Adult Obesity CPGs (2020), concluded 58% of membership supported endorsement and the remaining membership declined endorsement. Contradictions and lack of practicality were key areas of concerns highlighted by RD members (Dietitians of Canada, 2021). One contradiction highlighted was the act of suggesting patients should lose 10% of their body weight, while also telling providers not to use weight as a "goal" or main focus with patients (Wharton et al., 2020). Other guidelines have been similarly criticized for using weight as a goal, intervention, or marker of health risk, while simultaneously discouraging weight-centric practice (Maxwell et al., 2019a, 2019b; Rasmussen & Yaktine, 2009; Wharton et al., 2018, 2020).

In recent years, many professions, like RDs, have had to move their practice online in outpatient settings, due to increased infection risks related to the COVID-19 pandemic. This has created compounded impacts on evidence translation and communication from provider to patient and vice versa (Rasmussen & Yaktine, 2009; Tewksbury et al., 2021; Weissman et al., 2020). In the media, COVID-19 has demonstrated how, now more than ever, misinterpretations, misunderstandings, and miscommunications of research and science have impacts on perception of evidence and evidence use (Else, 2020; Gleick, 2020; Lin et al., 2020; Tang et al., 2021). Many academic publications and media posts have surfaced on weight-related evidence during the pandemic (e.g., "obesity increases risk for COVID-19," "quarantine 15"), and while some are evidence-based, some are deemed to be "rushed science" (Bessey & Brady, 2021; Else, 2020; Schwartz, 2020; Wang et al., 2021). It is unclear how RDs have responded to or engaged with this, and as the pandemic continues (2019–present), identifying and mapping their perceptions and knowledge of, and experiences with, weight-related evidence could help inform future weight-related research.

Based on inconsistencies in recommendations and varied weight perspectives, it is important to identify and map Canadian RDs' perceptions and knowledge of, and experiences with, weight-related evidence in practice, which will be the aim of this scoping review. "Weight-related evidence" is an ambiguous term, used purposefully, to include a range of perceptions, experiences, and knowledge in various practice areas. Definition of the term will be explored in a subsequent survey of Canadian RDs, which the results of the review will inform. Additionally, the terms knowledge, perception, and experience have been defined by the co-authors for use in this study (Appendix C). Included literature (peer-reviewed and grey) will be examined for mention of the COVID-19 pandemic to identify and map perceptions and knowledge of, and experiences with, any relationship(s) between weight-related evidence and the unprecedented impacts of the pandemic on dietetic practice. A preliminary search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews, and JBI EBP Database was conducted, and no current or underway systematic or scoping reviews on the topic were identified. Internationally, research has explored perspectives of weight-related practices among health care providers; however, it appears that there is limited research focusing on RDs (Bocquier et al., 2005; Cade & O'Connell, 1991; Steeves et al., 2015). This review will focus on Canada specifically, as the health care system's funding and policies are unique to Canada. In Canada (2004–2019), it appears research is lacking on RDs' views of weight-related evidence in practice areas other than weight/obesity management (Aboueid et al., 2019; Barr et al., 2004; Chapman et al., 2005; Marchessault et al., 2007).

Research Question

What evidence is currently available on Canadian RDs' perceptions of, knowledge of, and experiences with weight-related evidence in nutrition care?

Inclusion Criteria

Population

The population of interest is Canadian RDs and registered nutritionists (the latter not recognized by all provincial regulators) who provide nutrition care (Dietitians of Canada, n.d.). Both terms (RDs, nutritionists) will be included in the search strategy (Appendix A), and all results will be reported as RDs. Articles including "nutritionists" will be included only if the participants are registered in a province where "nutritionist" is recognized by the dietetic provincial regulatory body (Nova Scotia Dietetic Association, n.d.).

Concept

This review will consider studies and sources that explore RDs' perceptions of, knowledge of, and experiences with weight-related evidence in nutrition care for inclusion. The research team has co-created definitions for the three primary outcomes, which are perceptions, experiences, and knowledge; these three terms can be seen as socially constructed concepts, related to power and discourse in society (University at Buffalo, n.d.). Perception is informed by experience and knowledge, can be described as an individual's point of view, paradigm, or outlook on a topic or issue, and is informed by their perspective (Cambridge University Press, n.d.). Experience is seen as any event(s) occurring in the past tense, when the individual was awake and/or cognizant. Recall and description of experiences are limited to working memory (Merriam-Webster, n.d.). Lastly, knowledge is awareness and recall of a concept or phenomena. Knowledge informs skill in nutrition care and beyond (Encyclopædia Britannica, n.d.). The research team acknowledges that all three concepts can inform one another within an individual (Figure 1). More review- and topic-specific definitions can be found in Appendix C.

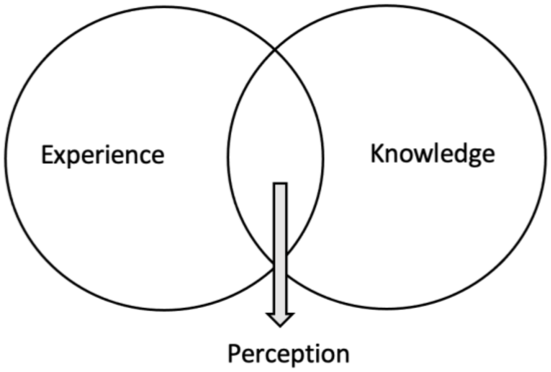

Figure 1 *Venn Diagram of How Experience and Knowledge Inform Perception in an Individual*

This review will consider weight discussed in terms such as but not limited to the following: weight management, weight as assessment measurement/tool, use in screening and risk assessments, use in caloric needs assessments, monitoring of disease progression, weight loss or gain, malnutrition, use and understanding of BMI categories, weight bias or discrimination, and use and/or comprehension of weight-related CPGs and surrounding research.

Context

This review will consider studies that include RDs' perceptions and knowledge of, and experience with, weight-related evidence in nutrition care across all practice settings (e.g., clinical, public health, education, research) in Canada. All provinces and territories in Canada will be included, and any studies outside of Canada will be excluded.

Information/Types of Sources

This scoping review will consider peer-reviewed and grey literature, including, but not limited to, primary research studies, systematic reviews, reports, dissertations, conference abstracts, opinion texts, reports, websites or blogs, and online newspaper articles. Online newspaper articles from reputable sources (e.g., Canadian Broadcasting Corporation, CTV Television Network) will be considered if they are an interview with or written by an RD. Both quantitative and qualitative research will be considered for inclusion.

Methods

This scoping review will be conducted in accordance with the JBI methodology for scoping reviews (Levac et al., 2010; Peters et al., 2020; Peters et al., 2021).

Search Strategy

The search strategies aim to locate published, unpublished, peer-reviewed, and grey literature. The database/peer-reviewed search strategy was developed by a JBI-certified librarian (MR). First, an initial search of MEDLINE (Ovid) and CINAHL (EBSCO) was conducted to identify articles on the topic. The text words contained in titles, abstracts, and index terms were then used to develop a full search strategy for CINAHL (EBSCO; Appendix A). Next, the search was sent to a second librarian trained in systematic review searching for Peer Review of Electronic Search Strategies (PRESS). After PRESS, the final search was adapted/translated to the four databases to be searched for this review: CINAHL (EBSCO), MEDLINE (Ovid), Embase (Elsevier), and Scopus (Elsevier). Prior to closing out the review, the reference lists of included articles will be screened for additional papers prior to community consultation. Only articles published in English will be included. This may be a limitation, as French is Canada's second official language; however, English is the primary language of the research team. There will be no restriction on article publication date. A grey literature search strategy was also developed in partnership with the team's librarian (MR), where Fuller et al. (2021) and *Grey Matters: A Practical Tool for Searching Health-Related Grey Literature* were consulted (Canadian Agency for

Drugs and Technologies in Health, 2019). Grey literature will be searched using Google Scholar, Google, and Microsoft Bing.

Study Selection

Following the search, all identified citations will be uploaded into Covidence (https://www.covidence.org/), and duplicates will be removed. Titles and abstracts will be screened by two independent reviewers (RW, AM) for assessment against the inclusion criteria. Next, articles will be retrieved in full and reviewed in Covidence against the inclusion criteria by the same two reviewers (RW, AM).

Source Selection

For grey literature sources, a template by Stapleton (2015, as cited in Fuller & Lenton, 2018), *How to Find & Document Grey Literature*, will be used. Both reviewers will search for grey literature using this template. Potentially relevant citations will be uploaded into Covidence, and duplicates will be removed. Titles and abstracts (e.g., for dissertations) or brief descriptions (e.g., for blogs) will be screened by two independent reviewers (RW, AM) for assessment against the inclusion criteria. After title and abstract screening, potentially relevant sources will be retrieved in full and added to Covidence, where the full text of selected citations will be assessed in detail against the inclusion criteria by the same two independent reviewers (RW, AM).

Study Data Extraction

Included articles will be extracted by the same reviewers (RW, AM) in Covidence using a co-created data extraction tool specific to the review. The extraction table (Appendix B, Table B1) will be piloted prior to data extraction with two to three select articles, and modifications and revisions will be made accordingly before going ahead with extraction. Some rows of the table have been included to highlight nuance specific to the topic such as "credentials," "funding," "conflicts of interest," and "weight paradigm," as all four can inform experiences and knowledge and thus perceptions related to weight. Other rows such as "guiding framework," "stage of nutrition care," and "practice setting" have been included to provide context and aid in mapping the results when the review is completed. COVID-19 is not included as its own extraction row, as it is a tertiary outcome and will be sorted underneath the appropriate perception, experience, or knowledge primary outcomes, as applicable. If appropriate, authors of studies and sources will be contacted to request missing or additional data, where required.

Source Data Extraction

For extraction, the included dissertations, reports, or conference abstracts will be extracted in Covidence, whereas websites and blogs will be extracted in Microsoft Excel using an adapted extraction tool for these sources (Appendix B, Table B2). Extraction will be completed by the same two independent reviewers (RW, AM). Specific to this extraction tool, rows such as "target audience" and "main topic of the blog" have been included to provide context for the primary outcomes of the review. "Weight paradigm disclosure in the article or blog" is included with the goal of identifying and mapping if and/or how dietitians are sharing their weight-related perceptions, experiences, and knowledge publicly.

Data Analysis and Presentation

Reasons for exclusion of full-text papers not meeting the inclusion criteria will be recorded and reported in the full scoping review manuscript. Any disagreements that arise between the reviewers at each stage of the scoping review will be resolved through discussion, or if unable to be resolved through discussion, with a third reviewer (SG). The results of the search will be reported in full in the final scoping review manuscript. Results of study identification, screening, and included articles will be presented in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Page et al., 2021). The PRISMA extension for Scoping Reviews (ScR) checklist will be used to direct reporting of the results (Tricco et al., 2018). The results will be presented in diagrams and/or tables to map the data responding to the review's research question, along with a narrative summary.

Community and Expert Consultation

The Delphi method is an acceptable approach for community consultation among scoping reviews, and will be used for consultation and to seek agreement that the review is comprehensive to community members (e.g., individuals with lived experience) and experts (e.g., experienced RDs and researchers; Clayton, 1997; Green, 2014; Hemming et al., 2011; Peters et al., 2020; Pollock et al., 2022; Williams & Webb, 1994). Informed by Hemming et al. (2011) and Williams and Webb (1994), Delphi method will be conducted online using a series of email rounds, aiming to identify any gaps, seek feedback on the applicability of the results to its population, and to guide dissemination. Panelists will be provided with the full scoping review manuscript prior to round one. During round one, panelists will be asked to do the following: (a) comment if they notice any missing literature, (b) comment on the practical applications of the findings to RDs, and (c) provide any recommendations for dissemination. Following this, the facilitator (SG) will collate and circulate all feedback into an anonymized summary report to the team for discussion (round two). Additional rounds may be warranted if consensus (i.e., agreement) is not reached; however, consensus is not always possible. If consensus is not reached after two rounds, all feedback will be collected and level of agreement/disagreement with be shared in the full scoping review manuscript.

Acknowledgements

Thank you to the Canadian Foundation for Dietetic Research for funding this research. Thank you to the following JBI Centres of Excellence for providing training opportunities for the co-authors (RW, AM, MR, SG): Aligning Health Needs and Evidence for Transformative Change (AH-NET-C; Dalhousie University) and Queen's Collaboration for Healthcare Quality (QcHcQ; Queen's University). Thank you to Mount Saint Vincent University's The Mount Library, Department of Applied Human Nutrition, and the Sheila A. Brown Centre for Applied Research, and thank you to Dalhousie University's W.K. Kellogg Health Sciences Library for providing invaluable resources and support during this study.

Funding

This scoping review is funded by a Canadian Foundation for Dietetic Research Dietetic Practice-Based Research Grant (2021–2022).

Conflicts of Interest

The authors declare no conflicts of interest.

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Appendix A

Search strategy for CINAHL (EBSCO). Search date: October 13, 2021.

No.	Query	Results
1	(MH "Dietitians of Canada") OR (MH "Dietitians") OR (MH "Dietitian Attitudes") OR (MH "Nutrition Services+")	9,108
2	TI (dietitian* OR nutritionist* OR dietician* OR "RD" OR "R.D." OR "P.Dt" OR "Dt.P" OR "RDN" OR "R.D.N." OR "Nutrition specialist*" OR ((nutrition* OR dietetic*) N2 (professional* OR specialist* OR practitioner* OR practice*))) OR AB (dietitian* OR nutritionist* OR dietician* OR "RD" OR "R.D." OR "P.Dt" OR "Dt.P" OR "RDN" OR "R.D.N." OR "Nutrition specialist*" OR ((nutrition* OR dietetic*) N2 (professional* OR specialist* OR practitioner* OR practice*)))	14,318
3	(MH "Body Mass Index") OR (MH "Body Weight")	111,843
4	TI (“Body weight” OR “Body Mass” OR “BMI” OR "B.M.I." OR obes* OR overweight OR "over-weight" OR weight OR "underweight" OR "IBW" OR "I.B.W." OR "ABW" OR "A.B.W." OR "AdjBW" OR "Adj.B.W." OR fat OR heavy OR "large* bod*") OR AB (“Body weight” OR “Body Mass” OR “BMI” OR "B.M.I." OR obes* OR overweight OR "over-weight" OR weight OR "underweight" OR "IBW" OR "I.B.W." OR "ABW" OR "A.B.W." OR "AdjBW" OR "Adj.B.W." OR fat OR heavy OR "large* bod*")	352,789
5	(MH "Practice Guidelines") OR (MH "Practice Patterns") OR (MH "Professional Practice, Evidence-Based") OR (MH "Professional Practice, Research-Based") OR (MH "Professional Practice, Theory-Based") OR (MH "Health Beliefs") OR (MH "Professional Knowledge+") OR (MH "Job Experience") OR (MH "Attitude") OR (MH "Attitude of Health Personnel") OR (MH "Dietitian Attitudes") OR (MH "Attitude to Obesity")	226,691
6	TI ("clinical practice" OR framework OR knowledge OR attitude* OR view* OR value* OR belief OR believ* OR perception* OR perceiv* OR philosoph* OR opinion* OR bias OR stigma OR strateg* OR discuss* OR approach* OR counsel* OR practice* OR suggest* OR guid* OR "best-practice*" OR skill* OR experienc* OR train* OR "evidence-based" OR evidence OR "EBP" OR "E.B.P." OR "evidence-informed" OR tool* OR refer* OR "CPG" OR "C.P.G." OR "health at any size" OR "HAES" OR diet* OR food* OR eat* OR restriction* OR decision* OR "body neutrality" OR ("calori* N1 (count* OR deficit* OR surplus*))) OR AB ("clinical practice" OR framework OR knowledge OR attitude* OR view* OR value* OR belief OR believ* OR perception* OR perceiv* OR philosoph* OR opinion* OR bias OR stigma OR strateg* OR discuss* OR approach* OR counsel* OR practice* OR suggest* OR guid* OR "best-practice*" OR skill* OR experienc* OR train* OR "evidence-based" OR evidence OR "EBP" OR "E.B.P." OR "evidence-informed" OR tool* OR refer* OR "CPG" OR "C.P.G." OR "health at any size" OR "HAES" OR diet* OR food*	1,112,752

	OR eat* OR restriction* OR decision* OR "body neutrality" OR ("calori* N1 (count* OR deficit* OR surplus*)))	
7	(MH "Canada+")	106,376
8	TX (canad* or "british columbia" or "Colombie britannique" or alberta* or saskatchewan or manitoba* or ontario or quebec or ("new brunswick" not "new jersey") or "nouveau brunswick" or "nova scotia" or "nouvelle ecosse" or "prince edward island" or newfoundland or labrador or nunavut or nwt or "northwest territories" or yukon or nunavik or inuvialuit or Abbotsford or Airdrie or Ajax or Aurora or Barrie or Belleville or Blainville or Brampton or Brantford or Brossard or Burlington or Burnaby or Caledon or Calgary or Cambridge or "Cape Breton" or Chatham or Kent or Chilliwack or Clarington or Coquitlam or Drummondville or Edmonton or "Fort McMurray" or Fredericton or Gatineau or Granby or "Grande Prairie" or Sudbury or Guelph or "Halton Hills" or Iqaluit or Inuvik or Kamloops or "Kawartha Lakes" or Kelowna or Kingston or Kitchener or Langley or Laval or Lethbridge or Levis or Longueuil or "Maple Ridge" or Markham or "Medicine Hat" or Milton or Mirabel or Mississauga or Moncton or Montreal or Nanaimo or "New Westminster" or Newmarket or "Niagara Falls" or "Norfolk County" or "North Bay" or "North Vancouver" or North Vancouver or Oakville or Oshawa or Ottawa or Peterborough or Pickering or "Port Coquitlam" or "Prince George" or "Quebec City" or "Red Deer" or Regina or Repentigny or (Richmond not Virginia) or "Richmond Hill" or Saanich or Saguenay or "Saint John" or "Saint-Hyacinthe" or "Saint-Jean-sur-Richelieu" or "Saint-Jerome" or Sarnia or Saskatoon or "Sault Ste Marie" or Sherbrooke or "St Albert" or "St Catharines" or "St John's" or "Strathcona County" or Surrey or Terrebonne or "Thunder Bay" or Toronto or "Trois-Rivieres" or Vancouver or Vaughan or ((Halifax or Hamilton or London or Victoria or Waterloo or Welland or Whitby or Windsor) not (UK or "United Kingdom" or Britain or England or Australia)) or Whitehorse or Winnipeg or "Wood Buffalo" or Yellowknife)	909,745
9	1 OR 2	20,320
10	3 OR 4	385,919
11	5 OR 6	1,235,550
12	7 OR 8	909,748
13	9 AND 10 AND 11 AND 12	502

Note. Geographic filter comes from *Filter to Retrieve Studies Related to Canada, Canadian Provinces, and the One Hundred Largest Canadian Centres from the EBSCO CINAHL Database*, by S. M. Campbell, 2022, John W. Scott Health Sciences Library, University of Alberta (https://docs.google.com/document/d/16s3Z0Xf0E94UilGO4cf7RIJllIRb0_dD3gs_ppe7354/edit).

Appendix B

Data Extraction Tools

Table B1

Data Extraction Instrument for Research Articles, Dissertations, Reports, and Conference Abstracts (Covidence).

Data Extraction Tool	
General Information	
Article title:	
Author(s):	
Date of publication:	
Journal name, volume, issue, pages:	
Study Details	
Objective(s):	
Research question(s):	
Methods:	
Sampling method: (if applicable)	
Inclusion/Exclusion Criteria	
Clerical	
What is the source? (e.g., peer-reviewed study, blog, report, conference abstract)	
If peer-reviewed research study, what was the study design (if applicable)?	
Author(s) credentials:	
Funding source:	
Conflict(s) of interest:	
Population	
Were the participants registered dietitians?	
Number of registered dietitian participants (n=)?	
What province/territory were the participants registered/located in?	
Other info about the sample: (e.g., demographics, years of experience)	
Do any dietitians disclose their weight paradigm? If so, how many in the sample?	
Context	
Was the study conducted in Canada? Where in Canada?	

What practice setting was the study focused on (e.g., clinical, public health, education, research)?	
Concept	
What type of weight evidence is used/discussed? (e.g., BMI, body weight, weight loss/gain)	
What framework is used in practice? (e.g., Nutrition Care Process (NCP), knowledge translation (KT), program development, policy statement)	
What stage of the NCP did the dietitian base their response on? (e.g., Assessment, Diagnosis, Intervention, Evaluation or Management)	
What were the discussed perception(s) of weight (if applicable)?	
What were the dietitians' experience(s) with weight evidence (if applicable)? (e.g., BMI, body weight, weight loss/gain)	
What was the weight-related evidence knowledge used/discussed (if applicable)?	
What is the discussed weight paradigm?	
Key Findings	
Results	
Limitations	
Other relevant details	
Miscellaneous notes	

Table B2

Data Extraction Instrument for Websites and Blogs (Microsoft Excel).

Article No. (e.g., #)	
General Information	
Blog article title	
Author(s)	
Link to article	
Date of publication	
Date of update(s) (if applicable)	
Name of blog	
Population	
Credential(s)	

What province/territory are the participants registered/located in?	
Other info about the sample: (e.g., bio included on blog, demographics, years of experience)	
Does the dietitian disclose their weight paradigm: 1) in the article, or 2) on the blog?	
Context	
What is the target audience of the blog? (e.g., other dietitians, other health care providers, general population)	
What practice setting was the blog focused on (clinical, public health, education, research etc.)?	
What was the main topic of the blog? (e.g., gestational weight gain, youth, body image)	
Concept	
What type of weight evidence is used/discussed? (e.g., BMI, body weight, weight loss/gain)	
What framework is discussed in the blog? (e.g., NCP, KT, program development, policy statement)	
At what stage of NCP was weight-related evidence discussed? (e.g., Assessment, Diagnosis, Intervention, Evaluation or Monitoring)	
What were the discussed perception(s) of weight evidence (if applicable)?	
What were the dietitians' experience(s) with of weight evidence (if applicable)? (e.g., BMI, body weight, weight loss/gain)	
What was the weight-related evidence knowledge used/discussed (if applicable)?	
Key Findings	
Summary of blog	
Other relevant details	
Extracted by: (initials)	
Miscellaneous Notes:	

Appendix C

Glossary of Terms

Experience[1]: An event that occurred in the past when awake and/or cognizant. Recall and description of experiences are limited to working memory (Merriam-Webster, n.d.).
Knowledge[1]: Awareness and recall of a concept or phenomena. Knowledge informs skill (Encyclopædia Britannica, n.d.).
Map: Compiling a summary of the available evidence rather than critiquing (i.e., critical appraisal) the quality of the evidence. “Mapping” evidence also allows more specific research questions to be developed for future research (Peters et al., 2020).
Nutrition Care Process: In 2003, the Academy of Nutrition and Dietetics (formally the American Dietetic Association) created the Nutrition Care Process (NCP) to improve the consistency and quality of individualized care for patients and the predictability of patient outcomes (Hammond et al., 2014). The four steps of the NCP are Assessment, Diagnosis, Intervention, and Monitoring/ Evaluation (Raymond & Morrow, 2020).
Partnership for Dietetic Education and Practice (PDEP) competency areas: There are seven main competency areas (2020), which are (a) food and nutrition expertise, (b) professionalism and ethics, (c) communication and collaboration, (d) management and leadership, (e) nutrition care (process), (f) population health promotion, and (g) food provision (Partnership for Dietetic Education and Practice, 2020).
Perception[1]: Informed by experience and knowledge, an individual’s view, paradigm, or outlook on a topic or issue (Cambridge University Press, n.d.).
Systematic Review: Includes systematic reviews with meta-analysis, scoping reviews, narrative reviews, mixed methods/mixed studies, and rapid reviews (University of Wollongong Australia Library, 2022).
Weight bias: Weight bias comprises any negative attitudes toward people based on their weight status (Obesity Canada, n.d.).
Weight discrimination: Weight discrimination comprises any action(s) toward individuals that stem from one’s preconceived notions or attitudes about weight status (Obesity Canada, n.d.).

[1] Perception, experience, and knowledge are all related to power and/or discourse in society and can be seen as socially constructed concepts. All three concepts can inform one another within an individual (University at Buffalo, n.d.).

Acknowledgements

Thank you to all the reviewers, authors, and readers of HPJ!

A special thank you to Dr. Sara Kirk and Gillian Ritcey at HPI for their continued support of HPJ.

Funding Support

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