



“I believe this team will change how society views youth in disasters”: the EnRiCH Youth Research Team: a youth-led community-based disaster risk reduction program in Ottawa, Canada

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Abstract

Setting The Sendai Framework for Disaster Risk Reduction promotes an “all-of-society” approach to disaster risk reduction (DRR). Since 2013, the EnRiCH Research Lab has implemented a community-based, participatory program to promote youth development and engagement in DRR in Ottawa-Gatineau. The EnRiCH Youth Research Team used an existing community education program called the Enrichment Mini-Course Program as a framework to engage youth in DRR. We aim to share the implementation process and lessons learned from this innovative “all-of-society” approach to DRR.

Intervention The EnRiCH Youth Research Team provides high school and university students with a platform to be heard on disaster and climate change issues. Youth are given opportunities to design and lead knowledge dissemination projects intended to educate members of the community about disaster prevention and preparedness. Students have opportunities to connect with academics, governmental and non-governmental organizations, and public health practitioners to share their ideas on youth participation in DRR in Canada.

Outcomes To date, this public health intervention has produced DRR training modules that can be used as curriculum support by teachers, a children’s book on earthquake preparedness, an educational video about youth participation in DRR, and several conference presentations. Members of the team have become well versed in disaster preparedness strategies.

Implications This program has demonstrated that youth can contribute to DRR through knowledge mobilization, and support public education about disaster preparedness. Offering this opportunity at a grassroots level can support participation by youth by allowing flexibility in design and adaptation to individual environmental and social contexts.

Résumé

Contexte Le Cadre d’action de Sendai pour la réduction des risques de catastrophe promeut une approche « de la société dans son ensemble » en matière de réduction des risques de catastrophe (RRC). Depuis 2013, le laboratoire de recherche EnRiCH a mis en place un programme participatif communautaire visant à promouvoir la participation et épanouissement des jeunes à la RRC dans la région d’Ottawa-Gatineau. L’équipe de recherche Jeunesse EnRiCH a utilisé un programme d’éducation communautaire déjà existant, le programme de mini-cours d’enrichissement, comme cadre pour engager les jeunes dans la RRC et les sensibiliser à ce sujet. Notre objectif est de partager le processus de mise en œuvre et les leçons tirées de cette approche innovante « de la société dans son ensemble » en RRC.

Intervention L’équipe de recherche Jeunesse EnRiCH fournit aux étudiants du secondaire et universitaires une plateforme pour se faire entendre sur les sujets des catastrophes et des changements climatiques. Les jeunes ont la possibilité de concevoir et de diriger

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des projets de diffusion des connaissances destinés à éduquer les membres de la communauté en matière de prévention et de préparation aux catastrophes. Ils ont la possibilité de rencontrer des universitaires, des organismes gouvernementaux et non-gouvernementaux et des praticiens de la santé publique pour partager leurs idées sur la participation des jeunes à la RRC au Canada. **Résultats** À ce jour, cette intervention de santé publique a produit des modules de formation à la RRC pouvant être utilisés comme matériel éducatif par les enseignants, un livre pour enfants sur la préparation aux tremblements de terre, une vidéo éducative sur la participation des jeunes à la RRC, et plusieurs présentations de conférence. Les membres de l'équipe connaissent bien les stratégies de préparation aux catastrophes.

Implications Ce programme a démontré que les jeunes peuvent contribuer à la RRC par la mobilisation des connaissances et soutenir l'éducation du public en matière de préparation aux catastrophes. Offrir cette opportunité au niveau local peut encourager la participation des jeunes en permettant de la flexibilité dans la mise en oeuvre et une adaptation aux contextes environnementaux et sociaux individuels.

Keywords Disaster risk reduction · Disaster education · Youth participation · Youth development · All-of-society approach · Resilience

Mots-clés Réduction des risques de catastrophe · éducation au sujet des catastrophes · participation des jeunes · épanouissement des jeunes · approche pangouvernementale · résilience

Introduction

The Sendai Framework for Disaster Risk Reduction is the global disaster management guideline from the United Nations Office for Disaster Risk Reduction (UNDRR 2015). The Sendai Framework recommends that populations at heightened risk be involved in the design and implementation of policies and plans to reduce disaster risk; this is referred to as an “all-of-society” approach to disaster risk reduction (DRR). This term is similar to the “whole of society” approach used in the public health literature (Addy et al. 2014; United Nations 2012), or “whole community” approach used by the Federal Emergency Management Agency (FEMA), which emphasize the importance of intersectoral collaboration and increased engagement with community stakeholder groups to reduce disaster risks (FEMA 2011; Public Safety Canada 2019; UNDRR 2015). At the community level, a whole of society approach supports communities to engage in DRR activities such as DRR education, disaster planning, and preparedness to strengthen community resilience (Public Safety Canada 2019).

DRR is a complex public health issue; it focuses on reducing risks and taking action toward addressing vulnerability to disasters (Public Safety Canada 2012; UNISDR 2009). Investment in prevention and preparedness strategies can reduce disaster-related losses—and vulnerabilities can be minimized or eliminated. Youth can be part of the solutions for DRR. In this paper, we present the EnRiCH Youth Research Team (YRT)—a youth-led community-based DRR program based in Ottawa, Ontario, Canada. Our program goals include building strong team relationships and cultivating a positive learning culture to generate a trusting and welcoming

collaborative space, and a sustainable program for youth to contribute to DRR and grow as individuals.

Setting

Our youth program is based in Ottawa, Canada's capital. In three consecutive years, there were numerous events that adversely affected our community. In 2017 and 2019, the Ottawa-Gatineau region experienced flooding (CBC News 2017, 2019a). In 2018, six tornadoes travelled through Ottawa, Gatineau, and surrounding areas causing widespread damage and power outages (Nease 2018). In 2020–2021, the global COVID-19 pandemic created a need for widespread adaptation to reduce risk and transmission. The various impacts of these disasters included families being displaced from their homes (CBC News 2019b), disruptions to education (CBC News 2020a), and increased mental health issues for children and youth (CBC News 2020b). Prior to these events, Statistics Canada (2016) reported that less than 50% of households in Ottawa-Gatineau had an emergency kit with supplies to respond to a disaster. Given the known disaster risks and lack of preparedness in our community, and the United Nations guidelines promoting an “all-of-society” approach to DRR, youth are an important stakeholder group who can help improve disaster preparedness and minimize disaster impacts in our community.

Youth participation in DRR

Youth participation in DRR is one of many inclusive DRR strategies to improve resilience to disasters (Lopez et al. 2012; Mitchell et al. 2008) thereby contributing to an all-of-society approach. Youth participation is a relatively new field of study

in DRR. With youth typically viewed as passive victims of disasters, in the last 10 years, the narrative has changed to focus on the capacities among youth to contribute in all phases of disasters (Mitchell et al. 2008; Muzenda-Mudavanhu 2016; Peek 2008; Pfefferbaum et al. 2018).

Youth experience positive outcomes, such as improved knowledge of risks, enhanced adaptive capacity, and an increased sense of social worth when they participate in DRR activities (Amri et al. 2018; Lopez et al. 2012; Matthews 2003), underscoring the importance of participation and applying this knowledge in policy and practice. Few programs in Canada involving youth in DRR policy and practice are documented. Here, we address this issue by providing documentation of our program activities, detailing innovative knowledge mobilization practice that contributes to community DRR.

Intervention

Development of the EnRiCH Youth Research Team

In 2014, we began research on disaster education programs for youth and discovered DRR youth engagement programs available in Canada. Our program is based on evidence rooted in promising practices in youth development (Larson 2006; Lerner et al. 2011; Maton 2008), youth participation (Lopez et al. 2012; Matthews 2003; Mitchell et al. 2008; Peek 2008; Pfefferbaum et al. 2018), and the 21st Century Skills Framework. This framework organizes skill development into four categories of learning: “ways of thinking”, “ways of working”, “tools for working”, and “living in the world” (Binkley et al. 2012). Our program is continually updated to reflect new policies, practice, and research on DRR.

The EnRiCH Youth Research Team (YRT) provides high school and university students with a platform to be heard and to contribute to disaster and climate change issues. Our three main goals are to (1) provide youth an opportunity to engage meaningfully in DRR and climate change issues; (2) contribute to reducing disaster impacts in Ottawa-Gatineau; and (3) raise awareness about the importance of inclusive DRR policies and practice. Youth are given opportunities to design and lead knowledge dissemination projects intended to educate members of the community about disaster prevention and preparedness, and promote youth participation in DRR. Students have opportunities to connect with academics and public health practitioners to share their ideas.

The EnRiCH YRT has been implemented by university students from the EnRiCH Research Lab since 2016, under the direction of Dr. Tracey O’Sullivan. The initiative began as a youth engagement component of an Early Researcher Award, funded by the Ontario Ministry of Innovation and Economic Development. Early on, when we were exploring

how to structure the YRT, we discovered the Enrichment Mini-Course Program (EMCP), which is offered by universities across eastern Ontario and western Québec to students from grades 8 to 11 as an opportunity to learn in a university setting (EMCP 2011). This program provided an ideal structure to engage youth in disaster education; we built our course using the 21st Century Skills Framework (Binkley et al. 2012). In 2015, Emily Guy and members of our team created and taught the first week-long, 25-hour disaster and emergency management course on behalf of our EnRiCH lab. The evidence-based course material and activities were based on a literature review of disaster management educational materials. Since 2016, Christina Pickering has continued to teach and develop the course each year, collaborating with students from the EnRiCH lab, including Zobaida Al-Baldawi in 2019.

Over a four-year period, our team mentored 120 high school students in DRR through the EMCP course. Every year, we adapt the course to reflect new policies, practice, and research on disasters, and incorporate constructive feedback from informal student evaluations. At the end of each mini-course, we invite students to join the EnRiCH YRT program; this course remains an important source of recruitment for our program.

Implementation process

Roles and key players

The supervisor supports the YRT by providing leadership, advocacy, institutional space for meetings, materials, funding, guidance on projects, and feedback/approval before publication. The lead mentor is a substantial role, requiring communication and relationship building with supervisors, community stakeholders, mentees, and fellow mentors to sustain a positive team environment. The lead mentor is responsible for preparing materials for meetings, organizing projects, and facilitating meetings. The undergraduate and graduate assistant mentors provide instrumental support with these tasks and work with the mentees during the meetings. Our community partners at the Canadian Red Cross support the YRT by fostering awareness of the importance of youth participation in DRR via the creation of a Canadian Youth Network in DRR and assisting with peer review of our education modules. This partnership is essential as practitioner endorsement increases reach and uptake of the knowledge and tools.

Our team ranges in age from 13 to 28 years of age. With students graduating and moving on to other endeavours, the team varies from year to year, ranging in size from 6 to 10 middle and high school student mentees, 2 to 4 undergraduate and graduate mentors, one undergraduate or graduate lead mentor, and one supervisor. As authors, we have filled the various program roles in different ways. Since 2014, Dr. O’Sullivan has supported and advocated for our

program as team supervisor. Emily Guy and Christina Pickering have been the lead mentors and led curriculum development. Lauren McVean and Zobaida Al-Baldawi joined the team as mentees in high school, and transitioned to be mentors upon entering university. Sarah Sargent is our community partner, endorsing this program through her work with the Canadian Red Cross.

Meetings

Over the years, the frequency with which the EnRiCH YRT meets has evolved. Meeting once per month is the most sustainable time frame, as it allows mentors time to prepare materials throughout the month. We meet for one 1.5-hour session on a weekday after school. This provides a stable meeting time that the high school students can put towards their community service hours required for graduation. Meetings start with a 10-minute roundtable update followed by a semi-structured meeting plan. Our goal in the meetings is to always let the mentees lead the sessions.

Program facilitators

Youth-training-youth model

The YRT follows a youth-training-youth model, which helps to minimize power differentials between the mentees and mentors. This in turn creates a more welcoming, non-judgemental environment where youth contributions are understood as valid, important, and equal to the contributions of those managing the program. The proximity in age between mentors and mentees helps strengthen team cohesion. The team supervisor attends meetings occasionally to connect with the team and emphasize the importance of the contributions they are making to the field of DRR.

Creating a positive learning culture

An important aspect of our YRT program is to create a positive learning culture; the mentors work to create a comfortable collaborative environment using the following strategies: (1) support young adult leadership to engage with and mentor youth; (2) emphasize that there are no wrong answers and encourage mistakes; and (3) be supportive, using positive reinforcement. These strategies can help the mentees feel more comfortable, confident, and capable of contributing to DRR and climate change. In turn, this can foster positive youth development (Lerner et al. 2011).

Building relationships

The open, non-judgemental environment within our program encourages individuals to be themselves and share ideas

without fear of judgement—creating a positive learning culture. Another important strategy is the emphasis placed on building relationships, to foster a supportive relational environment (Maton 2008). It is the mentors' responsibility to make sure everyone on the team feels valued, seen, and heard. Our mentors take time to get to know mentees, also encouraging mentees to connect with one another. Together, building strong team relationships and cultivating a positive learning culture generate a trusting and welcoming collaborative space, and a sustainable program for youth to contribute to DRR and thrive.

Resources required

The time invested in this program varies each month. Between meetings, the mentors spend roughly one hour per week preparing materials. Mentors undergo a yearly Vulnerable Sector Check and prepare parental consent forms for projects the youth will be involved with. Financial resources are put toward a workspace capable of hosting roughly a dozen people, with access to computers, recording equipment, art supplies, and whiteboards. Our meeting location is easy to access via public transit or by car.

Fundamental program tenets and lessons learned

The core tenet of our program centres on co-direction of meetings. Mentors facilitate discussions by being active listeners and observers, thereby supporting a youth-led working environment where leadership skills and a sense of social worth can blossom (Larson 2006; Lerner et al. 2011; Maton 2008; Matthews 2003). A focus on empowerment prompts mentors to identify the team's assets. In the literature, this is called asset-mapping (Morgan and Ziglio 2007), or a strengths-based worldview (Maton 2008), which emphasizes strengths and interests, and innovation in applying them to create a collaborative work environment. For example, we highlight the artistic talent and technological expertise within the YRT by tailoring our projects to showcase their unique skills, while simultaneously challenging them to foster new skills.

Another tenet we follow is to provide structure and support and foster motivation (Larson 2006) to create innovative outputs (e.g., our YRT video). We developed strategies to support these creative outputs by embracing the team's energy. During meetings, we provide coloured markers and blank paper for them to use; this helps focus students who may have trouble sitting down for long periods of time and is a creative outlet for students to communicate their ideas. Mentees are also encouraged to participate actively by writing on the whiteboards, and every month, we alternate tasks to keep meetings fresh, fun, and productive.

Since 2015, our team has learned many lessons about what works and what does not. With respect to community

outreach, we have found that our contact with expert stakeholders in DRR has been met with enthusiasm; they have remarked on the innovation of this program and have provided encouragement and support for knowledge mobilization. While we have been fortunate, we realize the challenge in sustaining long-term partnerships given the workloads of many practitioners in DRR, as well as the slower pace of our team's productivity in comparison with the necessary faster pace required of field practitioners. Because our YRT team meets once monthly and focuses on participation of the mentees, we tailor the pace of our activities to their workloads during the school year, their availability for meetings, and the learning curves for both mentors and mentees, depending on the materials we are creating. These challenges are exacerbated when there is a community disaster that requires response over a long period of time. Regular meetings and opportunities for sharing updates from the team have been good strategies for maintaining collaborative partnerships.

Outcome

To date, this public health intervention has produced DRR training modules that can be used as curriculum support by teachers, a children's book on earthquake preparedness, an educational video about youth participation in DRR, a Photovoice project, and several conference presentations. Members of the team have become well versed in disaster preparedness strategies. Below is a description of our program outputs. Figure 1 shows a timeline of our projects across the years.

Our projects across the years

Disaster education modules

Through conversations with youth members on the team, it was apparent they were provided with little information about DRR in school. They expressed an interest in creating materials that could be used to help inform their peers. Thus, the team created a set of DRR training modules, rooted in the 21st Century Skills Framework (Binkley et al. 2012) and a whole community approach to youth preparedness (FEMA 2011). The modules are similar to other community-based youth engagement programs, such as FEMA's Be a Hero: Youth Emergency Preparedness Curriculum (FEMA 2013). Rooting the modules in the 21st Century Skills Framework educational standards, and providing flexible formatting allows teachers to incorporate and adapt information into existing lesson plans, such as mathematics, art, and history (Fuhrmann et al. 2008).

There are nine education modules: (1) introduction to disaster management; (2) floods; (3) winter storms; (4)

house fires; (5) wildfires; (6) tornadoes; (7) earthquakes; (8) health emergencies; and (9) hazardous materials. Each module has been translated into French. Over the years, we have edited and refined the modules to include over 100 pages of materials based on constructive feedback from informal student evaluations from our week-long EMCP course discussed earlier in this manuscript. The modules are currently being peer-reviewed by members of the Canadian Red Cross and will be distributed for peer review by educational experts before being published as open access resources on our EnRiCH Research Lab website.

EnRiCH youth participation video

In 2017–2018, the team created a video about the EnRiCH YRT and the importance of youth participation in DRR. They conceptualized the video, did camera work and production, were directors and camera subjects, and edited the video, which is available at this link: <https://www.youtube.com/watch?v=WG0NCi5m2d0>. In the video, team members answer questions about their participation in the EnRiCH YRT, provide their perspectives on youth participation in DRR, and give advice for practitioners who might want to replicate our program (EnRiCH Youth Research Team 2018). Additionally, our youth team members discuss important concepts such as empowerment, diversity, inclusivity, group dynamics, learning styles, leadership, and youth–adult partnerships.

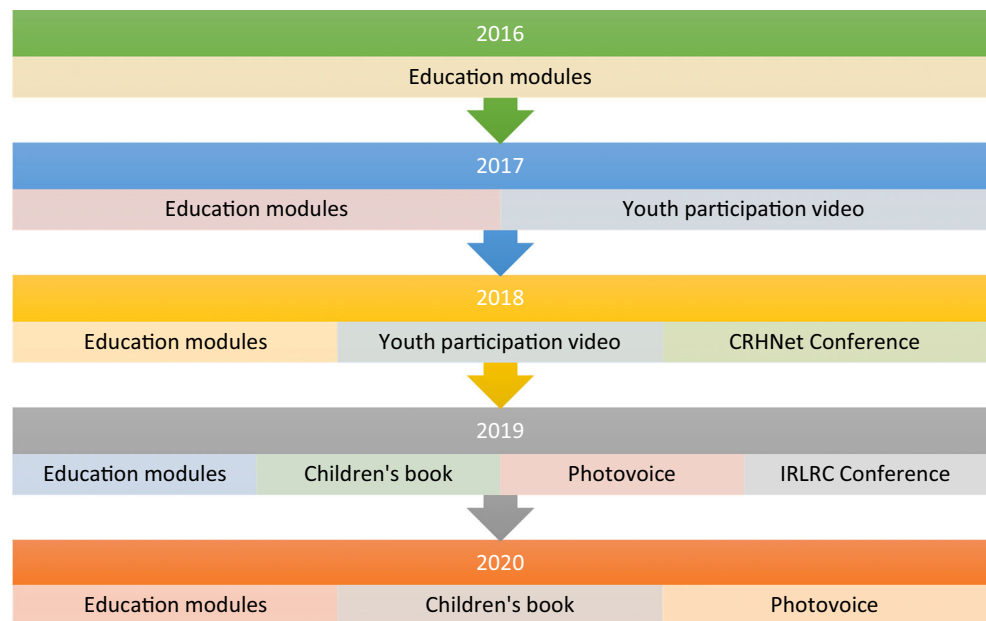
Additional knowledge translation activities

In October 2018, we presented our video and an oral presentation at the Canadian Risk and Hazards (Knowledge and Practice) Network (CRHNet) Conference in Vancouver, British Columbia, Canada. Following the presentation, we received many requests for resources from researchers and practitioners wishing to adapt our program in their own communities. In 2019, our team presented at the IRLRC (Interdisciplinary Research Laboratory on the Rights of the Child) Conference in Ottawa emphasizing the rights of youth to participate in issues that affect them.

Children's book

Our team wrote and illustrated a children's book to teach young kids what to do in an earthquake situation. The team worked together to design the book and characters and to write the story. Two of our mentees illustrated the story and another mentee designed the word art. We are in the process of disseminating the children's book, in addition to the education modules, through the Canadian Red Cross and school boards for peer review. The children's book will also be open access

Fig. 1 EnRiCH Youth Research Team projects across the years. *CRHNet*, Canadian Risk and Hazards (Knowledge and Practice) Network; *IRLRC*, Interdisciplinary Research Laboratory on the Rights of the Child



and available as a PDF online once it passes peer review. Our goal for 2021 is to increase the visibility and reach of the team's outputs through open access publishing and increased stakeholder outreach.

EnRiCH YRT Photovoice team

In addition to the children's book, throughout 2019 and 2020, four mentees from the EnRiCH YRT were participants in a Photovoice research project on youth participation in DRR and climate change. Photovoice is a community-based research method (Wang and Burris 1994), which is a collaboration between participants and researchers. Participants are actively involved in decision-making at every stage of research (e.g., identifying objectives, Photovoice assignments, exhibition planning) as they share their lived experiences through photographs, focus groups, and themes (Wang and Burris 1994). The YRT mentees participated in nine focus group meetings, during which they developed questions they wanted to explore. Between meetings, they took photos in their community that represented their answers to their questions and then shared the photos with the group. Our Photovoice project was supposed to conclude with an in-person exhibition in spring 2020 to showcase their work to public health, academic, and community stakeholders. Unfortunately, due to COVID-19 restrictions, we were unable to host the exhibition. We are in the process of adapting the exhibition to be publicly, and permanently, available online in spring 2021 to showcase their work.

Implications

The EnRiCH YRT is an example of a promising practice to operationalize youth participation in DRR, by introducing youth to DRR and giving them opportunities to be involved in research and activities. One goal of our program is to help build community capacity by engaging youth in disaster preparedness. We have seen personal and professional growth among individuals on our team, including improved knowledge of disaster risks, increased confidence, leadership, project management skills, and greater sense of social worth (Amri et al. 2018; Lopez et al. 2012; Matthews 2003). In the last year, long-term mentees have become more confident in taking the initiative to ask for greater responsibility within the team. Others have taken their knowledge and applied it to other community programs. For instance, some mentees have created their own social justice-based clubs and organizations, and/or joined other youth-focused programs such as community youth councils.

While no formal evaluation has been undertaken, we are seeing evidence of program reach and knowledge uptake. Team members asking their families to put together family grab bags, mentees inviting friends to join the team, and interest in our program from stakeholders in the community, are all indicators of our program's reach. This mirrors sentiments held by our team, with one student saying they joined the program because: "I believe this team will change how society views youth in disasters."

DRR requires investment. With improved partnerships, the EnRiCH YRT can support practitioners, researchers, and emergency managers by acting as a grassroots resource

to improve prevention and preparedness strategies at a local level (Wilson et al. 2010). This can be done, for example, by investing in upstream public education on disaster risks and preparedness strategies, and by improving communication strategies (UNDRR 2015).

Conclusion

In our experience, there is interest to include youth in disaster risk reduction, yet there are not many opportunities for youth to learn about disaster management or participate actively in the field. The EnRiCH YRT began to fill this gap by providing youth an opportunity to work on DRR initiatives. It has offered one solution to operationalizing global and national DRR policies, including the Sendai Framework's "all-of-society" approach. Our youth-led program also allows youth to thrive through a strong focus on youth development, leadership, and skill building. By reflecting on our experiences in developing and implementing this program, our hope is to create awareness about the need for youth participation in DRR programming, help provide insight for practitioners who may want to replicate our program, and support innovation and opportunities for youth engagement, to support community resilience.

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References

- Addy, N. A., Poirier, A., Blouin, C., Drager, N., & Dubé, L. (2014). Whole-of-society approach for public health policymaking: a case study of polycentric governance from Quebec, Canada. *Annals of the New York Academy of Sciences*, 1331(1), 216–229. <https://doi.org/10.1111/nyas.12503>.
- Amri, A., Haynes, K., Bird, D. K., & Ronan, K. (2018). Bridging the divide between studies on disaster risk reduction education and child-centred disaster risk reduction: a critical review. *Children's Geographies*, 16(3), 239–251. <https://doi.org/10.1080/14733285.2017.1358448>.
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining twenty-first century skills. In P. E. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and teaching of 21st century skills* (pp. 17–66). Berlin: Springer.
- CBC News. (2017). The Ottawa and Gatineau flood: a photo timeline. *CBC News* <https://www.cbc.ca/news/canada/ottawa>.
- CBC News. (2019a). Spring flooding in Ottawa-Gatineau, by the numbers. *CBC News* <https://www.cbc.ca/news/canada/ottawa>.
- CBC News. (2019b). Gatineau families still living in hotels after 2018 tornadoes. *CBC News* <https://www.cbc.ca/news/canada/ottawa/gatineau-families-still-housed-in-hotels-after-2018-tornadoes-1.5283387>.
- CBC News. (2020a). Mont-Bleu parents protest part-time return to class. *CBC News* <https://www.cbc.ca/news/canada/ottawa/mont-bleu-parents-reject-part-time-return-to-class-1.5655159>.
- CBC News. (2020b). Pandemic taking a heavy toll on the mental health of young Quebecers, public health study finds. *CBC News* <https://www.cbc.ca/news/canada/montreal/mental-health-young-residents-1.5773568>.
- EMCP. (2011). Enrichment Mini-Courses Program. https://www.emcp-pmce.ca/index_en.php.
- EnRiCH Youth Research Team. (2018). Introducing the EnRiCH Youth Research Team [Video]. YouTube. <https://www.youtube.com/watch?v=WG0NCi5m2d0>.
- FEMA. (2011). A whole community approach to emergency management: principles, themes, and pathways for action. https://www.fema.gov/sites/default/files/whole_community_dec2011_2.pdf.
- FEMA (2013). Be a Hero: youth emergency preparedness grades 9-12. United States. https://www.ready.gov/sites/default/files/2020-08/ready_emergency-preparedness-curriculum-grades-9-12.pdf.
- Fuhrmann, S., Stone, L. D., Casey, M. C., Curtis, M. D., Doyle, A. L., Earle, B. D., Jones, D. D., Rodriguez, P., & Schermerhorn, S. M. (2008). Teaching disaster preparedness in geographic education. *Journal of Geography*, 107(3), 112–120. <https://doi.org/10.1080/00221340802458482>.
- Larson, R. (2006). Positive youth development, willful adolescents, and mentoring. *Journal of Community Psychology*, 34(6), 677–689. <https://doi.org/10.1002/jcop.20123>.

- Lerner, R., Lerner, J., Lewin-Bizan, S., Bowers, E., Boyd, M., Mueller, M. K., Schmid, K., & Napolitano, C. (2011). Positive youth development: processes, programs, and problematics. *Journal of Youth Development, 6*(3), 38–62. <https://doi.org/10.5195/JYD.2011.174>.
- Lopez, Y., Hayden, J., Cologon, K., & Hadley, F. (2012). Child participation and disaster risk reduction. *International Journal of Early Years Education, 20*(3), 300–308. <https://doi.org/10.1080/09669760.2012.716712>.
- Maton, K. I. (2008). Empowering community settings: agents of individual development, community betterment, and positive social change. *American Journal of Community Psychology, 41*(1), 4–21. <https://doi.org/10.1007/s10464-007-9148-6>.
- Matthews, H. (2003). Children and regeneration: setting an agenda for community participation and integration. *Children & Society, 17*(4), 264–276. <https://doi.org/10.1002/CHI.745>.
- Mitchell, T., Haynes, K., Hall, N., Choong, W., & Oven, K. (2008). The roles of children and youth in communicating disaster risk. *Children, Youth and Environments, 18*(1), 254–279. <https://doi.org/10.7721/chilyoutenvi.18.1.0254>.
- Morgan, A., & Ziglio, E. (2007). Revitalising the evidence base for public health: an assets model. *Promotion & Education, 14*(2), 17–22. <https://doi.org/10.1177/10253823070140020701x>.
- Muzenda-Mudavanhu, C. (2016). A review of children's participation in disaster risk reduction. *Jamba: Journal of Disaster Risk Studies, 8*(1), 1–6. <https://doi.org/10.4102/Jamba.V8i1.218>.
- Nease, K. (2018, September 29). Anatomy of a storm: revisiting the devastation caused a week ago, when six tornadoes hit Ottawa, Gatineau, Que., and surrounding areas. *CBC News* <https://www.cbc.ca/news/canada/ottawa>.
- Peek, L. (2008). Children and disasters: understanding vulnerability, developing capacities, and promoting resilience — an introduction. *Children, Youth and Environments, 18*(1), 1–29. <https://doi.org/10.7721/chilyoutenvi.18.1.0001>.
- Pfefferbaum, B., Pfefferbaum, R. L., & Van Horn, R. L. (2018). Involving children in disaster risk reduction: the importance of participation. *European Journal of Psychotraumatology, 9*(sup2). <https://doi.org/10.1080/20008198.2018.1425577>.
- Public Safety Canada. (2012). Emergency management vocabulary. http://www.publications.gc.ca/collections/collection_2012/tpsgc-pwgsc/S52-2-281-2012.pdf.
- Public Safety Canada. (2019). Emergency management strategy for Canada: Toward a resilient 2030. <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgncy-mngmnt-strtg/mrgncy-mngmnt-strtg-en.pdf>.
- Statistics Canada. (2016). Emergency preparedness and resilience: Community-based fact sheets—Community of Ottawa-Gatineau (CMA), Ontario. http://www.statcan.gc.ca/pub/85-002-x/2016001/article/14638/s3/s3_2-eng.htm.
- UNDRR. (2015). Sendai Framework for Disaster Risk Reduction. http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf.
- UNISDR. (2009). UNISDR terminology on disaster risk reduction. <https://www.unisdr.org/we/inform/terminology>.
- United Nations. (2012). Political declaration of the high-level meeting of the general assembly on the prevention and control of non-communicable diseases. https://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf.
- Wang, C., & Burris, M. A. (1994). Empowerment through photo novella: portraits of participation. *Health Education & Behavior, 21*(2), 171–186. <https://doi.org/10.1177/109019819402100204>.
- Wilson, M. G., Lavis, J. N., Travers, R., & Rourke, S. B. (2010). Community-based knowledge transfer and exchange: Helping community-based organizations link research to action. *Implementation Science, 5*, 33–33. <https://doi.org/10.1186/1748-5908-5-33>.

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