Determining and Exploring Stakeholder-Identified Research Priorities for Child and Family Health: A Priority Setting Study and Qualitative Systematic Review

by

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Abstract

Background. Patient-oriented research promotes the exploration of topics that align with stakeholder-identified, patient-focused priorities. Partnering with caregivers and healthcare professionals to determine their priorities for child and family health research provides direction for future patient-oriented research to address practical, relevant, and meaningful issues. Identifying stakeholder-identified priorities and conducting patient-oriented research leads to improved health care delivery and health outcomes.

Objectives. To (*i*) determine the top priority research topics in child and family health according to stakeholders, and (*ii*) systematically locate, appraise, and synthesize the current literature regarding a top health research priority identified by stakeholders.

Methods. This thesis was completed from 2018 to 2022 and followed a patient-oriented research approach across two distinct, but connected studies. Study 1 was a mixed-methods priority setting study conducted in partnership with stakeholders (caregivers and healthcare professionals [HCPs]) at the Northeast Community Health Centre (NECHC) in Edmonton, Alberta, Canada. This study followed a modified, six step, James Lind Alliance methodology to generate a 'top 10' list of stakeholder-identified priorities for child and family health research (objective i). Study 2, informed by the stakeholder-identified research topics generated in Study 1, included a systematic qualitative evidence synthesis on the impacts of COVID-19-related restrictions on physical activity (PA) for children and youth (objective ii).

Results. For Study 1, in partnership with stakeholders at the NECHC, a steering committee was formed to oversee and advise throughout the study process. The initial survey, to gather potential priority questions, generated 1,265 submissions from 100 caregivers and 25 HCPs. Out of scope submissions were removed and similar questions were combined to create a master list of questions (n=389). Only unanswered questions advanced (n=108) and were rank-ordered through a second survey by 100 caregivers and 25 HCPs. Stakeholders (n=12) gathered for a final workshop to discuss and finalize the 'top 10' list. Priority questions included a range of topics, such as mental health, screen time, impacts of COVID-19 restrictions, and behaviour. Study 2 emerged from one of the highest ranked stakeholder-

identified priorities generated from Study 1. For Study 2, qualitative evidence was reviewed regarding the impacts of COVID-19 restrictions on PA for children and youth. After 3,505 record titles and abstracts were screened and 717 full-texts were reviewed, 15 studies were included in the review. Curriculum-based PA, organized sport, and active transportation were negatively impacted by COVID-19 restrictions. Restrictions disrupted PA routines and reduced opportunities for energy expenditure, training for sport performance, and socialization, resulting in negative impacts on mental health and social connections. Negative changes in PA were affected by perceived risk of COVID-19 exposure; inadequate PA instruction; poor access to supportive PA spaces, equipment, and programming; increased screen time; and poor weather. Unstructured PA (*i.e.*, active play) was inconsistently impacted. Some children and youth experienced increases in unstructured PA, particularly outdoors. Positive changes in PA were facilitated by family co-participation, availability of outdoor space, and a perception of mental health benefits.

Conclusion. In Study 1, caregiver and HCP stakeholders prioritized diverse topics within the 'top 10' list; questions regarding mental health were the most common. Future patient-oriented research at this site can be guided by these stakeholder-identified research priorities. In Study 2, qualitative data indicated that pandemic-related restrictions had a predominantly negative impact on curriculum-based PA, organized sport, and active transporting among children and youth, with inconsistent impacts on unstructured PA.

Preface

This thesis is an original work by Andrea Eaton. The study in chapter 2 of this thesis received ethical approval from the University of Alberta Research Ethics Board on June 17, 2019 with the name "Determining Stakeholders' Priorities for Child and Family Research at the Northeast Community Health Centre", with ethics ID Pro00085252.

Chapter 2 of this thesis was submitted to a peer-reviewed journal (*Paediatrics and Child Health*) as:
Eaton A, Dyson MP, Gokiert R, Rajani H, O'Neill M, Ladha T, Zhang M, Birken CS, Maguire JL, Ball GDC. Priority topics for child and family health research according to caregivers and healthcare professionals (In Review).

The work in this thesis was completed under the mentorship and guidance of my supervisors, Ball GDC and Dyson MP. For the study in Chapter 2, the conceptualization of the study was completed by Ball GDC, Ladha T, Rajani H, Maguire JL and Birken C prior to the start of my graduate studies. Ball GDC, Ladha T, Rajani, Maguire JL and Birken C obtained funding for this research. I was responsible for developing the research proposal and study protocol, leading stakeholder engagement, collecting and analyzing study data, drafting the manuscript, and completing subsequent manuscript revisions with co-author feedback. Ladha T, Rajani H, and Zhang M provided expertise and guidance for stakeholder engagement at the Northeast Community Health Centre. Gokiert R provided expertise on community engagement. O'Neill M participated in verification of submissions in methods step 4 of Chapter 2. All co-authors reviewed and provided revisions or approval of the resulting manuscript in Chapter 2.

Chapter 3 of this thesis will be submitted to a peer-reviewed journal (destination journal: *Journal of Sport and Health Science*) as:
Eaton A, Ball GDC, Hwang Y, Carson V, Gokiert R, Dennett L, Rajani H, Zhang M, Dyson MP. The impacts of COVID-19 restrictions on physical activity in children and youth: a systematic review of qualitative evidence. (Pending submission).

For the review in chapter 3, with the supervision of Dyson MP and Ball GDC, I was involved in the conceptualization and refinement of the review topic from a stakeholder-identified research priority generated in Study 1. I was responsible for collecting and analyzing data, drafting the manuscript, and completing subsequent manuscript revisions with co-author feedback. Hwang Y provided content expertise and was the second reviewer for all screening, quality assessment, and data extraction steps. Carson V provided content expertise. Gokiert R provided support and expertise through the conceptualization and refinement of the review topic and on community engagement. Dennett L developed the search strategy in collaboration with the review team. Rajani H and Zhang M supported continued community engagement for this review. All co-authors reviewed and provided revisions or approval of the resulting manuscript in Chapter 3.

The manuscripts presented in this thesis were supported by the Clinical/Community Research Integration Support Program (CRISP) grant administered by the Women and Children's Health Research Institute (WCHRI) at the University of Alberta. During my graduate research program, I was supported by funding from a Patient and Community Engagement Training (PaCET; WCHRI), a 75th Anniversary Graduate Student Award (UAlberta), a Queen Elizabeth II Scholarship (UAlberta), and the Alberta Health Services Chair in Obesity Research (awarded to my supervisor, Geoff Ball).

Dedication

I dedicate this thesis to my daughters, Emily and Claire;

and to my parents, my Momma and Pappa Jake.

I will always work to make you proud.

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I have immeasurable gratitude for my supervisor, Dr. Geoff Ball, who provided me with the opportunity to pursue graduate studies along with numerous personal and professional development opportunities. He has demonstrated leadership along with patience, support, and encouragement. Geoff has been an important reminder of balance and self-care and allowed me to remain a present and engaged mom to my daughters. I would like to thank Dr. Michele Dyson for her calm and thoughtful approach, encouragement, and support. She has enriched my graduate experience. Geoff and Michele, I feel honoured and humbled to have been your trainee. I wish to thank my committee member Dr. Rebecca Gokiert for her valuable community engagement expertise, thoughtful feedback, committed support and encouragement. I would also like to thank Dr. Arnaldo Garcia-Perez for his kindness, support, and engagement in my research. Thanks to Samantha Davies and Mikhaila Skehor for their administrative support.

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
AHS	Alberta Health Services
CER	Community-Engaged Research
CHNRI	Child Health and Nutrition Research Initiative
CIHR	Canadian Institutes for Health Research
COVID-19	2019 novel Coronavirus
EBM	Evidence-Based Medicine
HCPs	Health Care Professionals
JBI	Joanna Briggs Institute
JLA	James Lind Alliance
NA	North America
NECHC	Northeast Community Health Centre
NGT	Nominal Group Technique
PA	Physical Activity
PICO	Population, Intervention (or phenomena of Interest), Control, Outcome
POR	Patient-Oriented Research
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PROSPERO	International Prospective Register of Systematic Reviews
PSP	Priority Setting Partnership
REDCap®	Research Electronic Data Capture
SEM	Socioecological Model
WHO	World Health Organization

Chapter 1

Introduction

1.1. BACKGROUND TO PRIORITY SETTING STUDY

1.1.1. Child health research

Childhood is the base for health and wellness in a person's life. This period of childhood, which includes all ages under 18 years (1), presents a valuable opportunity for families and pediatric health care professionals (HCPs) to help build the best possible foundation for children's lifelong health. (2) The term 'health' refers to a state of well-being across physical, mental, spiritual, and social domains and is not indicated solely by the absence of disease or illness. (3) Child health research is important because it allows for the improved health status of children through the prevention, diagnosis, treatment, and management of childhood health conditions. Child health research can produce enormous impacts with improved child health translating to healthier families, healthier communities, and healthier societies. (4)

There is ample evidence connecting childhood health, lifestyles, and circumstances with adult health outcomes. (5,6) A child's health sets the stage for proper growth and development (7) and can have dramatic health consequences later in life. (8) Cardiovascular disease (9), asthma (10), obesity (11), and mental illness (12) are some of the many chronic conditions which can originate in the early years of life. As healthy children are more likely to become healthy adults (7), it is imperative to focus on childhood health and well-being in order to optimize not only the health of populations, but also the social and economic success of society. (13)

A child's family is the most prominent influence in supporting and promoting their health and development. (14) Family health research extends the focus beyond an individual child to include others who are related, generally reside in the same household, and share financial resources. (14) Families typically share positive or protective factors leading to good health as well as risk factors for poor health; they naturally share lifestyles, sociodemographic characteristics, and a household environment, which all influence each individual's health status. (14) For this reason, child health research can, and should, extend beyond children individually to include the family unit, as it does within my thesis.

Approximately 90% of children in Canada, along with their families, access health care in a community setting through a pediatrician or family doctor within the first five years of life (15) and this care is typically their initial entry point into the health care system. HCPs within the community-based health care setting have a unique perspective as they help to guide families through the foundational years of a child's life. This context is multifaceted as HCPs in the community setting can be involved with preventative care, acute or urgent care, diagnostics, and both short and long-term treatment and management of health conditions. (15) Positioning child and family health research alongside this health care, in a community-based setting, has the potential to reach an incredible proportion of children and their families.

Health care settings with active research have demonstrated improved patient outcomes compared with sites without research activities. (16) This highlights the value in integrating research into the primary point-of-care for a great majority of children. Community-based health care settings are an appropriate and feasible location to conduct health research that can have a direct impact on health care delivery and health outcomes for children and families. (17) Further, research in this setting provides an opportunity to encourage positive patterns of health care and health research engagement for both children and their families early on.

1.1.2. Community-engaged research

Conducting research in a community-based setting necessitates collaboration with community members. Although the term 'community' can be defined in multiple ways, for the purposes of my thesis, community refers to a "group of people who are linked by social ties and share common perspectives or interests". (18, p4) Although communities are presented as a single unit of 'community', they are diverse and include heterogenous perspectives and experiences of the individual community members. (19)

Community-engaged research (CER), as the name suggests, centers on the philosophy of researchers engaging directly with the community they intend to conduct research with. (20) It is defined as "the process of working collaboratively with groups of people affiliated by geographic proximity, special interests, or similar situations with respect to issues affecting their well-being". (20, p3) The CER approach emerged in response to research historically being conducted 'on' people as 'subjects, often including marginalized populations with the researcher-subject relationships existing solely for the benefit

of the researchers. (21) Typically, topics of health research were decided by researchers based on their personal or professional interests. (22-24) Community concerns and interests were often not acknowledged or addressed, leading to community members feeling exploited as the research was designed to benefit primarily researchers and not the participants or community itself. (19, 24)

CER is unique because of the guiding principles of this approach, rather than the methods employed. (18,24,25) Building a trusting and collaborative relationship is an inherent process within CER. (20) It is characterized by partnership, cooperation, and negotiation between researchers and community members, with a shared goal of addressing a community issue. (18,24,25)

CER is an umbrella term encompassing a range of approaches. The extent of community-engagement and relationship between researchers and the engaged community can vary considerably across projects. (26) Low-level community engagement sees researchers solicit minimal community input on only a few elements of the research; the highest level engages participants in a full and equal partnership with extensive collaboration and empowerment of participants during every step of the research process. (18,26) This full-partnership and maximal community engagement includes community-based participatory research (CBPR), which is one of the most recognized types of CER, but may not be suitable for all research projects or community settings. (18) Levels of engagement can also be considered on a spectrum from informing community, consulting with community, or involving community, all the way to collaborating with community and empowering community. (27)

No matter the extent, community engagement should ideally be present throughout the research process from the phases of planning and conception through to dissemination of findings. (26) CER views community members as equal and active partners in the research process, rather than passive subjects. (24,25,28) It can include a host of diverse stakeholder groups with a shared interest, from individuals with lived experience through to relevant agencies, institutions, and organizations. (26) Partnering with communities in research helps to optimize research processes, participation, and perceived value of research. (29,30) In health care, CER allows community members to share their personal perspective and input on research topics which are meaningful, important, and affect them personally, or their community's health and well-being more widely. CER in health research increases research relevance

and value. (29,30) It also leads to health research outputs that are more applicable and optimizes dissemination strategies through enhanced communication and improved research uptake. (29-31)

1.1.3. Patient-oriented research

CER aligns with patient-oriented research (POR) in health care. POR engages with a specific community - a community of patients, their caregivers, and their families, as partners who share an interest in how health research is funded, planned, conducted, and disseminated. (32, 33) Over the past 10 to 15 years, there has been a growing movement to involve patients and community stakeholders in health research. Consistent with CER, POR has the goal of engaging patients as active partners rather than passive subjects, but uniquely has the specific goals of influencing health research, health care, and health outcomes. (32) POR focuses on patients within the health care system and is prioritized by the Canadian Institutes for Health Research (CIHR) as the "cornerstone of evidence-informed health care". (32) Evidence-informed health care is the process of making informed health care decisions, based on the best available research evidence "integrated with patient values, preferences, and circumstances". (34) The intention of POR is to initiate change in the way health is researched and health care is delivered – to ensure that patients are receiving high-quality, cost-effective, and up-to-date health care services, resulting in improved health outcomes for patients. (32)

Family-oriented research is enveloped by POR, which aims to engage caregivers (parents or other primary caregivers) and families along with patients. (32) Within pediatrics, this is important as families carry the primary responsibility of promoting a child's growth and development. (35) Families provide the context for a child's health and well-being. (36) Research that is family-oriented recognizes the significance of family in a child's life and therefore, seeks to include families as partners in research and health care. (35) The term 'POR' within my thesis is used to describe research related to both patients and their families and does not imply engagement with the patients alone, as the name suggests.

POR emphasises that it is imperative for health care to be based on the best available evidence so that resources are optimized. (32) When evidence is lacking, researchers have an opportunity, and a responsibility, to plan and conduct research to build the evidence base. Approximately 40% of all provincial budgets in Canada are spent on healthcare (37); this substantial expenditure highlights the value of POR. Research must be relevant and valuable for patients and their HCPs, in order to optimize

the use of health care expenditures. Matching health research goals to the practical needs of children, their families, and their HCPs leads to more effective use of research funding. The potential for research topics and opportunities are limitless and research funding is finite, so it is necessary and important determine which topics should be the prioritized in health research. (38)

1.1.4. Research priority setting

Priority setting in research is any activity that is completed by more than one person to decide the questions or topics that are of highest priority for researchers to address and can include stakeholder input, data analysis, or a combination of both. (39) Historically, health research priorities have been decided by researchers selecting topics they feel are the most important for research to address or those which align with their personal and professional interests. It is well-documented that there is a mismatch between the priorities of researchers and the priorities of patients, their families, caregivers, and HCPs. (22,40,41) With this mismatch, funding may not be allocated judiciously. It is more likely to be directed into low priority, low value, or low relevance research areas and is more likely to neglect the needs of patients and other relevant stakeholders. (41-43) A more contemporary approach to priority setting in health research links directly with POR, as it strives to ensure that health research follows priorities identified by patients and other relevant stakeholders, including HCPs. (32) This approach engages patients and stakeholders to determine research priorities that are not only relevant and beneficial for individual health, but also have the potential to initiate changes within the healthcare system.

In 2008, one review found that only 19% (28/148) of all published health research priority setting studies actually involved both patients and their HCPs working collaboratively to determine research priorities. (44) POR and priority setting have definitely gained traction since 2008. Another review, published in 2021, found that since 2007, the number of research priority setting projects have steadily increased. (45) However, it is notable and disappointing that even with this increase, of projects completed in 2020 alone, only 29% of studies (26/89 studies) included public engagement, which was reported as the highest rate for pubic engagement in priority setting studies of any year to date. (45) Engagement with stakeholders is valued and endorsed by local, provincial, and national funding agencies (32,46), yet the mismatch remains between current research practices and the priorities of patients and stakeholders. (47)

1.1.5. Pediatric research priorities

Pediatric research priorities and research agendas have been proposed for diverse pediatric populations and topics (6), but often focus on specific pediatric health conditions. For example, priorities or agendas have been set for pediatric mental health (48,49), solid organ transplantation (50), type 1 diabetes (51), and asthma. (52) These, and others, have and will continue to guide pediatric health research across multiple countries worldwide. (6) Within Canada, research priorities have recently been generated for pediatric emergency research (Canada-wide in 2018) (53), pediatric preventative care (greater Toronto area in 2017) (38), and for children less than 2 years of age (across Alberta in 2021). (54)

Lavigne *et al.* (38) stated their study was the first priority setting project completed for pediatric preventative care research with stakeholder (parent and HCP) engagement. This study was based solely in the greater Toronto area of Ontario, Canada and engaged parents of children, zero to five years old, who had previously been involved with the Target Kids! research network. (15) Similarly, HCP partners were recruited through the same network or worked within the greater Toronto area. (38) Priority setting studies completed to date have highlighted important research priorities, and have done so including the valuable input of stakeholders in various child health domains. Despite this important work in priority setting for pediatric research, considering geographic and social differences, along with the dynamic nature of research, there remains an opportunity to expand on pediatric research priorities. To date, there are no other published priority setting projects that have been completed in community-based settings for child health research including children of all ages. Addressing this existing gap, the first objective of my thesis work was to partner with caregivers and HCPs in a community-based health care setting to determine their priorities for child and family health research.

1.1.6. Existing Priority Setting Methodologies

Methods that bring together patients and other relevant stakeholders to set priorities and promote POR are crucial to addressing the existing incongruency. There remains a significant need to have research priorities determined using systematic, rigorous, and transparent methods. (55,56) Setting priorities in health research can be particularly difficult as there are a large number of competing research topics, with outcomes that are not certain and impacts which cannot always be measured. (56,57) With

this, it is important to ensure a rigorous and appropriate method of priority setting is selected. There are multiple methodologies which can be employed in order to engage patients and other relevant stakeholders in the priority setting process. A recent review (56) identified six of the most commonly implemented approaches applied for priority setting in health research, described below. The James Lind Alliance methodology is presented last as it was the approach implemented for the priority setting project described in Chapter 2 of my thesis.

1.1.6.1. Child Health and Nutrition Initiative (CHNRI)

In a review of priority setting in health research prioritization, the Child Health and Nutrition Research Initiative (CHNRI) method was identified to be used most frequently. (56) This systematic yet flexible method was initially created to set research priorities for child health globally but the strengths and flexibility of the process have aided expansion beyond its initially intended use. (58) The first step of the CHNRI process is for a small group of stakeholders to be selected to manage the process and represent stakeholders more widely. Next the context and criteria for priority setting are defined, including the scope of the project and what criteria need to be satisfied in order for a topic or question to be considered a top priority. Criteria typically include: answerability, equity, impact on the burden, deliverability, and effectiveness. (56,58) Additional criteria may be added at the discretion of the management team. Research topics are generated by the management team and/or participants (stakeholders at large). (56,58) Questions are judged against criteria and topics are assigned a score, based on how well they satisfy the pre-established criteria. Scores are taken back to stakeholders for feedback; feedback is then incorporated and scores adjusted accordingly to create a final rank-ordered list of research priorities. (56,58)

Strengths of the CHNRI methods include that it is systematic and transparent, making it easily reproducible. (59) The process is democratic and inclusive, with stakeholders managing the entire process. It is flexible, extremely simple, and can be inexpensive to conduct. (59) Limitations include that there is potential for the generation of a limited number or narrow scope of research topics to be produced and for the management team to introduce bias if the group is limited in size or diversity of views. (56,58)

1.1.6.2. The Delphi Method

The Delphi method has been used since the 1950s and was originally developed by the RAND Corporation to forecast the impacts of technology on warfare, not for research priority setting. (60) However, this consensus method using a systematic and iterative multi-step process has evolved, and in 2018, the Delphi method was found to be the second most common approach to priority setting in health research. (56) In this process, a facilitator leads a group of experts to reach consensus on a given topic. For research priority setting, the facilitator is typically a researcher and the group of experts are stakeholders, selected by the investigator, who have experience or knowledge on the topic. (56,61) Consensus is reached through a series of anonymous structured questionnaires (referred to as 'rounds') without participants ever meeting in person. (56,61,62) Research ideas are gathered from stakeholders using an open-ended questionnaire. (56) Responses are organized and used to create a structured questionnaire of potential priority topics (or questions) for the first 'round'. (56) Each round has participants anonymously respond by ranking or rating each option, then results are summarized and shared with participants. Compiled results are then used to generate the questionnaire for the next round, with the lowest ranked items removed for fewer options each round, as the process works towards consensus. Typically, up to four iterative rounds can used to reach consensus. (56,61)

There are many strengths in the Delphi method. (56,61) First, it is accessible and facilitates engagement as in-person meetings are not required for stakeholders to participate, enabling the engagement of diverse participants (across differences in geographic locations, mobility, *etc*.). Second, maintaining anonymity is central to the process and supports participants sharing responses openly and honestly. Third, using multiple iterative rounds allows for the incorporation of feedback and learning throughout the process. Lastly, the Delphi method is considered to be flexible and adaptable to the needs of specific projects. (56,61) Limitations of the Delphi method include that there is: (i) no guidance on how to identify participants in the process, (ii) a lack transparency regarding the criteria being used to rank priorities, (iii) a potential for attrition through the multiple rounds, and (iv) the process can be lengthy and time-consuming. (56,61,62) It should be noted that although accessibility can be increased without face-to-face meetings, a lack of resources (*e.g.,* nearby post office, internet access, etc.) can still hinder participant engagement. (62)

1.1.6.3. Consultation

Yoshida (56) found 'stakeholder consultation' to be the third most commonly used method for health research priority setting. Priority setting studies implementing this method were reported to consult stakeholders through a combination of expert panel interviews and focus group discussion(s). (56) Focus groups or panel interviews can be effective in eliciting multiple views and allowing discussion of different viewpoints. (63) At the same time, they have the greater potential for individuals to dominate the process, and introduce an influential bias in the priority setting process. (63) Studies which implemented a consultation process often provide insufficient description of their methods, making replication of the process extremely difficult and results more open to challenge. (56)

1.1.6.4. Online Surveys and Questionnaires

Online surveys and questionnaires, without any face to face interaction, have also been used to set health research priorities. Yoshida (56) reported approximately eight percent (8%) of health research priority setting studies follow this method. Similar to consultation, they do not follow an established or systematic methodology for the prioritization process. This approach may be valuable in obtaining input from a large number or diverse group of stakeholder participants; however, it can be difficult to adequately design surveys or questionnaires appropriate for stakeholders at large with diverse backgrounds and experiences. (63) Open-ended questions contained in the questionnaire can require significant interpretation without an opportunity for follow-up, verification, or feedback on the prioritization results. (63) Lastly, the lack of consistency and structure in using online surveys and questionnaires limits their value in health research priority setting. (63)

1.1.6.5. Nominal Group Technique (NGT)

Although not typically used for health research priority setting in isolation, this method has been used to set priorities in other domains (64) and is incorporated within others, including the James Lind Alliance (JLA) (41) (described later). The NGT is a structured and iterative process for groups to efficiently and effectively reach consensus. (65,66) Participants may receive additional background or contextual information to review prior to the meeting in order to enhance their participation in the process. (67) NGT occurs face-to-face with a moderator present and begins with an introduction to the topic. The moderator then poses a number of questions regarding the topic and participants are asked to share their

responses. Next, participants vote on the ideas or topics to be prioritized. Responses are compiled and the rank-ordered list is presented to the group. All participants are asked to share their perspective on the prioritized list and the group discusses the results. Subsequent rounds of voting and discussion follow until consensus is reached. (65,66)

There are several advantages of the NGT for priority setting. First, this process is democratic and encourages contributions from all members of the group through both voting and discussions. (63,65-67) Second, by supporting the participation of all members in a group, the NGT is particularly useful where participants have diverse perspectives. (63,65-67) Third, the format of the NGT and use of a moderator helps to prevent individuals from dominating the process. (63,65-67) Lastly, the NGT is flexible and allows for modifications as required. (63,65-67) A potential limitation is that there is no way to make participation or contributions anonymous, which can deter some participants from expressing their complete or true viewpoints. (63) It has also been suggested that the structure of the NGT may limit contributions by members of the group during discussions. (63)

1.1.7. James Lind Alliance (JLA) Methodology

The JLA was established in 2004 as a non-profit initiative that involves bringing together patients, their caregivers, and HCPs to create priority setting partnerships which work together "to identify and prioritise the unanswered questions or evidence uncertainties that they agree are the most important for research to address". (41, p5) Within my thesis, 'stakeholders' is used to refer to patients, their parents or primary caregivers, and HCPs, collectively. The JLA states 'patients' may include individuals themselves (*e.g.,* children) or those who represent them (*e.g.,* parents or primary caregivers). (41)

The JLA was developed in the United Kingdom as an evidence-based, step-by-step priority setting process that is easy to conceptualize and apply. (41) The process is deliberative, involving discussions and group-based decision-making which extends beyond simple stakeholder consultation using surveys or focus groups alone. (68) The JLA is a seven-step iterative process that is systematic, yet flexible and responsive to the needs of the priority setting partnership (41) It includes the active engagement of stakeholder partners on a steering committee which oversees and advises on the priority setting process through two surveys and a final workshop involving a modified NGT. The JLA methodology is presented in greater detail in Chapter 2.

Importantly, the structure of the JLA helps to address the mismatch between what researchers want to study and the practical information that patients (and their caregivers) and HCPs need in their day-to-day lives and clinical practices, respectively. (40,41). The process is intended to ensure the voices of patients, their caregivers, and their HCPs are recognized and incorporated into health research, effectively creating a POR model for priority setting in health research.

The JLA seeks to provide a clear set of research priorities through a process that is systematic, transparent, equally inclusive for stakeholder groups, and free from researcher influence in priority setting activities. (41) The priorities are meant to highlight questions that are directly relevant to stakeholders and are expected to have the greatest potential to benefit patients, their families and their healthcare providers. (41) The goals of the process are to ensure research focuses on these priority topics and to increase awareness of patient- and stakeholder-identified priorities amongst researchers and funders. (41)

1.1.8. Rationale for selecting the James Lind Alliance Methodology

Determining priorities for health research is complex, but evidence-based methodologies exist to help navigate the process. Priority setting projects can be vastly different, and because of this, there is general agreement that no single methodology can be considered superior or best practice for setting research priorities. (69)

The JLA methodology was selected for the priority setting project contained within my thesis for a number of reasons. First, it is evidence-based and has been suggested to be the “best-researched public-clinician partnership approach for research topic generation”. (70, p8) Second, the JLA methodology aligns with POR values, with patients, caregivers, and other relevant stakeholders involved directly in the priority setting process from conception through dissemination. Further, the results of JLA priority setting partnerships are intended to highlight these stakeholder-identified priorities for researchers and funders alike, further supporting POR. Third, the JLA is flexible and permits modifications to fit the context of specific projects. Fourth, the JLA methodology has been successfully implemented for numerous health research priority setting projects, including for eating disorders (71), miscarriage (72), cardiac arrest (73), and autism (74), demonstrating its efficacy and adaptability while maintaining rigour. Lastly, research

team members had experience implementing the JLA methodology to determine health research priorities in Ontario, Canada. (38)

1.2. BACKGROUND TO QUALITATIVE EVIDENCE SYNTHESIS

1.2.1. Rationale for transition from priority setting project to systematic review

Strengthening the evidence base using stakeholder-identified priorities leads to improved health care and health outcomes. (32) With such a substantial expenditure on health care in Canada (37), aligning child and family health research with the practical needs of children, their families, and their HCPs means more effective use of investment dollars. There is potential for an incredible return on investment, which has been estimated to be around 800% on investments made in early childhood development. (54) This highlights the need for researchers to conduct POR to accumulate evidence and ensure that resources are allocated judiciously to match stakeholders' priorities. Once stakeholder priorities are known, there is an opportunity to plan and conduct research to strengthen the POR evidence base.

Stakeholder-identified research priorities need to be translated into research in order for a priority setting project to be worthwhile and effective. The steps of translation from priority to project can include: (i) understanding which portions of the priority topic remain unanswered, (ii) considering a broad research priority topic, and generating a specific and focused research question addressing an unanswered aspect of the topic, and (iii) developing a research plan to address the focused research question. (75)

As a part of my thesis work, I, along with my co-authors, worked to initiate this translation process and respond directly to stakeholder-identified priorities from the study described in Chapter 2. The JLA priority setting project, described in Chapter 2, was conducted in order to facilitate future POR in child and family health. Chapter 3 is a study demonstrating the next step in translating a priority topic into active research. The study in Chapter 3 emerged from one of the highest ranked priorities identified in the priority setting study from Chapter 2.

1.2.2. Hierarchies of evidence

As previously stated, POR is considered a 'cornerstone of evidence-informed health care' (32). Evidence-informed health care incorporates hierarchies of evidence (or levels of evidence) as a core

principle. Hierarchies of evidence are heuristics that allow for the evaluation of evidence based on the relative strength of the findings from scientific studies with various study designs. (76,77)

More than 80 hierarches of evidence have been proposed and there is no consensus on an absolute, best, or ideal hierarchy or on the exact ranking of included study designs. (78) However, hierarchies of evidence are typically represented visually as a pyramid and agreement does exist that the best available evidence (based on rigour [including strength and precision]) is placed at the top of the pyramid. (79) This allows for a 'top-down' approach for HCPs to determine what constitutes 'best evidence' as a part of evidence-informed heath care. Rigour refers to the extent to which a study applies the scientific method to "ensure an unbiased and well-controlled experimental design, methodology, analysis, interpretation and reporting of results". (80) Systematic overviews of reviews, systematic reviews, and meta-analyses are consistently found at the top of this pyramid.

Hierarchies of evidence were initially created to support and inform evidence-based medicine (EMB) (81) and many hierarchies of evidence available and referenced today remain centered around EBM. (82) EBM is defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of EBM means integrating individual clinical expertise with the best available external clinical evidence from systematic research". (83, p.71) This definition led to criticism that EBM failed to recognize the value of patients' perspectives and failed to integrate patients' perceptions, circumstances, understanding, and values into care. (34) The term 'evidence-informed practice' has been promoted to indicate that medicine and the health care process is patient-centred rather than focused on the scientific reduction of quantitative evidence. (84)

The patient-oriented focus for evidence-informed health care is reflected in the hierarchy of evidence pyramid presented in Figure 1.1. (85) This hierarchy of evidence, adapted from the National Health and Medical Research Council (82), maintains systematic reviews and meta-analyses as the highest quality of evidence, but also recognizes other evidence syntheses and guidelines as additional high-quality evidence sources.

1.2.3. Overview of methods for evidence synthesis

Evidence synthesis, also called knowledge synthesis, is a research method that allows researchers to gather, contextualize, integrate, and critically appraise all pertinent individual research

studies related to a focused research question. (86-88) Evidence that has been synthesized is considered to be less biased, more rigorous and more generalizable. (88) Evidence syntheses can be useful for summarizing an evidence base or improving the understanding of current evidence by identifying inconsistencies and gaps that exist. Understanding the current evidence through evidence syntheses allows for more precise and judicious planning for future research agendas. (86)

Multiple distinct methods exist for evidence synthesis. Most importantly, an evidence synthesis method needs to align with the specific research question being addressed. (86) Regardless of the method employed, all are systematic and use transparent and reproducible methods to analyze data from multiple primary sources. (88) The most common methods of evidence synthesis are briefly described below. (88)

1.2.3.1. Systematic review

Systematic reviews are the most common type of evidence syntheses. Systematic reviews are comprehensive and can be used to address a wide range of research questions using an organized and transparent process. They are effective in gathering, comparing, assessing, and synthesizing the evidence related to intervention effects. (88) Systematic reviews are time intensive and typically take several months to a year or more to complete the process. (89) The term ‘systematic review’ is sometimes used generally as an umbrella term, encompassing other types of reviews. (89)

1.2.3.2. Meta-analysis

Meta-analysis is a statistical synthesis method applied to objectively pool quantitative outcome data from multiple studies. It can be conducted independently or alongside a systematic review. (89) Meta-analysis is used to provide a summary measure of effect and is a method that continues to be developed. (88)

1.2.3.3. Qualitative evidence synthesis

Qualitative evidence syntheses follow the same process as a standard systematic review, but synthesize qualitative rather than quantitative evidence. (88) A qualitative evidence synthesis can also be referred to as a qualitative systematic review. Qualitative evidence syntheses will be discussed in greater detail later in this chapter.

1.2.3.4. Mixed methods synthesis

Mixed methods syntheses are those which consider both quantitative and qualitative evidence. Often, qualitative evidence is synthesized in order to inform, enhance, extend, or supplement a quantitative review. (88) Multilevel synthesis involves the combination of quantitative and qualitative syntheses, conducted independently first and then aggregated. (88) Another method of mixed methods synthesis is realist synthesis which aims to provide “an explanatory analysis aimed at discerning what works for whom, in what circumstances, in what respects and how”. (90, p21)

1.2.3.5. Scoping review and evidence map

Scoping reviews and evidence maps aim to identify research gaps and map the current available evidence in a specific research area. (88) They offer direction for evidence synthesis and may evaluate existing evidence, but do not summarize effect measures of an intervention as systematic reviews can do. (89) Scoping reviews and evidence maps are often completed as a preliminary project in order to assess the evidence that is suspected to be very limited, very vast, or very diverse and can take longer than a systematic review to complete. (89)

1.2.3.6. Narrative review

Narrative reviews are sometimes called literature reviews and have a wide scope and no standardized methodology or protocol. (89) They seek to provide a descriptive summary of relevant studies. (89) A narrative review provides more opportunity for individual insight and speculation than quantitative methods. (91)

1.2.3.7. Rapid review

Rapid reviews follow the same systematic methodology as a standard systematic review but do so within a limited timeframe. They take “methodological shortcuts” in order to reduce time commitments, but do so at the risk of reducing rigour and introducing bias. (89) They are useful in situations where aggregated information is needed quickly, such as for government agencies or policy recommendations. (89)

1.2.3.8. Overview of reviews

Also called umbrella reviews, overviews of reviews emerged due to an ever-increasing number of evidence syntheses being produced. (88) Overviews of reviews are aggregations of multiple systematic

reviews on a specific topic or they may combine more unique syntheses together in order to adequately answer a broader question. (88,89)

1.2.4. Qualitative evidence synthesis methodology and rationale

1.2.4.1. Qualitative evidence synthesis methodology

Qualitative evidence syntheses are used to systematically review and summarize qualitative research evidence and follow the same conceptual and practical guidance as the systematic review process. (88) Qualitative evidence syntheses provide an improved understanding of the perspectives, views, and experiences of individuals. (92) Through a qualitative evidence synthesis, rich interpretations of the lived experiences and related personal impacts of a given condition can be produced. (92) Qualitative research "seeks to develop understanding of and explanation for the behaviours, experiences and interactions of individuals and the social contexts in which these occur". (92, p2) In the health and health care setting, a qualitative evidence synthesis brings together knowledge from multiple independent studies to create a composite descriptive understanding of individuals' health experiences, perceptions, and perspectives and the natural variations that exist.

Methods of conducting qualitative evidence synthesis, specifically within health and health care, have developed with an increasing demand for knowledge and understanding that goes beyond what can be known through systematic reviews of quantitative evidence alone. (92) Qualitative evidence synthesis aligns with evidence-informed health care. Both support the notion of a person-first or patient-first perspective and highlight the importance of the way health phenomena are experienced. Understanding patterns in patient experiences, perceptions, attitudes, barriers, and facilitators provides important contextual information about how individuals experience phenomena which impact their health. (88)

There are several methods available methods available for conducting a qualitative evidence synthesis, ranging from integrative to interpretative approaches and the selection of methodology depends on the review question and scope. (88,92,93) Integrative approaches are more deductive and summarize or aggregate findings from individual studies. (92) Interpretive approaches are more inductive and support concept and theory generation from findings of primary studies. (93)

1.2.4.2. Qualitative evidence synthesis rationale

The selection of the qualitative evidence synthesis method was based on several advantageous characteristics of the JBI (formerly Joanna Briggs Institute) (94) endorsed methodology for qualitative evidence synthesis: meta-aggregation. (95) First, meta-aggregation is "is a method of synthesis designed to mirror the Cochrane Collaboration process of systematic reviews of effectiveness whilst being sensitive to the nature of qualitative research and its traditions. Implicit in its development is a recognition of the valuable role qualitative research can play in bolstering evidence-based healthcare" (96, p25). Second, meta-aggregation is designed to reflect the role of meta-analysis in quantitative systematic reviews. Third, a meta-aggregative approach does not seek to generate theories and concepts from the findings of primary studies. (95) The research question was not one which compelled the generation of new theory but rather supported an aggregative approach. Meta-aggregation approaches use thematic analysis, without theory generation, and produce summary findings. (95) Meta-aggregation is be done in three steps: (i) extracting individual study findings along with illustrative quotations, (ii) developing descriptive categories for findings, and (iii) developing one or more synthesized findings of categories. (95) Meta-aggregation pools data from across different studies, even those with disparate methodologies (97) and is able to provide meaningful statements that can be used to inform policy and practice. Further, meta-aggregation it is a well-established qualitative evidence synthesis methodology that has been successfully implemented to answer similar questions about health impacts and experiences. (98,99)

1.2.4.3. Rationale for review on the impacts of COVID-19 restrictions on the physical activity of children and youth

The community-engaged priority setting study in Chapter 2 prioritized research on the impacts of COVID-19 restrictions on the physical and mental health of children and youth. This topic, like other priority topics identified in the first study, was broad and lacked the specificity required to translate a priority topic into a suitable review question. With this, stakeholders were engaged to determine a relevant, valuable, and focused topic for a systematic review. The resulting topic, the impacts of COVID-19 restrictions on the physical activity of children and youth, addressed a distinct but focused portion of a high priority research topic from the study in Chapter 2. The review topic is relevant, meaningful, patient-oriented, and responsive to stakeholder-identified research priorities.

COVID-19 was declared a pandemic in March 2020 by the World Health Organization and resulted in an unprecedented world-wide health response with nearly 200 countries imposing varying degrees of restrictions on their citizens to control the spread of the virus. (100) Despite reducing the exponential spread of the virus, restrictions had dramatic personal and social consequences for individuals throughout the world. (101,102,103) In 2020, UNICEF reported that worldwide, 99% of children and youth ≤18 years old experienced some degree of COVID-related restrictions and 60% of children experienced partial or complete lockdowns. (104) Restrictions impacted numerous settings, including schools, playgrounds, recreation centers and organized sports, disrupting the lives and physical activity (PA) patterns of over 2.34 billion children and youth globally. (105,106)

PA positively impacts the social, physical, and mental health of children and youth, with benefits extending into adulthood. (107) Current evidence suggests a dose-response relationship between PA and health for children and youth; every incremental change (increase or decrease) in PA is consequential. (107) In the current pandemic, PA leads to positive mental health outcomes for children and youth experiencing COVID-19 restrictions. (108)

Qualitative research allows for an improved understanding of the contextual factors, experiences, and complexities (109) related to COVID-19 restrictions and PA for children, youth, and their families. An understanding beyond the measurable (quantitative) impacts of COVID-19 restrictions on physical activity for children and youth will allow for better supports, planning, and interventions (110) as we move towards a post-pandemic period, promoting healthy PA levels for children and youth.

For the systematic review described in Chapter 3, it was determined a priori that qualitative and quantitative studies would be synthesized separately if there was an ample body of evidence. It was anticipated that the quantitative review would be completed first. However, between the time of the protocol registration and completing screening, a scoping review was published, with a significant overlap with the proposed quantitative review. Additionally, this review identified a significant gap with qualitative research being identified need for this topic. With this development, only the qualitative review was completed as a part of my thesis.

1.3. THESIS OVERVIEW

1.3.1. General Overview

Chapter 2 of this thesis was a priority setting project conducted with stakeholders at the Northeast Community Health Centre (NECHC) in Edmonton, Alberta, Canada. Working in partnership with stakeholders, a 'top 10' list of research priorities for child and family health research according to caregivers and HCPs was generated at that site. It was imperative to demonstrate a commitment to addressing these stakeholder-identified priorities and support further POR. Addressing a stakeholder-identified research priority, through the review conducted in Chapter 3, was an opportunity to honour the relationship established with community-members through the priority setting project and demonstrate a commitment to addressing their needs.

1.3.2. Rationale for research setting

Prior to beginning of my graduate studies, there was interest from both researchers and pediatricians at the NECHC in conducting research at this site. Together, they aimed to establish a longer-term plan for community- and practice-based research in child and family health. Limited research had been conducted at the NECHC in child and family health and they had determined there was both a need for it and an opportunity to initiate it. The priority setting project (Chapter 2) was a foundational step in establishing community engagement, a relationship between researchers and NECHC stakeholders, and a plan for continued high-quality POR aligned with self-identified priorities of stakeholders at this site.

1.3.3. Thesis objectives and research questions

1.3.3.1. Objectives

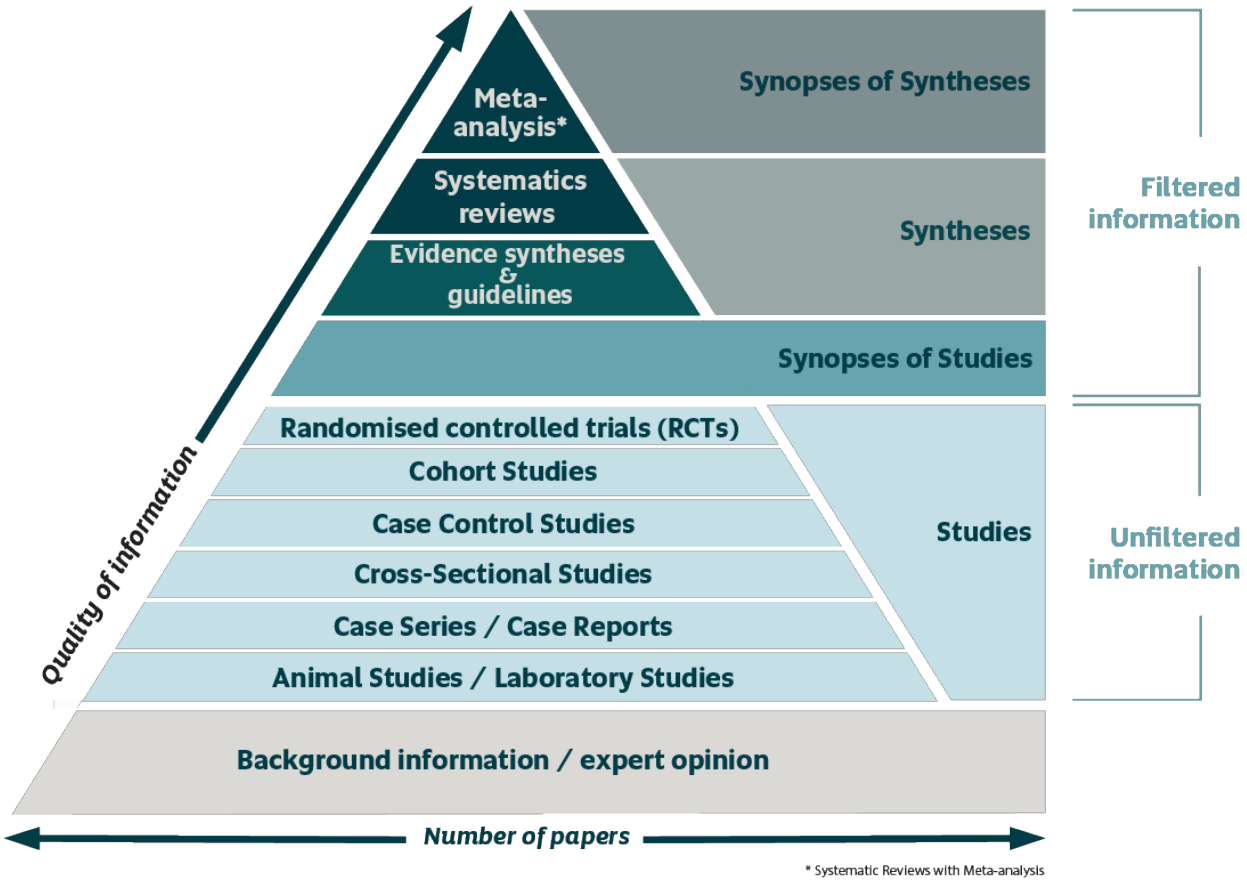
1. To identify unanswered questions that stakeholders (caregivers and HCPs) have about child and family health.
2. To generate a 'top 10' list of priority questions about child and family health to guide future research at the NECHC.
3. To identify and initiate a secondary research project related to one of the top stakeholder-identified priorities.
4. To synthesize evidence on one of the highest stakeholder-identified priority research topics: the impact of the COVID-19 pandemic on PA in children and youth).

5. To explore factors across the socioecological model that were perceived to influence PA.

1.3.3.2. Research questions

1. What unanswered questions do stakeholders (parents/caregivers and HCPs have about child and family health?
2. What are the ‘top 10’ highest priority questions for child and family health research according to stakeholders at the NECHC?
3. What is the impact of the COVID-19 restrictions on PA in children and youth 18 years of age and younger?
4. What individual, interpersonal, institutional, community, and policy factors influenced PA for children and youth during COVID-19 pandemic restrictions?

Figure 1.1. Hierarchy of Evidence[85]



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Chapter 2

Priority Setting Study

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2.1. ABSTRACT

Background. Patient-oriented research (POR) aligns research with stakeholders' priorities to improve health services and outcomes. Community-based healthcare settings offer an opportunity to engage stakeholders to determine the most important research topics to them. The objectives were to identify unanswered questions that stakeholders had regarding any aspect of child and family health and prioritize their 'top 10' questions.

Methods. This study followed the James Lind Alliance (JLA) priority setting methodology in partnership with stakeholders from the Northeast Community Health Centre (NECHC; Edmonton, Canada). The research team partnered with five caregivers and five healthcare professionals [HCPs]) to create a steering committee. Stakeholders were surveyed in two rounds (n=125 per survey) to gather and rank-order unanswered questions regarding child and family health. A final priority setting workshop was held to finalize the 'top 10' list.

Results. The initial survey generated 1,265 submissions from 100 caregivers and 25 HCPs. Out of scope submissions were removed and similar questions were combined to create a master list of questions (n=389). Only unanswered questions advanced (n=108) and were rank-ordered through a second survey by 100 caregivers and 25 HCPs. Stakeholders (n=12) gathered for the final workshop to discuss and finalize the 'top 10' list. Priority questions included a range of topics, including mental health, screen time, COVID-19, and behaviour.

Conclusion. Stakeholders prioritized diverse questions within the 'top 10' list; questions regarding mental health were the most common. Future patient-oriented research at this site will be guided by priorities that were most important to caregivers and HCPs.

2.2. INTRODUCTION

Typically, health research priorities are determined by researchers or funding agencies based on topics they believe are important to address. (1,2) It remains relatively uncommon for patients, caregivers, or healthcare professionals (HCPs) to be included in priority-setting processes (3), leading to a mismatch between research conducted and patient needs. (4-6) This mismatch can result in inefficient use of research funding and resources, low value, and poor implementation of findings. (7,8)

A more progressive view encourages a patient- or family-oriented approach, one that establishes a partnership between patients, caregivers, HCPs, and researchers to determine what and how research is funded, conducted, disseminated, and used. (9) Termed 'patient-oriented research' (POR), this approach promotes research that is meaningful and relevant to patients and their families (3,10) and results in improved healthcare quality, engagement, and outcomes. Further, POR increases research quality, uptake (11), accountability, and transparency. (12) A key tenet of POR is addressing patient-identified research priorities. (3)

The James Lind Alliance (JLA) (6) provides an evidence-based, priority setting methodology to generate research priorities in partnership with patients, caregivers, and other stakeholders. It is well-documented that the priorities of researchers often do not align with those of patients, caregivers, and HCPs. (1,5,6) With this misalignment, research is more likely to focus on low priority, low value, or low relevance areas and neglect the needs of patients and other relevant stakeholders. (6,13,14) The JLA aims to ensure research focuses on topics that are directly relevant to patients and increase the awareness of stakeholder-identified priorities amongst researchers and funders. (6)

For most families, community-based appointments are entry points into the healthcare system; this setting facilitates POR that is integrated, accessible, and valuable. (15) Conducting health research in community-based settings enables social, environmental, and contextual factors to be integrated throughout the research process. (16) Pediatricians, HCPs, and researchers shared an interest in establishing research at the Northeast Community Health Centre (NECHC), making it an ideal setting to develop and conduct community-based POR.

The purpose of this research was to understand the research priorities of stakeholders (parents and caregivers [hereafter referred to as 'caregivers'] and HCPs) through a JLA priority setting partnership.

The objectives of this study were to (i) identify unanswered questions that stakeholders had about child and family health and (ii) generate a 'top 10' list of their priority questions to inform future research.

2.3. METHODS

This research followed a modified JLA priority setting methodology through six steps (Figure 2.1). The two main exceptions to the JLA protocol were the exclusion of formal JLA engagement and a JLA-contracted advisor. This was counterbalanced by informal support from the JLA and the experience of research team members and others who have completed previous JLA priority setting projects. (17,18) This research was conducted from July 2019 to October 2021, including 7-months of delays due to the COVID-19 pandemic. This study received ethical approval from the University of Alberta Health Research Ethics Board (Pro00085252) and operational and administrative approvals from Alberta Health Services and the NECHC. Reporting of this study aligns with the Reporting Guideline for Priority Setting of Health Research (REPRISE). (13)

Setting and Participants

Our research was conducted at the NECHC in Edmonton, Alberta, Canada. The NECHC is a regional, community-based clinic providing primary, secondary, consulting, and speciality health services to children and families with diverse sociodemographic backgrounds. Limited child health research has been conducted at the NECHC, so this priority setting project was an ideal first step establishing a long-term plan to conduct high-quality and relevant POR at this site. Research participants included two groups of stakeholders from the NECHC: (a) caregivers of 0-17-year-olds accessing health services and (b) HCPs providing pediatric health services at the site.

Modified JLA Process

Step 1. Form a Steering Committee

Recruitment for the steering committee occurred in-person at the NECHC and through purposive sampling with HCP partners to identify potential caregiver stakeholders with diverse ethnic, cultural, and personal backgrounds. HCPs were recruited by convenience, with selection limited by the number of HCPs working at this site. The steering committee oversaw, informed, and advised on all study processes to optimize relevance, accessibility, and stakeholder engagement.

Step 2. Initial Survey to Gather Questions

Our steering committee co-created initial surveys to gather stakeholders' unanswered questions regarding child and family health (see Appendix A, Supplementary File 1a and 1b). Surveys were modeled after examples from previous JLA projects (17-19) and piloted with caregivers (n=10) at the NECHC to ensure clarity and acceptability. Following JLA guidance and other similar projects (17,20), 125 stakeholders were recruited. Caregiver participants were recruited in-person from the NECHC pediatric clinic waiting room. HCPs were recruited in person, via managers' email distribution networks, and using snowball sampling. There was no limit placed on the number of questions participants could submit.

Survey data were collected and managed using REDCap (Research Data Capture Tools) (21,22) hosted at the University of Alberta and completed by participants using a tablet, smartphone, or computer. Participants' demographic data were collected for descriptive purposes. Each participant received a $10 gift card.

Step 3. Summarize and Organize Questions

This process was completed by one researcher (AE) and verified by a second (MD). First, all 1,265 submitted questions were compiled using the JLA template. (23) Out of scope (*i.e.,* those not pertaining to child or family health) and non-questions were removed. With verbatim wording retained, questions were grouped into categories. Duplicates were removed and similar questions were merged to form a single indicative summary question following PICO format (Population, Intervention/Exposure, Control, Outcome) (24), whenever possible. When questions lacked specificity, assumptions were not made about respondents' intentions and retained the original questions, even if that meant indicative questions lacked PICO details. The steering committee reviewed and approved the summarized list of 389 questions.

Step 4. Verify True Unanswered Questions

The steering committee reviewed and approved a verification process to determine which questions were unanswered by currently available evidence (Appendix A, Supplementary File 2). If insufficient evidence was available through a Cochrane review, systematic review, clinical practice guideline, or position statement (*e.g.,* Canadian Pediatric Society (25), Greig Health Record (26)),

questions were considered unanswered. The verification process was completed for all 389 questions by one reviewer (AE) and verified by a second (MO), with discrepancies resolved by a third (GDCB). Unanswered questions (n=108) moved forward to step 5.

Step 5. Interim Priority Setting Survey

The interim prioritization survey included all 108 questions. Initial survey participants were invited to complete this survey and new participants were recruited in-person following the same methods as the initial survey. One hundred twenty-five stakeholders were recruited, but due to anonymity in survey responses, it was impossible to track new versus returning participants. Questions were organized into ten categories (*e.g.,* development and learning, mental health) to improve survey structure and clarity. Four versions of the interim prioritization survey were created, each with questions and categories presented in random order to minimize response bias. (27) Participants were asked to select questions they felt were the most important, with no minimum or maximum for selections. Results were compiled to create a rank-ordered list of questions, according to the total number of votes received. Participants provided demographic characteristics and received a $10 gift card.

Step 6. Final Priority Setting Workshop

All survey participants were invited to join the final priority setting workshop. The highest-ranked questions from the interim prioritization survey (selected by >50% of respondents) were compiled in random order to create a pre-workshop survey. This survey was sent to workshop participants, asking them to select the three most important and three least important questions. Survey results were compiled and discussed during a virtual (28) final priority setting workshop. An experienced facilitator led the meeting through rounds of discussion and voting using the Zoom polling function (28), with participants reaching consensus to finalize the 'top 10' priority list of unanswered questions for child and family health research. Participants received a $25 gift card. After the final workshop, participants were emailed a survey to rank-order the remaining questions (11 through 26), share demographic information, and rate their satisfaction with the workshop and overall study experience.

2.4. RESULTS

A summary flowchart of the study process with main results is presented in Figure 2.1.

1. **Form Steering Committee**

Researchers (n=5) partnered with five caregivers and five HCPs (2 pediatricians, 2 nurses, 1 social worker) to create a steering committee (Appendix A, Supplemental File 3).

2. **Initial Survey to Gather Questions**

One hundred caregivers and 25 HCPs participated in the initial survey; collectively, they shared 1,265 unique submissions. Demographic characteristics of survey participants are reported in Tables 2.1a and 2.1b.

3. **Summarize and Organize Questions**

All 1,265 submissions were reviewed; 494 out-of-scope (*e.g.,* "why does the government allow healthy foods to be served?") and non-question (*e.g.,* "supports", "cannabis") submissions were removed. The remaining 771 questions spanned diverse topics, including diet and nutrition (14%), healthcare navigation and supports (11%), mental health (9%), screen time (7%), and COVID-19 (5%). Figure 2.2 presents a visual representation of the most common topics submitted. Redundancies were removed and similar questions were combined to form 389 indicative questions.

4. **Verify True Unanswered Questions**

Of the 389 indicative questions, 108 were unanswered (Appendix A, Supplemental File 4). Agreement between two reviewers in the verification process was excellent (95–98%). A third reviewer was consulted for a final decision on four questions.

5. **Interim Priority Setting Survey**

One hundred caregivers and 25 HCPs completed the interim prioritization survey (Tables 2.1a and 2.1b). Twenty-six questions were prioritized by >50% of survey respondents, meeting the threshold to advance to the final priority setting workshop. Appendix A, Supplemental File 5 presents the interim prioritization rankings.

6. **Final Priority Setting Workshop**

Seven caregivers and five HCPs (1 pediatrician, 3 nurses, 1 social worker) participated in the workshop to finalize the top 10 priorities (Figure 2.3) through facilitated discussion and voting. Although the priorities spanned diverse topics, most related to mental health issues.

Post-Workshop Survey

All respondents indicated they were either ‘satisfied’ or ‘very satisfied’ for both the overall study and final workshop processes. The most favorable parts of the workshop included caregivers and HCPs meeting together, discussion quality, and the ease of Zoom polling. Areas for improvement included having a more diversity in participants’ cultural/ethnic backgrounds and increasing the duration of the final workshop. Participants rank-ordered the remaining questions (from 11 to 26) that fell outside the ‘top 10’ list. This list was shared with all workshop participants for feedback before finalizing the complete list of priority questions (Appendix A, Supplemental File 6).

2.5. DISCUSSION

Using a systematic stakeholder engagement process (6) to generate research priorities, this study generated a ‘top 10’ list that was dominated by mental health issues. These unanswered questions represent an important starting point to inform future collaborative research between stakeholders and academic researchers.

Our stakeholders highly prioritized mental health, which aligns with other recent child health priorities in Canada (17,29,30), demonstrating consistency across contextual, geographic, and sociodemographic differences. Previous priority setting focused on children less than two years old (29), less than five years (17,29), and emergency departments. (30) The findings from this study offer insight into the stakeholder-identified consensus priority topics for all children <18 years old in the community setting.

The presence of primary, secondary, consulting, and specialty care at the NECHC reflects the diversity of paediatric care across Canada. (31) Although priorities reflect the views of stakeholders at the NECHC, there is likely considerable overlap between their top priorities and those of stakeholders in other settings.

JLA priority setting is not intended to produce an absolute ‘top 10’ list. Priority setting is subjective and influenced by individual participants. However, a strength of the JLA methodology is its consensus building approach through multiple phases with shared decision-making and partnerships between

stakeholders. The results of this study support the continued prioritization of mental health research and signal the persistent and urgent need for research to address this stakeholder-identified priority.

To the knowledge of the authors of this study, this is the first priority setting study completed in child and family health since the COVID-19 pandemic was declared and includes topics reflecting the pandemic and related impacts. COVID-19 restrictions created methodological and practical challenges for the priority setting process, altering stakeholder engagement. Transitioning to a mix of one-on-one in person recruitment and virtual group meetings using online platforms highlighted the responsiveness and adaptability of the JLA process, providing an example to emulate in future research.

High-quality, community-engaged research requires an authentic and collaborative partnership between stakeholders and researchers, with a shared commitment to address local health issues. (32) During this study, there were strong relationships built with stakeholders at the NECHC. Sustained efforts were made to develop relationships with both HCP and caregivers, which were valuable, necessary, and time-consuming. HCP engagement was facilitated by frequent and consistent in-person interactions; they engaged more readily with this research and expressed a shared interest in the project from the study conception. Engaging caregivers as partners in the process (*i.e.,* as steering committee members), required a more considerable investment of time and energy. Despite expressions of interest, their participation was often difficult to secure. Public engagement in research entails a time commitment from stakeholders that can be difficult for some to make and sustain (33), which is consistent with my experience during this study.

Efforts were made to engage a diverse mix of stakeholder participants, yet most were white women. During recruitment, all HCP and caregivers present in-person at the clinic were approached, which indicates the study sample likely reflects a greater proportion of white women working as HCPs and presenting as caregivers in the clinic.

To disseminate study findings, consistent with REPRISE guidelines (13), priorities were shared with stakeholders via email and poster distribution, accompanied by formal presentations of study findings. The research team involved in this study has met with researchers and the funder to discuss the results and develop a plan for sharing and evaluating the impacts of these findings.

Limitations

Our study was not without limitations. First, expectations were to include a substantial proportion of families from refugee, immigrant, and low-income backgrounds. Despite greater demographic diversity in surveys, some steps included a less diverse sample. For example, there was less representation from low-income families in the study than anticipated, so their views may be under-represented. Further, stakeholders on the steering committee were primarily white women; most final workshop participants were white and all were women. Future research should use targeted approaches to ensure participants from diverse backgrounds and demographics can engage throughout the study process to achieve greater representation across diverse population groups.

Second, due to COVID-19 restrictions, the study deviated from JLA standards and the final priority setting workshop was held virtually, which included interactive polling. With this unprecedented change, the amount of time required to rank all 26 questions through virtual means was underestimated, so only the 'top 10' were ranked during the workshop. It is recognized that the rank-order of priorities may have been impacted by the virtual format and particularly priorities 11–26, which were rank-ordered after the workshop.

2.6. CONCLUSION

Stakeholder-identified research priorities are central to POR. This study provides a strong foundation for future POR at this site and the findings warrant follow-up by funders and researchers. The 'top 10' priorities provide guidance for meaningful, relevant POR by aligning future research activities with stakeholder priorities.

Figure 2.1. Flowchart of modified James Lind Alliance priority setting methodology, results, and timeline

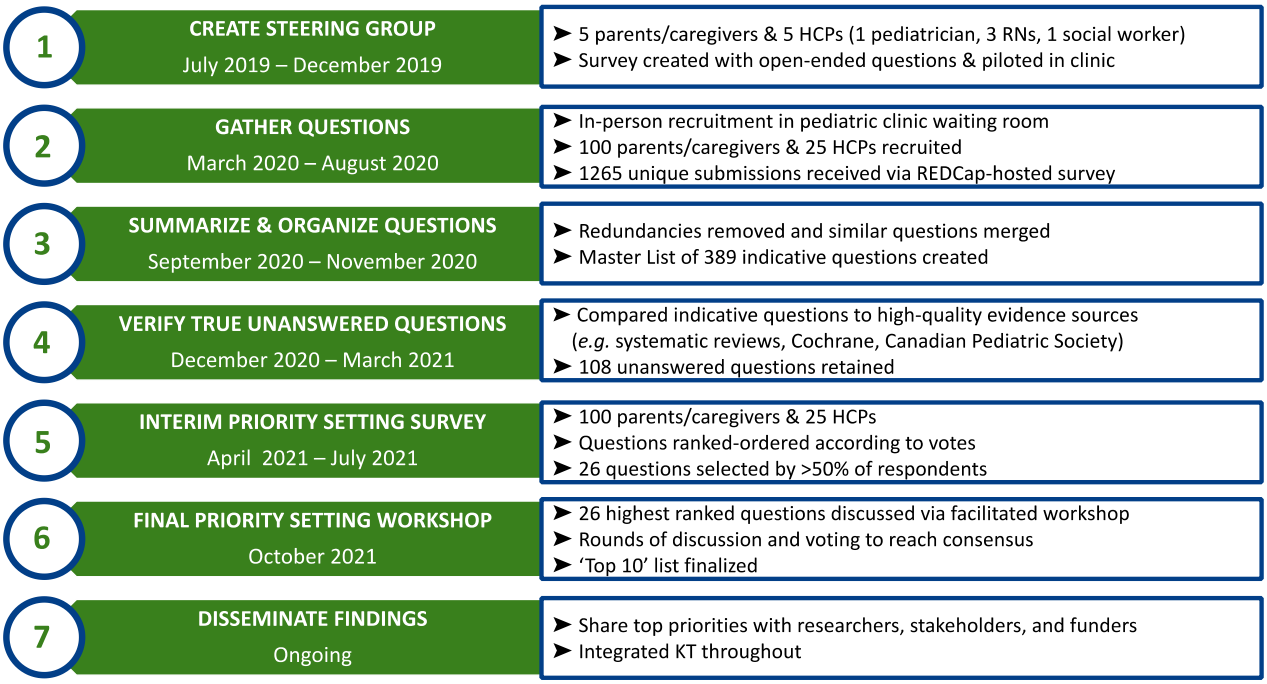


Table 2.1a. Demographic Characteristics of Caregivers

		Initial Survey (n=100)	Interim Survey (n=100)	Final Workshop (n=7)
Gender	Female	71	87	7
	Male	27	13	0
	Prefer not to say	2	0	0
Age (years)	<20	2	1	0
	20-29	12	7	0
	30-39	39	49	4
	40-49	26	23	1
	50-59	8	5	0
	60-69	2	2	0
	70+	0	1	0
	Prefer not to say	11	12	2
Ethnic or Cultural Identity*	White	53	59	5
	Indigenous	12	9	1
	South Asian	8	7	0
	Other	8	7	0
	Black	5	5	1
	Prefer not to say	4	6	0
	Chinese	3	3	0
	Filipino	4	3	0
	Arab	3	1	0
Highest Level of Education Achieved	No high school	3	1	0
	Some high school	5	8	0
	Diploma or equivalent	29	26	2
	University or college	40	48	1
	Graduate degree	16	10	4
	Professional degree	2	4	0
	Prefer not to say	5	3	0
Household income per year (CDN$)	Less than 25,000	8	7	1
	25,000-49,999	11	10	1
	50,000-74,999	21	13	2
	75,000-99,999	12	14	1
	100,000-149,999	24	22	2
	More than 150,000	6	12	0
	Prefer not to say	18	22	0
Born in Canada	Yes	71	74	6
	No	27	23	1
	Prefer not to say	2	3	0
Number of children	1	19	23	3
	2	36	33	0
	3	24	19	0
	4	6	15	4
	5 or more	11	8	0
	Prefer not to say	4	2	0

* Ethnic or cultural identity categories, which had zero (0) totals, were not included in this table.

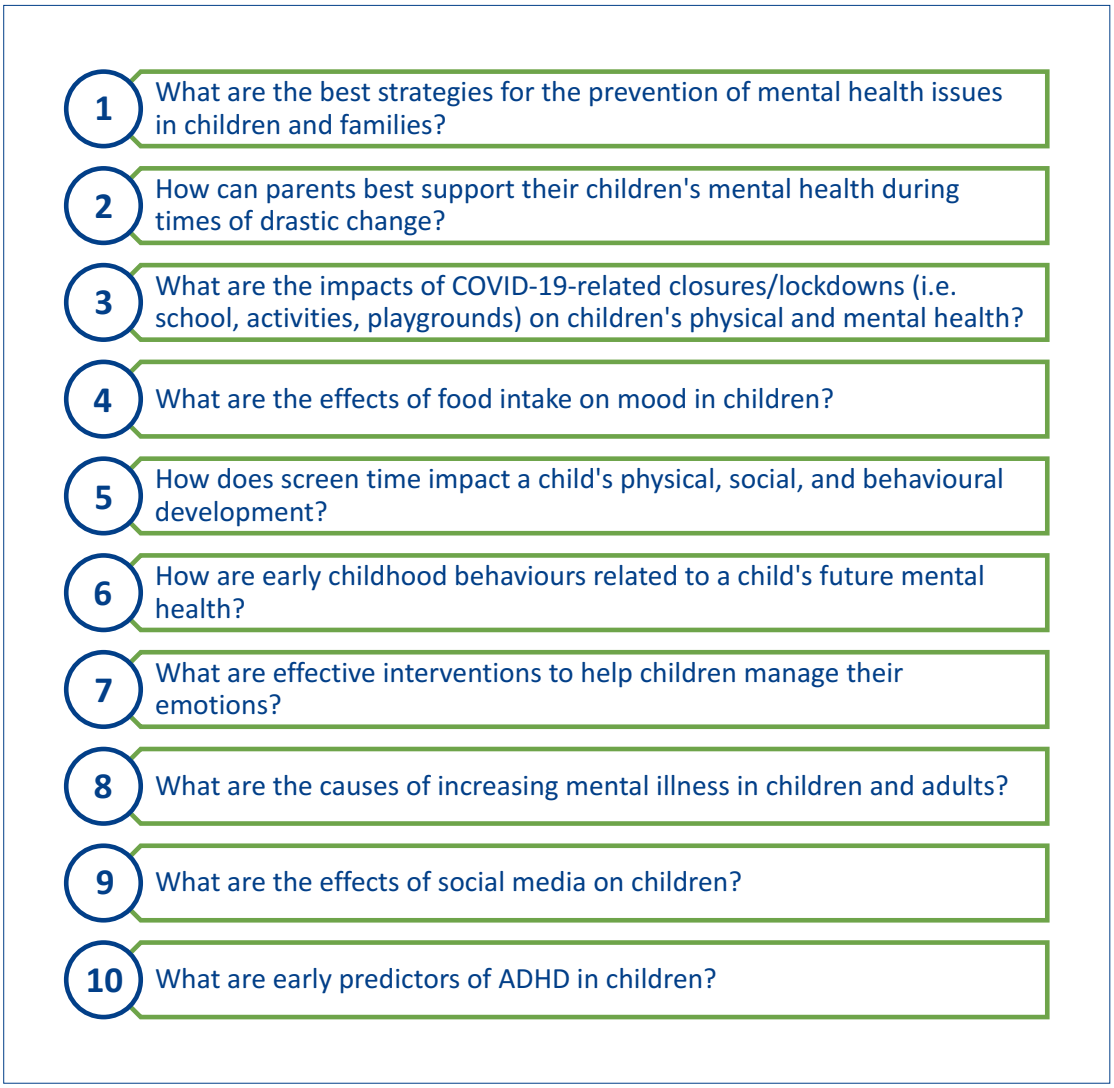
Table 2.1b. Demographic Characteristics of Healthcare Professionals (HCPs)

		Initial Survey (n=25)	Interim Survey (n=25)	Final Workshop (n=5)
Gender	Female	22	24	5
	Male	2	1	0
	Prefer not to say	1	0	0
Age (years)	<20	0	0	0
	20-29	3	1	0
	30-39	7	6	0
	40-49	2	4	0
	50-59	1	3	0
	60-69	2	3	1
	70+	0	0	0
	Prefer not to say	10	8	4
Ethnic of Cultural Identity*	White	17	18	2
	Indigenous	0	0	0
	South Asian	1	1	1
	Other	4	2	1
	Black	0	1	0
	Prefer not to say	1	2	1
	Chinese	2	1	0
	Filipino	0	0	0
	Arab	0	0	0
Highest Level of Education Achieved	University or college	16	15	2
	Graduate degree	1	3	1
	Professional	8	6	0
	degree	0	1	2
	Prefer not to say			
Household income per year	50,000-74,999	2	0	0
	75,000-99,999	4	2	0
	100,000-149,999	4	5	0
	More than 150,000	8	11	2
	Prefer not to say	7	7	3
Born in Canada	Yes	23	22	3
	No	2	2	1
	Prefer not to say	0	1	1
Number of children	0	10	5	0
	1	1	1	1
	2	8	11	2
	3	2	6	1
	4	1	0	0
	5 or more	0	0	0
	Prefer not to say	3	2	1

Figure 2.2. Word Cloud of Themes and Topics from Initial Survey Submissions (n=1265 submissions)

Text size corresponds to theme/topic frequency

Figure 2.3. The 'Top 10' Priority Questions for Child and Family Health Research



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Chapter 3

Qualitative Evidence Synthesis

This chapter will be submitted as an original manuscript to a peer-reviewed academic journal as: Eaton A, Ball GDC, Hwang Y, Carson V, Gokiert R, Dennett L, Rajani H, Zhang M, Dyson MP. The impacts of COVID-19 restrictions on physical activity in children and youth: a systematic review of qualitative evidence. 2022. *Pending Submission.*

3.1. ABSTRACT

Introduction. The COVID-19 pandemic impacted the lives of children and youth, including their physical activity (PA) settings and patterns. Qualitative research is well-suited to explore how the contextual factors, experiences, and complexities of COVID-19 restrictions impacted PA in children and youth. The objectives of this systematic review were to synthesize qualitative evidence on the impact of the COVID-19 restrictions on the quantities, experiences, or perceptions of PA for children and youth ≤18 years of age, and explore factors perceived to influence the impacts of COVID-19 restrictions on PA in children and youth.

Methods. Five databases (MEDLINE, Embase, SPORTDiscus, ERIC and CINAHL) were searched in June 2021 to locate qualitative research articles published since January 2020, with the search updated in December 2021. Articles considering any level of COVID-19-related restrictions, with or without comparators and in any setting, were eligible for inclusion. Eligible study outcomes included the quantity, types, experiences, or perceptions of PA in children and youth (≤18 years). Article eligibility, quality assessments, and data extraction were completed by two independent reviewers. Qualitative data were synthesized using meta-aggregation.

Results. After screening titles and abstracts of 3,505 records against eligibility criteria and reviewing 717 full text reports, 15 studies were included. Curriculum-based PA, organized sport, and active transportation (to and from school) were negatively impacted by COVID-19 restrictions. COVID-19 restrictions negatively impacted curriculum-based PA, organized sport and active transportation. Restrictions disrupted PA routines and reduced opportunities for energy expenditure, socialization, and training for sport performance, which resulted in negative impacts on mental health and social connections. Negative changes in PA were affected by perceptions of COVID-19 exposure risks; inadequate PA instruction; poor access to supportive PA spaces, equipment, and programming; increased screen time; and poor weather. Unstructured PA (*i.e.*, active play) was inconsistently impacted. Unstructured PA, particularly outdoors, was perceived to have increased for some children and youth. Positive changes in PA were facilitated by family co-participation, availability of outdoor space, and a perception of mental health benefits.

Conclusion. Qualitative data indicated that pandemic-related restrictions had a predominantly negative impact on curriculum-based PA, organized sport, and active transportation for children and youth, with inconsistent impacts on unstructured PA.

3.2. INTRODUCTION

In March 2020, COVID-19 was declared a pandemic by the World Health Organization. (1) This announcement led to an unprecedented world-wide health response with nearly 200 countries imposing varying degrees of restrictions on their citizens to control the spread of SARS-CoV-2. (2) Despite limiting the spread of the virus, COVID-19-related restrictions had dramatic personal and social consequences across the globe. (3-5) In 2020, UNICEF reported that 99% of children and youth experienced some degree of COVID-related restrictions and 60% of children and youth experienced partial or complete lockdowns. (2,6) Restrictions impacted numerous settings including schools, playgrounds, recreation centers, and organized sports, disrupting the lives and physical activity (PA) patterns for more than two billion children and youth. (7)

With the evolving nature of the COVID-19 pandemic and the link between PA and short- and long-term health outcomes, there is value in synthesizing evidence on how restrictions impacted PA for children and youth, and exploring the factors which may influence the extent of these impacts. Quantitative evidence suggests that one of the consequences of COVID-19 restrictions was a dramatic reduction in PA for children and youth from pre-pandemic levels. (8-11) Qualitative research can provide a rich understanding of contextual factors, experiences, and complexities (12) related to COVID-19 restrictions and PA for children and youth, complementing information from quantitative reports. In fact, a recent scoping review of quantitative evidence (11) noted that an improved understanding of the experience of COVID-19 lockdowns and restrictions for children and youth would supplement existing quantitative data.

A comprehensive framework, such as the socio-ecological model (SEM) (13), is valuable when considering the factors which may influence PA. The SEM developed by Brofenbrenner (14) applied by McLeroy (13), considers factors at the individual, interpersonal, organizational, community, and policy levels. Considering PA within this type of framework allows for an improved understanding of the complex inter-relationships between factors that shape PA engagement.

There is value in understanding the meaning of individual experiences within greater contexts while allowing findings to emerge from the lived experiences of participants. (15) In addition to recent reviews highlighting the need for qualitative research on this topic (11,16), the impact of COVID-19

restrictions on the physical health of children and youth was identified recently as a top research priority by community-based caregivers and clinicians (17), highlighting the relevance and responsiveness of this review. Accordingly, the objectives of this systematic review were to (i) synthesize qualitative evidence on the impact of the COVID-19 restrictions on the quantities, experiences, or perceptions of PA for children and youth ≤18 years of age, and (ii) explore the factors perceived to influence the impacts of COVID-19 restrictions on PA in children and youth.

3.3. METHODS

This review followed JBI (formerly Joanna Briggs Institute) recommendations for qualitative evidence syntheses using meta-aggregation. (18) Meta-aggregation is an integrative approach that follows a systematic review process, focusing on the combination of findings from across individual studies rather than re-conceptualizing or re-interpreting findings, to produce synthesized finding statements. (18,19) Synthesized findings reflect the original meaning of individual study data, presenting them as statements that can inform decision-makers and practitioners. (18)

The protocol for this qualitative systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO; CRD No. 42021270385) and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). (20) It was determined a priori that this review would be a rapid review of both quantitative and qualitative evidence, synthesized separately, following Cochrane rapid review guidelines. (21) However, given the methodological rigour applied, the protocol was modified to satisfy additional criteria (*i.e.,* dual independent screening and quality assessment) to satisfy systematic review criteria. Of note, grey literature was excluded from supplemental searching. It was determined a priori that qualitative and quantitative studies would be separated and synthesize independently if there was an ample body of evidence to warrant separation of the quantitative and qualitative reviews. It was initially anticipated that the quantitative review would be completed first. However, after registering the initial protocol, a scoping review was published, with a significant overlap with the proposed quantitative review. The scoping review identified a significant gap and need for qualitative evidence on this topic. With this development, only the qualitative review was completed.

Search Strategy

The search strategy was developed by a health services librarian (LD), in collaboration with the research team, and peer reviewed using the PRESS checklist (22) by a second librarian. The search strategy included extensive subject headings and keywords for the following 3 concepts: (i) PA/exercise, (ii) children/youth, and (iii) COVID-19, and was optimized for each database. The complete search strategy can be found in Appendix B, Supplementary File 1. The initial search was conducted on June 25, 2021 across five electronic databases (MEDLINE, EMBASE, CINAHL, ERIC, SPORTDiscus). Covidence systematic review management software (23) was used to import and manage relevant references. An updated search was conducted on December 15, 2021. Reference lists of relevant published systematic and scoping reviews were reviewed, as well as the reference lists of included studies. The search was limited to articles published from January 2020 to present with COVID-19 restrictions taking effect in March 2020.

Eligibility Criteria

Studies were eligible if they were full-text articles published in a peer-reviewed journal as original qualitative, mixed methods, or multi-methods research. Children and youth ≤18 years were not required to be study participants, but needed to be the focus of data collection. Studies were assessed for eligibility using criteria found in Table 3.1.

Article Selection

Screening forms were piloted on a sample of 50 studies prior to implementation. Two reviewers (AE, YH) completed independent title and abstract screening. Studies assessed by either reviewer as relevant advanced to full text screening. Full text screening was completed by one reviewer (AE) and verified by a second (YH), with exclusion reasons recorded. Discrepancies were resolved by a third reviewer (MPD) when necessary.

Quality Assessment

The JBI checklist for qualitative appraisal (18) was used to assess the methodological quality and potential for bias for all included studies. This JBI tool is comprised of 10 questions to assess the congruency between methodology and philosophical perspective, research objectives, methods, analysis, and interpretation of data. Additionally, it assesses if participants and their voices were adequately

represented, ethical adherence, and the extent to which a researcher considered their influence on the research. Two independent reviewers (AE, YH) assessed study quality, selecting a 'yes', 'no', 'unclear', or 'not applicable' for each question. 'Yes' responses were then tabulated to produce a quality assessment score for each included study. After independent assessment, the two reviewers then discussed any discrepancies to reach consensus. Final synthesized findings were rated for confidence according to the ConQual approach (24) with findings presented as a summary of findings in Table 3.2. The ConQual approach (24) is used to assess confidence, based on the dependability and credibility, of individual study findings and synthesized findings produced through meta-aggregation. This tool considers 5 questions from the JBI checklist for qualitative appraisal (18) to rate dependability. Credibility is assessed through the level of plausibility ratings produced during the data extraction phase (described below) for individual study findings. All studies begin with a score of 'high' and can be downgraded based on dependability and credibility assessments. Synthesized findings were also rated based on the aggregated level of dependability and credibility from across all studies and findings included in synthesized findings and were downgraded accordingly.

Data Extraction and Synthesis

The data extraction form was piloted with five articles; a data extraction codebook was created to establish consistent descriptors, definitions, and decision rules. Data were extracted independently by a single reviewer (AE) into the standardized data extraction form, and verified by a second reviewer (YH). Study findings were assigned a level of plausibility ('unequivocal', 'credible', or 'unsupported') based on the congruency between presented findings and accompanying illustrative or supporting quotes. (18) Unsupported findings (those without supporting data and illustrative quotes) were not included in data synthesis but were not removed from the review altogether. Levels of plausibility were included in the ConQual assessment for confidence in individual study findings.

The steps of synthesis included (i) extracting findings (themes, findings, or other analytic data) from each study, along with illustrative quotes; (ii) developing descriptive categories for findings, with at least two individual study findings in each category; and (iii) developing synthesized findings using at least two descriptive categories. Decisions regarding data synthesis were made by consensus between two reviewers (AE, YH) with support from other team members (GDCB, MPD), as needed.

Analytical Framework

Findings related to objective 2, factors which may influence the impacts of COVID-19 restrictions on PA for children and youth, were organized according to the levels of the SEM (13), including influences at individual, interpersonal, organizational, community, and/or policy levels. Factors which did not fit into the SEM were included, along with a narrative analysis. The SEM recognizes the complexities of and dynamic relationships between individuals and their surroundings. (25)

3.4. RESULTS

Based on initial and updated searches, once articles were screened for inclusion, 15 studies were eligible for inclusion in this review. (26-40) See Figure 3.1 for the PRISMA flow diagram and additional details.

Study Characteristics

Methodological characteristics from the 15 included studies are presented in Table 3.3 and extracted study characteristics and conclusions are described in Table 3.4. Across all studies, data collection was completed between April 2020 and January 2021, with one study not reporting dates of data collection. (32) Semi-structured individual interviews were the main method of data collection, used in 13 studies. (26-31,33-39) One study completed individual interviews, but did not specify the level of structure (40) and one collected data using both semi-structured focus groups (for youth) and individual semi-structured interviews (for adults). (32)

Articles explored the impacts of COVID-19 restrictions on a variety of domains, including movement behaviours (28), sedentary behaviours (35,40), sleep behaviours (27,31,36), child independent mobility (30), nutrition and eating habits (27,31,34,36,38), play behaviours (39), mental health (26,29,40), social connections (26,39), stress (27,29), social media use (29), screen time (31,34), and health related quality of life. (34) Additionally, some studies considered experiences of promoting child PA (37), barriers to PA (39), or youth sport and returning to the same. (32,37) Others explored the impacts of restrictions on children or youth more broadly, including psychological (33) or behavioural (27,33,34) effects.

Thematic analysis was most often used to analyse data. (28-30,32,36-38) Two studies coded and analysed following a grounded theory approach (26,34) and others followed content analysis (39), rapid qualitative analysis (31), and an interpretive phenomenological approach. (33) Two studies did not describe their analytical strategies. (27,40)

Quality Assessments

Quality assessments were summarized (see Appendix B, Supplemental File 2) with studies ranging from moderate to high quality, with scores of 7 to 10 (out of 10). (18) A quality assessment example using the JBI checklist (18) is provided in Appendix B, Supplemental File 3. All studies used appropriate methods to address their objectives and research questions and there was congruency among data collection, analysis, and research methodology. There were no statements locating the researcher culturally or theoretically in 7 of the 15 articles (27,29,31,34,36,39,40); these studies also did not address any potential influence of the researchers in conducting interviews, collecting data, performing analysis, or in other aspects of the research process. Dependability scores were downgraded for studies with these omissions. Only 4 articles (26,32,33,35) stated their philosophical or theoretical perspective. Most studies demonstrated adequate representation of participants and their voices through clear and robust illustrative quotes.

The included studies provided moderate confidence regarding the objectives of this review, as shown in Table 3.2, the ConQual (24) summary of findings table. See Appendix B, Supplemental File 2 for level of plausibility ratings assigned to individual studies. Most study findings were assigned unequivocal or credible levels of plausibility, with the exception of two studies, presenting equivocal (27) and unsupported (39) findings on PA. One study (39) failed to include any supporting illustrative quotations for their findings on PA and was excluded from meta-aggregation for this reason. ConQual confidence ratings for synthesized findings were downgraded accordingly, following the aggregated dependability and credibility ratings of the included studies.

3.5. SYNTHESIS OF RESULTS

Through the evidence synthesis, 14 categories and 4 synthesized findings emerged. Synthesized finding 1, 2, and 3 address objective 1 considering the impacts of COVID-19 restrictions on the PA of

children and youth; synthesized finding 4 addresses the objective 2 exploring the factors which were perceived to influence the impacts of restrictions on PA for children and youth. Figure 3.2 presents a summary of synthesized findings with supporting categories; Appendix B, Supplemental File 4 presents a sample of the complete synthesis mapping with a synthesized finding along with supporting categories and all supporting individual study findings and quotes.

Synthesized Finding 1. The loss of organized sport opportunities led to decreased PA

The finding reflects that, for children and youth, losing PA through organized sport (and other structured PA) disrupted meaningful routines. (26,28-31,33,35,37) It reduced opportunities for energy expenditure, training for sport performance, and socialization; and resulted in negative impacts on mental health and social connection. (26,31,32,37) Attempts to increase PA opportunities and replace organized sport were not always successful. (28,29,37) This synthesized finding was made up by 3 categories, which are described below.

Category 1. The cessation of organized sport impacted lifestyles and routines

The loss of organized sport removed important opportunities for PA for children and youth (26,28-31,33,35,37): “Kids these days are very programmed… every weekend was skating, gymnastics, dance or swim lessons and everything was pulled” (parent). (28, p6) Eliminating organized sport affected important aspects of daily routines for children and youth that were associated with these activities: “My life involves being in camogie [a team sport played by women in Ireland] and football teams, so I was doing a lot and being part of that but now I’m not doing anything really” (youth). (29, p13) There were limited opportunities to expend energy that would typically be spent during organized sport and PA. (26,31,37)

Category 2. Social connection and mental health were negatively affected by the loss of organized sport

Changes in mental health were described following the loss of organized sport. (26,32) Without organized sport, some children and youth struggled to maintain their mental and emotional wellness, as one parent described:

> Basically, every day he was doing something footy related, and it was just all gone overnight. It was just, you can't do this, you've got to stop. So, he was managing it okay, and then his mental health started to be affected, became like – I don't know, I'm not saying aggressive as in physically aggressive, but just the way that he would talk and would just be annoyed at everything, and couldn't really explain why he was so upset; he became really demotivated for a kid who was very motivated. It just became really hard for him and his mood and mental health went downhill so quickly (parent). (32, p7)

Some perceived that the loss of PA from organized sport "decreased opportunities for social connection and led them to feel disconnected and lonely". (26, p7) Beyond a mode of PA, organized sport was viewed as a social outing; it was valued because it helped to develop social relationships and social well-being (26,30,32): "I don't think many people realise just how important sport was, it's not just kicking goals or throwing goals or, taking marks or placing tackles or dribbling up the court, it doesn't matter. That's simply the vehicle for the wellbeing of communities and that social fabric" (parent). (32, p11)

Category 3. Attempts made to maintain PA through sport at home achieved mixed success

Virtual platforms improved accessibility to PA for some (29,37): "I've never done Zumba before because there's not one around here but I can do it virtually now" (youth). (29, p681) Some programming for organized sport and structured PA continued during restrictions through virtual training, digital apps, or modified sport settings. (28,29,37) Access to virtual programming encouraged some children and youth to maintain participation in structured PA (26,29,37): "Thursdays are always the running days and Saturdays are always the workout days" (youth). (26, p8) Other attempts at continuing sport participation at home independently and through virtual delivery were largely unsuccessful (28,37), as one parent shared: "She found virtual instruction really discouraging. In fact, how they had done it… she got really frustrated". (37, p6)

Synthesized Finding 2. Restrictions created both challenges and opportunities for PA through unstructured PA

This finding reflects the variable impacts of pandemic restrictions on unstructured PA. Unstructured outdoor PA was perceived to have increased for some individuals (26,29-31,40), with many children and youth engaging in new leisure activities with family members instead of peers. (29,30,35,37)

Unstructured PA was perceived to facilitate social connection, reduce boredom, support mental health, and provide valuable opportunities for PA. (26,29,40) Conversely, opportunities for unstructured PA, particularly outdoors, were limited by restrictions for other children and youth. (28,32,35,37) This synthesized finding was composed from 4 categories, which are described below.

Category 4. Increased opportunities for unstructured and outdoor PA

Many individuals perceived increased opportunities for unstructured PA in place of organized sport and curriculum-based PA. (29-31) Children and youth were often encouraged to participate in PA, particularly through unstructured outdoor activities. (30,31) Positive changes in both unstructured and outdoor PA were experienced by children and youth: “I might even be going outside more now, because I have more time to do that since I don't have to be at school all day” (youth). (31, p373) There was a perceived surplus of time that enabled unstructured PA: “I feel I have more time to go out for walks more often and for longer periods” (youth). (29, p682) Unstructured PA often filled time that would have been occupied by other activities (*e.g.,* school, sport) prior to restrictions. (29,31) It was common for children and youth to try new activities (29) or find alternatives to their typical PA: “I got a lot more into mountain biking and I met with a smaller friend group that I got a bit closer to than I would’ve if the pandemic didn’t start” (youth) (30, p6) Unstructured PA was viewed as adaptable and participants reported adjusting their (or their children’s) unstructured activities to manage their perceived risk of COVID-19. (30,37)

Category 5. Unstructured PA helped children and youth cope with the negative impacts of restrictions

Unstructured PA was reported as a coping mechanism and stress reliever. (26,29) Children and youth socialized and experienced positive mental benefits from PA (29,30): “The kids play a bit further apart, but we made a street bubble. The kids needed it for their mental health” (parent). (30, p8) Unstructured PA was a distraction, occupying time and reducing boredom : “I think I’m actually doing more because I’m going on walks during the day because I’m getting bored, and then I’m going on walks in the evening and then I’m outside playing with my dog” (youth). (29, p680)

Category 6. Unstructured PA occurred more frequently with family members

Due to restrictions, unstructured PA included family members in place of peers (29,30,32,35,37): "They're still playing, so that's good, it's just with the sibling group rather than friends" (parent). (30, p8) For some, participating in PA with their parents was new: "I would have went out for walks or went running with my dad... that would have been quite new doing it together" (youth). (29, p681) This was often experienced as a positive change (30,32), facilitating more family time: "My wife thinks the Coronavirus is the best thing that's ever happened because the family is spending more time together" (parent). (32, p9)

Category 7. Limited opportunities and options for unstructured PA

Although unstructured PA increased for some children and youth, others experienced limitations (37): "At one point in city where I am, they actually closed hiking trails. They came and they put big boulder things like big cement blocks. That was probably the most upsetting thing because I was like... this is the last thing that we can do outside" (youth). (37, p5) Some had fewer opportunities for unstructured PA, with this type of PA being perceived as just one of the many forms of PA children and youth were unable to participate in through COVID-19 restrictions. (31,37) Participation in unstructured outdoor PA was particularly difficult for some (28,37): "They have never been an outdoorsy person so that makes it difficult . . . she's a little bit frightened obviously because there's, we're on a very busy street and she'll see people walking by so she's nervous" (parent). (28, p7) Some individuals perceived the risk of COVID-19 was too great to participate in unstructured PA , even outdoors. (28,37)

Synthesized Finding 3. School closures reduced opportunities for PA

This finding reflects that for most children and youth, PA was perceived to decline with school closures. (26,28,29,31,35,36) A reduction in curriculum-based PA and no active transport to and from school contributed to decreased PA. This synthesized finding was made up by 3 categories, which are described below.

Category 8. Opportunities were limited for structured curriculum-based PA

A lack of curriculum-based PA was perceived to contribute to decreased PA. (26,28,31,32,35-38) Parents of school-aged children worried about PA levels and attributed some of this change directly to school closures: “My main concern is the lack of physical activity now, because there's no running around at school and stuff” (parent). (31, p374) Most parents perceived their child’s overall PA to have declined; some reported minor changes while others felt it was substantial: “It [PA] just totally, totally declined and there’s nothing, it’s just extremely difficult to replace that” (parent). (28, p6) Two studies considered preschool children specifically; one found parents perceived their pre-school children’s PA to be negatively impacted by restrictions (36) while the other found that when childcare centers were reopened, outdoor time and school-based PA was perceived to increase beyond pre-pandemic levels: “We actually have found that COVID has increased our PA exposure because we have had to get outside more. We are trying to keep the children spaced further apart, which means we are doing a lot more activities that involve physical motion” (educator). (38, p940)

Category 9. Virtual physical education programming altered PA engagement

School closures meant transitioning to virtual physical education classes, which were often perceived to lack structured PA, formal instruction, and experiential learning (26,28,31): “I found it was pointless because we don't really do any physical… we just list down stuff that we did" (youth). (26, p7) Physical education assignments and virtual classes encouraged PA during restrictions. (28,35,37) For example: “Gym through the Google Meets twice a week through a 7-day cycle...they required 20–30 min of activity” (youth). (28, p6) Regardless of the alternatives, opportunities for PA through curriculum-based programming were mainly considered inadequate. (26,28,31,35)

Category 10. Opportunities were lost for PA through active transport

Children and youth were unable to engage in PA through active transport (29,30,36): “I’m not walking to school and back so that affects that physical activity and we are at home, so we don’t really get that much just walking upstairs and downstairs” (youth). (29, p681) This type of PA was integrated into

daily routines prior to restrictions; in general, the loss of PA through active transport was attributed to school closures. (29,30,36)

Synthesized Finding 4: PA was facilitated or hindered by factors across multiple levels of the socioecological model

This finding reflects factors at the individual-, interpersonal-, organizational, community-, environmental- and policy-levels were perceived to either facilitate or impede PA for children and youth. This synthesized finding was created from 4 categories, described below.

Category 11. Individual motivation, self-determination, creativity, attitudes, and beliefs influenced PA

PA was facilitated by factors at the individual level. Some children and youth were intrinsically self-motivated to maintain PA participation. One youth noted their PA levels and stated: "I said to myself… maintain that goal" (26, p8) Extrinsic motivation prompted others to maintain their skills and fitness levels during the pandemic. One youth stated: "I don't want to go back and not be able to swim, the things that I used to be able to do, so I kind of want to keep my PA up". (29, p682) Self-determination and finding enjoyment in PA were reported by those who continued to participate in PA during periods of restrictions. (35) Creativity fostered participation in PA, with some children and youth crafting equipment and activities to allow for PA (26) and others using PA to avoid boredom. (29) Some children and youth viewed PA as a positive influence on their mental health (29,35): "It makes you feel better when you have done exercise" (youth) (29, p681); these types of attitudes and beliefs fostered PA.

Individual-level factors were detrimental to PA participation for some children and youth. A lack of extrinsic motivation was perceived to hinder PA for children and youth (28,29,32): "I think my motivation dropped because you would come home from school, and you'd hear all these rumours of 'yeah footy is not coming back at all'. I heard that a lot, so I'd just lose a lot of motivation" (youth). (32, p7) Children and youth described an emotional struggle to maintain PA without incentives involved in sport and peer participation. (28,32)

Fear and anxiety related to the virus hindered PA, specifically unstructured PA. (30,34,35) Perceived COVID-19 risk, concern about judgement from others, physical distancing, and the behaviours of others (*i.e.,* if others respect public health rules) also reduced PA participation. (30)

Category 12. Social support and co-participation influenced engagement in PA

At the interpersonal level, social support was perceived to be valuable for PA engagement. (26,29-37) Parents noted the benefits of being outside and staying active for children and youth (40); parental support and encouragement facilitated PA. (26,29-31,34) Further, the family environment and participating in PA with parents and/or siblings was perceived to enhance PA during periods of restrictions (26,28-31): “Most physical activity was with my family, I went out for walks or went running with my dad” (youth). (29, p681) Additionally, cohorting with peers or neighbors provided additional social support and was enabled PA participation. (29,30,35,37)

With the closure of schools and shutdown of organized sports, connecting with peers through virtual platforms was perceived to provide a source of support and improve opportunities for PA: "If we're both doing it, then I'll be more likely to actually follow through with it" (youth). (26, p8) Support from friends, teachers, and coaches through virtual platforms encouraged PA engagement. (37) The social discourse and increased attention on PA during restrictions also prompted engagement: “You sort of see a whole bunch of people on social media saying this is a good time to do physical activity so you’re like yeah, so if they’re doing it, I’m doing it” (youth). (29, p681)

Conversely, a lack of social support limited PA participation. Children and youth were less inclined to be active without social support from family and friends. (26,28,31,35) Without peer interaction, they felt it was more difficult to engage in PA (26,29,34,35): “It’s more challenging without them, because they would push you on and be like, you can do it" (youth). (29, p682) Some children and youth did not want to engage in PA without their family or friends (28,31): “If I'm not involved with them, they don't really do anything” (youth) (31, p374) For student-athletes, participation in training and sport declined without their usual access to teammates and coaches. (26)

Category 13. PA was affected by access to resources, equipment, programming, and space

Factors at the organizational and community levels were described as facilitators to PA, along with other factors in the physical environment. The availability of PA-enabling resources improved opportunities for PA during restrictions. (26,36-38) Having equipment around the home to facilitate PA was beneficial (26,36) and access to both indoor and outdoor spaces were perceived as positive influences on PA. (26,27,38) Specifically, having a yard or access to local greenspace provided additional opportunities for PA (27,36,37) and the proximity of these spaces was influential. (35) One child shared: “We are so lucky that I have a big yard, so we have the trampoline in the back. A yard to play in the front, all that kind of stuff, so it definitely helped having an outdoor space”. (37, p7)

Organizational and community-level factors also created limitations for PA, including a lack to equipment, facilities, and structured PA programming reduced participation in PA. (26,28,33,36-38,40) One child shared: “I can’t go on the slide, and they took off the swing, the monkey bars and the rings”. (37, p10) Reduced access to greenspaces and outdoor public spaces negatively impacted PA (28,30,35,37,38), as highlighted by one parent: “The pool…playground as well… all those are restricted”. (28, p7) The built environment around homes also impacted engagement with a lack of both indoor and outdoor space hindering PA. (27,29,35-37) One youth stated: **"**The space of my house is small and has to be shared with my siblings, so we are restricted to do PA at home" (27, p3), and a parent expressed the same perception: “They couldn't leave and there was nothing really they could do. And living in a block of flats, you can't be too noisy because you've got neighbours everywhere”. (36, p4)

Resources and finances were described as barriers to PA participation. (29,37) Limited internet access hindered participation in activities that were offered virtually: “I used to do dancing online, but the internet was always freezing” (youth). (37, p10) Some parents experienced a lack of capacity to support PA for their children and youth due to their work, other commitments, and limited finances (28,37). One parent said: “I looked into, they can swim, which is allowed if it’s a private lesson, but it’s one on one, but it was prohibitively expensive. So, I wanted them do it, but I can’t afford it”. (37, p5)

Category 14. Weather conditions affected outdoor PA

As a part of the physical environment, weather was commonly described as a facilitator to PA. Favorable weather was perceived to help children and youth get outdoors and be more physically active (26,28,36,37,40): “As the weather got better and we could be outside doing more, I think some of the negative impacts were alleviated just because he didn’t feel so confined” (parent). (40, p7)

Conversely, poor weather was a common factor that reduced PA for children and youth (26,28,36-38). Even if attempts at PA were made, unfavorable weather conditions deterred outdoor activities (26,28,36-38). It was common for participants to report: “It was windy or cold and nowhere to go” (parent) (28, p7) and “Now that it’s getting a bit colder, I don’t feel like she’s getting nearly enough activity” (parent). (37, p5)

COVID-19 restrictions had negative impacts on PA for children and youth and the policy-level decisions were influential across all study findings. (26-40) There were reported increases in PA reported after restrictions were eased. (26,38) Some studies collected data across multiple ‘levels’ of restrictions (*i.e.,* during lockdown and also as restrictions were eased). (37) However, no studies differentiated their results between the levels of restrictions in place at the time of data collection. Without this, it was not possible to meaningfully synthesize the more nuanced influences at the policy-level.

3.6. DISCUSSION

This systematic review was the first to synthesize qualitative evidence on the impacts of COVID-19 restrictions on PA for children and youth. Synthesized findings revealed that the pandemic had a negative influence across all types of PA; studies described negative impacts on opportunities for PA at school, through organized sport, and through active transport, despite efforts to maintain PA. Unstructured PA opportunities increased for many children and youth; however, restrictions created limitations for this type of PA. Findings are consistent with quantitative reviews, which have documented decreased PA for children and youth due to pandemic-related restrictions. (8,11,41)

Restrictions led to the shutdown of in-person sporting activities, removing opportunities to engage in PA through organized sports, which were typically done in team or social settings (with peers, coaches, or others). Two quantitative reviews have previously also reported decreased sport-related PA. (11,41)

Synthesized finding 2 provides valuable context for decreased PA through organized sport, highlighting the meaningful routines, mental health benefits, social connections, and social value conferred by PA through participation in organized sport.

There have been mixed findings on the impacts of pandemic restrictions on PA through unstructured PA, with outdoor play sometimes reported as a standalone domain. (11,41,42) A review by Rossi *et al.* (41) found that PA through "non-organized free play and outdoor sports" increased during restrictions while Paterson *et al.* (11) examined "unstructured PA", with reports of both no change and increased levels. The Paterson *et al.* review (11) also included 4 studies that focused specifically on "outdoor time and PA", reporting decreases consistently across studies. Kourti *et al.* (42) found outdoor play decreased while indoor play increased. This variability is consistent with the findings of this review; although overall opportunities for PA were perceived to have decreased, impacts on unstructured PA were not universal or consistent. The perceptions and experiences highlighted in this review show that opportunities for unstructured PA specifically outdoors, increased for some children and youth and decreased for others. These differential impacts suggest that unstructured PA was the PA domain most susceptible to influence from factors across the SEM (*e.g.,* motivation, enjoyment of PA, social support, access to greenspace, weather conditions).

Reviews have highlighted numerous facilitators and barriers to PA for children and youth prior to (43,44) and during the COVID-19 pandemic. (8,11,41) Gender has been reported as a determinant of PA independently of (43,44) and during the COVID-19 pandemic restrictions. (41) However, Paterson *et al.* (11) found inconsistent reports on the influence of gender on changes to PA through restrictions. The studies included in this qualitative review lacked specificity and consideration for gender differences. Two studies considered or commented on gender: one study noted males were more willing to participate in PA if peers were involved and females were more aware of risks related to the virus (35) while a second study included only females. (29) The remaining studies did not explore or comment on PA differences related to gender.

Differences in perceptions and experiences of PA across age groups were not appraised within the synthesis in this review because of either limited evidence across all pediatric ages or inconsistency in how age was reported across studies. Quantitative reviews showed that age influenced PA during

COVID-19 restrictions (41) and that older children or youth experienced greater decreases in PA. (11) Although the inclusion criterion for this review included all children and youth, pre-school children (<6 years old) were included in only two studies. (36,38) Lafave *et al.* (38) interviewed educators on pre-school children's PA in early childcare settings in Canada and reported an increase in both PA engagement and time spent outdoors, which was not consistently reported for school-aged children and youth. However, Clarke *et al.* (36) considered the perspectives of parents on their pre-school children's PA and reported decreased engagement in PA under restrictions, with limited structured PA and no active transport, which aligned more closely with findings for school-aged children and youth.

In an overview of reviews, Biddle *et al.* (44) reported that barriers (perceived and real) hindered PA in youth, specifically a perceived lack of time, lack of interest, lack of motivation, other activities (*e.g.,* homework), and the perceived amount of effort required. (44) An important psychological barrier that emerged from this review of qualitative studies included feelings of fear and anxiety regarding the COVID-19 virus. Participants described avoiding or altering PA to minimize risks of exposure to the virus and to avoid judgment from others. Feelings of fear and anxiety were reported by children, youth, and parents alike, so it was not unique to any group. As restrictions ease over time, it will be important for researchers to evaluate how feelings of fear or anxiety influence PA and if these feelings are more salient in some groups versus others.

These synthesized findings provide context for the positive link between parental support and co-participation in PA with children and youth. (11,41,43,45) Most reports of parental encouragement promoted PA occurring outdoors and co-participation was often through unstructured outdoor PA (*e.g.,* bicycle riding). (28-31,35,37) Parental support was a facilitator for PA for children and youth, and interestingly, PA was also reported to have improved family dynamics and experiences. (29,30,32) Some families engaged in new or different PA together (29) and some reconnected through restrictions with an increase in available time to spend together. (32)

The interruption of PA routines, particularly through the cancellation of organized sport, was perceived to disrupt social connection for children and youth. Evidence suggests this should have been expected with the cancellation of organized sport and reduced PA (43,45) as there is consensus on sport participation being beneficial for children and youth and, specifically, being associated positively with

improved social health. (46) Social connection is enhanced through sport with the positive involvement of coaches, peers, and teammates. (46) The findings of this review align with this existing evidence, describing negative impacts to social well-being with restrictions on organized sport participation. Several studies described the importance of peer support and social connection as facilitators of PA, suggesting the relationship between PA and social connection is reciprocal.

Multiple studies in this review included specific child or youth populations, including those with obesity (31,33,34), student-athletes (26,32), or pre-school children (36,38); however, these studies did not generate unique categories or synthesized findings. Previous reports (47,48) found that those who were more active prior to restrictions (*i.e.,* athletes) experienced greater decreases in their PA during pandemic restrictions. Student athletes were the focus of two studies in this review and this data suggested that their sport-related PA was negatively impacted by restrictions. (26,32)

The findings of this review should be considered alongside its limitations. First, nearly half of included studies (n = 7/15) (26,28,30,31,37,38,40) were set in North America (NA). Although studies from eight countries outside of NA were also included, improving the transferability of findings from this review, it may remain limited by dominant NA representation. Second, the lack of studies on PA for pre-school children limited the transferability of findings to this population. Third, limitations may come from people's understanding of what constitutes PA. Authors of the included studies rarely described how PA was defined to their participants. With this, it is possible that some PA has been excluded (*e.g.,* active transport or unstructured PA) or overestimated. A description of what was considered or explained as PA to participants in each individual study would be beneficial to ensure that the experiences described are based on a common understanding of PA. Lastly, studies on COVID-19 have been published at a rapid rate, therefore additional evidence has likely been published since the date of the most recent search.

In conclusion, this qualitative synthesis provides a rich understanding of the impacts of pandemic-related restrictions on PA of children and youth, the types of PA that were affected, and the factors that were perceived to have influenced these impacts. These impacts were not experienced evenly or consistently across the types of PA. There were consistent reports of PA declining due to the loss of organized sport and school closures, whereas the impacts on unstructured PA were inconsistent. Child and youth engagement in PA during restrictions was perceived to be influenced by individual motivation,

attitudes, and beliefs; social support and co-participation; access to space, programming, or equipment; and weather conditions. With PA directly impacting the current and future health status of children and youth, the improved contextual understanding of the impacts of pandemic restrictions on PA levels, experiences, and perceptions will be foundational knowledge for the care of children and youth moving forward.

Table 3.1. Eligibility criteria for studies included in qualitative evidence synthesis

Category	Criteria
Population of Interest	Children and youth (≤18 years) OR population subset presented for children and/or youth (≤18 years) OR population average <18 years if population includes both children and adults
Phenomena of Interest	Any COVID-19 related restrictions implemented to reduce population movement or activities in order to reduce the spread of the virus May include: full lockdowns (e.g., all movement and activities are prohibited other than essential services that are required to meet basic human or economic needs, and includes stay-at-home orders and mandated closures including schools, playgrounds, and parks), partial lockdowns (e.g., targeted measures to reduce virus transmission in high-risk settings such as sports facilities, restaurants, or fitness centers, curfews, travel restrictions), quarantine requirements, and other restrictions implemented to reduce virus transmission
Comparator	Any comparator including pre-COVID-19-related restrictions, across timepoints during COVID-19 restrictions, normative data; or no comparator
Outcome	Quantity, experiences, or perceptions of PA reported through subjective or objective measures including self-report, parental-report, or device-based measurements, including individual interviews and focus groups Type of physical activity including: physical education class, leisure/recreational/play activity, active transport, or organized sport
Language of Publication	English OR any language in which the study can be intelligibly translated using Google translate online tool
Publication Date	January 2020 onwards
Study Design	Qualitative or mixed-methods research studies

Table 3.2. ConQual (24) summary of findings table

Systematic Review Title: The impacts of COVID-19 restrictions on physical activity in children and youth: a systematic review of qualitative evidence

Population: Children and youth ≤ 18 years

Phenomena of Interest: Experiences, perceptions, and levels of physical activity

Context: Any level of COVID-19 pandemic restrictions

Synthesized Finding	Type of Research	Dependability	Credibility	ConQual Score	Comments on rating
The loss of organized sport opportunities led to decreased PA	Qualitative (high)	Downgraded one (-1)	High (no change)	Moderate	2 of 9 studies scored 2-3 out of 5 for the questions on dependability, rating was downgraded by one; all included findings were unequivocal
Restrictions created both challenges and opportunities for PA through unstructured PA	Qualitative (high)	Downgraded one (-1)	High (no change)	Moderate	7 of 9 studies scored 2-3 out of 5 for the questions on dependability, rating was downgraded by one. The remaining 2 studies scored 5 out of 5; all included findings were unequivocal
School closures reduced opportunities for PA	Qualitative (high)	Downgraded one (-1)	Downgraded one (-1)	Low	Two studies scored 2-3 out of 5 for dependability, rating was downgraded by one. The remaining 3 studies scored 5 out of 5; findings included mix of unequivocal and credible findings
PA was facilitated or hindered by factors across multiple levels of the socioecological model	Qualitative (high)	Downgraded one (-1)	High (no change)	Moderate	5 of 13 studies scored 2-3 out of 5 for the questions on dependability, rating was downgraded by one; all included findings were unequivocal

Figure 3.1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) (20) flow diagram

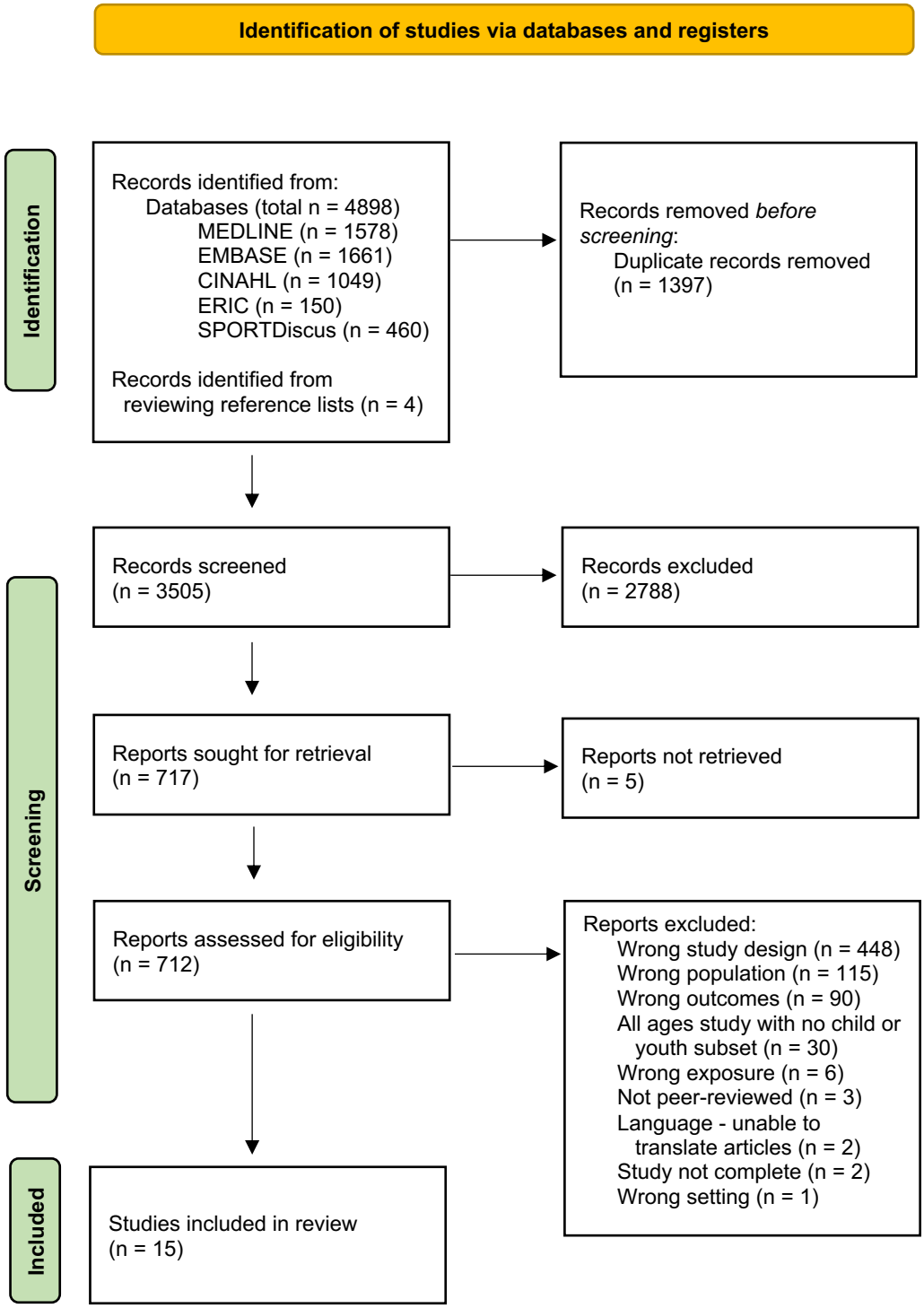

Table 3.3. Methodological characteristics of included studies (n=15)

Characteristic	n (%)
Study Design	
Qualitative	12 (80%)
Mixed-methods	3 (20%)
Population of Interest	
Preschool-aged only (0-4 years)	2
School-aged (5-18 years)	7
Youth only (12-18 years)	6
Range (years)	2-19
Sample Size	
Total	418
Range	10-75
Study Participants	
Children/Youth Independently	69
Parents Independently	99
Parents & child/youth dyads or triads	223
Early childhood educators	17
Sport coaches	5
Sport volunteers	2
Sport administrators	3
Specific Populations of Interest	
Interviews regarding youth athletes	59
Interviews regarding children or youth with obesity	136
Country	
Canada	5
United States of America	2
Australia	1
India	1
Indonesia	1
Italy	1
Ireland	1
Malaysia	1
Netherlands	1
United Kingdom	1

Table 4. Study characteristics and conclusions of included studies

Author	Methodology	Population of Interest	Sample size	Outcomes of Interest	Data Analysis	Description of main conclusions on PA
Publication Year	Philosophical Perspective	Setting/Context	Interview Participant(s)			
Country	Data Collection Method	Population Details	Participant Details			
Amran & Jamaludin (27)	Qualitative	Youth 13-15 years	15	Behavioral health experiences	Analysis through (i) coding and themes, (ii) subthemes were discussed by the research team for verification and, (iii) participants provided feedback on findings	Youth experienced a lack of PA and felt it was difficult to engage in PA, with their lifestyle being mostly inactive, predominated by sedentary activities
2021	Not stated	Participants were selected from households of the lowest socioeconomic standing in Malaysia	Youth independently			
Malaysia	Online: Semi-structured interviews & focus groups	Students enrolled in secondary school	Youth 13-15 years; 8 female, 7 male			
Andriyani *et al.* (35)	Qualitative	Youth 12-15 years	20	Reasons affecting changes in PA and sedentary behavior in Indonesian adolescents' during the COVID-19 pandmeic based on mothers' perspectives	Thematic analysis	Mothers perceived their children to be less active than before the pandemic, with self-determination and enjoyment, supports from others, and PA facilities and equipment related to changes in PA
2021	Pragmatism	Adolescents studied at junior high school level and lived in the Yogyakarta region of Indonesia	Parent and youth dyads			
Indonesia	Semi-structured individual interviews via telephone or video call		Parents: 25-55 years, all females; Youth 12-15 years; 9 female, 11 male			
Clarke *et al.* (36)	Qualitative	Preschool children 3-5years	20	Everyday activities of children through lockdown and the easing of restrictions including eating , PA and sleep habits	Thematic analysis	Parents reported lockdown negatively impacted children's activity routines. Some positive changes were identified (use of local environment for PA), many described lack of routines, habits, boundaries which may have been detrimental
2021	Not stated	Southwest and west UK	Parents independently			
United Kingdom	Semi-structured individual interviews via telephone or video call	Most families in most deprved quintile for income	21-45 years; 16 mothers, 4 fathers			

Author	Methodology	Population of Interest	Sample size	Outcomes of Interest	Data Analysis	Description of main conclusions on PA
Publication Year	Philosophical Perspective	Setting/Context	Interview Participant(s)			
Country	Data Collection Method	Population Details	Participant Details			
Elliott *et al*. (32)	Qualitative, interpretive descriptive	Youth sport athletes 15-18 years	39	Impacts on youth sport, attitudes and behaviours regarding future youth sport participation	Thematic analysis	Themes captured insights about a decline in physical activity and mental well-being, an increase in family connectedness, the challenge for sports to attract volunteers and participants back into sport, and the opportunities to reset values and philosophies underpinning the provision of youth sport
2021	Not stated	Metropolitan, regional, rural, and remote areas of South Australia	Youth sport stakeholders (adults independently, youth in focus groups)			
Australia	Individual online interviews & focus groups		18 youth athletes 15–17 years; 11 parents, 5 coaches, 2 volunteers, and 3 administrators, 15 to 82 years			
Gilbert *et al.* (40)	Convergent parallel-mixed methods design	Elementary-aged children 4-11 years	16	Perceived changes in mental well-being (MWB), PA, and sedentary behavior (SB), and associations between changes in MWB with changes in PA and SB	Coding, creation of qualitative themes, integration of qualitative and quatitative findings	Parents felt children benefited from being outside and staying active. While some parents indicated limitations in PA due to closure of parks and organized sports, they felt PA was beneficial and improved child MWB
2021	Not stated	St. Louis, USA-based neighborhood groups for parents with elementary school children	Parents independently			
USA	Individual interviews via telephone or Zoom	16 parents reported on a total of 23 elementary aged children (13 female, 10 male)	Parents: 15 female, 1 male			
Gothwal *et al.* (39)	Phenomenological qualitative	Children and youth 7-19 years	48	Parent- or child-reported impacts of COVID-19 pandemic and how they are managing their daily lives, especially with regard to schooling and educational needs	Inductive content analysis	Parents expressed concerns about reduced physical activity in their child due to being indoors. Some parents reported that their children had become 'lazy' during the pandemic, spending a lot of time playing video games
2021	Not stated	Children with visual impairmet who attended Vision Rehabilitation	Parent-child/youth dyads			
India	Semi structured individual interviews in-person or by telephone	˜1/3 of families classified low income; ˜1/3 of schools didn't provide online classes during restrictions	Children 7-19 years (median=10); 29 male, 19 female			

Author	Methodology	Population of Interest	Sample size	Outcomes of Interest	Data Analysis	Description of main conclusions on PA
Publication Year	Philosophical Perspective	Setting/Context	Interview Participant(s)			
Country	Data Collection Method	Population Details	Participant Details			
Lafave *et al.* (38)	Qualitative descriptive	Preschool children 2-5 years	17	Nutrition and PA environment in the early childhood education	Thematic analysis	Educators were taking children outside more than their usual pattern once schools re-opened and felt that this increased child physical activity; hurdles to PA included space for physical activity, access to equipment, and loss of variety in activities
2021	Not stated	Early childhood education centres, mainly urban and located in Alberta, Canada	Educators independently			
Canada	Semi-structured individual interviews		All female			
Neshteruk *et al.* (31)	Qualitative	Children and youth 5-17 years	51	Families described their experience during the COVID-19 pandemic, with a particular emphasis on children's diet, physical activity, sleep, and screen time behaviors	Rapid qualitative analysis using a systematic team-based approach	Children with obesity experienced a lack of PA due to limited space, a more sedentary lifestyle, and inadequate PA knowledge and fitness tools; however, there were both negative and positive changes to their overall weight-related behaviors
2021	Not stated	Pediatric primary care	Parent-youth dyads or triads (more than one parent or child)			
USA	Semi-structured interviews via videoconferencing	Diagnosis of obesity (BMI ≥95th percentile for age, gender); Recruited from clinical trial for children with obesity	61 children 5-17 years; 33 female, 28 male			
O'Kane *et al.* (29)	Mixed-methods	Female youth 12-14 years	16	Changes in mental health, sleep, and social media usage	Thematic analysis	Pupils had increased free time and had tried new forms of PA, and many undertook PA with their families, but there was no significant change in PA levels
2021	Not stated	Post-primary schools with >80 students across years 9 to 10	Youth independently			
Ireland	Semi-structured interviews via telephone or Zoom		All female			
Pelletier *et al.* (30)	Qualitative	Children 8-12 years	21	Experiences and perceptions of CIM and PA during the COVID-19 pandemic for parents and children	Thematic analysis	Findings from this study indicate a perceived increase in unstructured play during the COVID-19 pandemic and impacts on social opportunities for families, along with anxieties related to adapting to safety protocols
2021	Not stated	Northern British Columbia	Parent-child dyads or triads (more than one parent or child)			
Canada	Semi-structured interviews via Zoom with or without video		23 parents (31-57 years); 22 children (8-12 years; 9 female, 14 male)			

Author	Methodology	Population of Interest	Sample size	Outcomes of Interest	Data Analysis	Description of main conclusions on PA
Publication Year	Philosophical Perspective	Setting/Context	Interview Participant(s)			
Country	Data Collection Method	Population Details	Participant Details			
Pietrabissa *et al.* (33)	Qualitative - interpretative phenomenology	Youth 14-17 years	10	Main patterns in the lived-experiences of adolescents with obesity and their caregiver made of COVID-19-related social isolation, and to describe attitudinal, psychological, and behavioral responses to social isolation	Interpretative phenomenological approach (IPA)	Daily routines were impacted during quarantine, affecting adolescent's adherence to PA recommendations with some finding PA was faciliitated and others felt PA was limited; highlighted the importance of and need for support during quarantine from their families and peers
2021	Not stated	Inpatient obesity clinic	Parent-youth dyads			
Italy	Multi-informant semi-structured interviews, in person	Adolesents attending clinic for weight reduction; interviews conducted with parent and child separately, then combined into single unit for analysis	Parents 44-59 years, 9 mothers 1 father; youth 14-17 years			
Riazi *et al.* (28)	Qualitative	Children 5-11 years	29	Changes in movement behaviours during pandemic, parental approaches to supporting healthy movement and outdoor play behaviours before and during pandemic, existing and anticipated barriers and facilitators to movement and outdoor play behaviors	Thematic Analysis	Reported a dramatic decline in PA and outdoor play among children, parental perceptions varied by province regarding weather conditions. Findings supported that living in a house (e.g., potential for outdoor space) and parents co-participating in physical activities with their children were associated with children's PA and outdoor activities wth provincial differences in role of weather in opportunities for PA.
2021	Not stated	Toronto, Ontario and Vancouver, British Columbia	Parents independently			
Canada	Semi-structured individual interviews via Zoom		Parents of children 5-11 years old (10 women, 19 men); 29 children of parents interviewed (13 girls, 16 boys)			
Shepherd *et al.* (26)	Qualitative; phenomenography	High school students 15-17 years	20	Experiences with physical activity, mental health, and social connections	Kinnunen and Simon; grounded theory	The stoppage or modifications to school and sports led to decreases in PA, social connections, and self-reported mental health for most student athletes in our sample
2021	Not stated	High school students from Calgary, Alberta	Youth independently			
Canada	Semi-structured interviews via phone or Skype	10 students enrolled & 10 students not enrolled in spring-season sport	10 female; 10 male			

Author	Methodology	Population of Interest	Sample size	Outcomes of Interest	Data Analysis	Description of main conclusions on PA
Publication Year	Philosophical Perspective	Setting/Context	Interview Participant(s)			
Country	Data Collection Method	Population Details	Participant Details			
Szpunar *et al.* (37)	Qualitative	Children less than 12 years	12	Perspectives of Ontario parents and children regarding their experiences getting children physically active during the COVID-19 pandemic, and to examine their feelings concerning children's return to PA programming	Thematic content analysis	Themes included: barriers (e.g., closures of supportive environments), facilitators (e.g., virtual platforms) and perspectives on return to sport. Most common facilitator for managing inactivity was getting active outdoors.Children's willingness to return to PA programming stemmed primarily from missing their friends, other important authority figures, and sporting events
2021	Not stated	All parents and children from urban environment in Ontario, Canada	Parent-child dyads (n=9) or parents alone (n=3)			
Canada	Semi-structured interview via zoom	1/2 of interviews done during lockdown, 1/2 completed when restrictions were eased				
Welling *et al.* (34)	Mixed-methods	Children and youth 6-15 years	75	Effects of lockdown measures on the children's lifestyle behaviors (eating styles and behaviors, PA, screen time) and HRQoL	Grounded Theory using a deductive, theory-driven approach followed by an inductive, data-driven approach	PA decreased mostly in adolescents; often families tried to motivate children into PA. Reasons for not suceeding were COVID-related anxiety, preference for PA with peers; succeeding reasons were use of online videos, co-participation in PA with family members, perceived available time for PA, and parents arranging outside play dates with peers
2021	Not stated	83 participants in quantitative portion of study, 75 of these completed qualitative	Children, youth, or parents independently as proxy for children			
Netherlands	Semi-structured individual interviews via telephone	Children and youth with severe obesity	Children and youth: 43 female, 40 male			

Figure 3.2. Summary of synthesized findings and supporting categories

1. The loss of organized sport opportunities led to declines in PA

- The cessation of organized sport impacted lifestyles and routines
- Social connection and mental health were negatively affected by the loss of organized sport
- Attempts made to maintain PA through sport at home achieved mixed success

2. Restrictions inconsistently impacted PA through unstructured PA

- Opportunities for unstructured PA and outdoor PA increased for some children and youth
- Unstructured PA helped children and youth cope with the negative impacts of restrictions
- Unstructured PA occurred more frequently with family members
- Limited options for unstructured PA led to declines in PA for some children and youth

3. School closures reduced opportunities for PA

- Opportunities for structured curriculum-based PA were limited
- Virtual physical education programming did not provide adequate PA
- Opportunities for PA through active transport were lost

4. PA was facilitated and hindered by factors across multiple levels of the SEM

- Individual motivation, self-determination, creativity, attitudes, and beliefs influenced PA
- Social support and co-participation influenced engagement in PA
- PA was affected by access to resources, equipment, programming, and space
- Weather conditions affected outdoor PA

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Chapter 4

Key Findings and Conclusions

4.1 THESIS SUMMARY

My research, described within this thesis, was completed through two distinct, but connected, research studies, described in Chapters 2 and 3. Chapter 2 presented a priority setting study, conducted in partnership with stakeholders at the Northeast Community Health Centre (NECHC), to generate a 'top 10' list of priority topics for child and family health research according to caregivers and health care professionals (HCPs). From these stakeholder-identified priorities, one of the highest priority questions was translated into the subsequent research project, exploring a meaningful and relevant patient-oriented research (POR) topic. Chapter 3 presented a qualitative evidence synthesis on the impacts of COVID-19 restrictions on the physical activity (PA) for children and youth. The key findings and conclusions of these research studies, which represent foundational work for POR in child and family health at the NECHC, are presented in this concluding chapter (Chapter 4), along with lessons learned, strengths, limitations, and future directions for research.

4.2. STUDY 1. PRIORITY SETTING

4.2.1 Key findings

The priority setting study presented in Chapter 2 identified 10 priority questions for child and family health research according to stakeholders (caregivers and HCPs) at the NECHC. Stakeholder-identified priorities are essential for POR in child and family health. The 'top 10' priorities generated from this study include:

i. What are the best strategies for the prevention of mental health issues in children and families?
ii. How can parents best support their children's mental health during times of drastic change?
iii. What are the impacts of COVID-19 related closures/lockdowns (*i.e.,* school, activities playgrounds) on children's physical and mental health?
iv. What are the effects of food intake on mood in children?

v. How does screen time impact a child's physical, social, and behavioural development?
vi. How are early childhood behaviours related to a child's future mental health?
vii. What are effective interventions to help children manage their emotions?
viii. What are the causes of increasing mental illness in children and adults?
ix. What are the effects of social media on children?
x. What are early predictors of ADHD in children?

Priority questions spanned diverse topics, including screen time, behaviour, and COVID-19, but the final 'top 10' list had a prominent mental health theme. With stakeholder feedback, along with consideration for my personal experience and educational background, resource availability, and capacity, it was determined that the second project in my thesis would focus on priority question number three. This broad question regarding the impacts of COVID-19 related closures/lockdowns on children's physical and mental health was narrowed to specifically consider the impacts of COVID-19 restrictions on the physical activity of children and youth, presented in Chapter 3.

Through the priority setting project, presented in Chapter 2, a partnership was established with stakeholders at the NECHC, creating an opportunity for continued research at this site. Further, findings from this study allow for future local and national collaborations related to the priorities generated. Stakeholder-identified research priorities are central to POR. This study provides a strong foundation for future POR at this site and the findings warrant follow-up by researchers and funders.

4.2.2. Lessons learned

4.2.2.1. Methodological lessons learned

Stakeholder engagement was facilitated by using an established, evidence-based, systematic process to engage caregivers and HCPs throughout my research. The JLA provided clear recommendations on non-negotiable aspects of stakeholder engagement, yet provided flexibility and responsiveness to match the unique needs of this individual project. For example, the COVID-19 pandemic and related restrictions created distinct challenges. In response to restrictions, adaptations were required and the final priority setting workshop was held virtually. The flexibility of the process allowed the priority setting workshop to be completed through an alternative mode while remaining true to the JLA process. Additional methodological differences between JLA recommendations for a priority

setting process (1) and the modified JLA implemented in the study in Chapter 2 are presented in Table 4.1. The two most notable exceptions to the JLA methodology were (i) the exclusion of a formal partnership with the JLA and (ii) the exclusion of a contracted advisor through the JLA. These exclusions were offset by informal support from both the JLA (2018 email from JLA assistant research manager to me; unreferenced), and two academic professionals (2,3) who successfully implemented the JLA priority setting methodology in past priority setting partnerships. (4,5)

Methodological lessons were learned regarding the JLA priority setting process itself. As a novice researcher, I often sought more precise methods with detailed guidance for decision-making processes and the management of potential methodological challenges. For example, when organizing and summarizing initial survey submissions, it was difficult to determine the appropriate level of specificity for each question. There was uncertainty about whether it was more correct to maximize trueness to the original submissions or to maximize PICO (population, intervention, control, outcome) details and make assumptions about participants' intentions. However, the JLA process is true to CER (community-engaged research) (6) and stakeholders on our steering committee were able to share their perspective and guidance. Through discussions with and feedback from steering committee members, it was decided that PICO details would be omitted as necessary in order to remain true to original submissions. Although frustrating at times, the processes were responsive and flexible, and created space for adaptations in the methods to match this individual study's and stakeholders needs.

This priority setting project was one of the first to be completed virtually. JLA priority setting projects are not typically completed using high levels of virtual engagement. Although there were likely other priority setting projects on other topics being conducted concurrently during the pandemic, there were no JLA priority setting projects previously reported on using this extent of virtual methods. The methods employed in this priority setting project offer valuable direction for future priority setting projects to increase access and can decrease barriers to participation, particularly for the final priority setting workshop.

The JLA methodology is a systematic and evidence-based process intended to generate research priorities in partnership with stakeholders. (1) POR, endorsed by the CIHR (7), also involves patients and other relevant stakeholders as partners. Through this research, it became apparent the

varied efforts required to partner with different groups of stakeholders. HCPs and caregivers engaged variably, particularly for the creation of the steering committee. When forming the steering committee, the proposed partnership described to HCPs and caregivers was consistent. However, HCPs engaged more readily with the research and expressed a shared interest in the project from the initiation of the study. Caregivers, however, were more difficult to engage and despite their expressions of interest, their commitments to the project were laborious and difficult to secure. It has previously been reported that public engagement in research entails a time commitment from stakeholders that can be difficult for some to make and sustain. (8) This was consistent with my experience of engaging stakeholders, particularly caregivers, in the priority setting process. Further, attrition of caregivers from the steering committee occurred and although partnerships were created with additional caregivers to maintain caregiver representation on the steering committee throughout, the differences in sustained commitment to the project were apparent.

Levels of engagement with stakeholders occur on a spectrum: inform, consult, involve, collaborate, or empower. (9) Beginning this research, while at the same time learning about POR (7), CER (6), and CBPR (10), I anticipated developing a strong partnership that would enhance collaboration and empowerment among stakeholders partners. However, in reality, the engagement was not uniform across stakeholder partners nor across phases of the research. This highlights that although researchers should engage with stakeholders as partners, they also need to "meet patients [or other stakeholders] where they are" (11) and not expect a higher level of engagement than they are willing or able to offer.

4.2.2.2. Practical lessons learned

Initially, it was expected that the stakeholder population would be diverse and include a substantial proportion of families from refugee, immigrant, and low-income backgrounds. This expectation was reflective of the sociodemographic characteristics of the population living in northeast Edmonton and generally accessing health services at the NECHC. (12) Further, HCP stakeholders had endorsed this expectation. Despite attempts to minimize barriers and facilitate engagement with participants from diverse sociodemographic backgrounds, most study participants were female, educated, and middle-class; the steering committee was composed primarily of female HCPs and exclusively female caregivers. Further, although the stakeholder population engaged included a diverse range of ethnic groups, the

majority were white. The discrepancies between expectations and realities of engagement may signify a number of practical issues, worth consideration. First, it is possible that additional time and relationship building is required prior to formal engagement. As some cultures distrust researchers, this strengthened initial step may help to build trust and demonstrate greater commitment to an authentic and longer-term relationship. (13,14) Second, it is possible that perceived and real barriers remained for families (*e.g.,* transportation or other resources, language), limiting their engagement. Although plans to mitigate barriers to participation for all stakeholders were in place, certain populations may have experienced a lack of access, resources, trust, or other issues to deter their engagement this study. (15) Third, I was the primary research contact with stakeholders in the clinic. It is possible that I may have impacted the engagement of certain stakeholder groups as a white, middle-class, educated, female.

Less than 20% of participants in study surveys were considered to be low income and 30% were born outside of Canada, while English was reported as the primary language for over 80% of caregivers. These participant characteristics differed from initial expectations, yielding a practical lesson. This deviation was likely due to the pediatric clinic at the NECHC, where participants were exclusively recruited from, being a specialty clinic. HCPs at this clinic see healthy general pediatric patients, but also a large proportion of patients with more complex needs and those requiring follow-up after a hospital admission. Families access this clinic from across north and central Alberta, and should likely not have been expected to present with the same sociodemographic characteristics as the population living in northeast Edmonton alone. This discrepancy demonstrates the importance of preparation and planning in community engaged research in order to develop clear and realistic expectations. (8)

As a student with a finite period of time dedicated to graduate work, my role in the project also had practical implications. First, the amount of time invested in early stage relationship development was less than optimal. However, being consistently present at the clinic facilitated researcher-stakeholder relationship development, even if time spent there was limited. Second, as a graduate student, there were practical challenges for the dissemination of study findings. Promoting stakeholder-identified priorities widely is not a simple or short-term task; rather, it required and will continue to require a sustained effort. Time as a trainee is finite; however, the responsibility of researchers to follow through on stakeholder-identified priorities remains. Third, after stakeholders invested considerable time and energy into this

priority setting project, researchers have an obligation to maintain the momentum of this project and make efforts to ensure these priorities are attended to, not filed within an academic journal and shelved. Despite my engagement with this project ending with this thesis, a responsibility remains to create value for stakeholders and honour their contributions to this study.

4.2.3. COVID-19 pandemic

Initial restrictions were implemented in Alberta in March 2020, one and a half months after in-person recruitment began for the initial survey to gather stakeholder questions in the priority setting study. Recruitment ceased completely with great uncertainty existing globally at that time. Auxiliary personnel, including researchers, were no longer permitted into Alberta Health Services (AHS) health care facilities as they prepared for an emergency influx of COVID-19 patients as seen in other jurisdictions around the world. The University of Alberta followed provincial mandates and issued a work from home order, suspending field research activities. Further, patients were not being seen in-person at the pediatric clinic, other than exceptional circumstances. With these restrictions and changes, in-person engagement halted. Once the COVID-19 situation stabilized in late July 2020, I was permitted to return to in-person recruitment. COVID safety protocols were developed and COVID-related research approvals were obtained from the Research Ethics Board, University of Alberta public health response team, Department of Pediatrics, and AHS prior to resuming research activities.

Returning to the clinic presented unique challenges for the remainder of the research process. Initially, anxieties were high with the uncertainty and a level of fear for possible viral exposure and transmission with every interaction, despite personal protective equipment being used. Interactions were impacted in an unprecedented way with masks, goggles, and excessive hand sanitizer used, all while maintaining maximum distance from each other. Returning to the clinic, as a researcher, things felt impersonal and distant. I expected families to be hesitant to engage with this project. However, this was not the case, and caregivers' willingness to engage in research in-person at the clinic seemed to be unchanged by pandemic conditions.

Our priority setting study methods were affected by pandemic restrictions. Although not ideal to diverge from the JLA recommended methods (1), these changes created a unique opportunity to explore previously unexplored modifications to the process. The most significant change to the JLA methodology

due to COVID-19 restrictions was the final workshop being transitioned to a virtual format using the Zoom videoconferencing platform. (16) This likely had both positive and negative impacts on the final priority setting workshop. First, the transition of the workshop to a virtual platform removed many barriers to participation for stakeholders. Stakeholders did not need to arrange childcare or leave work for an extended period of time to attend, as they were able to join from any setting with internet access. Transportation barriers were no longer relevant and the time commitment for the workshop was dramatically shorter (two hours versus a typical half or full day workshop).

On the other hand, Internet access emerged as a potential barrier to participation in the final workshop. However, I was unaware if any participants encountering this barrier, who had otherwise intended to participate in the workshop. The length of the final workshop was shortened from a half day to two hours, with anticipation that the use of a virtual platform and online polling tools would greatly expedite the process. Although the workshop spanned two hours, the process would have benefitted from additional available time to ensure no portion of the final prioritization workshop felt hurried. Also, the ability for stakeholders to join the final workshop virtually from various locations meant some participants joined from work, during their lunch hour. With this, they were only able to participate for the first hour of the workshop and their perspectives and votes were excluded from later discussions, voting rounds, and from final approval of the final 'top 10' list. If given the opportunity to conduct this same workshop again, I would suggest the length of the final virtual workshop would be lengthened or it be split to extend over multiple days with shorter sessions each day.

Other processes, including all stakeholder, research team, and steering committee meetings also transitioned to virtual platforms. Research has shown that when making requests from others, face-to-face interactions were superior to those through any other form of communication, including text-based (*i.e.,* email), video-conferencing, and audio communication. (17) With that, the impact of transitioning study activities from being mainly in-person to exclusively virtual through video-conferencing and email communication is worth consideration. Steering committee members were asked to review and provide feedback at multiple times. For example, during step 3, the steering committee was asked to review the master list of submitted questions and in step 4 they were asked to review the verification process for unanswered questions. Although feedback received, a lack of in-person contact may have reduced both

the quantity and quality of feedback submitted. Additionally, it is worth considering how the transition to virtual platforms may have impacted stakeholder engagement in the final workshop and the resulting priorities. Regardless, virtual access allowed study activities to occur that would have been logistically more difficult or impossible to arrange otherwise during the period of COVID-19 restrictions.

The most obvious impact of COVID-19 on this research was on the actual priority questions that emerged. COVID-19 was an explicit priority in the 'top 10', regarding the impacts of COVID-19 restrictions on children's physical and mental health. Although directly named in only one of the top priorities, COVID-19 became one of the most common topics submitted during the initial survey, along with questions which may have indirectly related to COVID-19 (e.g., screen time, mental health, social development). This was despite half of participants being recruited, and only 2 questions relating to COVID-19, prior to the pandemic being declared and study activities being paused. The COVID-19 pandemic ended up being formative for most of the research contained within my thesis. The systematic review directly addressed a COVID-19 topic with it being a relevant and topical subject for stakeholder*s.*

4.2.4. Strengths, limitations, and future directions

This section presents strengths, limitations, and future directions for research in addition to the study specific strengths and limitations discussed within Chapter 2.

Strengths of the priority setting study in Chapter 2 included the use of POR and CER approaches. These approaches enabled the engagement of key stakeholders as active partners in the research process, beyond simply informing or consulting. The priority setting study generated stakeholder-identified research priorities and was completed after the declaration of the COVID-19 pandemic in 2020. With this, the priorities are current – produced after a time when an incredible amount of change was experienced across the world, particularly by children, their families, and their HCPs.

This priority setting project was not without limitations. First, the list of final priorities includes questions which lack PICO details. The scope of the study considered stakeholder questions about child and family health widely, and the initial survey elicited questions from stakeholders that lacked specificity. Because assumptions about the intentions behind stakeholder submissions were avoided, the resulting list of priorities lack detail and often encompass a large scope of possible research questions within each priority. Second, although the various steps of stakeholder engagement include a reasonable level of

diversity across demographics in the initial and interim survey, the steering committee and final workshop groups were composed almost exclusively of females. Third, the JLA priority setting is a subjective process and it is recognized that subsequent priority setting processes following the same process, with different stakeholder participants could result in different priorities. Although it cannot be changed, this subjectivity provides an opening for priorities to be challenged. Fourth, although priorities are largely consistent with other priority setting projects, there is uncertain generalizability about the findings with stakeholders included in my research engaged solely through the NECHC. Lastly, children and youth were not engaged in any portion of this research. Evidence suggests that preferences for health can be elicited from youth, but that younger children may not be able to meaningfully complete these types of tasks. (18) Youth have been shown to have disparate preferences for their health care so it could be assumed their views on research priorities for child and family health topics would also diverge from their caregivers. (19) Although there is value in understanding the priorities for child and family health research from the perspective of children and youth, the cognitive demand of participant tasks included in the priority setting study may have extended beyond the capacity of children. Further, my capacity as a graduate student limited the extent to which children and youth could be involved as their involvement likely would have meant dramatic changes to the methods employed in the study.

It would be beneficial for future research to explore the priorities of other stakeholders. With this priority setting study including primarily well-educated mothers living in higher income households, their priorities may be different from fathers or parents with a lower socioeconomic or educational status, and results may not be generalizable to these and other groups. Future research may seek to give a voice to fathers, stakeholders with more specific sociodemographic characteristics (*e.g.,* low-income or immigrant families), or older children and teenagers who can reflect on what they feel are the most important research topics for healthy children and healthy families. This may require more targeted recruitment strategies.

High quality CER requires an authentic, trusting, and collaborative partnership between stakeholders and researchers, with a shared commitment to address local health issues. (20) Despite this study and related relationship-building being completed over an extended period of 27 months, work remains to be done. To maintain momentum, sustain, and build on the relationships and foundational

engagement the research team and myself have established with stakeholders and the community, it is imperative that future research at this site aligns with stakeholder-identified priorities.

It would be valuable for future research to explore more specific practical and methodological guidance for completing a JLA methodology without the formal partnership of the JLA. Throughout the priority setting process, the steering committee and research team often questioned what was ideal, what was acceptable, and what others had done in a similar situation. Although the JLA outlines the systematic process with general guidance, specific advice at each step is lacking. In reporting, manuscripts are typically restricted by word counts of the academic journals they are submitted to, so these valuable process details are usually omitted or removed. These details, decision-making guidance or parameters, and practical tips are valuable information that is more difficult to obtain. If priority setting is completed through a formal partnership with the JLA, they likely offer considerable support and guidance during times of uncertainty; however, financial and logistical barriers often prevent researchers from formally partnering with the JLA, leaving them to figure out these important process details on their own. Future research providing more specific advice and suggestions for common challenges in the process would be useful and could improve the efficiency and efficacy of future priority setting projects.

4.2.5. Study implications and conclusions

Findings of this study, together with other similar priority setting projects recently completed in Alberta (21,22) and Canada (4,23), provide substantial guidance to researchers and funders about the topics that are most meaningful for child and family health research. Topics related to mental health issues were consistently identified as the top priority for stakeholders across all five studies, including the one presented in Chapter 2 of this thesis. Other topics which were highlighted across multiple studies include the effects of screen time and social media on children, behaviour, and development. Together, these priority setting studies offer substantial direction to researchers and funders on the topics which need to be prioritized in child health research.

The research priorities generated in this study have already been used to inform the second study within this thesis – a systematic review of qualitative evidence considering the impacts of COVID 19 restrictions on children's health, specifically their PA. Future research needs to maintain alignment with

stakeholder-identified priorities and continue to engage in POR that is meaningful and relevant for stakeholders.

This project has developed a foundation for future research in child and family health at the NECHC. A positive relationship with both caregiver and HCP stakeholders was established, the clinic administration and staff, and the community, providing opportunities for future collaboration and research at this site.

4.3. STUDY 2. QUALITATIVE EVIDENCE SYNTHESIS

4.3.1. Key findings

The evidence synthesis presented in Chapter 3 used meta-aggregation to evaluate existing qualitative evidence on the impact of COVID-19 restrictions on PA for children and youth. The review included 15 primary qualitative studies, leading to 14 aggregated categories and 4 synthesized finding statements. The findings highlight that curriculum-based PA, organized sport, and active transportation were negatively impacted by COVID-19 restrictions. Negative changes in PA were perceived to be affected by COVID-19 risks; inadequate PA instruction; poor access to supportive PA spaces, equipment, and programming; increased screen time; and poor weather. There were perceptions of both increased and decreased PA through unstructured PA for children and youth, including outdoor PA. Positive changes in PA were facilitated by family co-participation, availability of outdoor space, and a perception of mental health benefits. This qualitative evidence synthesis highlighted that although PA was consistently reported as being negatively impacted by COVID-19 restrictions, impacts were not experienced consistently across PA types. PA directly impacts the health of children and influences the well-being of society broadly. This review provides synthesized knowledge of the impacts of pandemic restrictions on PA for children and youth which can inform current health care strategies and future pandemic planning.

4.3.2. Lessons learned

4.3.2.1. Methodological lessons learned

The research question examined in the qualitative evidence synthesis presented in Chapter 3 was focused and specific, as is required for a systematic review. However, the research topics identified as priorities in the study described in Chapter 2 were broad and often lacked specificity. With this, PICO

(population, intervention (or phenomena of interest), control, and outcome) details (24) were required to create the focus and direction necessary to translate a priority topic into a suitable review question. The priority topic addressed (priority question number 3 from study in Chapter 2) was the physical and mental health impacts of COVID-19 restrictions for children. This broad topic offered considerable flexibility for narrowing this priority topic. Maintaining a POR and CER approach to this review, stakeholders were engaged again for this project, and worked together to narrow the focus of this review to within the priority topic to something that was topical and valuable to stakeholders.

Stakeholder engagement remained for this review process, but to a much lesser extent than the priority setting study. Engagement through this project was largely reduced to informing and consulting with stakeholders (9) to expedite the review process. However, continued high-level engagement of all relevant stakeholder groups would have aligned more optimally with POR and CER. Despite engagement of stakeholders being at a lower level, an adequate level of engagement throughout this project was maintained in several ways. First, two HCPs from the NECHC remained active throughout the review process as co-authors in the project. They provided valuable input and feedback throughout, but especially during the conceptualization of the review topic. These HCPs helped to ensure that the focused review question remained relevant and meaningful for stakeholders. Second, a wider community partner was engaged - a representative from Ever Active Schools (25) – who provided valuable perspective in the planning stages on this review. Their representative provided input and direction in the conceptualization of the review topic to ensure that the resulting outputs would be useful and valuable for stakeholders widely. For practical reasons, mainly related to timeframes of my graduate studies, a higher level of engagement was not implemented and no engagement with caregivers occurred for this project; however, involving stakeholders as partners throughout the planning and decision-making processes of the review would have been optimal and may have led to a very different review question.

Our review was initially intended to focus on both qualitative and quantitative evidence of the impacts of COVID-19 on PA for children and youth. It was determined a priori that qualitative and quantitative studies would be separated and synthesized independently if there was an ample body of evidence to warrant separation of the two. It was initially anticipated that the quantitative review would be completed first. However, between the time of the protocol registration and completing the first round of

title and abstract screening, a scoping review was published (26), with a significant overlap with the proposed quantitative review. Additionally, this scoping review (26) identified a gap and highlighted the need for qualitative research on this topic. With this development, only the review evaluating the existing qualitative evidence was completed. Although the review process deviated from the original plan, it followed the existing evidence, contributed to an identified need, and the methodological rigour of the review remained unchanged. The initial protocol was published on PROSPERO and all necessary amendments were submitted, along with rationale, ensuring the review process remained transparent and rigorous.

4.3.2.2. Practical lessons learned

A practical lesson learned through this review process was the importance of conducting adequate background research to adequately recognize and ensure the feasibility of the project. Extensive research surrounding COVID-19 was and is still being published at an unprecedented rate. (27) A greater appreciation of the volume and pace of publications being produced would have encouraged more consideration of the scope of a quantitative review on the impacts of COVID-19 restrictions on PA for children and youth. This knowledge would have prompted me to ensure my personal skills and level of expertise, as well as review team expertise and capacity matched the required tasks and timeline for this review.

Engaging with HCP stakeholders and a community partner, Ever Active Schools, provided methodological value to this review process and helped to ensure greater patient-orientation. It also added important practical benefits. Discussions with these stakeholder partners, facilitated a greater understanding of the potential use of exploring this topic, along with the potential value of the resulting review. Realizing the potential end value and stakeholder views on PA for children and youth provided support for highlighting differences of impacts across the types of PA. Although individual study findings included in this review would not have changed, the approach to synthesis may have differed without the valuable stakeholder input provided.

4.3.3. Strengths, limitations, and future directions

This section presents strengths, limitations, and future directions for research in addition to the study specific strengths and limitations discussed within Chapter 3.

A strength of this review was its qualitative focus and meta-aggregative approach. This review brought together individual study findings into unique categorical themes and synthesized findings which remained true to the original studies. The qualitative focus is also a strength. It has been suggested that most determinants of PA for children and youth likely only have small-to-moderate impacts on PA independently and the interaction between these influencing factors intensifies the effects. (28,29) This dynamic interaction of factors highlights the value of the contextual understanding qualitative research provides. The COVID-19 pandemic and related restrictions have undeniably impacted PA and introduced new factors and interactions into the already complex determinants of PA for children and youth. Exploring PA through qualitative research, beyond numbers alone, has provided insight into the experiences and perceptions of PA for children and youth through COVID-19 pandemic restrictions.

Regarding the qualitative review, one limitation is that findings were not aggregated based on age because of differences across included studies. Quantitative evidence suggests that declines in PA were more pronounced for older children and youth (26), so the experience and perception differences between age groups would have offered beneficial insight. This is also true for sex and gender, as a consistent quantitative correlate of PA. Another limitation of this qualitative evidence synthesis is related to the rapid rate of COVID-19 related publications, which could potentially limit the findings of this review. There is the potential that numerous additional studies, matching eligibility criteria, have been published since the time of the updated search.

Future research on the impacts of COVID-19 restrictions on the PA of children and youth has several potential avenues. First, it would be valuable to explore the impacts by gender or by age group, specifically pre-school children. This review did not explore these potential differential impacts due to the variability or lack of specificity for populations of interest in the studies included in this review. Second, as things are slowly returning to ‘normal’ for societies, future research should consider the lingering impacts of the pandemic on the PA of children and youth. Considering children and youth were found to avoid or alter their PA due to feelings of anxiety or fear (in themselves or their parents), it will be valuable to explore how these feelings may remain and continue to deter engagement in PA. A third potential future direction would be to explore the experiences and perceptions of PA for children and youth as the world moves towards a post-pandemic period. It will be important to consider which impacts on PA for children

and youth through COVID-19 restrictions were short-lived or if some, or all, of the impacts, experiences, and perceptions persist even after all restrictions have been lifted. Last, future research should consider these impacts in light of planning for future pandemics. It will be crucial to have an improved understanding of the delicate balance between public health measures and the unintended consequences of restrictions, including widespread impacts on the health and PA of children and youth.

4.3.4. Study implications and conclusions

This evidence synthesis provided an up-to-date and methodologically rigorous review synthesizing the current qualitative evidence on the impacts of COVID-19 restrictions on the physical activity of children and youth. Quantitative evidence has consistently suggested that one of the consequences of COVID-19 restrictions has been a significant reduction in PA levels for children and youth (compared to before the pandemic). (26,30-32) However, there was an identified need for qualitative evidence on the topic (26), making this review a valuable complement to the quantitative data available.

In conclusion, the findings of this review allow for an improved understanding of the contextual factors, experiences, and complexities of the impacts COVID-19 restrictions had on the PA of children and youth. (33) An understanding beyond the quantitative impacts of COVID-19 restrictions on PA for will allow for better supports, planning, and interventions as societies move towards a post-pandemic period and promote healthy PA levels for children and youth (26). Understanding how curriculum-based PA, organized sport, unstructured PA, and active transport were differentially impacted through restrictions will allow for more targeted, efficient, and effective interventions moving forward. For future pandemic planning, the findings of this review provide an improved awareness of unintended collateral consequences which can result from public health measures, including impacts on the health and PA of children and youth globally. Lastly, this review aligns with a stakeholder-identified priority, identified through a CER project making this review relevant, meaningful, patient-oriented, and responsive to both researcher- and stakeholder-identified research priorities.

4.4. CONCLUDING REMARKS

My thesis research generated a 'top 10' list of stakeholder-identified priorities for child and family research. Priorities were produced through a partnership with caregivers and HCPs and had a notable mental health theme, consistent with other priority setting projects conducted in Alberta and Canada. The priorities generated offer guidance for researchers looking to pursue meaningful and relevant POR topics in child and family health. My thesis research followed these priorities and demonstrated an example of the conduct of POR to meet the priorities of families and their HCPs.

Table 4.1. James Lind Alliance recommended methods versus implemented methods

JLA Phase	JLA Method Recommendation	Method Implemented
Establishing priority setting partnership	Formal JLA engagement	Informal support from JLA via email Informal support from other researchers and professionals who have completed successful JLA priority setting in the past
	Contracted JLA advisor engagement	
Steering Committee Formation	Have equal representation of patients/caregivers as health care providers	Steering committee composed of more healthcare providers than caregivers
	Have representation from all stakeholder groups at steering committee meetings	Only healthcare providers and researchers present at initial in-person steering committee meeting
	Monthly meetings; preferably in person, but may be via teleconference	Initial meeting in person; regular email updates to steering committee; videoconference meetings x 3
Initial Survey to Gather Questions	Questions gathered from: (i) patients, (ii) caregivers, (iii) healthcare providers, (iv) existing guidelines and systematic reviews	Questions gathered from (i) caregivers and (ii) healthcare providers
Summarize and Organize Questions	Master list of submitted questions published on website	Master list of submitted questions not published
Verify True Unanswered Questions	Master list of unanswered questions published on website	Master list of unanswered questions included in manuscript
Interim Priority Setting Survey	Unanswered questions shortlisted by steering committee for interim priority setting survey	All questions on master list of unanswered questions included in interim prioritisation survey
Final Priority Setting Workshop	Half day or full day workshop	Two-hour workshop
	Held in person	Held virtually using Zoom platform
	Recommended minimum of 12 participants, maximum of 30	12 participants present
	Modified nominal group technique with small breakout group discussions and group rankings	No breakout discussions; all discussions occurred as large group; ranking occurred by individual votes using Zoom polling
	Whole group review of final list of priorities	Review of final list completed by smaller group of participants due to early departure from meeting by some participants
Timeline	12-18 months	28 months

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Appendices

Appendix A

This appendix contains supplemental files for the priority setting study presented in Chapter 2, including:

Supplemental File 1a. Initial Survey for Primary Caregivers

Supplemental File 1b. Initial Survey for Health Care Professionals

Supplemental File 2. Question Verification Process

Supplemental File 3. Steering Committee Composition

Supplemental File 4. Master List of Unanswered Questions

Supplemental File 5. Interim Prioritization Rank-Ordered List of Unanswered Questions

Supplemental File 6. Complete List of Priority Questions from Final Priority Workshop

Supplemental File 1a. Initial Survey for Primary Caregivers

Pediatric primary care is about looking after children and keeping them healthy as they grow. It is about meeting the everyday health needs of children and their families. Primary care includes preventing, screening, and managing illness, disease, and injury. Primary care should meet your child's everyday health needs and focuses on wellness to keep your child as healthy as possible.

We want future research in pediatric primary care to be meaningful to you and focused on topics which are important to you, your child, your family, and your healthcare providers. We want to know what questions you have about keeping your child and your family as healthy as possible that you do not have answers to at this time. Your questions can be very general or about specific issues. These can be questions you have asked your healthcare provider (doctor, nurse, dietitian, or other) that they could not provide an answer to or about a topic you feel future research needs to focus on for children and families.

Please do not include any personal identifiers (i.e., your name or other personal information) in your responses.

1. **What questions do you have about keeping your child healthy?**

2. **What questions do you have about keeping your family healthy?**

It can be difficult to recall all your questions at one time. With these next questions, we want you to think about different ways to keep your child and family healthy. Think about these health topics and if you have other questions related to each topic for your child and/or your family.

3. **What questions do you have about <u>physical activity</u>** (examples: obesity, screen time, active play) …
   for your child?
   for your family?

4. **What questions do you have about <u>growth and nutrition</u>** (examples: healthy eating, starting solid foods, milk or juice intake) …
   for your child?
   for your family?

5. **What questions do you have about <u>illnesses, infections, diseases, or injuries</u>** (examples: vaccines, colds, ear infections, asthma, allergies, car seat safety, safe sleeping) …
   for your child?
   for your family?

6. **What questions do you have about <u>mental health</u>** (examples: anxiety, depression, screening/management) …
   for your child?
   for your family?

7. **What questions do you have about <u>behavior</u>** (examples: crying or temper tantrums, bullying, attention issues or issues with focus)…
   for your child?
   for your family?

8. **What questions do you have about <u>development and learning</u>** (examples: speaking, motor skills like walking or using a pencil, reading, writing, social skills)…
   for your child?
   for your family?

9. **What questions do you have about <u>parenting</u>?** (examples: discipline, family support, toilet training, parental stress, creating a supportive home environment, parenting skills)

10. **What questions do you have about your child's diagnosis?** (this could include preventing, treating, or managing issues related to their diagnosis)

11. **Are there <u>other</u> questions you have about child and family health?** (examples: sleep, oral care, hygiene, vision, hearing)

Supplemental File 1b. Initial Survey for Health Care Professionals

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Pediatric primary care is about looking after children and keeping them healthy as they grow. It is about meeting the everyday health needs of children and their families. Primary care includes preventing, screening, and managing illness, disease, and injury. Primary care should meet children's and their families' everyday health needs and focuses on wellness and keeping children as healthy as possible.

We want future research in pediatric primary care to be meaningful to you and focused on topics which are important to you, the children you care for, and their families. We want to know what questions you have about keeping children as healthy as possible as they grow that you do not have answers to at this time. Your questions can be very general or about specific issues. These can be questions you have been asked by a parent or other person that you wish you had more information about or evidence to support your answer. The questions can also be about a topic you feel future research needs to focus on in order to improve the care provided to pediatric patients and their families in primary care.

Please do not include any personal identifiers (i.e., your name or other personal information) in your responses.

1. **What questions do you have about keeping children healthy?**

2. **What questions do you have about keeping families healthy?**

It can be difficult to recall all your questions at one time. With these next questions, we want you to think about different ways to keep your child and family healthy. Think about these health topics and if you have other questions related to each topic for your child and/or your family.

3. **What questions do you have about <u>physical activity</u>** (examples: obesity, screen time, active play) …
   for children?
   for families?

4. **What questions do you have about <u>growth and nutrition</u>** (examples: healthy eating, starting solid foods, milk or juice intake) …
   for children?
   for families?

5. **What questions do you have about <u>illnesses, infections, diseases, or injuries</u>** (examples: vaccines, colds, ear infections, asthma, allergies, car seat safety, safe sleeping) …
   for children?
   for families?

6. **What questions do you have about <u>mental health</u>** (examples: anxiety, depression, screening/management) …
   for children?
   for families?

7. **What questions do you have about <u>behavior</u>** (examples: crying or temper tantrums, bullying, attention issues or issues with focus)…
   for children?
   for families?

8. **What questions do you have about <u>development and learning</u>** (examples: speaking, motor skills like walking or using a pencil, reading, writing, social skills)…
   for children?
   for families?

9. **What questions do you have about <u>parenting</u>?** (examples: discipline, family support, toilet training, parental stress, creating a supportive home environment, parenting skills)

10. **What questions do you have about specific child diagnosis/diagnoses?** (this could include preventing, treating, or managing issues related to their diagnosis)

11. **Are there <u>other</u> questions you have about child and family health?** (examples: sleep, oral care, hygiene, vision, hearing)

Supplemental File 2. Question Verification Process

This form was adapted with permission from the James Lind Alliance*
Process for Evaluating Indicative Questions Against Existing Evidence

The purpose of this Question Verification Form is to enable the Northeast Community Health Centre Child and Family Health Priority Setting Partnership (PSP) to describe clearly how they will check that their questions were unanswered, before starting the interim prioritization stage of the process. The JLA requires PSPs to be transparent and accountable in defining their own scope and evidence checking process. This will enable researchers and other stakeholders to understand how this PSP decided that their questions were unanswered, and any limitations of their evidence checking. Indicative questions will be verified as a true uncertainty before they can move forward to the interim prioritization step.

This process is intended as a systematic guide for evaluating indicative questions to determine if they are considered to be 'answered' or 'unanswered' according to the current evidence and literature sources. Sources will be sequentially checked for evidence supporting the answer to each indicative question and the source(s) of verification for each question will be recorded in the Indicative Questions - Data Management Form in Excel.

Evidence checks will be conducted by one person (AE) and verified by a second person, independently. Discrepancies will be discussed between the two information specialists and if it remains unresolved, a third person from the Steering Committee will be consulted for a final decision.
Sources to be checked, sequentially, are:

1. Canadian Medical Association practice guidelines and clinical tools
2. Canadian Pediatric Society position statements and practice points
3. Cochrane Database of Systematic Reviews
4. Rourke Baby Record
5. Grieg Health Record
6. American Academy of Pediatrics clinical practice guidelines
7. American College of Physician guidelines and recommendations
8. Bright Futures Guidelines
9. Other Systematic Reviews
    a. These systematic reviews will be evaluated for quality and reliability (published protocol/methodology, AMSTAR2) along with relevance and currency, when applicable as determined by 2 information specialists and confirmed with Steering Committee when discrepancy exists.
    b. Searched through: PROSPERO, Google Scholar, Medline, PubMed, CINAHL, Embase
10. Other 'expert' sources (e.g., Autism Canada, Centre for ADHD Awareness Canada)
    a. These sources must still have reliable evidence bases for their recommendations and guidelines- to be confirmed by information specialists.

These sources must be published in English. Date of publication has been discussed by the Steering Committee and determined that systematic reviews do not necessarily have to be current to be relevant and reliable. Based on the questions submitted during the initial survey, some evidence will be considered foundational and/or unchanging. These sources will be discussed by both information specialists (and Steering Committee members as needed) for confirmation of relevance and reliability.

Finally, those questions which can be resolved with reference to existing research evidence, (i.e., they are 'answered questions' and not uncertainties), will not be discarded. If a question can be answered with existing information but this is not known, it suggests that information is not being communicated effectively to those who need it. These findings may be useful to inform future awareness-raising exercises, knowledge translation and community education strategies. These questions will be retained as 'answered questions' and these will be dealt with separately from the 'true uncertainties' considered during the research priority setting process. These questions will also be shared with the Steering Committee and published on our website.

* James Lind Alliance. Templates and Useful Documents. [Internet]. Londong: James Lind Alliance; 2016 [cited 2021 Dec 20]. Available from: https://www.jla.nihr.ac.uk/about-the-james-lind-alliance/templates-and-useful-documents.htm.

Supplemental File 3. Steering Committee Composition

Parents/Primary Caregivers	Health Care Professionals	Researchers
Lilliam Huerta	Sarah Beltran	Geoff Ball
Kristine Husereau	Hasu Rajani	Michele Dyson
Taryne Johnsen	Bev Schakel	Andrea Eaton
Michelle Johnston	Marilyn Thompson	Tehseen Ladha
K.L. (Declined acknowledgement)	Mona Zhang	Jonathon Maguire

Steering Committee members were required to declare competing interests to the group in order to maintain a culture of openness and transparency. Geoff Ball declared research interests in nutrition and obesity. No other competing interests were declared by steering committee members.

Supplemental File 4. Master List of Unanswered Questions

RANK	INDICATIVE QUESTION	# OF SUBMISSIONS REPRESENTED BY QUESTION
1	What are the most effective interventions to develop social skills for children?	10
2	What are effective interventions to help children manage their emotions?	7
3	What vitamins and supplements optimize child and adult health?	6
4	What is the relationship between screen time and the mental health of children and adults?	6
5	What are effective interventions for parents to manage negative sibling interactions?	6
6	What the the effects of social media on children?	5
7	What are effective interventions to improve focus and attention in children?	5
8	What are the most effective measures to prevent the exposure to and transmission of Covid-19?	5
9	What are effective strategies for children to stay safe at school during the Covid-19 pandemic?	5
10	What are the risks and benefits of attending school versus staying home for children during the Covid-19 pandemic?	5
11	What are the most effective behaviour management strategies for children across age groups?	5
12	What are effective interventions to manage a child who is bullying other children?	5
13	What challenges do parents/families face which make it difficult to follow through on physician's advice?	5
14	What are the best strategies for the prevention of mental health issues in children and families?	5
15	What is the impact of specific diet plans (plant-based diet/vegetarian diet/keto diet, etc.) on health outcomes in children?	4
16	What are the short- and long- term benefits and risks of screen time on children?	4
17	What is the cause of autism in children?	4
18	What are effective management strategies for allergy symptoms in children?	4
19	What are the most effective management strategies for concussions in children?	4
20	What are the effects of sugar on a child's growth, development, and well-being?	3
21	What are the best strategies for parental self-care?	3
22	How does screen time impact a child's physical, social, and behavioral development?	3
23	What are early predictors of ADHD in children?	3
24	What are the cultural barriers practitioners may face (or cultural considerations required) when discussing an Autism diagnosis with a family?	3

25	What are effective interventions to help children with the effects of trauma they have experienced?	3
26	What are effective management strategies for dealing with ADHD medication-related reduction in or loss of appetite?	3
27	What effect do the chemicals/additives/GMOs/pesticides in food have on children and their development?	2
28	What strategies can help parents manage the mental and physical changes of becoming a new parent?	2
29	What strategies are effective in helping families adopt healthier lifestyle habits?	2
30	What are the recommendations for time children should spend outdoors?	2
31	How does screen time affect a child's brain development?	2
32	What are the causes of increasing mental illnesses in children and adults?	2
33	What are effective stress reduction strategies for single parents?	2
34	What are the most effective strategies for communicating with teenagers about mental health?	2
35	How are early childhood behaviors related to a child's future mental health?	2
36	What are the risks for children if they contract Covid-19?	2
37	What are the impacts of Covid-19-related closures/lockdowns (i.e., school, activities, playgrounds) on children?	2
38	What is the level of parental knowledge regarding carseat safety?	2
39	What are effective strategies to promote self-care and hygiene in children?	2
40	What supports do parents need to ensure that their family has a healthy diet?	1
41	What strategies can healthcare providers use to effectively provide cross-cultural communication on nutrition and healthy eating?	1
42	How does nutrition affect a child's learning?	1
43	What is the effect of food intake on mood in children?	1
44	How much time should you let a baby/toddler cry before it is harmful to the child?	1
45	What are the benefits and risks of removing cord clamps within 2-3 days of birth?	1
46	Are there benefits of child led weaning as opposed to traditional way of introducing solids to infants (i.e., pureed/mashed, etc.)?	1
47	What are the short- and long-term effects of melatonin use for children and adults?	1
48	What are recommended morning routines for children and adults for optimal wellness?	1
49	What are the impacts of a consistent routine on a child's physical and emotional health and development?	1
50	What are the most effective early interventions for gross motor delays in children?	1
51	What are the sources parents are using to access information regarding their child's development?	1

52	Do parents whose children have speech delays find "Talk Box" to be a helpful resource?	1
53	What are effective strategies for mothers to ensure they remain healthy with competing demands and limited time?	1
54	What are effective communication and management strategies parents can implement to help their child experiencing obesity?	1
55	What are effective strategies to encourage children to re-engage in physical activity after a period of inactivity?	1
56	How can screen time be combined with physical activity?	1
57	How can families balance screen time and outdoor time?	1
58	What is the impact of educational screen time (e.g., apps about learning numbers, colors, etc) and entertaining screen time (e.g., movies/shows) on children's development?	1
59	What is impact of educational screen time on children's learning outcomes?	1
60	To what extent do genetics play a role in mental health issues for children and adults?	1
61	What is the relationship between parental stress and anxiety in children?	1
62	What are strategies to avoid or reduce the risk of depression during the winter months?	1
63	Are CBD products an effective and safe option for the treatment of severe anxiety in children?	1
64	What are strategies to manage overeating related to anxiety in children?	1
65	What are effective management strategies for bipolar disorder?	1
66	How can parents best support their children's mental health during times of drastic change?	1
67	What is the effectiveness of peer-support interventions for families in managing child/adolescent mental health issues?	1
68	What is the effect of the early recognition and treatment of anxiety disorders in children on their mental health in adolescent and adult years?	1
69	What are effective parenting strategies for parents to use with a child who has post-traumatic stress disorder (PTSD)?	1
70	How do specific diagnoses (i.e., ADHD, ODD, anxiety) impact the experience of puberty for children?	1
71	How do hormonal changes impact ADHD-related behaviors as a child ages?	1
72	How do hormonal changes impact developmental delays as a child ages?	1
73	What are effective strategies parents can use to connect with a child who has autism?	1
74	What are the short- and long- term effects of extended mask use for children and adults?	1
75	What are the impacts of online learning for children rather than in-person learning at school?	1
76	How will children's social development be impacted by the Covid-19 pandemic?	1
77	What is the relationship between Covid-19 and the mental health of families?	1

78	What can be done to prevent emerging psychosomatic traits from worsening in children who have experienced trauma?	1
79	What are effective parenting strategies to manage behavioral issues in a child?	1
80	How to discipline a child who has attempted suicide and threatens to do so when disciplined?	1
81	How can parents deal with the pressure of constant comparison with other parents and families?	1
82	How can parents improve their own parenting skills when they did not learn these from their own parents?	1
83	How helpful do parents find online learning programs on parenting? (e.g., Triple P)	1
84	How can parents ensure they are aligned in their approach to discipline and routines (parenting)?	1
85	How can parents manage aggression between children?	1
86	To what extent does requiring both parents to consent for a child to go to counselling impact a child accessing a services?	1
87	What are strategies to improve confidence for children?	1
88	What are ways to teach children patience?	1
89	What are effective strategies parents can use to calm a child who has complex or multple neurodevelopmental conditions/needs?	1
90	What are effective strategies to foster a positive parent-child relationship?	1
91	What are effective strategies to teach children to establish boundaries and stand up for themselves?	1
92	What method of scheduling pediatrician appointments (for their children) do parents find is optimal to make the appointments most useful? (e.g., set time points, parent-booking as needed)	1
93	How can clinicians more effectively communicate their health recommendations to families of different cultures?	1
94	How does an Indigenous cultural background impact a parent's experience of having a baby with jaundice?	1
95	What social determinants of health do families find are the most important or impact their family's health the most?	1
96	What are effective ways for parents to manage conflicting health information sources/recommendations/advice?	1
97	What are effective strategies to improve dental care experiences for children?	1
98	What strategies prevent allergies for children?	1
99	Does early exposure to allergens prevent later allergies for children?	1
100	What are effective strategies to prevent asthma?	1
101	What is the benefit of increasing inhaled corticosteroid dosing during acute respiratory illness?	1
102	What are the causes and predictors of migraines in children?	1
103	Why does a child vomit during a migraine?	1

104	What are the causes of seizures in children?	1
105	Is there a genetic factor to seizures and can that factor be mitigated?	1
106	What are family-based strategies to reduce feelings of isolation in a child with a chronic illness?	1
107	How can parents better understand and manage a child's chronic pain?	1
108	How can parents help their infant children who have been tube fed to establish (or re-establish) a relationship with food?	1

Supplemental File 5. Interim Prioritization Rank-Ordered List of Unanswered Questions

OVERALL RANK	INDICATIVE QUESTION	*CAREGIVER RANK*	*HCP RANK*
1	How does screen time affect a child's brain development?	1	2
2	What are effective interventions to help children manage their emotions?	2	6
3	What are the most effective interventions to develop social skills for children?	3	16
4	What are the best strategies for the prevention of mental health issues in children and families?	5	14
5	How does screen time impact a child's physical, social, and behavioral development?	8	9
6	How are early childhood behaviours related to a child's future mental health?	4	55
7	What are the causes of increasing mental illnesses in children and adults?	10	15
8	What are the effects of social media on children?	6	29
9	How can parents best support their children's mental health during times of drastic change?	13	19
10	How will children's social development be impacted by the Covid-19 pandemic?	23	3
11	What is the effect of the early recognition and treatment of anxiety disorders in children on their mental health in adolescent and adult years?	17	18
12	What is the effect of food intake on mood in children?	12	40
13	What are strategies to improve confidence for children?	14	39
14	What are the short- and long-term benefits and risks of screen time on children?	15	53
15	How do specific diagnoses (e.g., ADHD, ODD, anxiety) impact the experience of puberty for children?	7	64
16	What are early predictors of ADHD in children?	9	65
17	What are effective interventions to improve focus and attention in children?	20	26
18	What are the impacts of Covid-19-related closures/lockdowns (i.e., school, activities, playgrounds) on children's physical and mental health?	36	1
19	What are the most effective behaviour management strategies for children across age groups?	11	69
20	What is the relationship between screen time and the mental health of children and adults?	18	42
21	What is the relationship between Covid-19 and the mental health of families?	34	5

22	To what extent do genetics play a role in mental health issues for children and adults?	19	48
23	What are the effects of sugar on a child's growth, development, and well-being?	31	12
24	What are the impacts of a consistent routine on a child's physical and emotional health and development?	26	21
25	What are ways to teach children patience?	16	73
26	What is impact of educational screen time on children's learning outcomes?	27	24

Supplemental File 6. Complete List of Priority Questions from Final Priority Workshop

FINAL RANK	INDICATIVE QUESTION
1	What are the best strategies for the prevention of mental health issues in children and families?
2	How can parents best support their children's mental health during times of drastic change?
3	What are the impacts of COVID-19-related closures/lockdowns (i.e., school, activities, playgrounds) on children's physical and mental health?
4	What are the effects of food intake on mood in children?
5	How does screen time impact a child's physical, social, and behavioural development?
6	How are early childhood behaviours related to a child's future mental health?
7	What are effective interventions to help children manage their emotions?
8	What are the causes of increasing mental illness in children and adults?
9	What are the effects of social media on children?
10	What are early predictors of ADHD in children?
11	What is the effect of the early recognition and treatment of anxiety disorders in children on their mental health in adolescent and adult years?
12	What are the most effective behaviour management strategies for children across age groups?
13	What are the most effective interventions to develop social skills for children?
14	To what extent do genetics play a role in mental health issues for children and adults?
15	How will children's social development be impacted by the Covid-19 pandemic?
16	How do specific diagnoses (e.g., ADHD, ODD, anxiety) impact the experience of puberty for children?
17	What are the effects of sugar on a child's growth, development, and well-being?
18	What are strategies to improve confidence for children?
19	What are the impacts of a consistent routine on a child's physical and emotional health and development?
20	What is the relationship between screen time and the mental health of children and adults?
21	What are effective interventions to improve focus and attention in children?
22	How does screen time affect a child's brain development?
23	What is the relationship between Covid-19 and the mental health of families?
24	What are the short- and long-term benefits and risks of screen time on children?
25	What is the impact of educational screen time on children's learning outcomes?
26	What are ways to teach children patience?

Appendix B

This appendix contains supplemental files for the priority setting study presented in Chapter 4, including:

Supplemental File 1. Complete Search Strategy

Supplemental File 2. Quality Assessments Summary using JBI Critical Appraisal Checklist for Qualitative Research

Supplemental File 3. JBI Quality Assessment Sample

Supplemental File 4. Synthesis Mapping Sample of Synthesized Finding Statement with all Supporting Categories, Findings, and Quotes

Supplementary File 1. Complete Search Strategy

Ovid MEDLINE(R) ALL 1946 to December 14, 2021
Date searched: Dec 15, 2021
Results: 1578
Search saved as: Medline covid physical activity pediatric

1. COVID-19/ or SARS-CoV-2/
2. (Coronavirus* or corona-virus* or 2019-ncov or ncov-19 or n-cov-19 or covid or "covid's" or covid-19 or covid19 or SARS-CoV* or SARSCov*).mp.
3. 1 or 2
4. leisure activities/ or recreation/ or "play and playthings"/
5. exercise/ or exp Sports/ or "Physical Education and Training"/ or exp Physical Endurance/ or Physical Exertion/ or exp Physical Fitness/
6. (exercis* or physical* activ* or physical* inactiv* or physical* exert* or physical endurance or fitness or aerobic* or walk* or swim* or running or jogging or cycling or bicycl* or bike or biking or sport or sports or sporting or soccer or hockey or gymnastics or basketball or volleyball or rugby or football or baseball or skiing or rowing or skating or hiking or rock climbing or athletics or "track and field" or danc* or yoga or pilates or physical education or gym* class* or PE class* or (play not (play adj3 (role or part))) or (playing not (playing adj3 (role or part))) or recreation* or fitbit* or pedomet* or acceleromet* or (movement adj8 (track* or behavio* or level*)) or activity level* or leisure or sedentary or active transport*).mp.
7. 4 or 5 or 6
8. exp Child/ or adolescent/ or pediatrics/ or minors/ or (pediatric* or paediatric* or child* or preschool* or pre-school* or kindergarten* or kindergarden* or elementary school* or nursery school* or (day care* not adult*) or schoolchild* or toddler* or boy or boys or girl* or middle school* or pubescen* or juvenile* or teen* or youth* or high school* or adolesc* or young adult* or pre-pubesc* or prepubesc* or grade-1 or grade-one or grade-2 or grade-two or grade-3 or grade-three or grade-4 or grade-four or grade-5 or grade-five or grade-6 or grade-six or grade-7 or grade-seven or grade-8 or grade-eight or grade-9 or grade-nine or grade-10 or grade-ten or grade-11 or grade-eleven or grade-12 or grade-twelve or junior-high or m*-old or 1-y*-old or one-y*-old or 2-y*-old or two-y*-old or 3-y*-old or three-y*-old or 4-y*-old or four-y*-old or 5-y*-old or five-y*-old or 6-y*-old or six-y*-old or 7-y*-old or seven-y*-old or 8-y*-old or eight-y*-old or 9-y*-old or nine-y*-old or 10-y*-old or ten-y*-old or 11-y*-old or eleven-y*-old or 12-y*-old or twelve-y*-old or 13-y*-old or thirteen-y*-old or 14-y*-old or fourteen-y*-old or 15-y*-old or fifteen-y*-old or 16-y*-old or sixteen-y*-old or 17-y*-old or seventeen-y*-old or 18-y*-old or eighteen-y*-old).mp. or (child* or adolesc* or pediat* or paediat*).jw.
9. 3 and 7 and 8
10. limit 9 to yr="2020 - 2022"
11. limit 10 to (autobiography or biography or clinical trial, veterinary or clinical trials, veterinary as topic or editorial or lecture or news)
12. 10 not 11

Embase 1974 to 2021 December 14 (Ovid interface)
Date searched: Dec 15, 2021
Results: 1661
Search saved as: Embase covid PA pediatric

1. coronavirus disease 2019/ or exp severe acute respiratory syndrome coronavirus 2/
2. (Coronavirus* or corona-virus* or 2019-ncov or ncov-19 or n-cov-19 or covid or "covid's" or covid-19 or covid19 or SARS-CoV* or SARSCov*).mp.
3. 1 or 2
4. leisure/ or recreation/
5. play/
6. exercise/

7. exp sport/
8. physical education/
9. "physical activity, capacity and performance"/ or physical activity/ or physical capacity/ or physical inactivity/
10. (exercis* or physical* activ* or physical* inactiv* or physical* exert* or physical endurance or fitness or aerobic* or walk* or swim* or running or jogging or cycling or bicycl* or bike or biking or sport or sports or sporting or soccer or hockey or gymnastics or basketball or volleyball or rugby or football or baseball or skiing or rowing or skating or hiking or rock climbing or athletics or "track and field" or danc* or yoga or pilates or physical education or gym* class* or PE class* or (play not (play adj3 (role or part))) or (playing not (playing adj3 (role or part))) or recreation* or fitbit* or pedomet* or acceleromet* or (movement adj8 (track* or behavio* or level*)) or activity level* or leisure or sedentary or active transport*).mp.
11. or/4-10
12. child/ or boy/ or girl/ or exp infant/ or preschool child/ or school child/ or toddler/
13. adolescent/
14. pediatrics/
15. (pediatric* or paediatric* or child* or preschool* or pre-school* or kindergarten* or kindergarden* or elementary school* or nursery school* or (day care* not adult*) or schoolchild* or toddler* or boy or boys or girl* or middle school* or pubescen* or juvenile* or teen* or youth* or high school* or adolesc* or young adult* or pre-pubesc* or prepubesc* or grade-1 or grade-one or grade-2 or grade-two or grade-3 or grade-three or grade-4 or grade-four or grade-5 or grade-five or grade-6 or grade-six or grade-7 or grade-seven or grade-8 or grade-eight or grade-9 or grade-nine or grade-10 or grade-ten or grade-11 or grade-eleven or grade-12 or grade-twelve or junior-high or m*-old or 1-y*-old or one-y*-old or 2-y*-old or two-y*-old or 3-y*-old or three-y*-old or 4-y*-old or four-y*-old or 5-y*-old or five-y*-old or 6-y*-old or six-y*-old or 7-y*-old or seven-y*-old or 8-y*-old or eight-y*-old or 9-y*-old or nine-y*-old or 10-y*-old or ten-y*-old or 11-y*-old or eleven-y*-old or 12-y*-old or twelve-y*-old or 13-y*-old or thirteen-y*-old or 14-y*-old or fourteen-y*-old or 15-y*-old or fifteen-y*-old or 16-y*-old or sixteen-y*-old or 17-y*-old or seventeen-y*-old or 18-y*-old or eighteen-y*-old).mp. or (child* or adolesc* or pediat* or paediat*).jx.
16. or/12-15
17. 3 and 11 and 16
18. limit 17 to conference abstracts
19. 17 not 18
20. limit 19 to editorial
21. 19 not 20
22. limit 21 to yr="2020 -Current"

CINAHL Plus with Full Text (EBSCOhost interface)
Date searched: Dec 15, 2021
Results: 1049
Deselect: Apply equivalent subjects
Search saved as: COVID-19 Physical activity CINAHL (in Idennett account)

S1 ((MH "COVID-19") OR (MH "COVID-19 Pandemic")) OR (Coronavirus* or corona-virus* or 2019-ncov or ncov-19 or n-cov-19 or covid or "covid's" or covid-19 or covid19 or SARS-CoV* or SARSCov*)
S2 ((MH "Recreation+") OR (MH "Leisure Activities") OR (MH "Play and Playthings+") OR (MH "Dancing+") OR (MH "Walking+") OR (MH "Physical Fitness+") OR (MH "Physical Activity") OR (MH "Physical Performance") OR (MH "Sports+") OR (MH "Exercise")) OR ((exercis* or physical* activ* or physical* inactiv* or physical* exert* or physical endurance or fitness or aerobic* or walk* or swim* or running or jogging or cycling or bicycl* or bike or biking or sport or sports or sporting or soccer or hockey or gymnastics or basketball or volleyball or rugby or football or baseball or skiing or rowing or skating or hiking or rock climbing or athletics or "track and field" or danc* or yoga or pilates or physical education or gym* class* or PE class* or ((play or playing) not (play* N3 (role or part))) or recreation* or fitbit* or pedomet* or acceleromet* or (movement N8 (track* or behavio* or level*)) or activity level* or leisure or sedentary or active transport*))
S3 ((MH "Child") OR (MH "Child, Preschool") OR (MH "Infant+") OR (MH "Adolescence")) OR (pediatric* or paediatric* or child* or preschool* or pre-school* or kindergarten* or kindergarden* or elementary school* or nursery school* or (day care* not adult*) or schoolchild* or toddler* or boy or boys

or girl* or middle school* or pubescen* or juvenile* or teen* or youth* or high school* or adolesc* or young adult* or pre-pubesc* or prepubesc* or grade-1 or grade-one or grade-2 or grade-two or grade-3 or grade-three or grade-4 or grade-four or grade-5 or grade-five or grade-6 or grade-six or grade-7 or grade-seven or grade-8 or grade-eight or grade-9 or grade-nine or grade-10 or grade-ten or grade-11 or grade-eleven or grade-12 or grade-twelve or junior-high or m*-old or 1-y*-old or one-y*-old or 2-y*-old or two-y*-old or 3-y*-old or three-y*-old or 4-y*-old or four-y*-old or 5-y*-old or five-y*-old or 6-y*-old or six-y*-old or 7-y*-old or seven-y*-old or 8-y*-old or eight-y*-old or 9-y*-old or nine-y*-old or 10-y*-old or ten-y*-old or 11-y*-old or eleven-y*-old or 12-y*-old or twelve-y*-old or 13-y*-old or thirteen-y*-old or 14-y*-old or fourteen-y*-old or 15-y*-old or fifteen-y*-old or 16-y*-old or sixteen-y*-old or 17-y*-old or seventeen-y*-old or 18-y*-old or eighteen-y*-old) OR SO (child* or adolesc* or pediat* or paediat*)
S4 PT (editorial* or news)
S5 (S1 AND S2 AND S3) NOT S4 **Limiters** - Published Date: 20200101-20221231

ERIC (EBSCOhost interface)
Date searched: December 15, 2021
Results: 150
Deselect: Apply equivalent subjects
Search saved as: (Covid-19 Eric or Sport Discus in Idennett account)

S1 (Coronavirus* or corona-virus* or 2019-ncov or ncov-19 or n-cov-19 or covid or "covid's" or covid-19 or covid19 or SARS-CoV* or SARSCov*)
S2 (exercis* or physical* activ* or physical* inactiv* or physical* exert* or physical endurance or fitness or aerobic* or walk* or swim* or running or jogging or cycling or bicycl* or bike or biking or sport or sports or sporting or soccer or hockey or gymnastics or basketball or volleyball or rugby or football or baseball or skiing or rowing or skating or hiking or rock climbing or athletics or "track and field" or danc* or yoga or pilates or physical education or gym* class* or PE class* or ((play or playing) not (play* N3 (role or part))) or recreation* or fitbit* or pedomet* or acceleromet* or (movement N8 (track* or behavio* or level*)) or activity level* or leisure or sedentary or active transport*)
S3 (pediatric* or paediatric* or child* or preschool* or pre-school* or kindergarten* or kindergarden* or elementary school* or nursery school* or (day care* not adult*) or schoolchild* or toddler* or boy or boys or girl* or middle school* or pubescen* or juvenile* or teen* or youth* or high school* or adolesc* or young adult* or pre-pubesc* or prepubesc* or grade-1 or grade-one or grade-2 or grade-two or grade-3 or grade-three or grade-4 or grade-four or grade-5 or grade-five or grade-6 or grade-six or grade-7 or grade-seven or grade-8 or grade-eight or grade-9 or grade-nine or grade-10 or grade-ten or grade-11 or grade-eleven or grade-12 or grade-twelve or junior-high or m*-old or 1-y*-old or one-y*-old or 2-y*-old or two-y*-old or 3-y*-old or three-y*-old or 4-y*-old or four-y*-old or 5-y*-old or five-y*-old or 6-y*-old or six-y*-old or 7-y*-old or seven-y*-old or 8-y*-old or eight-y*-old or 9-y*-old or nine-y*-old or 10-y*-old or ten-y*-old or 11-y*-old or eleven-y*-old or 12-y*-old or twelve-y*-old or 13-y*-old or thirteen-y*-old or 14-y*-old or fourteen-y*-old or 15-y*-old or fifteen-y*-old or 16-y*-old or sixteen-y*-old or 17-y*-old or seventeen-y*-old or 18-y*-old or eighteen-y*-old) OR SO (child* or adolesc* or pediat* or paediat*)
S4 PT (editorial* or news)
S5 (S1 AND S2 AND S3) NOT S4 Limiters - Published Date: 20200101-20221231

SportDiscus (EBSCOhost interface)
Date searched: Dec 15, 2021
Results: 460
Deselect: Apply equivalent subjects
Search saved as: (Covid-19 ERIC or Sport Discus in Idennett account)

S1 (Coronavirus* or corona-virus* or 2019-ncov or covid or covid-19 or covid19 or SARS-CoV* or SARSCov*)
S2 (exercis* or physical* activ* or physical* inactiv* or physical* exert* or physical endurance or fitness or aerobic* or walk* or swim* or running or jogging or cycling or bicycl* or bike or biking or sport or sports or

sporting or soccer or hockey or gymnastics or basketball or volleyball or rugby or football or baseball or skiing or rowing or skating or hiking or rock climbing or athletics or "track and field" or danc* or yoga or pilates or physical education or gym* class* or PE class* or ((play or playing) not (play* N3 (role or part))) or recreation* or fitbit* or pedomet* or acceleromet* or (movement N8 (track* or behavio* or level*)) or activity level* or leisure or sedentary or active transport*)
S3 (pediatric* or paediatric* or child* or preschool* or pre-school* or kindergarten* or kindergarden* or elementary school* or nursery school* or (day care* not adult*) or schoolchild* or toddler* or boy or boys or girl* or middle school* or pubescen* or juvenile* or teen* or youth* or high school* or adolesc* or young adult* or pre-pubesc* or prepubesc* or grade-1 or grade-one or grade-2 or grade-two or grade-3 or grade-three or grade-4 or grade-four or grade-5 or grade-five or grade-6 or grade-six or grade-7 or grade-seven or grade-8 or grade-eight or grade-9 or grade-nine or grade-10 or grade-ten or grade-11 or grade-eleven or grade-12 or grade-twelve or junior-high or m*-old or 1-y*-old or one-y*-old or 2-y*-old or two-y*-old or 3-y*-old or three-y*-old or 4-y*-old or four-y*-old or 5-y*-old or five-y*-old or 6-y*-old or six-y*-old or 7-y*-old or seven-y*-old or 8-y*-old or eight-y*-old or 9-y*-old or nine-y*-old or 10-y*-old or ten-y*-old or 11-y*-old or eleven-y*-old or 12-y*-old or twelve-y*-old or 13-y*-old or thirteen-y*-old or 14-y*-old or fourteen-y*-old or 15-y*-old or fifteen-y*-old or 16-y*-old or sixteen-y*-old or 17-y*-old or seventeen-y*-old or 18-y*-old or eighteen-y*-old) OR SO (child* or adolesc* or pediat* or paediat*)
S4 PT (editorial* or news)
S5 (S1 AND S2 AND S3) NOT S4 Limiters - Published Date: 20200101-20221231

Supplemental File 2. Quality assessments summary using JBI Critical Appraisal Checklist for Qualitative Research*

Highlighted columns indicate questions considered in the ConQual** assessment of dependability.

Author (Year)	JBI Critical Appraisal Question Number										Dependability	Credibility	Confidence
	1	2	3	4	5	6	7	8	9	10			
Amran & Jamludin (2021)	U	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Credible	Low
Andriyani et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High	Unequivocal	High
Clarke et al. (2021)	U	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Unequivocal	Moderate
Elliott et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High	Unequivocal	High
Gilbert et al. (2021)	U	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Unequivocal	Moderate
Gothwal et al. (2021)	Y	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Unsupported	Very Low
Lafave et al. (2021)	U	Y	Y	Y	Y	Y	Y	Y	Y	Y	High	Unequivocal	High
Neshteruk et al. (2021)	U	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Unequivocal	Moderate
O'Kane et al. (2021)	U	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Unequivocal	Moderate
Pelletier et al. (2021)	U	Y	Y	Y	Y	Y	Y	Y	Y	Y	High	Unequivocal	High
Pietrabissa et al. (2021)	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	High	Unequivocal	High
Riazi et al. (2021)	U	Y	Y	Y	Y	Y	Y	Y	Y	Y	High	Unequivocal	High
Shepherd et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High	Unequivocal	High
Szpunar et al. (2021)	U	Y	Y	Y	Y	U	Y	Y	Y	Y	High	Unequivocal	High
Welling et al. (2021)	U	Y	Y	Y	Y	U	U	Y	Y	Y	Downgrade 1	Unequivocal	Moderate
	Y = Yes		U = Unclear										

*Lockwood C, Munn Z, Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *Int J Evid Based Healthc. 2015;13(3):179-187. doi:* 10.1097/XEB.0000000000000062.

** Munn Z, Porritt K, Lockwood C, Aromataris E, Pearson A. Establishing confidence in the output of qualitative research synthesis: the ConQual approach. BMC Med Res Methodol. 2014 Sep 20;14:108. doi: 10.1186/1471-2288-14-108. PMID: 25927294; PMCID: PMC4190351

Supplemental File 3. JBI Quality Assessment Sample**

JBI CRITICAL APPRAISAL CHECKLIST FOR QUALITATIVE RESEARCH

Reviewer **Andrea Eaton** Date **March 22, 2022**

Author **Amran & Jamaludin** Year **2021** Record Number **634**

		Yes	No	Unclear	Not applicable
1.	Is there congruity between the stated philosophical perspective and the research methodology?	☐	☐	☑	☐
2.	Is there congruity between the research methodology and the research question or objectives?	☑	☐	☐	☐
3.	Is there congruity between the research methodology and the methods used to collect data?	☑	☐	☐	☐
4.	Is there congruity between the research methodology and the representation and analysis of data?	☑	☐	☐	☐
5.	Is there congruity between the research methodology and the interpretation of results?	☑	☐	☐	☐
6.	Is there a statement locating the researcher culturally or theoretically?	☐	☐	☑	☐
7.	Is the influence of the researcher on the research, and vice- versa, addressed?	☐	☐	☑	☐
8.	Are participants, and their voices, adequately represented?	☑	☐	☐	☐
9.	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	☑	☐	☐	☐
10.	Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	☑	☐	☐	☐

Overall appraisal: Include ☑ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

All credible findings, but low confidence and dependability due to lack of description regarding questions 6 and 7.

** Lockwood C, Porritt K, Munn Z. Qualitative research synthesis: Methodological guidance for systematic reviewers utilizing meta-aggregation. Article. *International Journal of Evidence-Based Healthcare*. 09 / 01 / 2015;13(3):179-187. doi:10.1097/XEB.0000000000000062

Supplemental File 4. Synthesis Mapping Sample of Synthesized Finding Statement with all Supporting Categories, Findings, and Quotes

Synthesized Finding 1. The loss of organized sport opportunities led to decreasesd PA

Category 1. The cessation of organized sport impacted lifestyles and routines

The changing landscape of PA during lockdown - changes in PA level (both increases and decreases) (O'Kane)	"I think it's went down because I'm not doing as much training as I would have. Like I do try and go out a walk every day and I do the home workouts, but it would have gone down" (O'Kane)
Choice of activity (swapping activities, accessing new/different activities) (O'Kane)	"It has cut Irish dancing out but I am still trying to get on a walk everyday"
COVID-19 restrictions decreased the amount and intensity of PA - change to school and sport routines (Shepherd)	"I definitely stopped running as much. My endurance got a lot worse"(Shepherd)
Changes to resources led to changes in PA (Shepherd)	Access to resources was hampered by COVID and affected their engagement in the pre-pandemic PA and sport-specific traning; some modified their activity, worked on other skills: "I wasn't able to swim anymore, then I started... going on runs or work on other skills" (Shepherd)
Access to training programs affected engagement in PA and social connections (Shepherd)	"I didn't have a coach to teach me anymore" (Shepherd)
The changing landscape of PA during lockdown - Changes in PA level (both increases and decreases) (O'Kane)	"I think [overall PA levels] went down because I'm not doing as much training as I would have. Like I do try and go out a walk every day and I do the home workouts, but it would have gone down" (O'Kane)
The changing landscape of PA during lockdown- Choice of activity (swapping activities, accessing new/different activities) (O'Kane)	"All those things I did are now cancelled so all the activities I have to do now would be on my own." (O'Kane)
Changing Priorities - Lack of Motivation (dificult to get motivated) (O'Kane)	"I think it's [PA] probably less [important] because my life involves around being in camogie and football teams, so I was doing a lot and being part of that but now I'm not doing anything really" (O'Kane)
Change in pattern and types of activity (Peletier)	"I would say this year is different than other years in terms of less organized activities that both my kids are in. For me it's way less stress, we can always have dinner together because young children's activities are always between like 4 and 7 so someone's always got to be picking up, dropping off, all that kind of thing" (parent) (Pelletier)
Variation in perceived activity level - No sports or classes (Neshteruk)	Parent "…he starts to dance, jump and all of that, but it's not the same as going to where they teach him to play soccer." (Neshteruk)
Recognising Struggle (a shared experience brought on by the pandemic was emotional struggle) (Elliott)	'there would definitely be some junior players who would be grieving that they've missed out on their opportunity to play under 16s or even under 18s"(Elliott)
Re-engaging after restrictions (emphasises two distinct notions including the difficulties associated with resuming sport involvement and the participants' experience of re-engaging with a highly regulated form of sport participation) (Elliott)	I know a lot of people that have dropped out just because they can't be bothered to continue with the season because it's too hard to get back into or it's too hard to follow the restrictions ... I know a few people that just don't want to continue because it's – I think they don't find a point. (Elliott)
Loss of structured activities and destinations for PA (Riazi)	"Kids these days are very programmed . . . Every weekend was skating, gymnastics, dance or swim lessons and everything was pulled" (Riazi)
	"It's [PA] just totally, totally declined and there's nothing, it's just extremely difficult to replace that" (Riazi)

Important role of parents and peers in motivating children to engage in PA (Welling)	"Before COVID we had an exercise club, with 2 other girls. (...) It's a pity that stopped, because those girls were fun to exercise with." (Welling)
What helps with MWB during COVID-19 (Gilbert)	Parents felt children benefited from being outside and staying active. While some parents indicated limitations in PA due to closure of parks and organized sports such as dance and soccer, many noted playing outside in a yard, riding bikes, and taking walks improved child MWB. (Gilbert)
Parents: Overall feedings regarding children's return to sports and play (Szpunar)	"Well, I guess when you're at the dance studio five nights a week and then all of a sudden you're not there anymore.... it's like for her, it was more like the loss of activity." (Szpunar)
Reduction in Activity Levels (Szpunar)	"I was more active before because with Covid you can't do very many activities." (Szpunar)
Category 2. Social connection and mental health were negatively affected by the loss of organized sport	
The impact of changes to PA and Mental Health during the pandemic (Shepherd)	[The onset of restrictions] "affected me mentally 'cause I was used to putting all my energy into a sport, but then suddenly I didn't have anywhere to put that energy… it just made me feel very um, impatient or like, um, restless" (Shepherd)
The loss of school and sports led to a decrease in social connections (Shepherd)	"it impacted me a lot… how I stay connected with people is going to practices and talking to them there (Shepherd)
Access to training programs affected engagement in PA and social connections (Shepherd)	" I didn't have a coach to teach me anymore" (Shepherd)
Choice of activity (swapping activities, accessing new/different activities) (O'Kane)	"All those things I did are now cancelled so all the activities I have to do now would be on my own." (O'Kane)
Recognising Struggle (a shared experience brought on by the pandemic was emotional struggle) (Elliott)	I think, especially with the 15-year-old, he's going through life changes, he's got huge amounts of testosterone that he would use up, basically every day doing something footy related, and it was just all gone overnight. It was just, you can't do this, you've got to stop. So, he was managing it okay, and then probably about five weeks in, his mental health started to be affected, became like – I don't know, I'm not saying aggressive as in physically aggressive, but just the way that he would talk and would just be annoyed at everything, and couldn't really ex- plain why he was so upset; he became really demoti- vated for a kid who was very motivated. It just became really hard for him and his mood and mental health went downhill so quickly. (Elliott) 'They look forward to the social outing on a Saturday with sport or Thursday night at training and they're just going to have nothing like that anymore' (Elliott) "... with the isolation, the kids are not good at handling that I don't think, they need to look at their mates, that sense of loneliness, they sort of feel that the physical activity that they don't get, they certainly are missing out on that. And the fear of the unknown I think that's the greatest fear you could have, because they don't really know what's going to happen. And so, with all that becomes some dark periods, some negative thoughts and so on. And I just think that sport's a great one at building resilience. You get whopped in a game and then you bounce back and come back again. And that's so important because sport reflects what life's all about and so it's those qualities, the development of those qualities and attributes that we're missing out on from there." (Elliott) I think without training with my school and without being at school with my friends, it's kind of put a bit of a downside to my mental stability, but just like being positive each day and just thinking, 'well the pandemic is not going to last forever and I will see people again', like it's definitely something that kept me going. And just like messaging people, FaceTiming, that's something I did a lot in the pan- demic just to keep in touch with the people I enjoy being around. (Elliott)

Reconnection (unexpected 'silver linings' during the height of the pandemic. Reconnection was philosophically rooted in participants experiences of adapting to life in lockdown with their immediate family, especially in relation to remaining engaged in physical activity) (Elliott)	Well with my friends and everything we are quite tight, and we have a good relationship, but I think it ['Zooming'] was in initiated because of when na-tionals was cancelled and so many people were dis- appointed and we were just trying to find the good out of what had happened, and not see all the nega- tives even though we had to go through that time of grieving, I think we were just all there for each other. Um ... I had communication with my coach and our like club committee and everything were posting things or saying stuff to like keep us – like stay positive and everything, and I stayed in contact with a lot of the swimmers, and were all trying to keep each other positive. Like trying to have a positive attitude towards things and where they were going and everything. (Elliott)
Reimagining Sport (participants regularly reflected on 'what matters most' for youth sport and described the pandemic as an opportunity to refocus and re-imagine sport once the pandemic recedes) (Elliott)	"I don't think many people realise just how import- ant sport was, it's not just kicking goals or throwing goals or, you know, taking marks or placing tackles or dribbling up the court, it doesn't matter. That's simply the vehicle for the wellbeing of communities and that social fabric." (Elliott)
Parents: Overall feedings regarding children's return to sports and play (Szpunar)	Children's social connectedness: "So, you know, I think [child] has some mental health problems, because now with all this happening, you know, everyone's getting on each other's nerves, and I know [child] getting frustrated with us and we're getting frustrated with each other because we are trying to be careful and trying to go by most of these guidelines." (Szpunar)
Children: Challenges to getting active (Szpunar)	"They went through this stage where they were like, does it really matter? You know, nothing's going to go back to normal like, you know, week after week, you know, just kept continuing and just know- ing that school could not come back so they really just the school not going back to, like, what's going on so they were like, who cares? And I just I took it easy on them. You know, because they are children still and, you know, everybody was going through the same thing. But this is really new for a child that was go, go, go. And all of a sudden, you're, like, you know what? You don't have to go anywhere. You stay at home and watch the iPad if you want to, or you could watch TV if you want is it was an adjustment for them." (Szpunar) "There would be like an episode where she might get upset and she cries, and that hurts your feelings, too, because she's justified and you don't know how else to explain it to her, and she just has to get through it and but you're like, there's no reason for this (...) She's not getting in trouble, but you're kind of giving her so many rules and all she just wants to do is just throw the ball and just sort of be free, so. It just maybe stifles her a little bit and then can cause a little bit of frustration, (...) we had to deal with a lot of that." (Szpunar) Not being able to see important personnel (friends, coaches): It impacted me like, very much, because I couldn't see my dance friends. I couldn't go to dance, and I couldn't do much." (Szpunar) "I miss seeing my friends and getting to go to competitions or swim meets and just having fun." (Szpunar) "When you get to be in person is much more fun than trying to dance on your own at home when you don't have the studio, or mirrors, or space." (Szpunar)

Category 3. Attempts made to maintain PA through sport at home achieved mixed success

Choice of activity (swapping activities, accessing new/different activities) (O'Kane)	"I've never done Zumba before cos there's not one round here but I can do it virtual now" (O'Kane)
The impact of changes to PA and Mental Health during the pandemic (Shepherd)	[it helps to] "just focus on my weight training, just help alleviate stress" (Shepherd)
Access to training programs affected engagement in PA and social connections (Shepherd)	"…so I Google like weight training routines" (Shepherd) Some reported accessing training plans provided by their sports organizations, which provided structure for their training and guidance on what PA to perform and to facilitate ongoing engagement in PA: "Thursdays are alwsys the running days and Saturdays are always the workout days" (Shepherd)

	Access to virtual training was desired by participants who did not have access to other resources: "somce the rugby season got cancelled, I think it would have been cool if like we had like virtual practice or something" (Shepherd)
The changing landscape of PA during lockdown- Choice of activity (swapping activities, accessing new/different activities) (O'Kane)	"I've never done Zumba before cos there's not one round here but I can do it virtual now" (O'Kane)
Re-engaging after restrictions (emphasises two distinct notions including the diffi- culties associated with resuming sport involvement and the participants' experience of re-engaging with a highly regulated form of sport participation) -(Elliott)	'We need to remember to not place pressure on people to return if they don't feel that that's some- thing that they are comfortable to do' (Elliott)
Loss of structured activities and destinations for PA (Riazi)	"tried to get the eight-year-old to do soccer drill and he's like 'nah'. He just doesn't have any interest in it. He just didn't want to do it." (Riazi)
	some parents attempted to fill the void by providing "training at home" (Riazi)
Parents: Challenges to getting active (Szpunar)	Quality of Virtual instructions: "She found it really discouraging. In fact, how they had done it was pre-recorded. It wasn't like a Zoom live type dance session. So, she got really frustrated that the instructor couldn't see her or wasn't speaking back to her or that like, you know, she's not making suggestions like, can we do this? Can we do that? And it was so regimented." (Szpunar)
Children: Solutions to challenges of getting active (Szpunar)	Virtual platforms: "There are all these free programs available on YouTube and stuff to get them up and dancing." (Szpunar)
	Virtual platforms: "They would they found this YouTube channel where they could do kids exercises. So, they would do that every day just to kind of keep them off the screens and active." (Szpunar)
	"I miss basketball, but me and my mom play basketball together." (Szpunar)
	"I have a hockey set-up in my basement, so I play hockey in the basement." (Szpunar)
	"I went on hockey training camp on Zoom five days a week, 1 h per day, for 6 weeks." (Szpunar)
	"I used to do dancing online, but it [the internet] was always freezing."(Szpunar)
Reduction in Activity Levels (Szpunar)	"I'm less active because we don't have any games. We're just doing drills." (Szpunar)