

SSHRC Imagining Canada's Future
Knowledge Synthesis:
Energy and Resources
Children and Youth's Biopsychosocial Health in the context
of Energy Resource Activities

Dr. Pamela Irwin, Dr. Robin Cox, Dr. Leila Scannell, Dr. Sarah Fletcher,
Trevor Dixon Bennett, M.A., Dr. Cheryl Heykoop, & Dr. Michael Ungar

ResiliencebyDesign Lab, Royal Roads University
& Resilience Research Centre, Dalhousie University

Corresponding Author:
Dr. Robin S. Cox
Royal Roads University
Robin.Cox@RoyalRoads.ca

Key Messages

1. *The effects of energy activities on children and youth have been largely overlooked.*

This review has revealed that relatively few studies have investigated the effects of energy systems on the biopsychosocial health of children and youth. This is a particularly important area of study, given the short and long-term physical and mental health implications associated with young people's increased vulnerability to environmental hazards as a result of their dependence on the systems (family and community) that are impacted by those hazards, and the potential for disruption due to developmental vulnerabilities as well as long term impacts over the course of their lifespan.

Policy Recommendation(s):

- a. To include and encourage a focus on children and youth in research on energy systems through targeted and ongoing funding priorities.

2. *An emerging body of literature describes a range of negative health impacts of energy activities on children and youth.* Those studies that have begun to investigate the health effects of energy emissions and extraction on developing fetuses, children and youth have revealed that there are health, social, and economic issues related to environmental contamination and or degradation associated with energy extraction and production. This includes direct health impacts related to spills and leaks, dust, noise, toxic waste management, emissions and other environmental impacts (air, water, soil) associated with ongoing operations and the closure of facilities and management of clean up. It also includes indirect impacts related to increased vehicle traffic around and near sites causing greater risk of accidents and also contributing to increased air pollution, and the social and economic impacts of boom-bust economies associated with energy resource extraction industries on families and communities.

Policy Recommendation(s):

- a. Health indicators (physical, mental, and population health) and health impact assessments should be incorporated into environmental impact assessments and the ongoing monitoring and evaluation of proposed energy projects.
- b. These indicators and assessments should address both short/acute impacts and long-term, cumulative impacts.
- c. Accountability measures should be incorporated into such assessments and evaluation processes to support actions to mitigate and prevent adverse consequences of energy resource activities for children, youth, families and their communities.

d. In addition, energy resource development, urban planning, technological innovation, and policies should incorporate a socio-ecological lens that includes and foregrounds children, youth and their families highlighting both potential vulnerabilities and opportunities for empowerment and engagement in decision-making processes.

3. *Psychosocial and cultural outcomes should be considered.* Although relatively few studies have investigated the psychosocial implications of energy resource activities, some studies have established a connection between air pollution and educational and behavioural and social outcomes for youth and children. Further outcomes of relevance include the impact of these activities on access to lands and livelihoods, heightened in- and out-migration, potential increase in tensions, conflict and unrest and other activities (e.g., fishing, hunting, food production, cultural activities) especially in First Nations communities proximal to these resource activities.

Policy Recommendation(s):

- a. Integrate and monitor HVAC systems and water quality systems in schools, residential buildings, and other public spaces in which children and youth congregate in areas where exposure to emissions is a risk.
- b. Incorporate social impact indicators into environmental impact assessments and the ongoing monitoring and evaluation of proposed energy projects.
- c. Develop culturally relevant social impact assessment tools that address concerns specific to First Nations, Metis and Inuit Communities.

4. *The effects of renewable energy extraction and production on children and youth are largely unknown.* This review has further revealed that relatively few studies and consultative practices incorporate a child- and youth-centric approach to understanding and implementing the transition to low- or no-carbon energy systems. The biopsychosocial effects of wind, solar, hydro, and other renewables on young people need to be examined.

Policy Recommendation(s):

- a. Prioritize a focus on children and youth in research through funding initiatives and expectations.
- b. Adopt a child and youth-centred theory of change in consultation, decision making processes and policy development as governments and industry consider and move forward in this transition.
- c. Involve youth as key stakeholders in the proposal, development, and operations of new and existing renewable projects.

5. *Youth have great potential for agency in response to energy resource activities.* Youth are not only vulnerable to the effects of energy resource activities, but they also desire, and have the capacity and capabilities to be involved in decisions related to the energy resource activities and policies. They are motivated to take action to mitigate and/or prevent those effects and to shape current and future policy and practice in relationship to energy resource activities and climate change.

Policy Recommendation(s):

- a. Meaningfully engage youth in the design and implementation of community-based research efforts aimed at capturing youth voices and perspectives related to the impacts of energy activities on children and youth.
- b. Support the meaningful participation and contributions of youth in consultation processes at the local, regional, provincial/territorial and national levels, and directly involve them in shaping and influencing policy development and implementation processes.

Executive Summary

Although it is extensive, the knowledge about the biological and psychosocial (biopsychosocial) effects of energy resource activities (including construction, operation, spills, waste management, transportation) and climate change is diffuse, and characterised by a multitude of disciplinary and practice arenas. Fragmentation is particularly evident in the research about the impact of energy resource activities on children and youth, their families, and communities. An overview of this literature reveals that young people are directly and indirectly affected by the social, economic, and environmental impacts related to energy resource activities across energy systems (e.g., oil and gas, hydro-electric, nuclear); yet they are typically excluded from contributing to the planning and policy dialogue around the management of these systems or the anticipated transition to a zero or low carbon future. As such, this omission falls short of the principles and rights inherent in the United Nations Guiding Principles on Business and Human Rights or the Convention on the Rights of the Child and the expectations that children have the right to participate in decisions and matters affecting them. Further, this omission fails to acknowledge the growing awareness/conception of children and youth as active change agents in their lives and those of their community and society, and their role in influencing individual and community resilience in the context of climate change. It also signals a rift between current research, policies, and practices, and an “Imagined Future” for Canada.

This review addresses this disconnect by: capturing, collating and summarising the evidence about the biopsychosocial and economic impacts of energy resource activities on children and youth, in the context of environmental change; describing

young people's engagement in climate change mitigation; and recommending future research and policy directions. A systematic search of the interdisciplinary and international literature was screened for relevance, and complemented with a purposeful search to extend the breadth and depth of the final collection of articles. These were then synthesised according to the biological, psychosocial, and economic impacts of emissions and energy resource activities on children and youth, their families, and communities.

Much of the literature focuses on the direct health or biological impacts of emissions on young people. Emissions or *air pollution* originate from industrial and household energy production sources and processes in the form of gases (ozone), particle matter (smoke), and traffic-exhaust fumes, contaminated with toxic chemicals. Because of their developmental immaturity, and receptivity to exposure through inhalation, ingestion and/or dermal (skin) contact, children are at high risk of significant biological health effects from indoor and outdoor air pollutants. While respiratory conditions, such as asthma, are the most commonly reported emission related health impacts in children and youth, the type, extent, and severity of exposure is subject to environmental conditions—location (proximity to industrial sites), source of industry (petrochemicals, coal), traffic patterns (urban/rural), weather conditions (smog), and seasonal variations; as well as the composition of the pollutant. For instance, the impact of nuclear emissions depends on the time (pre and/or postnatal) and degree (short and/or long-term) of children's exposure to radiation. Some studies suggest that the co-exposure to different emissions, and the synergistic interactions of chemical toxins through direct exposure (e.g., ingestion of contaminated soil or water) may also be associated with higher rates of multiple forms of cancer, and other acute and/or longer-term health effects, and may also

result in substantive biodevelopmental and neurodevelopment effects, including delays to cognitive function, motor performance, and social behaviour in young people. From this perspective, it is surprising that the research about the corresponding psychosocial and economic impacts for children, families and communities is very limited.

This orientation is reversed in the literature about the effects of energy resource extraction (mining, drilling, nonconventional natural gas extraction - fracking). Literature on extraction activities focuses on the large-scale operational removal of solids (metals, minerals), liquids (oil) and/or gases (natural gas), primarily in rural and remote locations. Although youth employed in these industries are exposed to a range of biophysical and occupational hazards, including contaminated dust, excessive noise and vibrations, and work-site accidents, there are few accounts in the literature of how these activities impact the biological and mental health of youth. Oil and gas and other energy resource activity is also associated with social and economic development resulting in such things as purpose-built towns, long distance commuting, high incomes, and concomitant psychosocial and economic implications. For youth living in and near energy resource activities, health implications can include increases in risky and delinquent behaviours, mental health problems (depression) and other concerns related to disrupted or unpredictable family routines and relationships (*see saw* solo to co-parenting arrangements, domestic abuse); and by the impact on families and communities of *boom and/or bust* resource-dependent economies. Contemporary reports on nonconventional natural gas extraction (i.e., fracking) and oil sands activities provide community-level perceptions of biological risks, and the cultural, and psychosocial adjuncts to the

resource-curse paradox, where resource-rich communities experience low incomes and social wellbeing.

Overall, this review demonstrates that children and youth exhibit a wide range of biopsychosocial and economic effects related to their exposure to energy resource activities, especially those related to carbon-intensive energy emissions and extractions (i.e., oil, gas, fracking). This review further demonstrates a general lack of focus in the literature on these direct and indirect impacts of these activities on children and youth. Where children youth are the focus of study, they are most often framed one dimensionally as a vulnerable population in need of protection, rather than as citizens with rights and potential agents of change in their communities. However, an emergent literature describing youth engagement and activism in response to energy activities, also signals that youth stand poised as a significant sustainability and resilience multiplier.

Table of Contents

KEY MESSAGES	ii
EXECUTIVE SUMMARY	v
TABLE OF CONTENTS	2
CONTEXT	ERROR! BOOKMARK NOT DEFINED.
IMPLICATIONS	ERROR! BOOKMARK NOT DEFINED.
APPROACH	ERROR! BOOKMARK NOT DEFINED.
TABLE 1: SYNOPSIS OF CRITICAL INTERPRETATIVE SYNTHESIS SEARCH STRATEGY	ERROR! BOOKMARK NOT DEFINED.
PHASE ONE: SYSTEMATIC LITERATURE SEARCH AND STUDY-SPECIFIC DATA SCREENING AND EXTRACTION PROTOCOLS.	ERROR! BOOKMARK NOT DEFINED.
TABLE 2: THE NUMBER OF ARTICLES PER DATABASE FOR EACH ENERGY SYSTEM.	ERROR! BOOKMARK NOT DEFINED.
OVERVIEW OF RESULTS	ERROR! BOOKMARK NOT DEFINED.
PHASE TWO: MULTIFACETED PURPOSIVE SAMPLING REVIEW.	ERROR! BOOKMARK NOT DEFINED.
TABLE 3: PURPOSIVE SAMPLING APPROACH	ERROR! BOOKMARK NOT DEFINED.
TABLE 4: SOCIAL-ECOLOGICAL FRAMEWORK CROSS-REFERENCED TO RESULTS (ACCORDING TO NUMBER)	ERROR! BOOKMARK NOT DEFINED.
RESULTS	ERROR! BOOKMARK NOT DEFINED.
1. EMISSIONS	ERROR! BOOKMARK NOT DEFINED.
1.1 INDIVIDUAL EFFECTS.	ERROR! BOOKMARK NOT DEFINED.
1.2 FAMILY.	ERROR! BOOKMARK NOT DEFINED.
1.3 COMMUNITY.	ERROR! BOOKMARK NOT DEFINED.
2. EXTRACTION	ERROR! BOOKMARK NOT DEFINED.
2.1 INDIVIDUAL EFFECTS.	ERROR! BOOKMARK NOT DEFINED.
2.2 FAMILY EFFECTS.	ERROR! BOOKMARK NOT DEFINED.
2.3 COMMUNITY.	ERROR! BOOKMARK NOT DEFINED.
3. BROADER IMPACTS	ERROR! BOOKMARK NOT DEFINED.
4. YOUTH AS AGENTS OF CHANGE IN THE CONTEXT OF ENERGY PRODUCTION AND CLIMATE CHANGE	ERROR! BOOKMARK NOT DEFINED.
4.1 YOUTH ENGAGEMENT AND ACTIVISM IN RESPONSE TO ENERGY ACTIVITIES.	ERROR! BOOKMARK NOT DEFINED.
KNOWLEDGE GAPS AND AREAS FOR FUTURE RESEARCH	ERROR! BOOKMARK NOT DEFINED.
KNOWLEDGE MOBILIZATION PLAN	ERROR! BOOKMARK NOT DEFINED.
CONCLUSION	ERROR! BOOKMARK NOT DEFINED.
REFERENCES	ERROR! BOOKMARK NOT DEFINED.

