

THE POLITICS OF CHILD HEALTH TECHNOLOGIES

THE POLITICS OF CHILD HEALTH TECHNOLOGIES: SOCIAL VALUES AND
PUBLIC POLICY ON DRUG FUNDING FOR CHILDREN IN CANADA

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Lay Abstract

Drug research, development and policy have historically excluded children. One area of persistent neglect is public policy on funding for paediatric medicines. In most publicly funded health systems, including Canada's, decisions about which drugs to cover are made through a formal process called health technology assessment (HTA). This dissertation examines the role and challenges of HTA as applied to child health technologies, with a focus on the social values that inform drug policy for children. It addresses existing gaps in knowledge through the integration of insights from: 1) a comprehensive review of the academic literature on the moral dimensions of child health and social policymaking; 2) in-depth qualitative analysis of the HTA and drug policy environments for children in Canada, employing Ontario as a case study; and 3) a survey of the Canadian public on health system resource allocation for children. Together, these studies generate a detailed picture of the Canadian policy landscape for child health technologies, insights into the fit of current HTA approaches to the realities of child health and illness, and a foundational understanding of the social values relevant to drug policy decisions for children.

Abstract

Health technology assessment (HTA) frameworks appraise the value of technologies – be they drugs, devices, procedures or services – to inform policy decision-making and resource allocation amongst alternatives within publicly funded health systems. The prevailing principles and metrics by which HTA is conducted were designed with adult health conditions and treatments in mind. The evidentiary and normative dimensions of HTA frameworks may have unique repercussions for drug policy and coverage decisions in children, but their relevance to child health has received almost no critical scrutiny in either academic or policy circles. Approaches to paediatric drug coverage approval and access currently lack child-specific data on social values and priorities, a core component of HTA in most countries with public drug funding programs, including Canada.

This thesis presents a mixed methods study of social values relevant to child HTA and drug policymaking in publicly funded health systems, comprised of three original scientific contributions. The first of these is a critical interpretive synthesis (CIS) of the academic literature on the moral dimensions of child health and social policymaking across a range of disciplines and policy domains. The second is a grounded theory analysis of qualitative interviews with diverse health system stakeholders on the social values and health system factors relevant to child HTA and drug funding policy in Canada. The third is a stated preference survey of the general public that assesses societal preferences for health resource allocation to children as compared to adults, to generate evidence for priority setting on health technologies within Canada's publicly funded

health system. Together, these studies yield specific knowledge about the policy landscape for child health technologies in Canada, broad conceptual insights into the normative and methodological dimensions of child HTA, and a foundational understanding of the social values relevant to drug policy decisions for children.

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List of Abbreviations

CADTH – Canadian Agency for Drugs and Technologies in Health

CDR – Common Drug Review

CIS – Critical interpretive synthesis

CRC – Convention on the Rights of the Child

DIN – Drug identification number

ECD – Early childhood development

EMA – European Medicines Agency

EU – European Union

FDA – Food and Drug Administration

HiREB – Hamilton Integrated Research Ethics Board

HRQOL – Health-related quality of life

HTA – Health technology assessment

ICER – Incremental cost-effectiveness ratio

IQR – Interquartile range

NCE – New chemical entity

OR – Odds ratio

pCODR – Pan-Canadian Oncology Drug Review

pCPA – Pan-Canadian Pharmaceutical Alliance

pERC – pCODR Expert Review Committee

QALY – Quality-adjusted life year

R&D – Research and development

RCT – Randomized controlled trial

SAP – Special Access Program

SD – Standard deviation

US – United States

Declaration of Academic Achievement

This thesis presents a mixed methods study of social values and health system dynamics related to drug policy for children, comprised of three original scientific contributions framed by introductory and concluding chapters. I, Avram Denburg, am the lead author on all co-authored studies included in the dissertation. I undertook conceptualization of the overall project, design of its component studies, and was responsible for related data collection, analysis and preparation of the written manuscript. My supervisor, Julia Abelson, contributed to project design and synthesis, and gave substantive feedback on drafts of the thesis chapters. Members of my supervisory committee – Mita Giacomini, Jeremiah Hurley, and Wendy Ungar – each provided detailed input on drafts of the individual research studies and framing chapters, which informs the final manuscript. Shiyi Chen provided statistical support for the analyses presented in Chapter 4.

Chapter 1. Introduction

This thesis presents an original body of scientific work on child drug policy and health technology assessment (HTA) in Canada. In this introductory chapter, I provide an overview of the drug policy environment for children in Canada, with specific attention to the current gaps and challenges in HTA and drug funding for children. I then outline the aims of the research and the approach taken to address them in each of the three discrete studies that comprise the thesis. Finally, I highlight the novel substantive, theoretical and methodological contributions made by this work.

Background

Drug Policy: Making Space for Children

Historically, children have suffered relative exclusion from drug research and development, owing to a confluence of political, economic and regulatory factors (1). Growing recognition of this exclusion, coupled with changing scientific and philosophical perspectives on research involving children, have underwritten efforts to incorporate the unique needs of children into research and regulatory paradigms in most advanced health systems (2). One area of persistent neglect is public policy on funding for paediatric medicines. As the pace of technological innovation has increased, challenges have surfaced in the evaluation of novel therapies for public coverage.

Health systems are faced with the dual and often competing pressures of resource scarcity and technological innovation. In this environment, emphasis on the comparative value of health interventions through the process of health technology assessment has come to figure prominently in policy and program stewardship. HTA is a “multi-

disciplinary field of policy analysis, which studies the medical, social, ethical and economic implications of development, diffusion and use of health technology” (3). HTA frameworks seek to ascertain the relative effects of technologies – be they pharmaceuticals, devices, procedures or services – on individual and population health, the availability and distribution of resources, and other aspects of the health system. HTA provides a range of health system stakeholders with evidence-based information for decision-making and priority setting.

Drug funding decisions in health systems involve difficult values-based trade-offs. Notions of value, however, may vary in important ways in relation to features of the illness, the population affected, or sociocultural context (4,5). To date, the vast majority of HTA research has focused on adult health problems and technologies. Child health has received comparatively little attention (6). More fundamentally, the fit of existing HTA methods for child health issues and interventions remains almost entirely unexamined. There is, however, growing awareness that HTA as currently conducted presents a variety of conceptual, normative and methodological problems in the context of child health (7).

Health system challenges

As currently constituted, Canadian approaches to evaluating health technologies take little account of children *per se*. Drug approvals for selling medicines in Canada are based on assessments of safety and efficacy by Health Canada, the national regulator. Applications for public funding of novel drugs are made to the national-level HTA organization, the Canadian Agency for Drugs and Technologies in Health (CADTH), which conducts formal technology assessments to guide federal, provincial, and territorial

drug reimbursement decisions (8). It is rare that a novel drug is evaluated primarily for a paediatric indication; typically, funding recommendations are based on adult indications and evidence, and haphazardly extended to paediatric indications – often without rigorous consideration of the evidence for use in children. A key driver of this is the preponderance of industry-driven submissions: most submissions to national HTA bodies are made by their manufacturers.

This reality is in part a product of market dynamics, which routinely disadvantage children. As a fraction of the potential market for most drugs, children generate weak economic incentives for strategic investment or prioritization by industry. Unique disease biology and formulation requirements attached to children further fragment these small markets. Medications for children need to be tailored to their evolving size and developmental capacities: different dosages and preparations are required as children grow. More complex still, the relationship between adult and paediatric indications for a given drug is variable. Some drugs are used for similar indications across age groups, though the evidence on their efficacy may vary. Many drugs treat different diseases entirely in adults and children. A few drugs are indicated for use in children alone (9). The political economy of drug development for children thus disincentivizes industry-generated evidence on the safety and efficacy of novel therapies in children, and by extension, industry submission of such therapies for dedicated paediatric HTA review.

Similar problems exist for established therapies. Many existing drugs lack formal paediatric indications, forcing providers to prescribe off-label for children (10). No routine mechanisms exist to mandate or motivate review of drugs already on market for

adult indications in order to extend public funding recommendations to paediatric indications. In the absence of such mechanisms, HTA submissions by providers or patient groups are rare: the time and resources required to conduct the detailed pharmacoeconomic analyses required for such submissions is often prohibitive.

Finally, priority setting for HTA review itself has become a determinant of access to public drug funding. National and provincial HTA bodies in Canada contend with an ever-quickenning pipeline of novel agents against a backdrop of limited institutional resources. The processes for deciding which drug submissions to prioritize for review also typically disadvantage children. A number of the most common principles invoked to order HTA queues – including disease burden, economic impact, strength of evidence, and expected level of interest – conflict with the realities of childhood disease epidemiology and research evidence (11).

HTA challenges

Related to, but distinct from, the system-level challenges to child-focused drug reviews are conceptual challenges that stem from existing HTA paradigms. The adjudication of drugs and other health technologies for public coverage requires a framework to analyze and interpret the value of such technologies. Most institutional approaches to HTA, in Canada and abroad, are premised on three major foci of evaluation: evidence, economics, and ethics. These domains are valued and incorporated in different ways across different health systems, but the broad contours of assessment are remarkably similar (12). In virtually all existing HTA paradigms, modes of evaluation

in these domains are premised on normative assumptions that generate inherent bias against positive funding recommendations for children.

A foundational challenge to drug assessments for the treatment of childhood diseases resides in the nature and perceived quality of clinical evidence for their effective use. The established hierarchy of evidence-based medicine, which ranks methods of inquiry by their susceptibility to bias, places systematic reviews and meta-analyses of randomized clinical trial (RCT) data at its apex (13). Dominant HTA paradigms absorb this logic: they invariably privilege phase 3 RCTs above earlier phase trials, and routinely premise assessments of data quality – and hence drug efficacy – on meeting this bar. This approach is justified in most adult disease, but it breaks down in the paediatric space. Clinical trials in children are limited by small population sizes, the complexities of trial enrolment in children, and weak industry interest in paediatric drug development (14,15). The child health community has sought to surmount these barriers through collaborative research agendas, destigmatization of paediatric research, and advocacy in support of legislative reforms to regulatory environments for drug development (16). None of this is sufficient to consistently surmount epidemiologic realities. As a result, HTA drug reviews for paediatric indications are often non-starters: there simply isn't sufficient acceptable evidence to proceed.

Standard approaches to health economic evaluation in HTA also fail to account for unique features of child health and illness (17). The limited, if not absent, incorporation of life-course dynamics is a notable lacuna. Broadly accepted outcome metrics, like the incremental cost-effectiveness ratio (ICER), do not typically incorporate

time horizons long enough to assess the aggregate benefits and burdens of a given treatment applied in childhood (18). Relatedly, little accounting is made of the real or potential impacts of therapies on developmental trajectories, including treatment effects (both good and bad) with long latency periods. The current proliferation of novel biologic and immunomodulatory therapies compounds this: we have little knowledge of the developmental and late effects of many new drugs coming to market, confounding the precise derivation of long-term costs and effects stemming from their use in childhood. Just as importantly, the challenges of measuring health-related quality of life (HRQOL) in children complicate economic evaluation of child health technologies. Few preference-based measures of QOL among children exist, compromising the calculation of quality-adjusted life years (QALYs) for use in cost-utility analyses. The instruments developed to elicit health state utilities in children are rarely used in standard HTA programs, and even these rely on parental proxies for young children. Perhaps more importantly, the economic impacts of childhood illness and treatment on the family are rarely incorporated into pharmacoeconomic models, despite the ubiquity of dependency in children's experiences of illness (19).

The prevailing evidentiary and economic paradigms for HTA also give rise to a number of ethical dilemmas that are set in sharp relief in relation to child health. The constant value ascribed to discrete years at various points along the trajectory of a life implies that a QALY gained in childhood is equivalent to a QALY gained in old age (20,21). The social values that underpin such assumptions may vary both within and across societies. Some may value health gains in children above comparable gains in

adults, in consideration of, among other things: notions of fairness in the opportunity to live a full life, the social and economic costs of squandered potential, and the *sui generis* value of childhood itself (22-25). Societal preferences might align with weighted allocation of resources by degrees of social or biological vulnerability (26). Children are both inherently and conditionally vulnerable, a product of, variably, received socioeconomic disparities, incapacity for self-advocacy, and political disenfranchisement. Though broader than the technical concerns attached to the appraisal of any specific drug, these dynamics create equity-related challenges for HTA systems, necessitating careful consideration of the unique social values at play in the arena of drug appraisal and funding for children.

Thesis Aims and Approach

This thesis proceeds from the recognition that current HTA models and processes do not account for the unique evidentiary and ethical dimensions of child health and health care, compromising the legitimacy of their application to health technologies for use in children. Its central aims are to:

- 1) review and critically analyze the extant literature on the moral dimensions of child health and social policy (Chapter 2);
- 2) probe the complexities and potential shortcomings of traditional HTA methods as applied to children, through study of the relationships among evidence, economics and social values in paediatric drug policy, with specific emphasis on the Canadian context (Chapter 3); and

- 3) generate empirical evidence on societal preferences related to the allocation of public funds for child health interventions (Chapter 4).

These aims are addressed through three original scientific contributions. Chapter 2 presents a critical interpretive synthesis (CIS) of the moral dimensions of child health and social policy. The conceptual phase of the research program seeks to identify and flesh out key themes related to the normative dimensions of health and social policy for children from a review of the extant academic literature across a range of disciplines and policy domains. The search strategy follows a critical interpretive synthesis approach, which is well-suited to appraising heterogeneous bodies of literature that resist traditional systematic review (27). The following ‘compass’ question guides the search strategy: What ethical and social values inform health and social policies for children? In addition to tightly specified searches based on systematic review methodology, the use of purposive and theoretical sampling of the wide-ranging literatures relevant to this question augment data collection. Political theory on the social construction of target populations is employed to link sociologies of children to public policy analysis (28).

Chapter 3 undertakes a grounded theory analysis of qualitative interviews with diverse health system stakeholders on values relevant to child HTA and drug funding policy in Canada (29). Given the involvement of both national and provincial HTA institutions in the process of technology appraisal in Canada, this study employs Ontario as a case study to: 1) capture political and health system issues along the entire trajectory of drug coverage decisions, and 2) explore federal-provincial dynamics in the realm of paediatric drug policy in Canada. The study sample includes parents of children with

complex or chronic diseases, HTA experts and functionaries at the national and provincial levels in Canada, and provincial bureaucrats and policymakers involved with drug coverage decisions in Ontario. Theoretical perspectives on ‘technology as policy’ frame the analysis of data from the critical review and the development of novel theoretical insights (30-33).

Chapter 4 is a stated preference survey of the general public on societal views about the age-based prioritization of health resources, administered to a nationally representative sample drawn from the adult population of Canada. It seeks to explicitly assess societal preferences for health resource allocation to children as compared to adults, to generate evidence for priority setting on health technologies within Canada’s publicly funded health system. It incorporates and experimentally tests the influence of structured deliberation, in the form of a randomized moral reasoning exercise, on allocative preferences.

The overall research design takes the form of an exploratory sequential mixed methods study of social values for child HTA: the initial conceptual and qualitative phases of research inform the development of the survey instrument used in the quantitative phase (34). Together, these studies yield both specific knowledge about the policy landscape for child health technologies in Canada and broad conceptual insight into the normative and methodological dimensions of child HTA.

Context and Contributions

Significant knowledge and practice gaps exist in relation to the conduct of HTA for child health technologies. Prevailing systems of HTA, in Canada and internationally,

largely fail to incorporate principles or processes that account for the unique biological and sociological dimensions of child health and illness. This body of research furnishes novel substantive, theoretical, and methodological knowledge about the social values and system dynamics related to HTA for children.

Substantively, each of the thesis chapters fills in key knowledge gaps at the intersection of social values and policy for children. The CIS in chapter 2 synthesizes and critically analyzes literature from a wide range of academic disciplines, policy areas, and jurisdictions to provide conceptual insights into the array of values and norms that motivate and justify health and social policies for children. While limited pockets of prior research have engaged with the normative dimensions of policymaking for children in discrete issue areas, no comparable attempts to catalogue and juxtapose them across this range of domains and jurisdictions exist. The qualitative analysis in chapter 3 produces a detailed picture of the system-specific dynamics of technology assessment and drug funding policy for children in Canada. In addition, it unpacks the methodological challenges related to HTA for children, yielding broadly applicable insights for the structure and operation of HTA systems. Chapter 4 generates robust quantitative data on societal preferences for the allocation of scarce health system resources among adults and children across a range of health care scenarios; to this it adds evidence of the impact of structured deliberative methods on priority setting decisions by the public. Though prior studies have examined age-based allocative trade-offs, few have explicitly investigated the way in which the public treats children as compared to adults, and none have tested the role of deliberation on such decisions. Rigorous evidence of baseline and changing

public preferences for health resource allocation to children adds depth and specificity to the extant knowledge on health system priority setting.

Novel theoretical insights emerge from both the CIS of moral considerations in child health and social policymaking and the qualitative analysis of Canadian drug funding policy for children. Chapter 2 generates unique theoretical insights into the normative dimensions of child health and social policymaking across a range of societies. It presents a framework of the relationships between core policy-relevant values and concepts derived from scholarship on a panoply of child health and social policy issues. The power of fundamental insights into common and differentiating moral concerns across the broad canvas of child-focused policies provides a rigorous foundation for future normative analyses of health and social policies for children. Chapter 3 constructs a typology of values relevant to HTA and drug policy for children, producing a valuable heuristic for the analysis of both specific child health technologies and system-level approaches to their evaluation.

In methodological terms, the thesis incorporates qualitative and quantitative approaches to data collection and analysis, drawing on multiple data sources to generate insights founded on a broad range of perspectives. Its exploratory mixed method design integrates findings across the discrete studies: specifically, the conceptual insights on social values from chapters 2 and 3 are employed in the design of the survey instruments used in Chapter 4. Each study innovates in important ways, either in approach or application. Chapter 2 applies CIS methods to the study of values in child health and social policy. The CIS approach is relatively new and still underutilized. Its power

derives from a balance between systematic and inductive methods of literature review, drawing on the strengths of each to enable both rigorous and creative analysis of topic areas ill-suited to traditional approaches to systematic review and evidence synthesis (35). Uniquely, Chapter 2 marries political theory on the social construction of target populations with sociological theories of childhood to understand the relationships between values and public policies for children. Chapter 3 is the first study to incorporate theory on the sociopolitics of health technologies into grounded theory methodology, and represents the first application of both to the study of child drug policy in Canada. Chapter 4 embeds a randomized control trial of a moral reasoning exercise in a stated preference survey of the public on health resource allocation. The use of structured deliberative methods within large-scale surveys is rare. This study adds to this limited evidence base in an area hitherto unexplored: public allocative preferences related to children.

Together, these studies yield specific evidence on social values, system factors, and societal preferences that can be used to inform the creation of coherent and equitable drug and technology policy for children in Canada and comparable health systems abroad.

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Chapter 2. Preface

The first study in this thesis provides a conceptual foundation for the qualitative and quantitative studies that follow. In this chapter, we present results from a critical interpretive synthesis of the academic literature that touch on the moral dimensions of public policies for children. The theoretical insights that emerge from our analysis of the relevant literature enhance understanding of the moral language and dominant policy frames applied to children in a range of policy domains, scholarly disciplines, and sociopolitical contexts. The thematic findings from this study informed the design and analysis of the qualitative case study in presented in Chapter 3, and the stated preference survey presented in Chapter 4.

As lead author, I conceptualized the study, led its methodological design, and conducted the data collection, analysis and write-up. Julia Abelson assisted with the development of inclusion and exclusion criteria to guide article selection from the literature searches, and provided feedback on iterative drafts of the study manuscript. Mita Giacomini and Wendy Ungar reviewed the manuscript and provided detailed input on its substance and framing, which was incorporated into the final version of the chapter.

**The moral foundations of child health and social policy:
A critical interpretive synthesis**

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Abstract

Introduction: Allusions to the uniqueness and value of childhood abound in academic, lay, and policy discourse. However, little clarity exists in popular, political or scholarly spheres on the values that guide, or should guide, child health and social policymaking. In this paper, we review extant academic literature on the normative dimensions of child health and social policy to provide evidence-informed foundations for the development and adjudication of child-focused public policies.

Methods: We conducted a structured review of academic literature on the normative dimensions of health and social policy-making for children, following a critical interpretive synthesis (CIS) approach. The ‘compass’ question that guided our searches of the literature was: *What ethical and social values inform health and social policies for children?* We searched a range of electronic databases, including OVID Medline, PsychInfo, EMBASE, Web of Science, CINAHL, and ProQuest. Article selection was guided by *a priori* inclusion and exclusion criteria, supplemented by purposive selection of articles through an inductive qualitative approach to fill emergent conceptual gaps. We employed a social constructivist lens to frame, juxtapose and interpret themes emerging

from the diffuse literature on public policy for children. Political theory on the social construction of target populations served as a bridge between sociologies of childhood and public policy analysis.

Results: Our database searches returned 14,658 unique articles, of which 342 met inclusion criteria upon review of titles and abstracts. Full text review yielded 72 relevant articles. Purposive sampling of relevant literature complemented our electronic searches, adding 51 original articles, for a total of 123 articles. Our analysis of the literature reveals three central themes, each encompassing a few key values: *potential*, *rights*, and *risk*. The theme of potential captures discourse on childhood as a developmental state angled toward adulthood, and the evolving capacity implied by this trajectory. Rights relate to ideas, normative and legal, about the human rights held by children, which have gained prominence over recent decades. Risk incorporates ideas about vulnerability and the corollary need for protection that animate scholarship about children and childhood across a range of disciplines. These themes retain relevance in diverse policy domains. A core set of foundational concepts also cuts across fields and disciplines: *well-being*, *participation*, and *best interests* of the child inform debate on the moral and legal dimensions of a gamut of child social policies. Finally, a meta-theme of *embedding* – both familial and societal – emerges from the academic discourse in all policy domains examined; it gives form to the pervasive issue of a child’s place, in the family and in society, at the heart of much social theory and applied analysis on children and childhood.

Conclusions: Our review exhibits the recurrence and intertwining of three core themes – potential, rights, and risk – and key concepts – well-being, best interests, and participation – across diverse academic disciplines and policy areas. Foundational understanding of the moral language and dominant policy frames applied to children can enrich future analyses of existing and proposed social policies for children in a range of sociopolitical contexts. Our proposed schema of values, and allied exploration of their points of consonance and tension, is an important step in efforts to gauge social policy prescriptions not only by measures of outcome but also by evidence of their alignment with social values. Subsequent work in this area will need to detail the degree and impact of variance in the values mix attached to children across sociocultural contexts.

“Public provisions for children are inextricably linked with how we understand childhood and our image of the child, [which are] contestable constructions produced in the social arena rather than essential truths revealed through science.” (1, p.2)

Background

Most societies attach special importance to children and childhood. Allusions to the uniqueness and value of childhood abound in academic, lay, and policy discourse. Yet children continue to suffer a wide array of social ills, and social policies affecting children often fail to reflect their professed importance. This discordance between tacit social values and explicit policy warrants explanation. A nuanced understanding of the moral foundations of child-focused policies is an important first step in this endeavour. Surprisingly, little clarity exists in popular, political or scholarly spheres on the values that guide, or should guide, child health and social policymaking. In this paper, we review extant academic literature on the normative dimensions of child health and social policy, to provide evidence-informed foundations for the development and adjudication of child-focused social policies.

Methods

This research maps the normative dimensions of child health and social policy to inform future analyses of policy for children on a range of issues in varied sociopolitical settings. We conducted a structured review of academic literature on the normative dimensions of health and social policy-making for children. The search strategy followed a critical interpretive synthesis (CIS) approach, which is well-suited to appraising heterogeneous bodies of literature that resist traditional systematic review (2). CIS

methods facilitate the integration of concepts and evidence from varied epistemic and disciplinary vantage points, balancing the rigour and sensitivity to quality of systematic review methodologies with the capacity for depth and breadth that attends inductive qualitative approaches (3,4). The goal of CIS is the development of a theoretical framework made rich by both the breadth and depth of its underlying literature review. The research questions that framed the inquiry and guided its analysis took both descriptive and interpretive form, and underwent iterative refinement as data collection and analysis unfolded (Box 1). The ‘compass’ question that guided our searches of the literature was: *What ethical and social values inform health and social policies for children?* Explicit focus on variance in the use and framing of values by policy domain developed as data collection proceeded. We scoped relevant policy domains based on research team expertise, augmented by exploratory survey of the varied disciplines and policy contexts yielded by structured literature searches. An additional focus on tension in values priorities and commitments emerged during the course of data analysis. In addition to tightly specified searches based on systematic review methodology, we undertook purposive and theoretical sampling of the wide-ranging literatures relevant to this question to augment data collection. We sought to embed integration of these conceptual approaches to data collection throughout the continuum of the research process, from search strategy design to selection and analysis of relevant papers.

Based on concepts contained in our primary search question, we developed a matrix of Boolean-linked keywords and iteratively refined an optimal search strategy, with guidance from a university librarian with expertise in electronic database search

techniques (Tables 1, 2). Between March and June of 2016, we searched the following databases, refining search strategies for each platform to optimize yield: OVID Medline, PsychInfo, EMBASE, Web of Science, CINAHL, and ProQuest. We developed *a priori* inclusion and exclusion criteria to guide article selection based on iterative discussions between the principal investigator (AD) and a study team member (JA). Papers were excluded if they did not provide insight into the normative or values dimensions of social policy for children, either with respect to the content of child health and social policies or the processes by which such policies are made. Based on review of article titles and abstracts, we undertook stepwise exclusion of retrieved results as follows. Firstly, we removed all papers not focused on children. We included articles addressing children or childhood from birth to age eighteen; articles addressing embryos, fetuses or adults were excluded. We excluded literature not focused on policy or policymaking. Based on an exploratory analysis of initial search results and inductive literature searches, we explicitly included the following policy domains: health, welfare, education, development, rights, and family. Articles that focused solely on clinical or micro-level program dynamics or decisions were excluded. Finally, we removed articles that did not attend in specific and sustained fashion to normative, ethical, or values considerations.

Of the resultant pool of potentially relevant results, the principal investigator (AD) read full-text articles and purposively included articles that: 1) gave insight into the values dimensions and tensions inherent in social conceptions of children, and the policies that issue therefrom; and 2) explored the relationship between ethics, norms or social values and the nature, process or outcomes of policymaking focused on children.

To complement the systematic selection of relevant papers from online databases, we employed an inductive qualitative approach to data collection. Purposive sampling of academic literature was conducted in iterative fashion during the data analysis phase to fill emergent conceptual gaps. This sampling stage was informed by the pre-existing content knowledge of study team members and colleagues, supplemented by snowball searches of reference lists from key publications. This dual approach to selection and refinement of relevant literature facilitated the reflexivity and ongoing interpretive synthesis at the heart of the CIS approach (2).

Data analysis was conducted by the principal investigator (AD) with iterative input from study team members. It proceeded through four sequential, overlapping phases. First, we identified and categorically coded the major concepts and values in each included article. Second, using constant comparative methods, we worked interpretively across conceptual and normative categories to develop ‘synthetic constructs’ that rendered each category in the light of the whole body of evidence surveyed (5). Third, we sought to attend to points of tension and discordance within and among the constructs, and to consider their meaning. Finally, we built a synthesizing argument based on the insights from the interaction of these constructs, out of which theoretical insights emerged.

Theory

We employed a social constructivist lens to frame, juxtapose and interpret themes emerging from the diffuse literature on public policy for children (6,7). There exist objective dimensions of child life and development (e.g., age in years). However, our

analysis focuses on social and policy ideas of ‘the child’, with the recognition that these are socially contingent and defined largely by adult-led societies. This epistemological ground allowed us to consider both the historical and sociocultural specificity of such conceits, and to leverage insights from sociology and political theory to critique them. We drew on perspectives from the ‘new sociology of childhood’ to help unearth social values embedded in the diverse policy domains examined, and to interpret scholarly accounts of them (8-10). Specifically, we took a critical stance towards portrayals of childhood as *socialization*: that is, as a process of staged ‘becoming’ towards adulthood along scripted developmental lines (11). Critical constructivist approaches identify a number of core weaknesses in traditional sociologies of childhood. First, traditional views insufficiently recognize children’s competence as social actors, neglecting the evidence of children’s active, reflexive construction and negotiation of their own worlds. Second, these views tend to universalize children and childhood, denying the plurality of childhood constructs across contexts. Third, they overemphasize the child as individual and underappreciate the role of relationships that contribute to the nature of personhood (12). In our analysis, therefore, we pay particular attention to the agency and competence of children, the diversity of child life, and the relational character of childhood.

Political theory on the social construction of target populations served as a bridge between sociologies of childhood and public policy analysis (13,14). This theory uses the cultural identity and images of beneficiaries to explain policy processes and outcomes (Table 3). The process of social construction involves: 1) characterizing shared socially meaningful and distinguishing characteristics of a population; and, 2) assigning values

and symbols to those characteristics. This process is generated by the accrued social discourse across politics, culture, history, religion, and literature in a given society. Therefore, we understand cultural characterizations of children as normative and evaluative, rendered in positive or negative political tones through the use of narrative, metaphor and imagery (15). Our analysis of child health and social policies thus proceeded from the contention that the social construction of children as a target population – one often framed by vulnerability – has a strong influence on policy agendas and design, and inversely, that such policies embed constructed messages about children that influence society's perceptions of them and the social issues at hand.

Results

Our database searches returned 14,658 unique articles, of which 342 met inclusion criteria upon review of titles and abstracts. Full text review yielded 72 relevant articles. Purposive sampling of relevant literature complemented our electronic searches, and was refined in light of the emergent results from data analysis. Successive rounds of this strategy added 51 original articles, for a total of 123 articles (Figure 1).

Our review of the literature exposes few explicit analyses of the normative foundations of child health and social policy. Formal attempts to name, interrogate, or prioritize select values – either generally or in specific policy domains – are rare. Three central themes, each encompassing a few key values, emerge from the literature: *potential*, *rights*, and *risk*. The theme of potential captures discourse on childhood as a developmental state angled toward adulthood, and the evolving capacity implied by this trajectory. Rights relate to ideas, normative and legal, about the human rights held by

children, which have gained prominence over recent decades. Risk incorporates ideas about vulnerability and the corollary need for protection that animate scholarship about children and childhood across a range of disciplines. Many of the values within these themes crop up and retain relevance in diverse policy domains. A core set of foundational concepts also cuts across fields and disciplines, effectively regimenting the values discussions within them: *well-being*, *participation*, and *best interests* of the child serve as heuristic beacons for debates on the moral and legal dimensions of a gamut of child social policies. Finally, a meta-theme of *embedding* – both familial and societal – emerges from the academic discourse in all policy domains examined; it gives form to the pervasive issue of a child’s place, in the family and in society, at the heart of much social theory and applied analysis on children and childhood (Figure 2).

Potential

The idea of latent or unrealized potential inherent in children dominates in much of the literature. Allusions to childhood as a state of becoming cross disciplinary bounds and policy domains, as do corollary justifications for policy agenda setting, development and implementation premised on the realization of childhood potential. A number of distinct, if overlapping, sub-themes surface recurrently. Notions of *futurity*, and attendant arguments for *investment* in children, inhere in both theoretical discourse about childhood and applied analyses of a range of child-centred policies (16). These arguments emphasize and often explicitly value children’s potential to contribute to society as eventual adults – especially in economic terms – and leverage this idea as grounds and guidance for policy formulation (17,18). Critically, this future orientation often eclipses

valuing the present needs, experiences, and perspectives of children (1,19). Teleological renderings of the social meaning and value of children are couched in terms of return on societal investment. Such constructs closely align with the core values and assumptions of economic liberalism, wherein productive work and economic contribution epitomize social capital (20).

Related to this are frequent equations of childhood with *preparation*. Childhood is routinely construed as a preparatory stage of life, again, with desultory focus on any intrinsic value, and framed as both an opportunity and a means to socialize the young into prevailing societal norms and expectations. In Mayall's words: "The end or goal [of child policies] is to produce adult citizens who can and will engage in paid work, and take social responsibility...Childhood itself—the present tense of childhood—is devalued" (20). This focus on plastic potential and future significance sometimes takes on eschatological form, as the next generation offers humanity an opportunity to fix and improve on itself: "Children become instruments of society's need to improve itself, and childhood became a time during which social problems were either solved or determined to be unsolvable" (21).

Varied policy domains invoke the idea of the child's potential in characteristically different ways. It plays a central role in health and education. In the realm of child health, prevention and promotion frames dominate discourse, while in education investment frames hold sway (22). Early childhood development (ECD) is an area with solid scientific evidence on the relationship between early experience and brain development, and comparatively high degrees of expert consensus on interventions to optimize

neurodevelopmental outcomes. Investment frames prevail in the scientific and policy literature on ECD. Mounting knowledge about the impacts of early childhood environments and experiences on brain development during sensitive developmental periods, with consequent impacts on long-range neurodevelopmental outcomes, has underwritten the development of policy arguments grounded in allusions to future potential and ultimate economic contribution (23). By contrast, in the field of child welfare, the available evidence on policy impact at the population level is comparatively thin. The typical pattern of public discourse and policymaking focuses on individual cases, and the extrapolation of moral sentiments and arguments from such cases to broader child welfare policies. Moralistic frames predominate: arguments based on desert, rather than outcomes, have often carried the day (22,24,25).

The use of economic frames in the development of child health policies reach their apogee in the American context. Scholarly accounts of the evolution of child health policy in the United States (US) stress future economic potential to justify regular investments in child health – in particular, the phased expansion of Medicaid coverage. Policymakers in the US and internationally have traditionally understood child health as encompassing ‘valence’ issues: ideas emphasizing opportunities for consensus, rather than conflict, across a broad and varied constituency (26,27). Both investment and prevention have served as key normative frames for child health policy debate in the US. Sardell argues that these tropes helped to disaggregate children from other disadvantaged groups and produce the consensus necessary to move policy initiatives on Medicaid expansion for children forward, despite partisan politics (28). National security concerns

have also come into play. Rosenbaum identifies national security as a core normative driver for child health policy and system financing reform in the US (29). Specifically, low rates of military service eligibility in 1962 – exposed in a landmark 1964 Presidential study *One Third of a Nation* – drove much of initial Medicaid program development, as well as Reagan- and Bush-era expansions of the program (30). The scope and depth of coverage offered to qualifying low-income children grew out of Johnson administration Social Security Act Amendments in 1967. The language invoked both by Johnson and in *One Third of a Nation* to justify these child health coverage expansions relied heavily on issue frames such as early vulnerability, human potential and functioning, future economic contribution, and, in particular, long-term national economic productivity and military strength (29). The tendency to leverage individual child potential as a fulcrum for expansive sociopolitical goals – most often, the might and muscle of the polity – is common to arguments across a range of policy domains.

Rights

Rights-based exegesis figures prominently in the academic literature concerned with the moral dimensions of public policy for children. Of the major themes identified in our review, rights have perhaps the broadest disciplinary and substantive reach, mirroring the 20th century ascendance of human rights legislation and jurisprudence in national and international spheres of governance. Much of the literature draws on discourse and tenets from the United Nations Convention on the Rights of the Child (CRC), the signal child rights covenant of modernity (31). The ratification of the CRC dramatically increased the volume and changed the tenor of academic scholarship on children's rights. The construct

of ‘the competent child’ has emerged, an image focused on the child as a rights-bearing individual: one with legitimate needs and preferences, the right to voice them, and the right to participate in decisions about how to meet them. Notably, while the discourse on ‘potential’ focuses on the effects of policy, rights discourse introduces issues of policy process; the participatory rights of children, and the inclusion of their voice in policy decisions impacting them, are fundamental concerns. This discourse strains traditional notions – common in the child protection movement and couched in the rhetoric of risk – of the child as a passive, incomplete and ultimately incompetent vessel in need of protection and edification (32).

The literature reveals synergies between child rights and two paradigmatic normative concerns attached to policy formulation and adjudication for children: *well-being* and *best interests*. Indeed, a telescopic view of conceptions of child well-being in academic discourse captures its evolution from ideas related to the protection of the most vulnerable in the 19th and early 20th centuries, to expansive ideas about well-being as related to, and couched in, the universal rights of children, reaching their apotheosis in the CRC (33). The justification for child well-being gradually evolved from one founded in charity to one premised on entitlement. A key insight from the literature is that the prominence and broad acceptance achieved by the CRC has irrevocably tied notions of child well-being to achievement of their social, cultural, economic, civil and political rights (34), and moreover, that culturally relativistic renderings of children’s purpose and well-being must be tempered by universal conceptions of the rights of the child (35).

A parallel narrative centred on *participation* emerges in the literature, which sets in relief the role of rights in evolving conceptualizations of a child’s best interests. Changing mores about children, founded in changing models of the young child, influence ideas about the legitimacy and necessity of involving children in policy decisions that affect them. Child rights, as enshrined in the CRC, are one of the principal loci and drivers of changing societal perceptions (36). Relatedly, recent insights in the field of early childhood development studies have contributed to major changes in conceptual models of the young child, with corresponding implications for, and impacts on, ideas about involving children in policy decision-making. Scholars have identified three dominant models of the young child – the child as possession, the child as subject, and the child as qualified participant – and have elaborated a new model of the child as social actor, founded in novel theory and evidence from a diverse array of disciplines (37). CRC principles and jurisprudence buttress this model: United Nations General Comment No. 7 elaborates an explicit accounting of a child’s right to expression in “the development of policies and services, including through research and consultations” (38: p.7). The upshot has been a progressive, if fraught, incorporation of ideas of autonomy and participation into the best interests standard: in policy domains as diverse as predictive genetic testing, sexuality and sexual health, child welfare, public health, and research involving children; and in forms as varied as a seat at the policy table, proxy communication through identified advocates, and the incorporation of research evidence on children in policymaking.

Even so, a number of tensions inhere in the relationship between conceptions of children's rights and their best interests. The interface of child and parental rights remains a murky ethical and legal zone. The values of child autonomy and participation can conflict with the legitimacy of parental discretion in decisions regarding children in the child's best interests. Child rights scholars offer a hierarchical taxonomy of intergenerational rights in response, with parental rights as derivative from child rights, and therefore 'functional' in nature (39). This formulation recasts parental rights as prerogatives in the service of responsibilities, insofar as they protect and advance the child's rights (40,41).

Allied issues relate to the substance and application of a child's right to participate. What are the best ways to enact children's participation in policy development? What does participation look like in practical terms? The literature reveals divergent views about the intent and form of legitimate child participation, with identified problems ranging from tokenism, to degrees of imbalance in power relations, to issues of equity in opportunities for expression. Critics note that 'rights-thinking' abstracted from social context induces myopia on structural barriers to rights execution. Some argue that the practical instantiation of rights implies degrees of autonomous capacity that many children lack due to sociopolitical constraints, such as poverty, ethnic or cultural marginalization, familial mores, or lack of political franchise. In Huntington's words: "the dominant conception of rights is one-sided in its emphasis on individualism, rather than relationships" (42: p.664).

Corrective attention to social embedding comes through most clearly and consistently in the public health literature. Scholarship on public health policy invokes twin imaginings of children as rights-bearing individuals and relational beings, with attendant tensions between the two (43). One view affirms (evolving) moral agency, the other recognizes the embedded and contingent nature of childhood within family and societal institutions: an exclusive focus on rights can divorce public health policies for children from engagement with the lived realities of childhood, with corollary implications for equity and impact (44). An instructive example issues from the realm of childhood obesity policy. Some scholars prescribe programs with the intent for universal reach, such as public education campaigns, in deference to the ubiquity of the problem. Others contend that programs which emphasize health education above specific policy levers, such as food taxes, will tend to marginalize families and communities with less baseline capacity to act on educational prescriptions, such as low-income and rural groups (45).

Relatedly, health care policy literature addressing difficult ethical issues about the value of life tests the limits of child rights in relation to their family and social context. Newborn and infant rights are a case in point. Inquiry into cultural intuitions about the value of newborn life – studied through institutional policies and stakeholder perceptions attached to neonatal intensive care – reveals (and problematizes) an instance in which beliefs seem to shift from a defense of rights as unassailable entitlements to socially contingent ones (46). Categorical distinction of the value of newborn life from other child life underscores the moral contingency attached to child health. Vague notions of

‘personhood’ are leveraged to weigh the merits of acute medical intervention (e.g. resuscitation) for the neonate (47,48). Corollary considerations about the burdens imposed on other family members by newborn needs are incorporated into judgments about distributive justice within families – in respect of both parents and siblings. Whether an acutely ill infant should live or die often rests on the results of such arithmetic. Such patterns of policy thought and clinical practice expose deeply embedded historical, evolutionary and sociocultural factors that ground societal perceptions about the value of newborn and infant rights to life. Scholarly documentation of these and other instances of the relational character of child rights open critical windows into the landscape in which our social values about children move. Despite contentions, the direction of movement is clear: rights language has woven itself intimately into the fabric of academic and political discourse about public policy for children, and is certain to texture policy formulation and implementation into the future.

Risk

Risk is a central theme linking social values to policies for children. It takes on a number of hues in the literature analyzed, varying by discipline and domain of social policy (49). These manifest as a range of sub-themes and related concepts. *Innocence* is a frequent ideational precursor to notions of risk. Representations of the child as primitive and innocent abound, with either positive and utopian or negative (feral, delinquent) connotations (1). Innocence ties closely to notions of vulnerability and protection, as well as to the conception of childhood as a preparatory period of ‘socialization’ discussed above. Allusions to *vulnerability* shape a view of childhood as inherently risky.

Vulnerability discourse is marked in the early childhood development and child welfare literatures. Insights from developmental science identify sensitive periods during which early experiences can have outsized influence on developmental trajectories, especially cognitive, psychological and physiological patterns of behaviour (50,51). The child-as-vulnerable also prefigures but draws inspiration from theories and evidence on maternal-child bonding in developmental psychology (52). *Permanency* is a closely related ideological current that has predominated in child welfare discourse and policymaking. Child welfare scholars and advocates theorize that stability in early childhood environments allows for bonding with a ‘psychological parent’ that diminishes risk in early childhood and fosters improved developmental outcomes (53). The confluence of these perceived determinants of risk – innocence, vulnerability, and a need for relationship permanency - induce an emphasis on *protection* and *provision* as the natural grounds for social policy touching on children. This focus tends to produce and justify a measure of paternalism in child welfare policy and legislation, with little attention to points that might permit the active participation of children in the welfare system. Indeed, protection from abuse and neglect has served as the hegemonic principle in social work and child welfare systems across disparate polities for much of the past century (49).

The strong normative currents centred on the protection of children also relate closely to the concepts of *well-being* and *best interests*. The discourse linking these concepts to child protection issues from both the child welfare and public health fields, with varying definitions. Well-being receives both narrow and expansive formulation. Its

negative notion conceives well-being as the absence of abuse, neglect, exploitation. In positive terms, the well-being notion focuses minimally on need, and optimally on inclusive, holistic definitions of a high quality of life (54, 55). Critics have argued that the almost singular emphasis on a narrative of protection from risk in child welfare has excluded broader notions of child well-being, attentive to structural determinants of health and human flourishing (25, 56). They emphasize the socially and historically contingent nature of well-being: one tied to family functioning and parental responsibility, influenced by human rights paradigms, and variably constrained by protection of the private sphere (57, 44). From this standpoint, the risk/protection nexus constrains the ambit of what child well-being could represent, and how policy should seek to realize it.

The relationship between protection and best interests is more intimate still. The concept of ‘best interests of the child’ has predominated as a moral and legal barometer in health policy and child welfare fields alike (58). The health field has long adjudicated clinical or research interventions in children by reference to a best interests standard. The criterion assimilates concepts related to protection from harm and promotion of welfare, and centres on an adjudication of the balance between the benefits and risks of an intervention (59). The best interests standard has occasioned considerable debate. A recurring theme in the academic discourse on best interests centres on their legitimate scope: achieved, by turns, through the juxtaposition of individual, family and population perspectives. In the realm of research involving children, a fundamental tension emerges between the protection of children, as a uniquely vulnerable population, and the

promotion of aggregate child welfare through advancements in scientific knowledge (60). In light of a broader sociopolitical context that has abetted great lags in child-centred health research – particularly in the realm of drug and technology development – scholars have begun to defend differing conceptions about what constitutes acceptable risk to individuals, both as individuals and in service of the collective. The longstanding primacy afforded to a narrow conception of best interests – as inviolate protection of the individual child from research-related harm – is increasingly weighed against, and challenged by, the harms suffered by populations of children due to constraints on the forward march of medical knowledge (61).

The concept of best interests has also emerged as a normative lynchpin in the ethics of clinical practice. Here too the question of whose interests count is front and centre. A prime emergent example of this relates to genetic testing in children (62). The propriety of predictive genetic testing of children for diseases of adult onset has turned on application of a best interests standard. When genetic disease is not amenable to prevention or mitigation during childhood proper, the best interests standard has often dictated deferral of such testing until such time as the child can make an informed decision about it (63-65). However, tensions inhere in the interpretation and application of this standard to genetic testing of children, throwing the convolutions of the concept into sharp relief. The locus of interests accounted for – those of child, parent, or family – is a key cause of this tension. Questions surrounding the handling of incidental results from whole genome sequencing, and the rights of family members to knowledge of such results, have challenged the traditional exegesis of best interests (66). An oscillating

tension is evident between notions of family-embeddedness and the evolving autonomy and capacity of children. On the one hand, the ascendance of rights paradigms has induced a conflict between paternalism and participation in the interpretation of a best interests standard: some understand fidelity to best interests as fulfillment of the totality of CRC-enshrined rights, with due emphasis placed on autonomy (67). Others see the interests of a child as “embedded in and dependent on the interests of the family unit”, and argue for the incorporation of parental and family interests in that standard (63). To wit, the benefits that accrue to family members from the disclosure of incidental results about genetic disease in asymptomatic minors enter into the moral calculus governing the handling of genetic knowledge, and weigh against corollary risks to the child.

Debate on the legitimate bounds of a best interests standard also turn on different conceptions of risk. Again, the ramifications of genetic testing provide a useful case study. Arguments to withhold incidental findings about genetic conditions centre on worries about alterations to parent-child relationships: the risk of sundered bonding from changed perceptions about one’s child outweigh potential benefits from such knowledge (68). Conversely, those who argue for disclosure of incidental results justify their position through reference to the medical risks of undetected conditions. Relatedly, scholars and practitioners have defended the decision to grant parental requests for predictive genetic testing of their children through allusion to familial psychosocial risks related to uncertainty about a child’s genetic inheritance. The prevention or resolution of “disabling parental anxiety” counts in the tally of a child’s best interests (63, 66).

Child welfare scholarship and case law have also routinely employed the best interests criterion as a moral yardstick to measure the need for, and justify interventions to enhance, child protection. The concept itself has roots in English feudal law, and relates to the doctrine of *parens patriae*: the king as father of his people. Initially employed to legitimate sovereign wardship over ‘natural fools and idiots’, it was gradually expanded to include state duty towards the protection of children (59). The best interests standard has come to serve, in most liberal democracies, as a bulwark against historically unfettered parental possessory rights (69). A child’s best interests have become an elemental facet of legal decisions – and popular sensibility – regarding the protection and well-being of children in society. The institutionalization of rights discourse, culminating in the ratification of the CRC, has underwritten this tendency: the rights of the child imply specific corollary duties – of the parent, of society – that justify the curtailment of certain freedoms (70).

Signal debates in the child welfare literature issue from the intermingled interests of children, the rights and duties of parents, and the role of the state. Some scholars detect myopia in the hegemonic interpretation of best interests as ‘child protection’ in social work and child welfare systems (25,55,71). Protection from parental abuse and neglect dominates the prescribed hierarchy of child interests, and leaves little room for more inclusive notions of well-being that are attentive to the social determination of health (72). As Walsh notes: “focus on child abuse and the subsequent construction of ‘child protection’...has contributed to the creation of ‘neglected oppressions’ of age, illness, disability and poverty...in the acceptance of those who are seen to be ‘in need’” (25:

p.36). There is, in parallel, a foundational struggle between participation and paternalism in child welfare services: a complex dynamic exists where the state’s responsibility to safeguard children from harm meets its duty to promote their participatory rights. This tension turns on the intrinsic vulnerability assigned to children, and the consequent pull between competing views of the child as “the powerless victim of the malice of adults” and “the potential unlocker of solutions” (36: p.90). In the wake of a child’s rights revolution, social theorists have begun to detail portraits of children as active social agents rather than passive recipients of circumstance, and to argue for social policy that empowers them to enact this agency (33).

A survey of risk discourse across this broad range of disciplines and subjects yields a landscape of childhood marked by its vulnerability, and populated by attempts to build in norms of protection. Protection from harm – in the home environment, in institutional contexts such as health care, human subjects research, and law, in broader economic and political systems – is frequently justified, and judged, by reference to ideas about children’s well-being and best interests. As with potential and rights, risk is relational: it is situated in family and societal contexts, and calibrated against the interests of each.

Discussion

Our review exhibits the recurrence and intertwining of three core themes – **potential, rights, and risk** – and key concepts – *well-being, best interests, and participation* – across diverse academic disciplines and policy areas. The division of these complex ideas into discrete categories is not meant to imply their isolation from one

another. While the literature admits of strong central themes, the boundaries of these themes are at times indistinct: ideas about potential, rights and risk transit across disciplines and interact within them, alternately reinforcing and challenging one another. Their relationship with well-being, best interests, and participation is also variable. Scholars invoke notions of well-being, best interests, and participation more explicitly in discourse on child rights and risk than in relation to arguments about childhood potential. They are not, however, absent in the latter. Implicit ideas about well-being and best interests proceed from teleological views of the child: well-being is equated with optimal development into adulthood, and policies are seen to align with a child's best interests insofar as they promote this end. Notably, the academic literature has tended to examine best interests and well-being in isolation from one another; their interaction is little explored. A view from above renders them as overlapping – though not transposable – concepts that derive from distinct historical and institutional trajectories: well-being largely from public health, and best interests from legal traditions in child welfare and human subjects research. The potential to draw on conceptual synergies between the two for mutual reinforcement and illumination is abundant, but largely untapped.

The *embedded* nature of childhood is a foundational and unifying theme across diverse disciplines and subjects. Childhood is ineluctably conditioned by layered structures of family, community and society; images of and debates about children are framed by recognition of this contingent state. In particular, conceptions of well-being and best interests of the child are routinely tied to the well-being and interests of the family and, in certain instances, to broader societal well-being. Dominant ideas about

childhood potential, couched in terms of future social and economic contribution, blur the boundaries between individual and societal well-being in policy frames used to justify interventions in early childhood education and child health. The framing and adjudication of risk in childhood – for instance, as evinced in policy debates on paediatric genetic testing and child welfare – are closely allied to ideas about parent-child roles and responsibilities to one another, and how these impact relational interests within families. Child rights discourse grapples with the foundational tension between the sanctity and contingency of personhood, as capacities evolve and the contours of personhood solidify. This tension is evident in the use of rights arguments in debates on a wide range of child health and social policy domains, including research involving children, genetic testing, and public health interventions.

Policy neglect

A sizable tranche of the literature reviewed, irrespective of policy domain, describes situations of relative neglect with respect to robust public policy for children. This policy puzzle – relative policy neglect despite positive identity construction – is answered in part by the lack of power held by children (13). But what about parents as their proxies? Other phenomena may be at play. Our analysis suggests that, while the reasons for such neglect vary somewhat by political and cultural context, reliable features emerge, chief among them institutional and ideational factors. Consistent institutional constraints that surface across polities and policy worlds are the absence of political voice for children and the comparative lack of strong institutions designed to protect and advocate for children. Ideational challenges to public policy advances for children are

often located in states of competition with other minority groups for political attention, abetted by fractured identity and issue construction. On a number of social policy issues, children are absorbed into negative social constructions that frame other groups (notably, the poor and minorities) to which their parents belong. The splintering of children into multiple sub-populations with variable normative construction may dilute the effect of the positive construction attached to children *per se*. Compounding this, parents may be more divided by their identification with alternate ‘target populations’ than united through identification *qua* parents, hampering advocacy and social mobilization in response to perceived policy neglect or misdirection. Despite recognition of the policy neglect attached to children, insights into the need for more sophisticated policy arguments – and the implied demand for a conscious and nuanced unpacking of foundational values – are rare in the extant literature.

Rhetorical shifts

Our review also reveals shifts across time and place in the rhetoric used to justify public policy for children. These shifts hint at the influence of historical and cultural context on the expression and impact of values on policy in a given jurisdiction or domain. US child policy rhetoric, for instance, has shifted from arguments drawing on notions of rights, obligations, and compassion to economic arguments that leverage cost/benefit calculus (22,28). This rhetorical shift has ideological and political (such as Reagan administration rhetoric and policy) as well as societal roots (such as declining religiosity, the rising hegemony of empirical evidence in policymaking, and fluctuating fiscal pressures) (26,73). Analyzing elite discourse, in the form of congressional hearings

on various child policy issues, Gormley finds that there has been a gradual overall rise in the use of economic reasoning to frame and justify child policy, and a corollary decrease in moralistic reasoning (22). The speed and size of such changes vary by policy domain: as discussed above, moralistic arguments initially predominated in policy on education and poverty, but gradually gave way to economic arguments; by contrast, US policymakers have long framed child health policies in utilitarian logic, and couched their value in economic terms.

Modern welfare states are at various points along a discursive trajectory from welfare to well-being as an ordering principle for child-centred social policy. In most, visions of the child as ‘weak, poor, and needy’ have historically underwritten policy prescriptions; in a few, such visions give way to more holistic conceptions of well-being (1). In Britain, policies governing children’s services in a range of domains emphasize well-being as an objective, variably incorporating notions of need, deprivation, rights, quality of life, and social standing in its definition and measurement (55). Scotland’s recent development of a national policy framework for children places well-being at its centre (34). The social-democratic universalism long at work in most Scandinavian countries has tended to induce a focus on need fulfillment, rather than risk mitigation, in social policy: for children and families this has meant inclusive and positive definitions of child well-being at the core of social policies for children (72,74-76).

Though rhetoric differs in tone and emphasis across jurisdictions, there are broad trends evident; our analysis captures the most prominent and impactful of these. The increasing reliance on future potential, often expressed in economic language, is evident

across the majority of liberal democracies. Mounting allusion to child rights and well-being as yardsticks of successful social policy is also broadly detectable, and has gained global traction in the form of international child rights covenants and broadly adopted social indicators (77,78). However, the relative concentration of literature on policies and populations in the Global North precludes a truly global perspective on the relationship between values and child policies. The vast majority of the world's children live in political and cultural contexts where the impacts of child social policies have received little rigorous attention, scholarly or otherwise. Cross-cultural contestations of the values that ground public policy for children, and the consequent means and ends of such policies, are still poorly understood (77,79).

Internal tensions

A number of internal tensions are evident among the values that motivate and justify public policy for children. These tensions are manifest most clearly when these values are examined in the context of particular policy domains (Table 4). The strain between prevailing formulations of rights and embedding is plainest. Boundary conflicts in the territories of child and parental rights regularly emerge in the literature: sometimes they are threshold issues, sometimes they run to the centre of what it means to have and hold a right. The incorporation of family interests into the moral arithmetic of a child's best interests is a question of limits: how much of the familial interest to let in, how much of the individual interest to contain. This issue arises repeatedly in the literature on predictive genetic testing of children, where the child's future right to autonomous decision-making butts up against the benefits of actionable medical knowledge for other

family members (61). By contrast, the possessory rights of parents are judged in direct conflict with the best interests of children in much of the child welfare discourse – to a degree that justifies a *parens patriae* role for the state as legal protector to codify the hierarchy of these values, when in conflict (59,69). The idea of protection from risk is bound up in this tension, but plays both ways: it is a parent’s fundamental duty to protect his child; it is society’s duty to protect that child when he cannot.

This normative conflict is also evident in the domain of public health policy. Scholars from diverse disciplines recognize that exclusive focus on rights can divorce public health policies for children from engagement with the lived realities of childhood, with corollary implications for equity and impact. For instance, a number of authors argue that childhood obesity policy emphasizing universal health education above targeted intervention will tend to marginalize families and communities with less baseline capacity to act on educational prescriptions, such as low-income and rural groups (80). These twin imaginings of children as rights-bearing individuals and relational beings recur throughout the diverse bodies of literature on social policy for children. There is at once a clear affirmation of moral agency in evolution, and a recognition of the embedded and contingent nature of childhood within family and societal institutions.

Occasionally, the normative tension between two values is subtle and inconstant, and goes largely unrecognized in the literature. The push-pull between potential and rights is illustrative. The removal of constraints to optimal development, toward the realization of full human potential, is often regarded as consonant with the protection of a fundamental right of children. This theme comes through clearly in scholarship on early

childhood development. And yet the actual normative framing of potential, as we have seen above, more typically stresses the ultimate social responsibility of children to produce and to adhere to social norms. Such teleological justifications for early childhood policies imply, perhaps unconsciously, a devaluation of children who have suffered deprivation in early childhood environments: they are cast as squandered potential and, by extension, societal burden. More illuminating still, the devaluing of childhood *per se* in dominant conceptions of potential serves to blot out corollary rights, including children's right to be heard, to play, and to participate in decisions affecting them. Where the oak's emergence is scripted, the acorn has little choice but to grow straight up.

Perhaps not surprisingly, children themselves provide a clear-eyed view of the way forward. In studies that directly involve or report on child and youth perspectives, emphasis on the *a priori* value of childhood experience predominates. As compared to adult counterparts, youth participants tend to accord less attention and import to instrumental justifications for child and family policies – for instance, child care as a means to adult economic productivity, or education as a means to subsequent economic contribution – and more to policies responsive to the intrinsic value of childhood (81, 82). To wit, their policy preferences emphasize increasing child and youth 'voices' in policy discourse, reconceptualizing education as a means to more robust citizenship, clean air and water protections, and policies and programs to empower youth (81).

Limitations

Our analysis of the values dimensions of social policy for children is limited by language in two ways. Firstly, we restricted our searches and analysis to English language

literature. As a result, we may have achieved limited capture of the existing cultural variance in values construction and emphasis vis-à-vis children and childhood. Secondly, the broad bounds of this work meant dealing with very different disciplinary tongues. The play of each theme discussed varies by policy domain, its meaning contingent on the tropes and accrued debates of the field. Abstracting from the specific context of such debate inevitably impoverishes it: the unifying discursive threads sometimes cover over quite varied ways in which key issues are conceived and addressed. Considerations of a child's best interests in respect of genetic testing and child welfare systems often vary in kind: one deals with protection from theoretical future harms, the other from very real present ones. Even so, the analytic limitations provoked by such substantive differences are likely overstated. In both their attention to life-course dynamics and sensitivity to embedded childhood identity, each domain says similar things about children and their place in society.

Conclusions

Foundational understanding of the moral language and dominant policy frames applied to children can enrich future analyses of existing and proposed social policies for children in a range of sociopolitical contexts. Potential applications are readily apparent. Better understanding of the ways in which societies value health gains in children – does their intrinsic value outweigh instrumental considerations? Are gains made now less valuable if they fail to promote long-term potential? – could help set system priorities for funding health technologies and services. More nuanced evidence on modes and

perceptions of child participation in social policy agenda setting and development could inform context-specific criteria for engaging children and youth in political decisions that affect them. Subsequent work in this area will need to detail the degree and impact of variance in the values mix attached to children across sociocultural contexts. Insights into the acceptability of particular policy proposals in a given jurisdiction will hinge on the policy frames that prevail: where, for instance, family interests are held ascendant, assignments of state responsibility to mediate interactions between parent and child will have to take careful account of the place and integrity of such interests. Where the participatory rights of children gain increasing traction, customary conceptions of best interests or well-being may need to adapt.

Still, viewed from above, the insights that emerge from the broad themes we identify suggest more coherence than fragmentation in the normative concerns attached to children and childhood. We – as academics, as policymakers, as citizens of a collective – recursively frame and adjudicate policies for children in the light of a narrow band of moral presuppositions. Most societies paint children as potent, vulnerable, entitled and embedded. It is the admixture of these elements in particular policy spheres, across distinct places and times, that determines the form of a given policy and societal reactions to it. Absent an understanding of these core values, our capacity to learn from past policy failures and project future successes is fundamentally crippled. Our proposed schema of values, and allied exploration of their points of consonance and tension, is an important step in efforts to gauge social policy prescriptions not only by measures of outcome but also by evidence of their alignment with social values.

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Figures and Tables

Box 1. Research questions

Research Questions

Descriptive:

- What values undergird health and social policymaking for children?
- Does the policy domain influence the use and framing of values regarding children? Do certain values predominate in specific policy domains?

Interpretive:

- Where do scholarly accounts of values in child social policies overlap and diverge? What points of consonance and tension are evident?
- How do scholars juxtapose and reconcile discrete values?

Search question:

- What ethical and social values inform health and social policies for children?

Table 1. Child policy values CIS search strategy

Synonyms for social values	AND	Synonyms for policy	AND	Context domain synonyms	AND	Synonyms for child
Value* (to capture: value, values)		Policy, policies, policymaking (to capture: policy, policies, policymaking, policy-making)		Public* (to capture: public, publics, publicly, public policy)		Child* (to capture: child, children, childhood, child care, childcare)
Ethic* (to capture: ethic, ethics, ethical)				Social* (to capture: social, social policy, social policies)		P*ed* (to capture: pediatric, pediatrics, paediatric, paediatrics)
Norm* (to capture: norm, norms, normative)				Health* (to capture: health, health care, health-care, health care, health system, health-system, health systems, health sector, health care sector, health-care sector, health care sector)		Infant* (to capture: infant, infants)
Preference* (to capture: preference, preferences)				Welfar* (to capture: welfare, welfarist, welfare policy)		Adolescen* (to capture: adolescent, adolescents, adolescence)
Priorit* (to capture: priority, priorities,				Educat* (to capture: educate, educating,		Teen* (to capture: teen, teenage,

prioritization)				education, educational, education policy)		teen-age, teenager, teen-ager)
				Development* (to capture: development, developmental, early childhood development)		
				Right* (to capture: right, rights, human rights, child rights)		
				Econom* (to capture: economic, economics, econometric, economy, economies, economic policy)		

Table 2. Sample search strategy: MEDLINE

Ovid MEDLINE(R) 1946 to Present with Daily Update			
#	Searches	Results	Search Type
1	Social Values/	18692	Advanced
2	Social Norms/	138	Advanced
3	exp Ethics/	131609	Advanced
4	(value* or norm or norms or normative or ethic* or moral*).tw,kf.	1398111	Advanced
5	1 or 2 or 3 or 4	1481056	Advanced
6	exp Public Policy/	119129	Advanced
7	Policy Making/	13240	Advanced
8	(policy* or policies).tw,kf.	156581	Advanced
9	6 or 7 or 8	238720	Advanced
10	exp infant/ or (infant* or infancy or newborn* or new-born* or baby* or babies or neonat*).tw,kf. or exp child/ or (child* or kid or kids or toddler*).tw,kf. or exp adolescent/ or (adoles* or teen* or boy* or girl*).tw,kf. or minors/ or exp pediatrics/ or (paediatric* or pediatric*).tw,kf.	3421475	Advanced
11	5 and 9 and 10	6186	Advanced

Table 3. Social construction of target populations

CONSTRUCTIONS			
POWER		Positive	Negative
	Strong	<i>Advantaged</i>	<i>Contenders</i>
		Elderly Business Scientists	Rich Minorities Cultural elites
	Weak	<i>Dependents</i>	<i>Deviants</i>
		Children Mothers Disabled	Criminals Drug addicts Gangs

Adapted from Schneider and Ingram (13)

Table 4. Relationship between policy domain and values

Policy domain	Dominant values/themes	Points of tension	Illustrative quotes
Genetic testing	<ul style="list-style-type: none"> • Best interests of the child • Risk/benefit ratio • Relational obligations, family embedding • Child rights: autonomy, capacity, participation 	<ul style="list-style-type: none"> • Pull between notions of family-embeddedness and evolving autonomy and capacity of children • Tension between loci of interests accounted for: child vs parent/family 	<ul style="list-style-type: none"> • “The interest of a child is embedded in and dependent on the interests of the family unit.” (63: p.238) • “One important consequence of explicitly incorporating family interests into the best interest calculation is that an already difficult and subjective determination of the limits of parental authority will unavoidably become messier and more difficult.” (68: p.238)
		<ul style="list-style-type: none"> • Conflict between paternalism and participation in the interpretation of best interests standard 	<ul style="list-style-type: none"> • “The best interests of the child framework is increasingly complicated by a growing appreciation of pediatric autonomy and the development thereof.” (67: p.72)
		<ul style="list-style-type: none"> • Competing risks: altered parent-child relationship through knowledge of genetic mutation vs. psychosocial risk to family of uncertainty around genetic knowledge vs. medical risk of undetected genetic condition 	<ul style="list-style-type: none"> • “It may be ethically acceptable to proceed with predictive genetic testing to resolve disabling parental anxiety...” (63: p.238) • “...any risk of altered parental nurturing as a result of receiving information is outweighed by the increased ability of the child to recognize the need to obtain medical care in the future.” (66: p.5)

Child welfare	<ul style="list-style-type: none"> • Well-being: negative and positive formulations <i>Negative</i>: absence of abuse, neglect, exploitation <i>Positive</i>: minimally, focused on need; maximally, inclusive of expansive definitions of quality of life and desire • Protection • Agency and participation: tethered to child rights principles/conventions • Possessory rights of parents vs. best interests of the child 	<ul style="list-style-type: none"> • Multifaceted and internally tense notion of child well-being, incorporating: need, rights, quality of life, material condition, and social embeddedness 	<ul style="list-style-type: none"> • <i>Need vs quality of life</i>: need “focused on minimum requirements to avoid harm and participate in society”, whereas quality of life “captures degrees of enrichment [and] children’s subjective perception of their situation.” (55: p.380)
		<ul style="list-style-type: none"> • Socially and historically contingent conceptions of well-being: tied to family functioning, influenced by human rights paradigms, and constrained by protection of private sphere of affairs 	<ul style="list-style-type: none"> • <i>Quality of life vs. rights</i>: “quality of life offers an important counterbalance to rights, which...can give rise to a plethora of standards and procedures aimed at averting risk.” (55: p.380)
		<ul style="list-style-type: none"> • ‘Child protection’ vis-à-vis abuse/neglect as hegemonic principle in social work and child welfare systems, to the exclusion of broader notions of well-being 	<ul style="list-style-type: none"> • “Focus on child abuse and the subsequent construction of ‘child protection’...has contributed to the creation of ‘neglected oppressions’ of age, illness, disability and poverty...in the acceptance of those who are seen to be ‘in need’.” (25: p.36)
		<ul style="list-style-type: none"> • Complex dynamic between child rights and parental rights, and between the responsibility of the state to safeguard children from harm and to promote their participatory rights 	<ul style="list-style-type: none"> • “The extremely heavy emphasis in our society on individual freedom of action combines with the historical stress on parental rights in a formidable alliance resisting children’s rights.” (69: p.157-8) • “The tension within child protection between the child as the powerless victim of the malice of adults and the child as the potential unlocker of the solutions to their

			own difficulties...” (36: p.90)
Health policy (Public health, health care)	<ul style="list-style-type: none"> • Distinctness • Vulnerability, innocence and protection • Potential (life-course), harm prevention • Risk/threat to future population health patterns • Intrinsic vs. instrumental value of child life • Family embeddedness, ‘intrafamilial distributive justice’ • ‘Fair innings’ • Evidence 	<ul style="list-style-type: none"> • Internal pull between justifications for prioritization of child health interventions based on intrinsic (distinctness) and instrumental (potential) valuations of child health • ‘Fair innings’ argument privileges children but reduces them to a vessel for aggregate potential: it does not value childhood states of health or well-being differently than those of adults, nor is there a specific accounting made of differentials in developmental impacts across the life-course 	<ul style="list-style-type: none"> • “Childhood as a distinct developmental phase of life...” (26: p.70) • “Society may value health gains in children more highly because of their vulnerability.” (83: p.417) • “The child as a site of investment for the future”; “children as ‘becomings’ and not as ‘beings’ with experiences in the present.” (84: p.292)
		<ul style="list-style-type: none"> • Competing conceptions of children as rights-bearing individuals and relational beings 	<ul style="list-style-type: none"> • “Child health is not complete without considering spillover effects and non-health benefits, including changes in parent/caregiver productivity and earnings, family member quality of life and functioning.” (83: p.418)

	<ul style="list-style-type: none"> • Investment • Rights vs. relations • Liberalism vs. protectionism in capacity for medical decision-making • ‘Personhood’ 	<ul style="list-style-type: none"> • Novel equity implications regarding allocation of scarce health care resources to children vis-à-vis quality and availability of evidence on child health technologies and services to guide allocation decisions • Categorical distinction of the value of newborn life, with historical, evolutionary and sociocultural dimensions 	<ul style="list-style-type: none"> • Priority setting frameworks/methods “may penalize children if the quality of evidence is poorer or scunter than in adults.” (83: p.417) • “The value of a baby’s life is determined, in part, by the family context into which he or she is born... The commonness of infant death [has] led to protective cultural and emotional mechanisms in the form of philosophic differentiation of the newborn from older people.” (46: p.418-9)
<p>Child care, early childhood education</p>	<ul style="list-style-type: none"> • Teleological justification for child care policies: emphasis on educational outcomes and employability • Instrumental valuation of child care as mechanism for both enhanced child development and promotion of parental/family self-sufficiency (e.g. through 	<ul style="list-style-type: none"> • Sociopolitical context crucial in interpreting child care and educational policies, as political ideology influences cast and weight of values grounding policy formulation • Varying degrees of ambivalence and/or discord across polities regarding the appropriate role of government in mediating family life and decision-making vis-à-vis children 	<ul style="list-style-type: none"> • Prevailing justifications for policy on early childhood education “produce powerful notions of childhood by emphasizing its futurity and connection with the nation state.” (23: p.67) • “Americans’ strongly held values – including the importance of family, work, and equal opportunity... have come to fix the boundaries of public support for government interventions on behalf of very young children.” (85: p.54)

	<p>employment)</p>	<ul style="list-style-type: none"> • Competing justificatory frameworks for early childhood education and care: prevailing neoliberal model of economic potential vs. models emphasizing cosmopolitan belonging and solidarity 	<ul style="list-style-type: none"> • Care and education for children has been more marketised and commodified, with an emphasis on education outcomes rather than relational processes.” (86: p.243) • Alternative frames for early childhood education involve “imagery of the ‘social’ understanding of other cultures and ways of being, relationships and interdependence between people, and a disposition of openness...” (23: p.73)
<p>Research involving children</p>	<ul style="list-style-type: none"> • (Minimal) risk • Protection from harm • Equity • Evidentiary demands for promotion of child welfare • Individual vs population harms/protectoins 	<ul style="list-style-type: none"> • Fundamental tension between protection of children from harm, and promotion of child welfare through advancements in scientific knowledge relevant to children • Differing interpretations about what constitutes acceptable risk to individuals, both as individuals and in service of the collective 	<ul style="list-style-type: none"> • “The welfare of all children depends on research to test the safety and effectiveness of medical procedures, drug and biologics, and public health measures. Such research is essential in order to provide benefits and to prevent harms within the population of children as a whole.” (60: p.128) • “With this protection came a drawback: the health issues unique to children were underfunded and understudied.” (61: p.529)

Child rights	<ul style="list-style-type: none"> • Autonomy, individuality • Participation • Dignity • Parental/family rights • Teleological vs. intrinsic worth 	<ul style="list-style-type: none"> • Increasing focus on image of ‘the competent child’, as opposed to child as passive, incomplete and ultimately incompetent vessel in need of protection and edification 	<ul style="list-style-type: none"> • The “image of the competent child...is considered as a reaction against the childhood image of the incompetent child, characterized by considering children as objects in need of protection because of their vulnerability.” (39: p.520-1)
		<ul style="list-style-type: none"> • Tension between child autonomy and participation and legitimacy of parental discretion in decisions regarding children • Divergent views about the intent and form of legitimate child participation 	<ul style="list-style-type: none"> • “The centre stage of the children’s rights paradigm is the recognition of the child as an autonomous subject, meaningful in its current ‘child-being’...Parental prerogatives derive from the rights of their children.” (39: p.525)
		<ul style="list-style-type: none"> • Criticisms of ‘rights-thinking’ as divorced from social context, and therefore naive about structural barriers to rights execution 	<ul style="list-style-type: none"> • “The dominant conception of rights is one-sided in its emphasis on individualism, rather than relationships.” (42: p.664)

Figure 1. Literature sampling process and yield

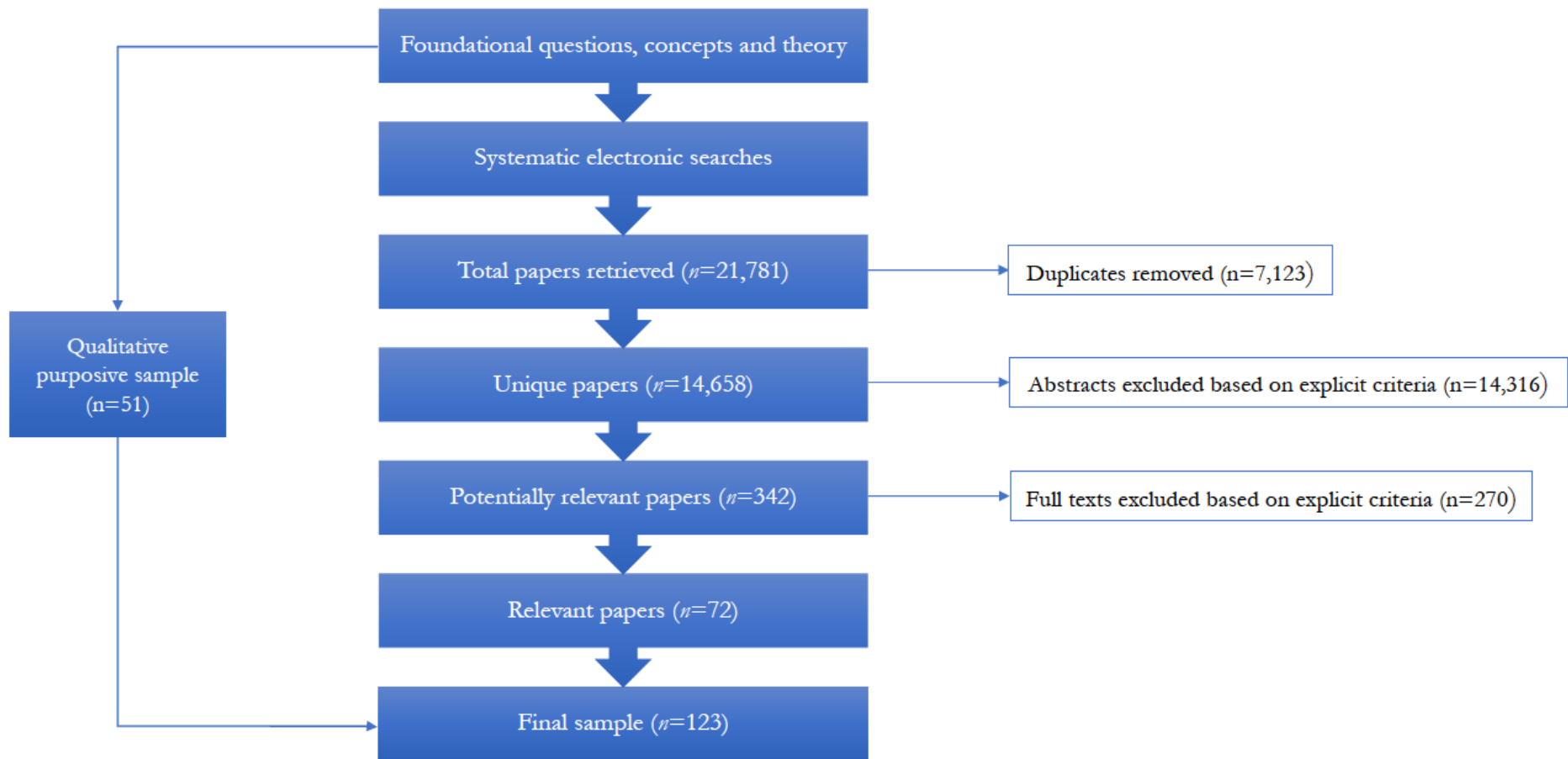


Figure 2. The normative scaffolding of child social policy



Chapter 3. Preface

The study presented in this chapter builds on the broad conceptual work undertaken in Chapter 2 through focused analysis of the values dimensions of a specific child health policy domain in a specific health system context. It explores the social values and system dynamics related to health technology assessment (HTA) and drug funding for children, through qualitative interviews with stakeholders involved with or affected by drug funding decisions for children at the provincial (Ontario) and national levels in Canada. Its elicitation and analysis of in-depth perspectives on the sociopolitical context and considerations surrounding funding decisions on child health technologies provide a valuable counterpoint to the population-level picture of societal preferences for health resource allocation that follows in Chapter 4.

I led the design of the study, conduct of the interviews, coding and analysis of the qualitative data, and development of the written manuscript. My doctoral supervisor (Julia Abelson) and two supervisory committee members (Mita Giacomini and Wendy Ungar) provided key input on study design, the development of data collection tools and coding structures, and the interpretation of analytic results.

***‘The problem is small enough, the problem is big enough’*: Social values and public policy on drug funding decisions for children in Canada**

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Keywords: health technology assessment, drug policy, children, social values, Ontario, Canada, health system, resource allocation, priority setting

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Abstract

Introduction: Public policy approaches to funding paediatric medicines in advanced public health systems remain understudied. Current approaches to HTA present a variety of conceptual, methodological and practical problems in the context of child health. This study explores the technical and sociopolitical determinants of public funding decisions on paediatric drugs, through the analysis of interviews with stakeholders involved in or impacted by HTA for child health technologies at the provincial (Ontario) and national levels in Canada.

Methods: We undertook a series of in-depth, semi-structured interviews with a stratified purposive sample ($n=22$) of stakeholders involved with or affected by drug funding decisions for children at the provincial (Ontario) and national levels in Canada. Grounded theory methods were employed to guide data collection and thematic analysis. We drew on theoretical conceptions of ‘technology-as-policy’ and the sociopolitics of health technologies as sensitizing concepts for our inductive coding and analysis of the data. The themes that emerged informed the development of conceptual and practical insights

on social values and system dynamics related to child HTA, of relevance public policymaking on the coverage of health technologies for children in Canada.

Results: Participant reflection on the normative and systems dimensions of drug funding for children forms two broad categories: technology and society. Each of these categories subsumes multiple themes, arrayed across a network of conceptual domains. Three species of values operate within and transit across these domains: procedural values, structural values, and sociocultural values. Analysis of the relationships between these key concepts and values yields two overarching findings about HTA for child health. Firstly, it reveals notable differences of context and substance related to child health technology production, evaluation and use. These differences span the technical aspects of HTA (from assembly to assessment to assimilation) and the surrounding sociopolitical milieu (from markets to governance to politics). Careful analysis of these differences sets in relief a number of substantive and procedural shortcomings of current HTA paradigms in respect of child health. Secondly, our study brings to light a unique range of social values attached to child health and technologies, and develops a novel typology to facilitate their apprehension and use. Taken together, these findings suggest a need to rethink how HTA is structured and operationalized for child health technologies: from the design of its component parts to the way they fit together.

Conclusions: Current approaches to health technology assessment are not well calibrated to the realities of child health and illness, nor to societal priorities relative to children. Our study contributes to the existing literature on HTA and drug access in three notable ways. Firstly, it furnishes unique empirical data on the political and health system

dynamics of drug funding decisions for children in Canada. Secondly, the analysis surfaces insights into the relevant social values for child drug funding decisions from varied stakeholder groups. The resultant typology of values is readily applicable to the evaluation of prevailing HTA paradigms and drug funding decisions for children in a range of health system and societal contexts. Finally, it employs this typology to catalogue and understand the play of social values across phases of the HTA process and the broader health system context. This produces a nuanced and contextually grounded analysis of concepts instrumental to drug funding decisions for children. The insights generated are directly applicable to the Canadian and Ontario contexts, but also yield fundamental knowledge about the normative dimensions of HTA for children that are germane to drug policy in other health systems.

Introduction

Despite advances over recent decades in child-specific drug regulatory provisions for drug approval in the United States (US) and European Union (EU), public policies on the *funding* of paediatric medicines in advanced public health systems have garnered little attention (1-3). Health technology assessment (HTA) frameworks appraise the value of ‘technologies’ – be they drugs, devices, procedures or services – to inform policy decision-making and resource allocation within publicly funded health systems (4). There is growing awareness that current approaches to HTA present a variety of problems in the context of child health. These range from methodological issues, including standard criteria for evidence appraisal and health economic evaluation, to system ones, including how technologies are prioritized for review and adjudicated for public funding (5,6). In particular, the ethical and sociopolitical dimensions of child HTA have received almost no attention in research or policy. The basis for drug coverage approval and access to novel health technologies for children currently lacks child-specific data on social values and priorities, a core component of HTA in most countries with public drug funding programs, including Canada (7,8).

HTA plays a critical role in drug policy in Canada, as in an increasing number of high-income countries. Formal technology assessment is now a standard component of public drug coverage decisions. The Canadian Agency for Drugs and Technologies in Health (CADTH) conducts national-level HTA reviews for novel drugs and therapeutics licensed for sale in Canada by the federal drug regulator, Health Canada (9). Its recommendations are passed on to the provinces (with the exception of Quebec), where

ultimate authority for public sector drug policy resides (Figure 1). While some provincial authorities recapitulate CADTH's reviews, most now rely on and use national technology assessments to inform their drug coverage decisions. Through the Pan-Canadian Pharmaceutical Alliance (pCPA), provinces are engaging in collective drug price negotiations with industry (10). In the context of mounting cross-provincial engagement on drug policy, CADTH's HTA recommendations play an increasingly important role in guiding cross-provincial policy harmonization.

This paper explores the social values and system dynamics that influence decision-making for public funding of paediatric drugs, through analysis of interviews with stakeholders involved in or impacted by HTA for child health technologies at the provincial (Ontario) and national levels in Canada. It contributes novel data to inform the assessment and prioritization of funding for paediatric drugs and health technologies, with direct policy relevance to health care priority setting bodies and government funders.

Methods

Data Collection

Between December 2015 and April 2016, we undertook a series of in-depth, semi-structured interviews with a stratified purposive sample ($n=22$) of stakeholders involved with or affected by drug funding decisions for children. The sample included: parents of children with cancer and other chronic diseases ($n=4$); health professionals (physicians, allied health, pharmacists, bioethicists) involved in the care of such patients ($n=7$); HTA professionals at the national level in Canada ($n=4$); and provincial policymakers involved with drug coverage decisions in Ontario ($n=7$). Interviewing stakeholders from these

discrete roles relative to HTA afforded us a range of perspectives to triangulate findings. We identified potential participants through grey literature review, institutional scans of relevant hospitals, HTA organizations and government websites, and referral from other stakeholders. Study participation was voluntary, and all participants provided written informed consent prior to participating in interviews. Interviews were audiotaped, transcribed verbatim and inductively coded using NVivo 11 software (QSR International, Ltd.). Data were anonymized and de-identified to protect participant confidentiality. Ethics approval for this study was granted by the Hamilton Integrated Research Ethics Board (HiREB) affiliated with McMaster University.

Data Analysis

Using interpretive grounded theory methodology, we undertook iterative sequential phases of data coding, moving from open through theoretical codes, with constant comparative methods employed to refine codes, establish analytic distinctions, and capture emergent themes. We conducted additional interviews to pursue salient themes as they emerged, until theoretical saturation was reached. These themes informed the development of conceptual and practical insights on social values and system dynamics related to child HTA, to inform public policymaking on the coverage of health technologies for children in Canada. We drew on theoretical conceptions of ‘technology-as-policy’ and the sociopolitics of health technologies as sensitizing concepts for our inductive coding and analysis of the data (11-14). The notion of technology-as-policy invokes the inherently political nature of all technologies: “Technologies not only get things done, like policies, they also change what gets done, how and by whom it gets

done, and who gains or loses as a consequence” (15). It underscores the power dynamics created and mediated by discrete technologies, and the moral implications of their development, use and disuse. Lehoux and Blume provide a normative framework to interrogate the sociopolitics of health technologies, which emphasizes four domains of assessment: actors, resources, knowledge, and power (13). We employed this framework as an heuristic to critically analyze the concepts and themes that emerged from our data.

Results

Participant reflection on the normative and systems dimensions of drug funding for children coalesced into two broad categories: **technology** and **society**. Each of these categories subsumes multiple themes, arrayed across a network of conceptual domains. Three species of values operate within and transit across these domains: *procedural* values, *structural* values, and *sociocultural* values.

1. Major Categories

1.1 Technology (HTA Paradigms)

Foundational ideas about the nature and role of technology in shaping health outcomes across the life-course emerged from participants’ reflection on, and challenges to, current approaches to the assessment of health technologies for children. These challenges spanned the line of production in HTA: from the *assembly* and prioritization of technologies, through the component parts of formal *assessment*, to health system *assimilation*. In each of these phases, participants located points of poor fit between HTA

process or structure and the realities of child health and illness; they also identified opportunities to better align HTA to these realities.

1.1.1 Assembly

The manner in which technologies are selected, packaged and presented for formal assessment by HTA institutions is an oft-overlooked but critical part of the process that determines public funding decisions for drugs and other health technologies (16,17). This ‘assembly’ phase is generative: it frames the perceived place, use and relevance of a given technology in relation to others; in so doing, it conditions both the priority assigned a technology and the parameters for conducting its review (18). A number of the HTA and health care professionals interviewed spoke to the importance of a birds’-eye view of the health system in setting up the trade-offs inherent in HTA. Emphasizing the opportunity costs of selecting technologies for assessment, these participants identified myopia in current HTA paradigms, in which decision-making is often abstracted from the wider health system context:

“If we want to design and execute a health care system that is evidence-informed and reflects our values, then actually we also have to tackle those higher-level resource allocation decisions.” (HTA professional)

They emphasized the added relevance of system-level perspective in the prioritization of child health technologies, arguing that standard metrics of priority setting in HTA may require rethinking to balance conventional concerns with those specific to the epidemiology and management of childhood disease. Disease burden as a principal determinant of HTA priority setting was a notable example. One participant referenced the need for more nuanced priority-setting based on disease prevalence, noting:

“if your view is you have to look first at the most common cancers, one hundred percent of the time children are going to be back of the queue.”
(Provincial policymaker)

The human and fiscal resources available for HTA were referenced as a determinant of priority setting tilted toward majority concerns:

“I think [it is] probably a practical issue that there's lots to carve off. Let's just carve it off for the adult. So, I don't think in the past [we] went out and said we don't do paediatrics, but whenever anything came 'round in paediatrics...it didn't really develop into anything.” (HTA professional)

In aggregate, a clear concern emerged that the palette of values incorporated into HTA priority-setting, and into the assembly of health technologies more broadly, is insufficient. The corollary of this in the paediatric space was a recognition that better incorporation of relevant values could help rebalance priority setting exercises to correct for intrinsic bias against child health technologies.

In addition to a critique of the values that structure HTA assembly, participants also cited problems with the processes that condition it. Clinicians, HTA professionals and parents alike viewed the submission process for HTA review as routinely at odds with the nature of paediatric drug development and use. The reliance on industry to put forward drugs for review by national HTA bodies – and, notably, to generate and package the clinical and economic evidence that enables it – was seen to limit the scope of paediatric drugs evaluated for public funding:

“The one policy thing that really bothers me in drugs is, it relies almost universally on the manufacturer putting something forward. So, the biggest issue I find in HTA – and it's not just a paediatric issue, I think it's a rare disease issue, but it's particularly relevant to paediatrics – is a lot of things never actually come forward for HTA.” (Provincial policymaker)

Participants located the root of this problem in the disjunct between industry profit incentives and the costs of doing business in paediatric drug development. Both the small size of childhood drug markets and the added complexity of clinical trials involving children conspire to deter industry from the work involved in submission for HTA review. As one subject noted:

“Industry makes those decisions based on economics and it just doesn’t make economic sense for them to [submit].” (Health professional)

In the absence of legislative provisions in Canada to incentivize or compel industry to generate drug safety and efficacy data in children, there is little financial reason for companies to seek either market approval or public coverage for most paediatric medicines. This lack of motivation has outsized impact in an HTA system heavily reliant on manufacturer-initiated submissions. As a number of participants noted, it shifts the responsibility for submission to other health system stakeholders, such as clinicians and patient advocacy groups. These parties are often poorly resourced to undertake the complicated work of HTA submission, which involves extensive evidence review and pharmacoeconomic modelling. More fundamentally, weak industry interest in childhood drug research limits the very evidence upon which funding recommendations are made: pharmaceutical companies are less likely to invest in establishing firm paediatric indications for their products in the absence of compelling markets for their sale. The HTA professionals interviewed identified the established indications for drug use as a critical component of HTA assembly:

“We typically only look at the Health Canada proved indications, so, therefore, if it has a restriction of 18 years of age or older...it's our

understanding that when we put these recommendations forward, the payers are following the indication for use.” (HTA professional)

The relationship between market dynamics and evidence generation was in fact a major theme voiced by participants, one with broader implications than on HTA assembly alone. We deal with this theme in greater detail below.

To better align HTA submissions with patient and health system needs, participants called for HTA institutions to do “more work at eliciting provider submissions, as opposed to everything coming from pharma” (Health professional), recognizing that this would necessitate dedicated resources to enable such submissions. One argued for built-in requirements to incorporate paediatric-specific indications for agents submitted to national HTA bodies. Others identified the need for a ‘paediatric HTA watchdog organization’, tasked with regular review of the landscape of HTA submissions in Canada and support of decision-makers in paediatric-specific evidence collation and interpretation. Indeed, some identified the potential for reciprocal benefits in such a relationship, alluding to a role for the HTA system itself to help define paediatric drug research priorities:

“The folks at the health technology assessment end are not just recipients of evidence...[They] can feed back to the people who provided the evidence, saying, ‘You know what? This suggests to us that there's more evidence to be had and we don't have the skills to figure out how to generate [it], you do.’ So there's a stimulus to go generate that new evidence. That's a dynamic that I think is well worth fostering.” (Health professional)

Taken together, these comments reveal both a nuanced understanding of the upstream factors conditioning funding decisions on child health technologies, and an appreciation that their redress will demand system reform on distinct fronts. The attention paid by

participants to the under-explored phase of HTA assembly suggests its relative importance in the context of childhood drug access, and the need to attend to it in attempts to optimize HTA systems for children.

1.1.2 Assessment

The phase of technology assessment itself received the most detailed reflection and scrutiny by study participants. Its component parts – evidence appraisal, economic evaluation, and consideration of social values – furnish the rationale for public drug funding recommendations by most HTA institutions. Most stakeholders found each of these components wanting in respect of child health and illness; many suggested creative ways to better calibrate them to assess drugs for paediatric indications.

1.1.2.1 Evidence

Participants paid greatest attention to the evidentiary challenges attached to child-focused HTA. The prominence afforded this domain may have been a function of its familiarity to those interviewed; it likely also speaks to its centrality in the unique set of challenges presented by technology assessment in child health. Challenges to traditional notions of evidence and metrics of clinical effectiveness prevailed across stakeholder groups, underscoring the complexity of evidence generation and appraisal for novel drugs used to treat childhood diseases. Participant reflection on the nature and place of evidence in child HTA converged into themes of *limitation*, *evolution* and *adaptation*. A sense of movement through these themes linked them into a coherent discourse about the

changing relationship between knowledge and access in respect of child health technologies.

1.1.2.1.1 Limitation

Participants uniformly described intrinsic limitations to the production and interpretation of clinical evidence in children. This theme of limitation prevailed across stakeholder groups and was among the strongest currents of discourse related to evidence for HTA. Frequent comparisons to the generation of evidence for adult health technologies set these limitations in sharp relief. The poor fit to child health of accepted valuations of medical evidence – in particular, as reified in the evidence-based medicine (EBM) hierarchy – surfaced repeatedly. Participants emphasized the difficulties of producing ‘high quality’ evidence in children in terms of current HTA standards, which interpolate EBM norms – in one participant’s words, “the ability to generate evidence in a paediatric population that is ‘robust enough’ to answer questions” (Clinician). These difficulties were traced to both disease and population dynamics. The issues of trial availability and size predominated. Participants spoke about inherent challenges to recruiting trial subjects in the context of most childhood diseases, noting small numbers of affected children and historical reticence to involve children in clinical research. They related this reticence to an admixture of societal, professional, and industry concerns.

Safety was a major preoccupation in this regard. A lower societal tolerance for risk among children was felt to animate decisions – both at the level of design and enrolment – about children’s involvement in clinical trials:

“I think from the societal level down to policy-makers, and even people on the front line in health care, there's a sense that in terms of the safety/efficacy balance we need to be more sure with respect to children than adults.” (Health professional)

“...that's been made quite concrete with respect to the enrollment of children in, for example, phase one trials. There has to be a higher standard, if you like, than for adults with end-stage disease.” (Health professional)

Diverse stakeholders identified the need for more and better paediatric drug safety data, in both pre- and post-market phases. A number identified the existence of provisions in other jurisdictions – notably the US and Europe – to both incentivize and compel industry to generate safety and efficacy data for paediatric indications of drugs new to market; they lamented the lack of comparable provisions in Canada. We return to this issue in a subsequent section. The perceived upshot of this relative lack of data on paediatric drug safety and efficacy is that *“you wind up adopting an adult intervention as the paediatric standard of care, without really the knowledge and the experience to do that safely and well.”* (Health professional)

In addition to upstream issues related to trial access and lack of data to support paediatric drug indications, participants identified downstream safety concerns attached to novel drug use in children. Most participants used the trope of ‘late effects’ to encapsulate this idea: the cumulative, often latent, and typically injurious side effects of a given treatment that accrue over the life-course. As participant responses evince, the potential effects of ‘late effects’ on drug access cut both ways. They can serve as putative barriers to the adoption of novel health technologies for children, inasmuch as lack of solid long-term safety data in children prompts deference to precautionary principles:

“If you commit an 85-year-old to a drug that affects the bone marrow it has different implications to if you submit a 5-year-old to that, especially if it’s a condition for which they will need treatment for many years.” (Health professional)

“We cannot just accept adult data on safety...we can't base it on adult evidence because we know when we start playing with the immune system, of a developing immune system, it ain't the same.” (Health professional)

Conversely, factoring in a drug’s long-term effects can buttress arguments in favour of health system adoption, if the expected toxicity profile is promising relative to existing standards of care. However, it is the absence of confirmatory data on their real effect, coupled with the higher normative bar set for proof of safety in children, that participants viewed as a principal evidentiary barrier in current HTA approaches to child health technologies:

“The whole issue of late effects is not going away, it's just going to shift...It's not a reason not to invest in the development of new agents and their application, it's just a wariness that, you know, life is not simple. There are nasty surprises just as there are wonderful revelations.” (Health professional)

The fact that many novel drugs in the era of precision medicine hold promise to reduce toxic side effects, both immediate and long-term, was seen by many as both a potential boon to children, and a factor inadequately recognized by current HTA paradigms. The benefits to children from reduction of treatment-related morbidity that would accrue over the life-course are not captured in standard assessments of the clinical or economic evidence on a given health technology. Many felt that better incorporation of this dimension of treatment effect would privilege public funding of child health technologies, while acknowledging that HTA bodies routinely need to take decisions in the absence of such long-term data.

Industry's reckoning of the risks and rewards of paediatric clinical trials research was also seen as a determinant of the quantity and quality of evidence on drug efficacy in children. In addition to the safety dynamics discussed above, broader industry strategy about the potential gains of extending study of a given drug to the paediatric space was seen to have considerable bearing on whether and what type of evidence is generated. In the view of some, this calculus had bearing on trial design, including the outcome measures on which the drug's success or failure is premised:

“The clinical data doesn't often measure what are the true outcomes from a clinical sense that...will have a real impact on these individuals. And so the evidence, again, is focusing more on the regulatory approvals.” (HTA professional)

Better integration of clinician and patient voice in industry-led drug trials for children was invoked as a means of enhancing the relevance of trial design and outcomes at the bedside, and by extension, in health system priority-setting exercises:

“Clinicians within the paediatric centres, as an example, if they're participating in these studies, need to give feedback to the manufacturers at the time that they're enrolling their patients to indicate more clearly what, what actually are the important outcomes from their perspective that should be measured.” (Provincial policymaker)

“We deal with the crumbs on the table sometimes I feel like. You know, and meanwhile it would have been much more helpful if we helped make the meal, right?” (Health professional)

Separately and together, these dynamics were identified as barriers to the generation of high quality evidence on the efficacy of drugs and other health technologies in children. Participants from clinical and HTA backgrounds acknowledged the integral role of randomized control trial (RCT) evidence of efficacy in current HTA paradigms,

and emphasized the resultant challenges faced in assessing the worth of child health technologies:

“If you take sort of the old-school way...for everything you do you need to have a randomized control trial and there needs to be a placebo arm, whether it's a drug or non-drug technology assessment.” (Health professional)

“Randomized controlled trials are usually expensive, require huge numbers and in the paediatric context, you know, a huge number in our world is like ‘why bother’ in the adult world, right?” (Health professional)

“This is going to be an exceptional challenge as we moved into the world of genomics and personalized medicine, because that notion of having the RCT as the gold standard of evidence is going to be increasingly harder to obtain.” (Parent)

“That approach where we deem phase I/phase II automatically experimental is outdated, outmoded, it doesn’t make sense.” (Parent)

The risk of missed signals of clinical efficacy within traditional trial designs was of particular concern to those engaged in understanding the relevance of novel drugs or technologies in children:

“If you struggle to accumulate 400 cases and the [drug] target only occurs in a portion of those cases, you're going to washout significant findings. All of which is to say randomized control trials for diseases that have low incidences are problematic and there needs to be a new view of the level of evidentiary support.” (Health professional)

“When you have children who are being put into very specific baskets of their genomic and genetic markers and being treated for those, and the amazing array of genetic and genomic aberrations across the diseases, this problem of the uncertainty of the evidence is going to really hit an apex. It's going to mean looking at clinical trials and looking at evidence, and trying to figure out what is appropriate evidence, very differently. We're going to have to see a major, major shift.” (Parent)

For a number of participants, the problem of proving efficacy for a small and internally heterogeneous population is compounded by temporal issues in study design

and analysis. Outcome measures in most trials are premised on relatively short windows of observation, to produce results at reasonable cost within relevant timeframes. The net effect is twofold: firstly, to limit appraisals of efficacy to short-term signals of effect; and secondly, to bias the design of outcome measures to fit such notions of efficacy. This latter phenomenon arguably has outsized impact on the assessment of child health technologies, insofar as it abstracts the effects of a given treatment from its real-world impacts. The example of cancer therapy is revealing: adult trials often measure improvements in survival in months of life gained, whereas most paediatric trials measure survival in patients cured. In both instances, the outcome of the intervention is typically premised on detection of statistically significant differences between study cohorts (whether experimental or historical). Both a gain of months and a gain of lives may meet thresholds for clinical and statistical significance. However, the cumulative effects – both positive and negative – of a given therapy over the life-course of a given patient are rarely captured, let alone contextualized:

“I think we've been caught many times in general terms in the approval of or the evidence for a substantial improvement in survival from drug X in the adult world in which survival approved by 50% and that 50% represents a prolongation of life from three to four and a half months. It's a good success story but it's not particularly effective.” (Provincial policymaker)

1.1.2.1.2 Evolution/Adaptation of Evidence

To many, the mismatch between epidemiological realities in children and the epistemic demands of HTA justifies a rethinking of our received appraisals of medical evidence. In the words of one participant, *“small numbers, small bodies, long outcomes: there has to be a different perspective.”* (Health professional) This recognition prompted

many stakeholders to weigh and advance evolving notions of evidence in child health, and to catalogue novel approaches to generating evidence on child health technologies. Across the stakeholder groups interviewed, a nuanced sense of the legitimacy of diverse forms of evidence emerged, one contingent not only on statistical certainty but also on clinical and social context for its interpretation:

“There are many of us who understand the fluidity of truth: truth is based on the question that you ask and who's answering the question...We should be looking at...the same set of facts. But then how you sift through those facts and how you weight those facts I don't think have to be prescribed by set formulae.” (Health professional)

This idealism was tempered by fidelity to rigour in evidence appraisal and the desire for reliable barometers by which to assess it:

“We know that there's uncertainty there, but can you put a box around that uncertainty as much as possible, so that if we are having to make a decision, we at least understand what the risks are when we're going down that particular path?” (Provincial policymaker)

Related to this, participants acknowledged that the pace of institutional change would likely slow fundamental shifts in the norms attached to clinical evidence in existing HTA paradigms:

“The people who make the rules are always going to be a bit slower; policymakers and governments struggle a little bit with creating formularies that are nimble.” (HTA professional)

Nevertheless, most argued that innovative ways to produce, incorporate, and assess clinical evidence on paediatric drugs and other health technologies will prove essential to HTA institutions charged with their review. Many pointed to existing instances of this innovation, and opportunities to promote and formalize it. Recurrent themes included novel trial designs, such as genomic basket trials and n-of-1 trials; standardized

guidelines for the use of historical comparators, where randomized exposures are infeasible or unethical; and evidence-building programs that adjudicate contingent funding approvals on the strength of accrued real-world evidence of effectiveness. Interestingly, many participants spoke to child health as an optimal testing ground for such innovation, because it is both crucial and tractable. As one parent put it, “*the problem is small enough, and the problem is big enough.*” (Parent) A range of stakeholders characterized paediatric trials as pilot opportunities for approaches to evidence generation that will prove essential to adult drug development in an era of precision medicine. The necessity of such innovation in the paediatric space was seen as a key driver in this regard:

“The numbers are smaller and so while that can be a disadvantage in terms of drug development, it can be an advantage in terms of being innovative in how you approach things. I think we’re starting to change the way we’re approaching the kids. How we change the way the system responds to them is going to be next.” (Parent)

In an emerging ‘golden age of new therapies’, a strong sense of the need for, and reality of, changing philosophies of treatment emerged. Participants viewed this reality as the foundation for new conceptions of the relative value of alternative forms of medical evidence, and their use in health technology assessment for children.

1.1.2.2 Economics

Often closely linked to their reflections on evidence, participants gave thoughtful and wide-ranging critiques of current modes of economic evaluation employed in dominant HTA paradigms. These insights spanned methodological and political challenges to the conduct and application of economic evaluation in HTA and drug policy

for children. Uncertainty was a frequent trope invoked to relate evidentiary limitations in childhood illness and treatment to HTA constraints:

“I think what we're struggling to get a handle on sometimes is what the level of uncertainty is within the evidence that is provided through to us... people are going to have to be more comfortable in working with that level of uncertainty, and some people are, some people aren't, so that certainly adds into the complexity of the review process.” (HTA professional)

Participants highlighted the implications for economic methods standardly employed in HTA, and the need to adapt them to deal with more and different kinds of uncertainty. The issue of altered time horizons, and the capacity to account for treatment-related health states along them, received particular focus.

“The biggest challenge always goes back to uncertainty. So, you can model something out but you're never going to have the model that definitively answers some of this information or some of these questions and so you have to work with uncertainty. So, part of it is understanding how do you deal with uncertainty? Part of it is trying to figure out if there are potentially new methods that one would need to have when you're looking at questions that have such a long time horizon that there's no way that you can possibly answer that.” (Health professional)

“[What] makes it very difficult is the time horizon, right? So, you know, often the economic models that we or others develop are explicitly for 5 years, or something like 5 years, and with kids, that may not be long enough to show the true effect of the intervention, and so you can of course produce models with a longer time horizon, but if you do that, then the uncertainty is always much higher.” (HTA professional)

Those interviewed enumerated challenges in accounting for both the positive and negative implications of therapeutic interventions across the life-course. The latent or chronic side effects of treatment, and their deleterious impact upon health-related quality of life at various life stages, were considered alongside potential gains in economic productivity from the combination of improved disease outcomes and less toxic therapy.

Participants spoke to current limitations in measuring or modelling both, and the need to do better in the context of child health.

A range of stakeholders also identified limitations in the current tools used to gather and analyze data for the economic evaluation of health technologies for children. The relative merits and deficiencies of the quality-adjusted life year (QALY) as a core metric were front and centre.

“The metric of efficacy using quality-adjusted life years, which is the standard denominator in any ICER, is extremely, extremely problematic with kids.” (Health professional)

Participants gave special emphasis to inadequacies in current methods for eliciting preferences and assigning value to varied health states in children. One noted the temporal challenge of accounting for *“the dynamics of preferences in a developing organism”* (Health professional), wherein children at different development stages might assign widely differing value to similar health conditions. A number questioned the legitimacy of parental proxies in health state valuation for children, citing evidence for discrepancies in parent-child assignments of value to the same condition or intervention:

“The role of a caregiver in eliciting those preferences, and their ability to do that accurately, is I think a big boondoggle.” (Health professional)

“Very low birthweight infants...when they actually grow up to be adults, and can self-report their own health, they report it at a much higher level than the parents did throughout their entire life.” (Health professional)

“There are ways of dealing with young kids – I mean kids of school age – who can, with appropriate instruments, respond to questions about their perceptions of their health. And they're often quite divergent in early experience, from those assessments provided by the parents.” (Health professional)

Many spoke to the need to broaden the context for determining the value of child health states. Some cited emerging efforts to incorporate impacts on the utility of family members in a more holistic, family-centred measure of utility. Others noted an intrinsic prejudice against chronic morbidity in QALYs, one that could tend to devalue long-term health gains in children with chronic illnesses, and thereby privilege cure above disease maintenance, with insufficient consideration of other potentially relevant population characteristics, such as age, socio-demographics, or unmet need:

“...prejudicing [against] those with chronic illnesses for which [drugs] are not curative but do end up being able to sustain a compromised quality of life for some years.” (Health professional)

Conversely, a cross-section of participants referenced the manner in which QALYs favour children, in terms of accounting for potential life years gained by a given intervention. They framed investments in child health, and associated life years gained, as a return on investment, and articulated a narrative centred on the social and economic benefits reaped by such investments:

“I think if you have a life left to live, that if we cure this thing and you are likely to have many, many more happy, successful years of your life...then we should really try to do that and make that [treatment] accessible.” (Health professional)

“Even if you're not, you know, particularly caring about children or you don't have warm fuzzies associated with children, if you're looking at it from just a crass economic perspective, there would be reason to perhaps prioritize the allocation or the knowledge generation related to paediatric drugs and issues, because of how many years of benefit you're going to have.” (Health professional)

An interesting distinction between the aggregate and developmental value of QALYs emerged within this narrative. This distinction took two forms. A subset of

participants intimated that the accounting of QALYs should incorporate sensitivity to differential benefit attached to health gains in critical developmental periods, in their capacity to condition the potential for gains in later years. Citing research on the economic returns from investments in early childhood development, these participants argued current approaches to both weighting and discounting QALY take insufficient account of the role of child health in social and economic potential across the arc of a life. Another group of interviews identified a lack of sophistication in the aggregation and interpretation of QALYs for priority setting at the health system level. They saw an opportunity for the explicit differentiation of QALY sums generated from population- and individual-level accounting:

“Are you getting 50 QALYs because 100 people are living an extra 6 months? Or are you getting 50 QALYs because one person lives 50 years?...My sense is that if you propose that scenario to ordinary human beings, they will go with the latter.” (Provincial policymaker)

Without identifying an inflection point, these participants implied that societal preferences might attach differently to the same sum of QALYs associated with either small gains in large numbers of people or large gains in small numbers. The implications of these different approaches to valuing QALYs was evident to many of those interviewed, who recognized that most child health interventions would fall in the latter category. Though not reflected into the incremental cost-effectiveness ratios upon which technology assessments often hinge, these alternative ways of aggregating QALYs are often worked into budget impact analyses and political coverage decisions. Clarity on how HTA institutions and governments place value on these respective types of QALY sums was a clear priority for these participants. This latter argument in particular was

associated with an implicit conviction in ‘fair innings’ – a notion which we treat in more depth in our analysis of the species of values that attach to child HTA and drug policy.

In light of the aforementioned challenges, a number of participants saw a crucial need for enhanced child health expertise in the economic evaluation of paediatric drugs and technologies. They related the capacity for nuanced and contextual understanding of the epidemiologic, developmental and sociological features of childhood as integral to legitimate exercises in health economic evaluation for child health interventions:

“One can never then actually truly understand a technology unless you have the expertise on that technology. And I think it increases the overall societal acceptance and use of a systematic approach of evaluating these treatments, any new treatment.” (HTA professional)

“We have been fairly strong protagonists of the idea that there ought to be HTA conducted for children by people with paediatric expertise...there should be paediatric teams assessing paediatric drugs.” (Health professional)

Such perspectives linked participant views on economic evaluation back to their evidentiary concerns, and to their reflections on the ethical, political and sociocultural dimensions of policymaking on drugs and technologies for children. We explore these dimensions in the sections that follow. First, we complete our thematic discussion of technology with the final phase in the HTA production line: assimilation.

1.1.3 Assimilation

We leverage the concept of assimilation to encompass participants’ reflections on the big-picture aspects of HTA production: firstly, its overarching framework and process; secondly, its interface with the surrounding health system. Keeping with the

production metaphor, assimilation deals with the organization of the factory and its interaction with the outside world, rather than the nuts and bolts of production.

1.1.3.1 Framework and Process

The interviews for this study occasioned frequent reflection on the optimal form and function of current HTA frameworks for the assessment of child health technologies. Some of these reflections offered subtle tweaks to existing HTA paradigms; others presented foundational critiques. Almost all participants spoke to the importance of a transparent and defensible framework as a core legitimator of a given HTA body and its recommendations. Most also referenced the key role of deliberative process in establishing optimal function, stressing the importance of procedural equity above allocative equality. Notably, the value of legitimate means was sometimes seen to outweigh any specific end:

“There are some [decisions] that are black and white, and those ones should probably be reproducible. But there are many that are grey, and I'm not sure it's totally crazy to say that if you had a different day, with a different composition of panel members, they might have voted the other way. And the process should be transparent, it should be one where people articulate their reasons for the decision, but I don't know whether it always has to be the same.” (Provincial policymaker)

This concern for appropriate framework and process frequently dovetailed with perceptions of inadequacy in respect of children. The routine extrapolation of adult recommendations to the paediatric space was seen as a cardinal example of this. Some rendered this a specific instance of the fallacy of decision-making based on population averages. Abstracted from the richness of individual clinical encounters, and premised on

the artificial cohorts prescribed by clinical trials, all HTA is consigned to speak to the mean:

“It’s really public health a little bit, right? You’re making decisions for a lot on average. [Whereas] a physician says, ‘well, actually there are different things happening with this person than with the population that the decision was made on’...It’s difficult because you’re making a policy which is [based] on a big generalization of data. At an individual level it might not have been the best decision.” (Provincial policymaker)

Others identified a distinct and more fundamental problem in the transposition from adult to child: the possibility that, due to differences in biology and social position, adult and child population distributions cannot be superimposed, let alone equated.

In recognition of this, many defended the need for an HTA framework tailored to children. Their proposals in this regard incorporated sensitivity to aspects of child life and health such as developmental trajectories, future potential, and family context:

“[Children] have that developmental thing that happens, right? So with a toddler, different developmental things than with an adolescent, a whole different area of stuff happening both mentally and psychologically that you have to consider. So, there’s all those developmental phases that you have to factor in.” (Health professional)

“An unhealthy child is generally an unhealthy mother and, not uncommonly, an unhealthy father and siblings as well. So, the notion of unit of analysis, I think, is very germane to childhood.” (Health professional)

The challenge of, and opportunity for, integrating alternative forms of evidence in any framework for child HTA was a paramount concern. Stakeholders related this both to the aforementioned constraints in generating traditional ‘high-quality’ evidence in paediatrics, and to the need to capture socially relevant dimensions of value not routinely represented in trial outcome measures. Some saw a role for enhanced patient and public engagement in this regard, including among children themselves:

“It's important to then have that public engagement, patient engagement to say well what's important for your child here? Is it important that they end up going to school or just going out to play?...[When] valuating any intervention, you know, we want to get the important outcome measures.” (HTA professional)

“There [is] work being done now to try and elicit the values of kids...even if they don't call the shots at the end of the day. So I think it might be interesting to hear from kids themselves, even if it's not going to be the final thing, but a bit of a window into the things that really are...quite compelling.” (Health professional)

Related to this, a number of those interviewed spoke to the need for balance between normative structure and flexibility in child HTA guidelines, arguing that rigid form can stymie both the legitimate play of moral intuitions and the incorporation of scientific progress:

“Sometimes I think these decisions can run into trouble where people get really fixed on, like, a particular cost-effectiveness threshold and don't take into account what their heart is sort of telling them is the right thing to do.” (Provincial policymaker)

“What isn't clear to me is whether this mathematical approach to doing it is superior to just wise people around the table, you know, saying ‘here is a case where we shouldn't use a threshold arbitrarily.’” (HTA professional)

“You want guidelines that are going to be able to give people appropriate constructs to make decisions, but within those guidelines, you want to make sure they are not so hard and fast. Because the world – especially of paediatric cancer – is changing, and if you're creating guidelines which are too rigid that could be a real danger.” (Parent)

A number of participants detected myopia in the frame typically applied to technology assessment, adult and child alike, arguing that “[looking] at one drug at a time, in isolation from everything else” (HTA professional) gives a decontextualized – and therefore artificial – impression of the value of a given technology. The need to better incorporate system-situating factors like opportunity cost, unmet need, equity, and public

priority was a recurrent motif. Many participants stressed the particular importance of broader context for the assessment of child health technologies, alluding to the unique play of evidence and social values in the paediatric space. Current approaches to incorporating social values in HTA for children were deemed especially weak.

From a process perspective, the critical need for paediatric expertise in the adjudication of child health technologies arose repeatedly. A number of participants noted the potential for caprice in decision-making based on committee representation, and envisioned enhanced and stable paediatric representation as a means of mitigating such caprice:

“You have to bring the right people around the table when you're going to be making decisions about pediatric technologies and there has to be some consistency with that membership.” (Provincial policymaker)

Participants identified this need at the level of both HTA institutions themselves and the drug funding bodies that receive and enact their recommendations. Interestingly, the push for paediatric representation in such fora was not made uncritically. A range of stakeholders recognized the potential for bias and agenda-pushing among child health experts tasked with assessing the value of a given drug or technology:

“I think that group of pediatric experts needs to clearly carry the caveat you are not here to promote pediatric drugs. You are here to assess applicability, cost effectiveness, utility of drugs for pediatric purposes with the same rigor just with the perspective of what is possible on a pediatric evidentiary basis.” (Provincial policymaker)

“Some people will argue that by making systems flexible and by allowing for context-specific expertise that we're just allowing everyone to say yes all the time.” (HTA professional)

However, this risk was often rendered as further proof of the need for a professionally and societally legitimate forum for child HTA: to limit opportunities for reactive or politically expedient decision-making on paediatric drugs and technologies, and to provide a structured forum to disentangle advocacy from dispassionate evaluation. While many participants were at some level invested in optimizing drug access for children, most also viewed objectivity as key to credibility in child-focused HTA. Rather than frame paediatric expertise as a barrier to objectivity, most saw it as a means of validating HTA for children:

“If there's a pediatric HTA process it's got to be objective...it's got to be objective or we will have no credibility.” (Health professional)

“It allows for pockets of expertise to be created. And one can never actually truly understand a technology unless you have the expertise on that technology. And I think it increases the overall societal acceptance and use of a systematic approach of evaluating these treatments, any new treatment.” (HTA professional)

Importantly, a few participants raised complexities attached to differentiated frameworks for adult and child HTA. They identified the transition from childhood to adulthood as particularly fraught, highlighting difficulties locating and justifying the switch from one state (and framework) to the next:

“There is a transition from children to adults...for those conditions that are on the cusp, that affect both children and adults, and you have two separate processes, you can have different decisions, you know, someone turns eighteen, all of a sudden something's not available anymore.” (Provincial policymaker)

A few stakeholders also spoke to the points of overlap between HTA for children and rare diseases, noting that some of the provisions in rare disease frameworks are applicable to technologies for certain childhood diseases. Still, most took care to point out that these

commonalities did not erase distinct facets of child health that might warrant explicit incorporation in HTA frameworks. The challenge of when and to what degree special concerns related to child health – developmental vulnerability, future potential, family embedding, evidence constraints – apply within and beyond ‘child’ populations is not easily resolved. For most interviewed, these challenges did not diminish the relevance of such concerns to child HTA. Rather, they served as a cautionary note to unexamined paediatric exceptionalism, and as a means of sketching the defensible boundaries of a child-adapted HTA framework.

1.1.3.2 System Interface

The other major facet of technology ‘assimilation’ explored by study participants was the way in which HTA institutions interface with the health and social systems in which they reside. Many felt that current approaches to paediatric drug funding decisions in Canada are overly *ad hoc*, a compound result of: 1) inadequately sketched assessment parameters for children; 2) insufficient submission of paediatric technologies for formal review; and 3) politicized environments for the discharge of coverage recommendations.

The role of emotion in stoking such politicization was front of mind for many:

“I don't think there is a model that anybody can point to and say ‘oh yeah, that's the one that actually works,’ because it becomes so emotional in many cases.” (Provincial policymaker)

“All it takes is, you know, one article in the front page of a newspaper sometimes to make a minister change their mind.” (HTA professional)

Alongside this, however, a range of stakeholders suggested that a cultural and political shift is underway, toward the routine instantiation of HTA in policymaking on

drugs and technologies at various health system levels in Canada. Many saw in this shift the potential to limit caprice in funding decisions, or at least define the territory and routes decision-makers could justifiably traverse. The opportunity for tightened and more effective interface between the various institutional players involved in drug access for children was a recurring theme. Innovative approaches to integrating clinical trial design and HTA processes were alluded to by a number of participants. For example, an adaptive pathways approach to drug development and access – which involves staged approval based on iterative, real-world evidence development and upfront involvement of patients and HTA bodies – was referenced as a means of creatively surmounting the data constraints attached to paediatric drug development:

“Adaptive pathways: where clinicians, payers, manufacturers, regulators, HTA bodies are all having discussions at the beginning part of locking these clinical trials in phase 3, for example, or even phase 2. It's really that earlier dialogue that I think is going to be absolutely necessary for people to just figure out 'how do we do that, and how do we collect some of the data.'”
(HTA professional)

A few also pointed to the need for more and better-articulated HTA processes at the level of individual health care institutions. These stakeholders envisioned opportunities to make smarter and fairer choices among technologies through the application of HTA to resource allocation at the meso- and micro-levels, including global hospital and regional program budgets – particularly where such budgets are *a priori* allocated to child health:

“The other group that I think is, has a much larger role to play in HTA that don't play a role are actually organizations. So, we always think of HTA as a government thing, but there's very little HTA that happens on a hospital level formally, although informally it happens all the time.” (Health professional)

By contrast, a number of stakeholders pointed to institutional reticence to conduct HTA in children – *“people often say, let's not go there if we have to, like, let someone else work it out”* (Provincial policymaker) – given both the methodological complexities and political sensitivities involved. This reticence was identified at various levels of the health system, from formal HTA bodies to hospitals to discrete disease-based programs. Of note, a range of participants laid at least part of the responsibility for the lack of volume and sophistication of paediatric HTA at the feet of the child health community itself. They identified a general lack of knowledge about HTA, a reticence to engage in political dimensions of health care, and an idealized view of children’s right to access health technologies as plausible culprits in the underdevelopment of HTA in the child health space. Even so, many perceived an opportunity to employ paediatrics as a rich testing ground for HTA development and reform, citing the strength of the child health community as a bounded and collaborative learning environment:

“It’s a way to pilot this in a patient population that’s smaller, to figure out what will work from a mechanical perspective. Not to limit it to the pediatric population necessarily over time, but how do we set up a system that works in a more nuanced way?” (Parent)

“They’re more closed systems, right? So, they tend to be much more closely connected and...the perception is that the transfer of data and knowledge across those communities is much freer...that’s a true learning environment, right, that you’ve already kind of got.” (HTA professional)

But the predominant theme on health system ‘assimilation’ centred on its absence. Most participants felt that broader health system dynamics are only weakly considered in standard drug and technology reviews. They pointed in particular to the opportunity costs of investment in a given health technology or service, and lamented the absence of their

routine incorporation in HTA recommendations and priority-setting endeavours. Many participants discerned the need for more holistic approaches to system-level planning in the face of resource scarcity, and the corollary need to reform HTA to enable such planning. Some felt this called for distinct funding pools for children, to compare like with like when gauging opportunity costs and to protect streams of funding for marginal populations:

“Numerically there's just a whole lot more [cancer of] breasts and lungs. So it's almost the case that there has to be a separate stream [of funding for children]. Does it have to be separately funded? I think the process has to be separately funded and I think the process has to be indorsed as a legitimate process for a particular subset.” (Health professional)

Others saw natural opportunities to enhance public funding for child health technologies, to which favourable budgetary and health impact profiles often attach:

“Oftentimes people only think about the small scope of what is affecting their own life and they complain that, you know, they can't get an MRI for their knee for six months, for example, in terms of resource allocation, and they want more money for more MRI machines, nor realizing that it probably doesn't matter what's seen in their knee. Probably nothing can be done about it. And if they had to – if you sat a person down and said listen, we can buy another MRI machine for you and your six friends who are all complaining, or we can reallocate money so that these kids can have these medicines to save their lives, they would all reallocate it and then they would feel bad about having complained.” (Health professional)

“We probably consider drugs that will treat or hopefully cure a child with cancer as being more essential than, you know, second line Avastin in colon cancer.” (Provincial policymaker)

Most felt that, until HTA paradigms begin to take account of opportunity costs, their capacity to guide health systems toward choices that maximize societal value is limited. Once again, the need to better incorporate social values in HTA to guide such choices

was voiced by the majority of respondents, and with it the obligation to attend thoughtfully to the unique considerations attached to children.

1.2 Society (Sociopolitical Context)

The social, political and economic determinants of drug access for children were front of mind for many participants. Their collective insights into the political and financial dimensions of drug development, marketing and regulation comprise a major category within the data. Three principal themes emerged from this domain: *markets*, *governance*, and *politics*. Stakeholders ascribed foundational importance to these themes as the structural landscape within which paediatric drugs and health technologies are assessed for public coverage. Together, they were construed as the preconditions for HTA and the ultimate determinants of its impact.

1.2.1 Markets

Drug market dynamics were deemed by many participants as a principal determinant of HTA priorities and outcomes. A range of stakeholders made explicit links between drug development, assessment, and funding; the economic dimensions of drug production and sale were seen to motivate and shape these links. The role of industry figured prominently in this regard. Despite a clear need for novel paediatric drugs, weak market incentives for industry to engage in their research and development (R&D) were cited time and again by participants as an upstream determinant of drug availability for children. The narrow markets constituted by various paediatric disease cohorts were understood to limit the generation of evidence on drug safety and efficacy in children,

with downstream impacts on the development of paediatric indications for novel and existing agents:

“I can tell you that no microbiologist, biochemist, CEO of big pharma says hey here's a great molecule. Let's develop it for kids. Or there's a great anti-cancer drug. Let's develop it for kids. There's no market. It's one percent of - one to two percent of your sales.” (Health professional)

“The market is extremely, extremely small...you're talking about very small, rare diseases, and/or short durations of therapy. So it creates difficulty in developing incentives on the regulatory side for pharma to develop products.” (Health professional)

Participants construed the upshot of narrow markets as either industry disinterest in paediatric drug development or pricing tactics to coax profits from limited market space. Such tactics were often seen as illustrative of a fundamental misalignment of corporate and societal goals:

“Policymakers have struggled with incentivizing pharma to develop products for narrow markets at affordable prices.” (Provincial policymaker)

“There's some drugs that are foundational, demonstrated, effective, high cost and subject to the whims and fancies of corporate decision making. Here I'm talking about asparaginase as one example. Whereby a drug that has had FDA approval for 10 years, was developed by one company, sold to another company with an increment, then sold again with a 300% increase in cost.” (Health professional)

Most participants related the disincentives for paediatric drug production to disincentives for HTA submission by industry:

“A lot of conditions are so rare that, you know, there's no path, and if there is a path, there's definitely no pharma submission through the HTA pathway to get them listed.” (Health professional)

“The work involved in an HTA submission, which is quite a lot, financially, sometimes doesn't even pay off for them to bother.” (HTA professional)

Conversely, some participants perceived changing industry calculus on paediatric drug development, driven by the impact of new scientific knowledge on market incentives. The example of cancer is illustrative: as research uncovers the fundamental genomic and molecular drivers of various malignancies, and drug developers leverage these insights to create agents targeted at these drivers, the hard divisions between child and adult markets soften. In place of distinct paediatric and adult cancers emerge cancers defined by their molecular signatures, which may transit across traditional age boundaries. Markets adapt, and industry interest accordingly. Interestingly, the direction of these changes was understood differently by different stakeholders. Some saw children as a ‘spin-off market’ (HTA Professional) from adults; others saw children as the opportunity for first forays into wider adult markets:

“Nobody is going to produce drugs that are very expensive to produce for a market that is very small. And so always I suspect around small molecule new agents, paediatrics will hang on the coat tails of new drugs that are developed for adult diseases that have similar molecular abnormalities. [But] their impacts and the toxicities will be different.” (Health professional)

“We're finding more acceptance, or interest, from drug pharma, from big pharma that never had any interest in pediatric cancer, in these diseases, because it gives them a potential opportunity as a window to then branch out and use them in the adult population.” (Health professional)

“There is a place for the paediatric guidelines to be leading the way for what you're going to need in the adult world.” (Parent)

A few stakeholders also identified the lack of ‘levers’ available to HTA bodies to inform drug R&D dynamics, and underscored the impact of this impotence on drug portfolios where market incentives are lacking or where evidence generation is fraught:

“We don't have a way to incentivize data generation anyway, which I think is a problem with HTA.” (HTA professional)

“We deal with the crumbs on the table sometimes I feel like. You know, and meanwhile it would have been much more helpful if we helped make the meal, right?” (Provincial policymaker)

Related to the need for enhanced feedback capacity from HTA to industry to direct drug R&D priorities, a number of stakeholders spoke to the potential for governments to take more responsibility for funding novel drug trials in children. They highlighted access barriers related to the often-clumsy interface between industry-funded trials and government drug policy: these included jurisdictional hurdles to accessing trial drugs, resulting in geographic and disease-based disparities in access:

“In kids, again, depending on the drug, that drug may be part of generating the evidence for its benefit and trying to get a drug funded within the context of the clinical trial for a child is still a stumbling block with government...Often these types of molecules will [only] be funded by the manufacturer.” (Health professional)

Alongside this, participants discerned a rapidly evolving research-clinical interface, in which the pressure to incorporate promising technologies into clinical practice is driving new approaches to evidence appraisal, and heightened expectations for real-world uptake:

“You can go from a plan of research to using [a technology] in a clinical way within months...Now, you're using what was meant to be a research study for clinical action. Totally different paradigm than the classic clinical trial.” (Health professional)

For many, the upshot of such observations was a perceived onus on governments to facilitate system uptake through nimble and creative policies that marry technology development, assessment and funding. These and other proposed corrections to market disincentives relate to the broader manner in which governments seek to mould paediatric

drug market dynamics through legislative provisions and regulatory oversight. We explore the drug policy and regulation in more detail in the section that follows.

1.2.2 Governance

Participants touched on the interface of HTA institutions and the surrounding health system in their comments on technology assimilation, but their insights extended well beyond this interaction. The manner in which structures and mechanisms of governance – of the health system, of drug development and marketing, of public resource allocation – influenced drug access for children constituted a dominant theme.

1.2.2.1 Policy and Regulation

The most consistent area of focus in this domain related to governmental policy and legislation on paediatric drug development, licensing, and sale. Participants described a variety of barriers to childhood drug access in the Canadian context, and ascribed a number of them to marked deficiencies in the drug regulatory environment. These deficiencies were juxtaposed with examples of regulatory reform and innovation in other jurisdictions, including the US and Europe, where specific provisions to buttress R&D for paediatric drugs have sought to correct for the market constraints described above.

Limitations tied to the nature and scope of paediatric formularies were front and centre for participants, evidence of fundamental shortcomings with the R&D-to-market axis for most paediatric agents. Participants described problems related to the development, testing, production, licensing, and sale of drugs for children, and traced many of these to the poor fit between intrinsic dynamics of childhood disease and

treatment and market-based systems for pharmaceutical development. The widespread lack of formal paediatric indications for existing and emerging agents was emphasized as a glaring symptom of this problem: both as a driver of off-label prescribing for children and as an indicator of evidence gaps in paediatric pharmacology:

“The last time I saw it, 85% of children admitted to a hospital received an off-label drug.” (Health professional)

“There are a gazillion drugs as you know that are completely standard of care for paediatrics that have no licensed indication for paediatrics... We're always piggybacking and trying to alter an adult solution to an adult problem to suit our needs.” (Health professional)

The fact that industry will routinely forego paediatric testing of already-developed medications with known clinical utility in children was seen as illustrative of the thorough lack of market incentives for paediatric drug development, and deep industry disinterest in the same. Participants highlighted resultant problems at all points along the research-to-market pipeline, among which are: lack of knowledge on paediatric drug safety, efficacy and dosing; inappropriate product formulation for children’s varying size and developmental needs; lack of industry licensing submissions and market entry for paediatric indications; and, as a result of the foregoing, lack of HTA submission by industry for most drugs used in or relevant to children:

“What happens often is that all the solid forms for product X are on the formulary, the liquid isn't... Why is that sensible? So, it really should be mandated, if you're going to submit, you submit your full product line.” (Health professional)

“Children come in all sizes. The vial is a single-entry vial. So, if a child is either big or small, bigger or smaller than the per-metre-squared dose, you have to waste.” (Health professional)

Description of these problems was routinely followed by mention of opportunities for their redress through regulation, real-world examples of the same, and identification of Canada as a laggard in this regard:

“I think you need a child framework on the regulatory side, because otherwise no one will develop drugs for kids. And unlike other interest groups, you specifically need studies for kids in order to demonstrate safety and efficacy. Otherwise you end up with trickle-down drug policy, where you just trickle down whatever you're doing in adults to kids.” (Health professional)

Provisions by the US Food and Drug Administration (FDA) and European Medicines Agency (EMA) to both incentivize and compel industry to undertake paediatric testing of drugs were referenced by participants as indicative of the need for and role of regulation in this space:

“The only reason we get drug trials in kids is because of the FDA. The stick of the FDA.” (Parent)

“Unfortunately it feels like the only body in the world that has the ability is the US FDA and it's through patented incentives. So, that's how pharmaceutical manufacturers really - that's the currency they work with. They work in patents.” (HTA professional)

Various stakeholders lamented Health Canada's inability to do the same:

“It strikes me that Health Canada is acting as a kind of beggar almost because, ‘oh we're so happy you're making an application, we can't demand anything of you other than safety and stuff. We can't say oh you've got a paediatric indication in England or in the EU, you need to submit that data here.’” (Health professional)

“[There's] lots and lots and lots of high quality data to support them, but there's no vehicle to get an official indication for those products.” (Health professional)

They also highlighted the downstream health system inefficiencies that result from desultory paediatric drug submissions and approvals at the national regulatory level.

Among those mentioned were the human resource burden associated with Special Access Program (SAP) requests to Health Canada and the inconsistencies in responses thereto:

“One of the things that frustrates me about the SAP mechanism is that there's huge inconsistency and variability in terms of who you deal with on the other end of the line.” (Health professional)

“One of the frustrations with dealing with the Special Access Program is that sometimes you can send the exact same application week after week...One week you send in an application and it gets just sent back to you, like granted, great; and then the next week there are 20 questions about the exact same application that went in last week.” (Health professional)

“The other side to this is the physician and team compensation model...and the amount of attention that [SAP] patients require and the amount of time you're spending filling out forms and sending letters and all these things.” (Health professional)

Some participants saw opportunities to take this regulatory oversight further: beyond shaping industry R&D activity and into health system priority-setting endeavours on childhood drugs and technologies. They envisioned a role for the use of high-level paediatric evidence – in the form of clinical guidelines – as a guide for national HTA priorities: both as a means of prioritizing paediatric drugs for licensing and coverage assessment, and as a means of articulating high-value areas for further R&D. Echoing calls among certain stakeholders to better integrate HTA and drug development paradigms, these participants envisioned a more proactive role for HTA institutions in drug policy and regulation, and described a role for the federal government to play in stewarding this reform.

1.2.2.2 System Integration and Stewardship

A second sub-theme of governance centred on the need to enhance system stewardship and integration with respect to paediatric drugs. A range of stakeholders described the regulatory landscape mediating drug access for children less as a system than a loose interaction of institutional silos:

“The payers know what's happening on their level, the pharma [companies] know what's happening on their level, and the patients know what's happening on their level – but no one actually really understands what's happening in each other's worlds.” (HTA professional)

“I don't think we've ever had a conversation in a meaningful way with the pediatric community, health community to say well, what is it you feel you need that this system does not provide?” (HTA professional)

Many identified access disparities issuing from weak governance and system fragmentation. The challenge of balancing access to medicines with sound and legitimate resource stewardship was felt to be particularly susceptible to the vagaries of a fractured political system. Participants identified these fractures at all levels of the health system, and across various sectors with bearing on drug policy and governance. The result, in the eyes of many, was disparity in drug access for children by geography, disease, and socioeconomic status, as well as relative disparity as compared to adults:

“There is the potential for inequities across the country and I think we've seen that...and by the way it's not related to the GDP of the province or the budget of the province, [it's] purely geographic.” (Health professional)

“It is a national tragedy to have Canadian health care administrations with differing drug formularies. I can accept as a Canadian that if I travel to the United States, I need to buy health insurance, but if I travel to Alberta, you know what? I shouldn't have to.” (Health professional)

“Children with cancer are – and their families, and it's their families we're talking about – are disadvantaged in terms of public payment for drugs compared to adults. Cancer Care Ontario covers a big chunk of that cost. There's no comparable coverage for children.” (Health professional)

“The other thing that bothers me about access is it's variable whether you [have] private insurance or public insurance, by the same prescribers, for the identical drugs for the identical condition.” (Health professional)

“The other challenge, as you know, in the paediatric context for when we get that drug in, expensive or not, that drug still has to be funded out of the institution's global budget. There's no unique funding envelope for these types of agents for children with cancer, or other conditions that are seeing these targeted therapies, [like] monoclonal antibodies, being developed.” (Health professional)

The corollary need for better harmonization of drug funding policy among system players was emphasized by a number of participants:

“I would love to see some harmonization of decisions that are made on the level of hospitals, on the level of the province with formularies.” (Health professional)

In addition to cross-institutional policy coherence and broad stakeholder buy-in, one of the most salient benefits of such harmonization was felt to be integration of the component parts of drug policy – along the continuum from development and production to licensing and funding:

“If it's a provincial jurisdiction, it's a small market. However, if the provincial level approval was subject to a framework that was a federal framework, the recommendation for the appropriateness of the funding of the drug could be tied to a federal requirement that the vial size be appropriate.” (Health professional)

Moreover, such harmonization was seen as both more tractable in the child health space than in the rest of the system, and more impactful:

“I think it's a lot easier to do in pediatrics than it is in adult medicine, because there are fewer players. You could probably do this in Ontario with, you know, just a children's hospital and representatives from the community and have a pretty interesting and robust way of looking at some of these niche agents.” (Health professional)

Importantly, select stakeholders argued that the goal of rationalized system structure and governance need not preclude varied policy choices along provincial lines. Indeed, a few contended that differing provincial contexts necessitated jurisdictional autonomy on drug coverage decisions:

“Why is everyone looking for even-Steven? Equity doesn’t mean equal, right?...If BC needs to make a decision that addresses the needs of BC’s population, in the context of the budget that they have and the means and the resources – if that’s our federated model – then BC should have the right do that.” (Provincial policymaker)

Provincial budgetary priorities notwithstanding, the vast majority of participants detected opportunities to improve the ways that drug policy for children is made and implemented in Canada. They collectively described a role for enhanced system stewardship at the federal level, to knit together the invested stakeholders and the component part of drug access over which they have influence.

1.2.3 Politics

Closely tied to insights about drug system structure and governance were participant acknowledgements of the highly political nature of drug policy decisions, and the broader national and provincial political currents that buffet such decisions. A number of participants framed their reflections on the political dimensions of drug policymaking with a presupposition of children’s marginality to political processes. The relative lack of agency ascribed to children was thought by many to abet a relatively low priority for child health on policy agendas:

“Right now kids aren’t figuring, aren’t in the picture...because relative to adults there’s so few of them getting sick. They don’t run lobby groups, they

don't vote, they don't make contributions to political parties, so they really don't have a voice.” (Health professional)

As a corrective to this natural state of political disempowerment, cause-specific advocacy was felt to play a critical role in marshalling attention to drug access barriers faced by children and pressing for political solutions. A range of stakeholders spoke to the increasingly vocal and impactful role played by patients and their families in advocating to government for enhanced access to child health technologies:

“[Patients] are a much more powerful lobby than they were 10, 15, 20 years ago. And so they're driving the bus, a little bit. They're not sitting at the back of the bus any more, they're sitting right behind the driver. And I think that's going to change the way that policy is developed.” (Health professional)

Participants pointed to the HTA-to-policy trajectory a key nidus for such advocacy. They identified a set of conditions vulnerable to influence by advocacy groups, both for better and for worse, at distinct points along this trajectory. At the stage of HTA reviews, participants noted structured points for patient and family input into drug reviews, and associated opportunities to enrich the social values tranche of HTA. Importantly, a range of stakeholders was skeptical of the value of this input in its current form, noting that the perspectives given voice are typically narrow and biased:

“Societal preference is solicited by what I call professional patients. So, people who essentially make a living sitting on these sorts of boards who, not disparage them, but their ability to actually express preferences for society at large, never mind a special interest group like children, I think is very difficult.” (Health professional)

“[Patient advocacy groups] inevitably have almost irreparable conflicts of interest, because they're usually funded by the person, by the manufacturer of whatever thing we're reviewing. Their ability to elicit the values of their entire community is not good, it tends to be small numbers of particularly vocal patients.” (HTA professional)

“The perspective that you end up getting, because largely it comes either from advocacy organizations or things like that, is we want everything, we want it now, we want, you know, unlimited access.” (Provincial policymaker)

At the stage of HTA uptake into policy, stakeholders pointed to a number of factors fit for harness by advocates. They recognized that governments lack meaningful knowledge about drug access issues for children, that stories related to child drug funding are often hot-button, and that opportunities exist to leverage the political optics of such stories in favour of children’s interests:

“There's no comparable [cancer drug] coverage for children [as there is for adults], and it seems astonishing to me that the government hasn't wakened up to that, because politically that's a bit of a hot potato you'd think, right?” (Health professional)

“There's that, you know, elephant in the room, where we just don't want to put ourselves in the position to say no to children.” (Provincial policymaker)

Conversely, a few of those interviewed noted that the logic of re-election cycles often serves as a disincentive to investment in priorities with delayed or long-term returns. As the most compelling arguments to fund childhood health interventions, including drugs, often centre on their life-course impacts, a number of participants were less sanguine about political commitment to child drug funding in the face of high upfront costs:

“It's hard to make the case to government to make decisions that will be financially fruitful many years down the road, because we're saying invest in kids now because they're going to cost more if you don't later on. But they might not be in power later on and they just want to get, like, maybe re-elected for the next - you know, if it's going to be extra costly now, then that might not be as attractive.” (Health professional)

In recognition of the parochial and highly politicized nature of many current advocacy endeavours, a few participants surfaced creative means to improve advocacy to better align individual patient and societal goals. A focus on teaching and promoting

‘advocacy for the cause’ – as opposed to advocacy to advance individual access goals – was a notable example:

“When I say advocating for the cause it’s advocating because we need to change these regulations. Here’s our considered, measured approach recognizing the economic issues, recognizing the historical issues, but putting forward a case as to why it should change and why we should start with pediatrics.” (Parent)

“We’ve done it drug by drug, but taking the generic case to the government really hasn’t been done adequately... There’s got to be a significant education piece and there’s got to be frank discussions about the problem being narrowly focused will create in terms of your ability be effective over time.” (Parent)

Relatedly, stakeholders also emphasized the role of the media in influencing governmental decision-making on paediatric drug funding, including the manner in which HTA recommendations are handled:

“There’s probably an article once a month about a child not receiving a drug because it wasn’t funded somewhere in Canada.” (Health professional)
“The health minister may be willing to go toe-to-toe with the OMA, but he probably doesn’t want to be on the front page of the Toronto Star saying they’re not paying for curative pediatric cancer drugs.” (Provincial policymaker)

They identified media impact on public perceptions about drug access for children, and cited examples of ‘public pressure’ influence on political decisions about specific drug coverage. Many saw these dynamics as detrimental to both HTA institutions and collective societal interests, in their circumvention of transparent, dispassionate processes for technology evaluation and resource stewardship:

“The things [for which] the government tends to override our decisions, I’ve found anecdotally, are generally things we recommend not to list that they end up listing because of public pressure.” (HTA professional)

“Rather than people dealing with, you know, the challenges within their own data, people will then run to social media, [the] press, and, I think, sometimes for the wrong reasons, just to argue that they need access to the treatment.”
(Provincial policymaker)

Such reactive governance was juxtaposed with the careful, laborious, and resource-intensive process of HTA: to demonstrate the bounded role for scientific evidence in the public domain, and to emphasize the importance of colloquial evidence and political calculation in ultimate coverage recommendations. In light of this, various stakeholders affirmed the need for an explicit and reliable process for adjudicating the value of child health technologies – one that not only leverages the transparent and deliberative approach of existing national HTA reviews, but incorporates a child-specific evaluation framework into its assessments.

2. Values Typology

Broad recognition of the need for an HTA paradigm tailored to children – one that takes account of both their intrinsic differences and their distinct place in society – led most participants to reflect on the social values that underpin drug policy processes and decisions for children. Values-based assertions and analyses figured prominently in each of the substantive domains discussed above. Three main species of values emerged from stakeholder reflections on HTA and drug policymaking for children: *procedural* values, *structural* values, and *sociocultural* values. This values typology cut across the major categories of technology and society. In each category, though, the values were tagged in different ways and with varied affinity to the themes related to technology and politics.

2.1 Procedural Values

We define procedural values as those that relate to the processes underlying HTA and health system priority-setting on drugs for children. Participant concerns with the normative dimensions of *how* such systems of decision-making operate stood out. Legitimate ends were repeatedly premised on legitimate means:

“I think if the process is perceived as fair, people have less of a problem with the decision than if the process is perceived as unfair.” (HTA professional)

In fact, given the thorny and intensely contested moral choices involved in HTA and drug coverage decisions for children, participants often hewed closest to procedural values to ground their arguments on ethical priority setting. Assertions of procedural legitimacy were tied to a cluster of related ideas: participation, deliberation, transparency, collective values, and the push-pull between orthodox methods and moral instincts. Procedural fairness was a recurrent theme, and was often equated with one or more of these ideas:

“I think you have to try and develop a fair process...Good solid base for decision-making, a fair process, a transparent process – and then make the best decision you have at the time with that information and be open to amending that if new information comes along.” (Provincial policymaker)

“What I think is fair is to be able to develop a policy system...that you can actually at least go through some logical process to come to a decision that, if you do need to make a choice, that there's a rational basis for that.” (Health professional)

Interestingly, children’s right to participate in the process of valuing health technologies was among the most prominent among these values. Participants questioned the routine lack of child voices in health and social policy decision-making about children, and proposed a collective challenge to current HTA paradigms to do better on this front:

“Patient preferences [are] very child-relevant because God knows what that means, when they don't have a voice.” (Health professional)

The inherent limitations associated with preference elicitation from proxy decision-makers, including parents, were emphasized:

“When you start moving into paediatrics, and you're using substitute decision-makers, and other caregivers, I think the quality of some of that information can diminish, and just introduces a number of other challenges into the process.” (HTA professional)

A number of participants noted the strong normative and jurisprudential foundations for child participation in the United Nations Convention on the Rights of the Child, which defends children's right to participate in decision-making processes affecting them. In the words of one stakeholder, *“there's a lot [of value in] ‘nothing about me without me’”* (Health professional). At the same time, many recognized the challenges to doing so in the HTA space. The tension between capacity and participatory rights was, for many, not easily resolved. Participants gave strong voice to the potential for unique and distinctly valuable insights from enhanced child participation in HTA, citing research on the elicitation of policy priorities among young children:

“What [researchers] heard [from children] was so different from what they expected, and so showed them that the way they would have prioritized where they put the money would have been so wrong if their goal was really meeting the needs of these little ones.” (Health professional)

Still, the practical means for enabling this participation and incorporating its results were not always clear to participants. When and how to assimilate child values and preferences into the patient input solicited for HTA reviews, and, more fundamentally, into the methods used to assign health state utilities, were questions posed but not answered. One participant referenced emerging science on continued neurodevelopment beyond

adolescence, and its implications for executive function and corollary conceptions of capacity even in this age group:

“[Consider] this newer literature on the young person's brain developing into their 20s and risk assessment being one of the last things to develop. So, you know, ‘if I can't play soccer...then life is over.’” (Health professional)

Nevertheless, the balance of input favoured enhanced efforts at child participation in the assessments and decisions that govern their access to health technologies.

A related theme to surface was the tension between the incorporation of individual and societal perspectives in drug policymaking for children. The value of personal experience – of disease, of treatment, of specific social context – was deemed by many an integral part of HTA reviews. As one participant put it, *“until you've actually had it, you don't know what a pain [the treatment] is”* (HTA professional). Running parallel to this was a recognition by some stakeholders of the often-indissoluble conflict between individual and community priorities. A number of participants spoke to the tension between access to specific drugs and responsible societal resource stewardship, and identified competing interests at the patient and community levels in respect of coverage decisions:

“It's hard enough to say no in a circumstance when, you know, the data are poor and you really can't justify recommending something. But it's an even harder thing to say, you know what, this just doesn't work with our values because this is where that really pointy part of individual rights really bumps up against society's rights or society's interests.” (Provincial policymaker)

Some argued for the primacy of collective societal values above patient and professional ones in the realm of public funding priorities – *“I don't think it should be the values of folks around the table making the decision – it's not my personal values that matter, it's*

the values of society” (Provincial policymaker) – and argued for enhanced public input into decision-making processes. Many felt that the arithmetic of societal values on drug coverage would differ for children, and that public voice should play a greater role in value assignment and priority-setting, in light of the intrinsic evidentiary limitations attached to child HTA.

2.2 Structural Values

The existence and play of *structural* values – those internal to and formative of the HTA framework itself – were also a coherent theme in the data. Participant reflections on life-course potential and fair innings, equity and unmet need, and the moral calculus of economic arguments were all central to interpolations of standard HTA logic for child health. The construct of the family also emerged as a structural value in specific instantiations, notably in relation to economic methods and the enhanced incorporation of social context into HTA.

2.2.1 Life Years Gained: Potential and Fair Innings

Life-course perspectives were frequently invoked to frame and justify approaches to HTA for child health technologies that diverged from, or directly complicated, established HTA paradigms. The idea of ‘life years gained’ stood out in this context. The simple fact of youth, of years of life left to live, animated most participants’ moral reasoning on HTA for children. Value propositions for paediatric drugs and health technologies were frequently framed and scaled in line with their capacity to yield gains in future years of life:

“I do think there are different ways to look at the technology when it's used in pediatric health care. In some ways I think of it as more akin to preventive medicine. Because presumably if you treat people well and can extend their lifespan they have a lot more life to gain.” (HTA professional)

“I just think it goes back to what society values and, you know, society would probably value a life that has years ahead of them than a life that doesn't have years ahead of them.” (Provincial policymaker)

Interestingly, the issue of disability did not often arise: participants gave little consideration to the value of life with disability, nor assumptions about the same baked into standard methods for health economic evaluation.

Layered on the simple arithmetic of life years were two main conceits that refined the moral calculus for many stakeholders: potential and fairness. Recognition of a child's latent potential, in social and economic terms alike, was central to many participants' views on the need to do HTA differently for children:

“It's the potential that's lost. It's just so much more of a tragedy when a seven year-old dies than when a seventy year-old dies. You know, there's, it's all the potential that's lost.” (HTA professional)

This conviction was expressed in relation to both personal and public spheres of life. The most common formulations were couched in terms of collective economic gains, be they to the health system or to society at large:

“You get something under control early on, you have less draw on the health care system later on...the biggest bang for your buck.” (Health professional)

“The economic benefits, right, of productivity gains to be had with good child health. That on its own should be a reason why governments should care about stuff. 'Cause if your kids don't do well then they can't be productive citizens and they can't contribute to your GDP [gross domestic product].” (Provincial policymaker)

“The other thing that makes that analysis different is what I call the rule of 7 and 77. Right? So you're making a drug decision for a 7-year-old who can

live 77 years versus a drug decision for a 77-year-old who might live 7, right? So while the...patient population is small, the life years [gained] are potentially huge depending how you look at things. You've got the economic things that flow from that, right? So it's not just 77 years but that can be...50 years of productive economic life.” (Parent)

However, participants also made powerful allusion to the personal, familial and communal benefits reaped from childhood potential realized:

“[My son] was 3 when he died. You know, he didn't get to play soccer, he didn't get to go to high school, he didn't get to go to university. You know, he doesn't get to do all the things his twin brother is doing.” (Parent)

Related to ideas about potential were notions about fairness. A wide range of participants referenced the existential value of experience across the arc of a life, and the injustice of a child deprived of such experience.

“I do think the years of life you have left to benefit should be considered. It's just that sense that an older person has lived their whole life and they've had a good life and a small person hasn't. I think people see that they have a whole life ahead of them and it's this idea of justice.” (Health professional)

“[When my mother died] it was sad, it was too early, there was a lot of things she still had to give but she had a full life. There's a different moral imperative in terms of [children]. I wish they were both still here but neither of them are – but there's a different moral imperative around a 3-year old dying and 80-year old dying and what they got to do.” (Parent)

“Before we get some people to move from 80 to 90 we should get everyone to 20 first in terms of fairness. Before everyone has two houses everyone should have one place to live.” (Health professional)

These convictions are captured in the philosophical concept of ‘fair innings’: it holds that everyone should have the chance to live the whole of a life, and that we should therefore give priority to those who have had less chance to do so. In the language of health economics, the ‘fair innings’ proposition posits that the less quality-adjusted life years one enjoys from birth till death, the worse off one is (19). Many participants displayed

intuitive affiliation with the idea of ‘fair innings’, and leveraged it as a justification for calibrating HTA to weight years gained early in life more heavily than those gained later.

2.2.2 Aggregate Benefit

A number of stakeholders invoked aggregate societal benefit as a barometer for the value of health technologies, but challenged its reflexive association with disease prevalence. Citing the potential for life-course benefits from interventions in childhood, these participants juxtaposed large benefits in a few to small benefits in many, and distinguished mathematical from moral equivalence. A number emphasized the need for analysis from the societal perspective – as distinct from the governmental perspective – in health economic evaluation for children, in recognition of the life-course repercussions of treatment and corollary impacts on both non-health sectors and future economic productivity. Many of the arguments in support of priority to children in this context shade into the realm of *sociocultural* values, which we explore in detail below. But the insistence that we should account differently for aggregate utility accruing from child health interventions was of central relevance to the *structural* values that inform HTA paradigms for children.

A few participants inverted the moral arithmetic of societal benefit altogether. They argued against priority-setting for drug development and funding based on aggregate societal benefit, eschewing justifications like burden of disease or utility maximization as determinants of priority. In place of aggregate utility, these participants argued for things like unmet need and novel discovery as value propositions for new technologies. In their eyes, the primacy of scientific knowledge should inform prioritization along the length of

the continuum from drug research to funding, by attaching value to innovation *per se*. One participant noted the potential for unanticipated benefits from novel drugs in diseases and populations distinct from their initial indication, and framed such spillover as fuel for the forward march of medical knowledge:

“We’ve known for centuries that discoveries in one group of patients will very often bring themselves back to another group of patients that was really quite unanticipated. And so if we close some of those doors, I fear that we actually slow down the progress of the ability to support humanity generally.” (Health professional)

2.2.3 Unmet need

The trope of unmet need was also leveraged in equity-based arguments for tailoring HTA to child realities and needs. Participants spoke to the relative lack of treatment options for children – as a result of gaps in clinical evidence, drug development, or licensed indications – and highlighted the equity implications of this status as ‘therapeutic orphans’. This unmet need was framed by some as an intrinsic justification for the prioritization of health technologies for children: not to supplant other means of assessing value, but to complement them:

“On the pediatric side, just given the fact that many of the current therapies often don’t have a pediatric indication...there may be an unmet need. [We must] identify the gaps in the current treatments, from a number of different factors, that make it important for us to bring forward a positive funding recommendation for this drug.” (HTA professional)

An array of stakeholders noted that the concept of unmet need is presently incorporated as a component of certain HTA frameworks, but implied that its form and reach remain somewhat hazy:

“Things might have similar budget-impact, similar cost-effectiveness, similar, you know, marginal extension of life. But then there are the sort of gut things about, well, so all of that may be true, but it's more important to have an option to give someone than to pile something else on existing options, and how do you quantify that?” (Provincial policymaker)

Their comments betray the lack of formal attempts in the HTA space to take account of the systemic issues that condition therapeutic need in child health, and to incorporate these dynamics in drug reviews for paediatric indications. A few participants connected unmet need to the idea of hope, suggesting that, particularly for severe or life-threatening conditions, the availability of treatment options *per se* had inherent value. Some noted the value of individual therapies in their role as one in a sequence of options, insofar as they sustain such hope in the context of rapidly evolving scientific knowledge:

“Sometimes [the therapy] will be a bridge, you know, you're just trying to get somebody to the point where they'll be the candidate for some other [treatment].” (Health professional)

"For us it's about getting to the next stage where breakthroughs are - because we're right on the cusp of serious [advances]." (Parent)

This perceived combination of historical exclusion and gathering momentum in the paediatric drug space coloured many participants' reflections on drug access for children, and placed unmet need alongside life-course potential, fair innings, and aggregate benefit as core justifications for a child-specific HTA framework.

2.2.4 Family

Finally, the construct of the family was a unique theme that emerged from participant reflections on the normative structure of HTA for children. Family context and impact were deemed essential components of the value propositions attached to the

assessment of childhood drugs and technologies. Proposals for their formal incorporation in HTA processes ranged from alternative methods for utility generation to structured procedural incorporation of parent and public voices at various points throughout the HTA continuum, from priority setting to evidence appraisal.

The idea of the family was frequently invoked in relation to the economic methods that underpin value assessments of child health technologies. Participants spoke to the decreased societal and economic productivity of family members of children with severe or chronic illness, and the lack of capture of these dynamics in standard economic assessments:

“You have the family, the parents involved, you know, going on the journey with them, that a lot of these things are actually more about the parents, probably, than the kids. You know, the having to take time off work, or you know, all of the travel, et cetera.” (Health professional)

“When a child dies, the families that I see, that are my friends who have lost their son or daughter, their ability to function in society and the world just becomes so immensely impaired.” (Parent)

They also repeatedly noted the importance of incorporating family context and perspectives in measures of utility among children:

“So you could take a kid whose utility is arguably zero, right? Like, who doesn't even perceive the world, but the family may find added utility in keeping the child alive, or in doing something for the child that costs money, and so therefore warrants an HTA, and if you just, if your unit of analysis was the child, obviously you would find, if the utility, this is a thought experiment, if the utility were zero, the cost-effectiveness threshold would be infinity, and so you would say never fund it, right?” (HTA professional)

“An unhealthy child is generally an unhealthy mother and, not uncommonly, an unhealthy father and siblings as well. So, the notion of unit of analysis, I think, is very germane to childhood.” (Health professional)

A few participants noted the potential to incorporate the little-heard voices of bereaved parents in child HTA. They referenced studies that elicit perspectives from parents following the death of their children, the perspectival changes alluded to by these parents, and the value in juxtaposing such views to those of patients and families currently engaged in efforts to access therapies:

“Bereaved family members within six months of the death of the patient...had such a different perspective, having gone through to the end, and then looking back...” (Health professional)

“To some extent we can go to caregivers – we don't tend to – bereaved caregivers for perspective, and maybe that's something we should do more of.” (HTA professional)

How to do this was less clear. But a clear sense that something is being missed in established methods for economic evaluation of child health technologies came through consistently. Stakeholders from across the range of perspectives represented asserted that HTA institutions need to spend time considering and incorporating how to optimize economic assessments to take account of familial impacts.

Participants also affirmed the value of parental perspectives in assembling grounded, real-world knowledge of child health technologies. The quotidian impacts of a given therapy – on the child, on the surrounding family – were felt to be poorly captured or prioritized in current HTA frameworks:

“It also has an impact on the family unit, just with trying to manage diets, and that's not just for the one kid in the house, it's for the entire family. So it goes beyond just the individual and could impact, you know, parents' quality of life, ability to retain jobs, all that sort of stuff.” (HTA professional)

Many stakeholders asserted that explicit incorporation of child and family perspectives had disproportionate importance in the assessment of paediatric drugs for public

coverage. Things little considered in adult health emerged as crucial determinants of the impact and acceptability of a given therapy among children: formulation specifics (dosage form, site of administration, palatability) and side effect profiles (both short- and long-term) often acted as hinge points for the immediate and future quality of life of the child and family. The developmental ramifications of drug-related toxicities were frequently cited as a source of chronic burden on families:

“If they do have to get IV treatments, versus oral treatments, because that's all that's available, they have to negotiate timelines with the parents, their availability, they have to take off work, et cetera, et cetera, you can see that with some of the adult populations as well, but I think it's probably more obvious within the pediatric population.” (HTA professional)

"We're dealing with lots of long-term effects...but he manages it all with an amazing amount of grace and strength." (Parent)

In short, ‘the family’ emerged as an insufficiently considered, but deeply important, mediator of the relationship between children and the health technologies they need, and a co-recipient of the benefits and burdens attached to them. There was broad agreement among participants on the need for HTA principles and processes better calibrated to the realities of children’s social context, with family at the centre.

2.3 Sociocultural Values

Widening the lens of social context, we identified a final strain of values that spoke to how broader social and cultural values relate to, shape, and condition responses to drug policy decision-making for children. These *sociocultural* values assembled into three main themes: culture, equity, and distinction.

2.3.2 *Distinction*

The notion that children are distinct, or unique, in sociocultural terms coloured many participants' reflections on paediatric drug policy and access. Expressed in varied ways, the sentiment that children constitute a separate and special social group, and that a number of the normative considerations in child health policy are therefore *sui generis*, was widely held and forcefully stated by participants. As a consequence of this perceived distinction, a range of participants identified a moral imperative for society to protect and promote the health and well-being of children:

"Societies are judged by how they treat the elderly, the infirm, and the children. When the infirm are also the children, I think there is a double ethical responsibility by society." (Parent)

For some, this sense of duty derived from a parental impulse to nurture, transposed from the individual to the collective:

"It's nurturing...Most adults who we're dealing with who control everything have had children. Not that they necessarily were children. I don't think that's what gets them. I don't think people say, gee, I was a child. No, they picture their child." (Health professional)

For others, it was connected to an inchoate conviction in the fair innings argument described above:

"I think at the societal level people have a responsiveness to the plight of a child that is different from somebody who is – that have had their three score years and ten and they're at the end of life." (Health professional)

For others still, this societal imperative attached to our deep, instinctual drive for species survival in evolutionary terms – again, the individual drive writ onto our collective social canvas. Moreover, in its evolutionary grain, some saw this instinct

as fundamentally human, and the corollary imperative as something shared across diverse human societies:

“[If] society believes there to be different values in child health, we should simply say that. I don’t think there’s any shame or anything to be upset about. I think it may be a societal preference that we have, that many societies in fact have. I mean if you really think about it from even just like a pure survival of the species perspective, if we’re not caring for our young then, you know, our species is toast.” (Provincial policymaker)

The effect of normatively distinguishing children was, for some, grounds to justify paediatric exceptionalism in policy:

“When we’re allocating resources or dividing up the health care budget pie, are there unique features of this being a paediatric context that would have sort of extra priority or extra points be given to how much goes to kids, as opposed to the framework that one would apply just across the board.” (Health professional)

Indeed, this moral obligation – called by one participant the “*founding principle of a compassionate society*” (Health professional) – was directly tied to drug access by a number of stakeholders, including willingness to pay for children’s health technologies:

“There needs to be a higher [cost] threshold when dealing with children than with adults. And I don’t think you’d get a strong argument from anybody against that.” (Health professional)

“I think we’re obliged to make sure that each of our children has access to the medicines and the technologies that they need to be well and have as high quality and as long a life as is possible.” (Health professional)

The discrepancy between conceptions of child distinction and priority, on the one hand, and constrained access to drugs, on the other, evinced for some a lack of intimate knowledge about child health realities and the development of drug policies and systems predicated on that ignorance:

“There is a real understanding deficit. You know, I’ve been in pediatrics for a very long time. There still remains an attitude in the adult world that pediatrics are reduced-sized adults and therefore can be thrown into the mix. And that just isn’t true.” (Health professional)

The play of other overriding instincts was, however, not lost on participants. The influence of incentives that blunt individual and social norms attached to children was recognized by many. Participant reflections on the market dynamics of paediatric drug development and the realities of political voice in democratic institutions are two ready examples. Nevertheless, the vast majority of stakeholders articulated both a moral basis and practical opportunities for reform of paediatric drug systems and policies in line with societal beliefs about the unique status of children.

2.3.3 Equity

Entwined with their recognition of childhood distinction, many participants identified the paradox of children’s relative marginalization in society. This perceived marginalization – encapsulated in the trope of children as ‘*an invisible minority*’ (Health professional) – was predicated on ideas about childhood vulnerability. Some framed this vulnerability as a lack of capacity for self-advocacy, and identified a corollary societal obligation to protect the interests of children in legal and policy fora:

“The vulnerability of not being able to advocate for yourself, calls on a different level, perhaps, for stewardship that takes into account that you don’t play equally because this group can’t be advocating in the same way.” (Health professional)

Relative inequity in drug access between children and adults were traced to this intrinsically powerless state, a consequence of both biological and political vulnerability:

“It’s a vulnerable population and so there’s hesitancy to study drugs, I think, in children.” (Health professional)

“Equity is an even more important consideration in children than adults because they have very little say in their place in society, their socioeconomic position.” (Provincial policymaker)

Anticipating comparable claims to political privilege from other vulnerable or marginalized groups, a number of participants sought to stress categorical distinctions of childhood vulnerability. Notions of innocence coloured participants’ portraits of inequity in drug access and health outcomes for children, and their attempts to distinguish it. For some, children’s near-total lack of responsibility for their health state justified their prioritization in funding decisions:

“I think people in principle believe that children are innocent and don't deserve to suffer. Whereas with adults, some of what you do...may have had an influence on what happens to you.” (Health professional)

Others located a key source of difference in children’s unique and evolving developmental state:

“Sometimes the pushback is yeah, so, you know, do we make [drug policy] different for women, [ethnic] minorities, immigrants? No. But there is a discrete developmental population in which devastating diseases occur. They occur rarely but they are critical in child health.” (Health professional)

The expressed intent of such distinctions seemed less an attempt to devalue alternative experiences of inequity, or related claims to priority, than a disavowal of zero-sum competition between them. The recurrent links made by participants between childhood vulnerability and inequity of access to drugs served, in aggregate, as grounds for the explicit incorporation of equity considerations in paediatric drug funding decisions.

2.3.4 Culture

While shared convictions about both children’s special status and relative marginalization seemed to pervade many of the interviews, there was also a sense that culture could modulate collective mores about children in a given society. A few stakeholders noted the bounded sociocultural lens through which they view children in relation to society. They intimated that dominant narratives about children in our society might appear parochial when viewed in a global context, and further, that such narratives might not adequately represent the nuance and variegation of cultural perspectives even *within* our society, or others like it:

“[Take] a cultural group that doesn't have that same lens...[and] puts priority on the elderly over kids...that culture gives a lot of deference to the contributions seniors have already made through their lifetime, and kids – ‘what have they done that's worthy of the extra point’? (Health professional)

While not eschewing the biological and social differences ascribed to children across the interviews, they troubled easy assimilation of these distinctions into social policy – at least in the absence of careful incorporation of a range of societal perspectives.

In addition to identifying varied ideas about children’s vulnerability and need for protection in different cultural contexts, a few stakeholders emphasized the role of culture in notions of fairness. They challenged the uniformity of cultural attachments to the ‘fair innings’ argument:

“This fair innings notion seems to be a very - I don't know if it's fair to say Western, but may be North American-centric type of framework and that whereas, you know, it might seem sort of obvious place to start to some, we can't make that sort of presumption definitely as we're much more of a global multicultural society.” (Health professional)

One participant drew a line from the divergence of cultural norms on age-based prioritization to legal provisions protecting against age-based discrimination. Specifically, the role of the *Canadian Charter of Rights and Freedoms* was invoked to describe the potential limits of preferential funding for paediatric drugs, and, perhaps more importantly, to underscore the competing moral principles that might reasonably attach to governmental policy on drug funding. As against this, some referenced provisions around minimal impairment in *Charter* rights denial: the need to prove that the “*harm of denying that right is less bad than the harm that's going to come from the activity*” (Health professional) – namely, prioritizing children in drug resource allocation. Others pointed to inherent states of vulnerability and marginalization in childhood as counterweights to claims of age-based discrimination in western liberal democratic legal philosophies:

“If you can make the case that you're part of a group that has been traditionally marginalized or treated sort of with less benefit, then to try and compensate or to even push higher than equality would be defensible without falling short and being accused of discrimination on basis of age.” (Health professional)

Taken together, participant reflections on the role of culture in mediating public perceptions about the place of children in society, and the collective duties owed them, constituted an important challenge to easy assumptions about society’s allocative preferences. Rather than overturn claims of inequity or distinct need attached to children, this challenge added valuable complexity to such claims, underscoring the need for robust processes and justificatory frameworks to ground allocative decisions on paediatric drugs.

Discussion

Our study yields two important, overarching findings about HTA for child health. Firstly, it reveals notable differences of context and substance related to child health technology production, evaluation and use. These differences span the technical aspects of HTA (from assembly to assessment to assimilation) and the surrounding sociopolitical milieu (from markets to governance to politics). Careful analysis of these differences sets in relief a number of substantive and procedural shortcomings of current HTA paradigms in respect of child health. Secondly, our study brings to light a unique range of social values attached to child health and technologies, and develops a novel typology to facilitate their apprehension and use. Taken together, these findings suggest a need to rethink how HTA is structured and operationalized for child health technologies: from the design of its component parts to the way they fit together. Importantly, this needn't require a major overhaul of existing frameworks or institutional processes; participants were resolutely practical in their dissection of current problems and recommended solutions. However, it does imply that focused attention to change along the continuum of HTA production, and to the regulatory systems that precede and receive that production, could yield substantial improvements in the quality and relevance of HTA for child health technologies.

Policy Implications: Relating Concepts and Values

Understanding the relationships between the major concepts and values ascribed to child HTA gives insight into opportunities for system improvement. None of the species of values identified is entirely distinct: the boundaries between them are porous,

and allow certain values to move across the typology in their relevance to different categories. *Structural* values tag closely to ideas about *technology* and the systems that evaluate their worth. *Sociocultural* values hold most sway in reference to *politics* and the broader societal determinants of policymaking for children. *Procedural* values are perhaps the most generic or foundational: they were invoked – and therefore retain relevance – across the domains of *technology* and *society* alike.

Procedural Values: Bridging Technology and Society

The moral relevance of process to the sequential phases of technology production – assembly, assessment, and assimilation – was asserted time and again by participants. In large part, this relevance related to the inclusion of voice: at each phase, having the right range of perspectives incorporated into decision-making was a priority for participants. The precise make-up of that ‘right range’ sometimes differed among stakeholders, but commitment to the careful inclusion of varied perspectives was consistent. Reflecting on technology assembly, many participants identified a relationship between power, voice, and the prioritization of technologies for review, one which has tended to privilege industry interests in the assembly phase. Reliance on a predominantly manufacturer-driven submission process has allowed market logic to dictate the framing and selection of health technologies for HTA, including at the national level in Canada. Given commonly weak market incentives attached to the development and sale of paediatric drugs, this reality has limited the presence and prioritization of child health technologies in HTA pipelines.

A number of participants called for reform of both the principles that govern HTA priority setting for assessment and the processes that structure their consideration, to correct intrinsic biases against the entry of many child health technologies into HTA portfolios. The formal inclusion of child health scientists, practitioners, patients and, notably, broader publics into institutional priority setting endeavours were seen as a potential corrective to existing deficiencies of perspective. Academics and HTA institutions in other jurisdictions have issued comparable calls for enhanced voice in HTA priority setting for both general publics and discrete constituencies within them (20-22). The findings from this study affirm and amplify such calls. Importantly, they also direct attention to the impact of distinct voices on the prioritization of technologies, and highlight the need to attend to the natural disadvantage of child health technologies in standard HTA priority setting processes.

The elicitation of social values emerged as a crucial nidus for procedural reform in the assessment and assimilation phases of child HTA. In particular, questions of whom to involve in defining and adjudicating value amongst competing child health technologies, and how to involve them, recurred across interviews. Cataloguing the range of problems with paediatric evidence generation and interpretation, and with methods for the economic evaluation of child health technologies, participants argued forcefully – and uniformly – that child health expertise is essential to meaningful technology assessment in this population. They saw viable nodes to incorporate such expertise in the appraisal of clinical evidence, and in the design and interpretation of pharmacoeconomic models for technology evaluation. Participants also stressed the importance of eliciting and

assimilating social values through deliberation with patients and publics; crucially, they signaled a role for children themselves in this capacity. Allied to this, a number called for strengthening fundamental knowledge on societal preferences vis-à-vis resource allocation in children through dedicated research in this realm.

Process considerations were deemed central to modes of technology assimilation with the surrounding health system, and played a notable part in participants' moral reasoning in the sociopolitical domain. The transition from HTA recommendation to policy was identified as a particularly weak joint in the evidence-to-policy continuum. As discussed above, participants cited opportunities to mitigate the political vagaries impacting funding decisions for child drugs and technologies. A notable example is investment in innovative trial designs, such as adaptive pathways, that incorporate staged drug approval, evidence of real-world safety and effectiveness, and input from HTA institutions, patients and publics across a drug's life span (23). Another critical, if thorny, issue is the need to consider opportunity costs in drug coverage decisions by comparing like with like. Some participants felt that a first, albeit imperfect, step toward this goal is distinct funding pools for paediatric drugs. A number of problems inhere in this approach, not least potential political intractability. At minimum, points of routine, structured engagement with child health communities, experts and patients alike, would help funders place HTA recommendations for specific paediatric technologies in broader system context.

Structural Values: Blueprint for Assembly and Assessment

Structural values tagged most directly to technology-related themes, with greatest bearing on the component parts of technology assessment. Participants highlighted the inclusion and weighting of evidence, methods for valuing health states, and the determination of appropriate cost-effectiveness thresholds as key parts of prevailing HTA frameworks in need of normative rethinking in the context of child health. At the micro level, a number identified opportunities to strengthen the foundations of child health economic evaluation through methodological reform of preference elicitation for child health states, including the incorporation of familial impacts of child illness and treatment. At the macro level, many participants endorsed the development of a coherent framework for child HTA that explicitly incorporates valuations of life-course potential and fair innings alongside more generic considerations like unmet need.

The patterning of structural values on technology assembly also emerged as an important determinant of access to child health technologies. In the view of many participants, practical realities governing the choice of technologies for assessment by HTA institutions, coupled with the power of particular sets of actors, shape the production of knowledge on, awareness about, and uptake of competing health technologies. Again, industry interests and voice predominate, rendering financial calculus an outsized determinant of priority. Alternative values for technology selection – such as equity, need, disease severity, potential impact, and the presence of treatment alternatives – are, by implication, undercut (16,17,24). Explicit consideration of the distributional impacts of priority setting by national and provincial HTA institutions

would go a way towards mitigating this imbalance. More routine use of equity as a frame for technology prioritization is a viable first step (25-27).

Sociocultural Values and the Politics of HTA

Sociocultural values attached most closely to participant reflections on the political and societal dimensions of child HTA and drug coverage. Echoing the play of structural values in HTA production, ideas about children's disadvantage and unmet need in the health technology space motivated a focus on equity as an organizing principle for paediatric drug funding decisions. The analysis at the sociocultural level went deeper, however, to claims of childhood as an ontologically and thus morally distinct state, one invested with unique societal meaning.

On the force of such claims – including allusions to inherent vulnerability and corollary societal duties to protect – a number of participants advocated for paediatric exceptionalism in drug policy. The practicalities of implementing such exceptionalism were left largely unexamined. Moreover, a few participants challenged these claims, noting the varied imprint of culture on perceptions about the value and place of children in society. Nevertheless, a strong narrative emerged around the need to think distinctly about children's health technologies and access to them, and to consider ways of embedding such distinction in practice.

Again, one potential instantiation of this goal is a national framework to guide drug policy for children, one that takes account of the distinguishing features of child health, illness, and treatment from drug development to coverage. Any such framework would need to focus on two principal aims: reform of the drug regulatory system to better

incentivize paediatric drug research, development and product licensing; and development of nationally adopted drug funding standards for children. Attending to the unique sociocultural, scientific, and political dynamics that condition access to medicines for children – both within HTA institutions and beyond – would strengthen the technical and moral bases of coverage decisions, and help rationalize these decisions across provinces, providing for more unified and equitable access to new and existing paediatric drugs.

Study Strengths and Limitations

To our knowledge, this study provides the first empirical evidence about the unique social values, system dynamics and sociopolitical dimensions of HTA for children. It assimilates rich qualitative data from a range of key stakeholders into a novel social values typology for child HTA. We employ this typology and associated concepts to produce insights into how to understand and improve drug assessment and policymaking for children in public health systems.

Our findings are bounded by the scope of our sample, which examined the Canadian HTA and health system context, with specific focus on Ontario drug policy dynamics. Our capacity to account for Canadian cross-provincial differences in drug policymaking environments or uptake of national HTA recommendations is therefore limited. This limitation is mitigated by the increasingly national scope of drug assessments, funding recommendations, and policy uptake in Canada. CADTH drug reviews increasingly serve a national purpose, with less recapitulation of HTA systems, processes, and recommendations at provincial levels. While it remains the purview of

individual provinces to make drug funding decisions, pCPA-led drug price negotiations with industry have encouraged pan-provincial coordination in the uptake of national HTA recommendations. Ontario represents one of the most complex provincial drug policy environments, with a legacy of layered HTA institutions and multiple drug funding programs. Its use as a case study was intended to capture and consider this complexity in our analysis of HTA for child health in Canada. Though its drug policy dynamics do not mirror those in other provinces, in-depth exploration of these dynamics yields a range of findings and policy considerations of relevance to other provincial jurisdictions.

The relevance of our findings to other health system contexts internationally is likewise open to question. In particular, the social values constructs that emerged from our sample are contingent on the wider values at play in Canadian society, and may not accurately reflect the range of sociocultural instincts or moral convictions in other societies, even those with similar economic, political and cultural histories. While variation doubtless exists, allied work by our team to systematically review and synthesize academic literature on the moral foundations of child health and social policy suggests broad consonance of values related to children and health across a wide range of societies (28). Remarkably, almost no evidence exists on the principles and processes of drug funding decisions for children in any health system context, including the social values that animate those decisions. This study serves as a first in-depth foray into the role of such values in HTA, with sufficient context-specificity to yield both foundational and particular knowledge for policy. Future work could focus on extending such social values and policy analyses to cross-country comparisons of HTA for children.

Lastly, our study sample focused on a range of stakeholders involved in or impacted by drug coverage decisions for children in Canada, including HTA professionals, provincial policymakers, health professionals, and patient family members. We did not formally sample members of the general public, nor undertake stratified sampling of other segments of the population with unique drug access experiences, such as those with rare diseases. Lastly, we did not interview children themselves. Involving these voices in future analyses of child HTA may yield novel insights. This study itself is part of a broader project on child HTA that includes the elicitation of stated preferences on child health resource allocation from the general public, to capture broader and more representative public input than in-depth interviews permit.

Conclusion

Current approaches to health technology assessment are not well calibrated to the realities of child health and illness, nor to societal priorities relative to children. This study explores the technical and sociopolitical determinants of public funding decisions on paediatric drugs, through the analysis of interviews with stakeholders involved in or impacted by HTA for child health technologies at the provincial (Ontario) and national levels in Canada. It generates new knowledge to inform policymaking on paediatric drugs, relevant to both HTA institutions and government payers. The analysis contributes to the existing literature on HTA and drug access in three notable ways. Firstly, it furnishes unique empirical data on the political and health system dynamics of drug funding decisions for children in Canada. It interrogates the fit of each phase of the HTA process – assembly, assessment and assimilation – to child health realities, and

emphasizes opportunities to improve current approaches to the assessment of paediatric drugs and technologies. Secondly, the analysis surfaces insights into the relevant social values for child drug funding decisions from varied stakeholder groups. The resultant typology of values is readily applicable to the evaluation of prevailing HTA paradigms and drug funding decisions for children in a range of health system and societal contexts. Finally, it employs this typology to catalogue and understand the play of social values across phases of the HTA process and the broader health system context. This produces a nuanced and contextually grounded analysis of concepts instrumental to drug funding decisions for children. The insights generated are directly applicable to the Canadian and Ontario contexts, but also yield fundamental knowledge about the normative dimensions of HTA for children that are germane to drug policy in other health systems.

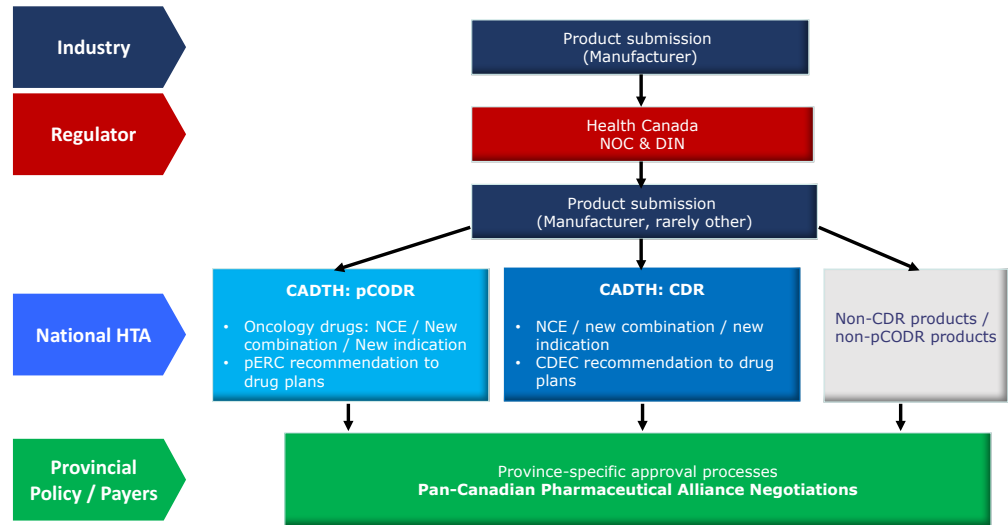
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Figure 1. Drug approval and funding process in Canada (except Quebec)



Note: CADTH = Canadian Agency for Drugs and Technologies in Health, CDEC = Canadian Drug Expert Committee, CDR = common drug review, DIN = drug identification number, HTA = health technology assessment, NCE = new chemical entity, NOC = notice of compliance — approval of drug safety and efficacy, pCODR = pan-Canadian Oncology Drug Review, pERC = pCODR Expert Review Committee.

Appendix 1. Informed consent form (professional)



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**PARTICIPANT INFORMATION SHEET AND CONSENT FORM
(POLICYMAKER/PROFESSIONAL)**

Title of Study: The politics of child health technologies: Social values and public policy on drug funding decisions for children in Canada

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Funding Source: Canadian Institutes of Health Research
Ontario Ministry of Health and Long-Term Care

You are being invited to participate in a research study conducted by Dr. Avram Denburg and colleagues because you are a health care provider involved in the care of children or a professional involved in health technology assessment. This study examines decision-making for public funding of paediatric medicines in Ontario/Canada. Specifically, it investigates the ethical principles and social values that serve as inputs to, and influence the outcomes of, health technology assessment for paediatric medicines.

In order to decide whether or not you want to be a part of this research study, you should understand what is involved and the potential risks and benefits. This form gives detailed information about the research study, which will be discussed with you. Once you understand the study, you will be asked to sign this form if you wish to participate.

The costs of conducting this study are being covered by two grants: 1) a Fellowship Award from the Canadian Institutes of Health Research (Awardee: Dr. Avram Denburg); and 2) a Health System Research Fund grant from the Ontario Ministry of Health and Long Term Care entitled "Harnessing Evidence and Values for Health System Excellence" (Principal Investigators: Dr. John Lavis and Dr. Jerry Hurley).

WHY IS THIS RESEARCH BEING DONE?

Drug research, development and policy have historically neglected children. One area of persistent neglect is public policy on funding for pediatric medicines. In most publicly funded health systems, including Canada, decisions about which drugs to cover are made through a formal process called health technology assessment (HTA). There is growing awareness that HTA as currently conducted presents a variety of problems in the context of child health. The ethical and social dimensions of child HTA have received almost no attention in academic or policy domains.

WHAT IS THE PURPOSE OF THIS STUDY?

This project seeks to understand how we assess the worth of child health technologies for public funding. It explores the social values that inform decision-making for public funding of paediatric medicines, through interviews with stakeholders involved in or impacted by HTA for child health technologies at the provincial (Ontario) and national levels in Canada. This research will deepen our understanding of the assessment of child health technologies, and generate evidence on the social values that influence this process. Ultimately, such knowledge will help guide policy decisions on which drugs to cover for children and why.

WHAT WILL MY RESPONSIBILITIES BE IF I TAKE PART IN THIS STUDY?

If you volunteer to participate in this study, you will be involved in a one-on-one semi-

structured interview with a study investigator or research assistant. A researcher will ask you about your thoughts, opinions, and experiences with HTA and/or drug funding and access for children in Ontario/Canada. We are specifically interested in your thoughts about how current principles and processes for public drug coverage impact access to medicines for children in Ontario, what ethical issues arise in public drug funding decisions for children, and which social values should predominate in decision-making about public coverage of paediatric medicines.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no physical risks or discomforts to this study, as it consists only of a confidential one-on-one interview.

HOW MANY PEOPLE ARE IN THIS STUDY?

We are interviewing parents of children who have had experiences with issues related to access to novel drug therapies, health care providers involved obtaining access to, and treating children with, novel medical therapies, and professionals involved in HTA institutions and processes in Ontario and nationally. We plan to interview a total of 15-20 people, with additional interviews as needed.

WHAT ARE THE POSSIBLE BENEFITS FOR ME AND/OR SOCIETY?

We cannot promise any personal benefits to you from your participation in this study. However, the information you share with us may be used by policy-makers in the future when deciding whether or not (and under what circumstances) to fund novel drug therapies for children. The information you provide about your current experiences with HTA or drug access may help to inform the way child HTA is conducted in the future.

IF I DO NOT WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

It's important for you to know that you can choose not to take part in this study and just continue on as you do now. Choosing not to participate in this study will in no way affect your employment or status as a health care professional or your involvement with HTA institutions or processes.

WHAT INFORMATION WILL BE KEPT PRIVATE?

Your data will not be shared with anyone except with your consent or as required by law. Your personal information (e.g. name, e-mail address, phone number) will not be recorded with your interview data or kept following data collection.

For the purposes of ensuring the proper monitoring of the research study, it is possible that a member of the Hamilton Integrated Research Ethics Board may consult your research data. However, no records which identify you by name or initials will be kept. By signing this consent form, you authorize such access.

The audio-recordings of the interviews will be transcribed (typed) by a professional transcription company. The audio-recordings, without any identifying information attached, will be transferred to that company by uploading them to a password protected secure server. If you choose to state identifying information on the audio-recording (we will not ask you for identifying information, but sometimes when people are talking they accidentally say their own first name or other identifiers), the transcription company will have access to that information. Any identifying information on the audio-recording will be removed when the interview is transcribed (typed). Audio-recordings will only be listened to by members of the research team and they will be destroyed after 10 years. If you wish to review or edit your audio-recording, you are welcome to do this. Please contact the Principal Investigator, Avram Denburg. If your data collection has ceased when you contact us to review your audio-recording, we will require the date and time of your interview in order to identify which recording is yours. We will need this information because after data collection for an individual is finished, we will have removed your name from our records and the date and time of your interview will be the only way to identify your recording.

CAN PARTICIPATION IN THE STUDY END EARLY?

If you volunteer to be in this study, you may withdraw at any time and this will in no way affect standing as a health care professional or your involvement with HTA institutions or processes. If you participated in an interview, you have the option of removing your data from the study, by notifying the interviewer during the interview, or by contacting the Principal Investigator, Avram Denburg, with the date and time of your interview. You may refuse to answer any questions you don't want to answer and still remain in the study.

WILL THERE BE ANY COSTS?

If you incur parking fees when attending the interview, we will reimburse these.

QUESTIONS

If you have questions or require more information about the study, please contact the research team at avram.denburg@sickkids.ca.

CONSENT STATEMENT

Participant:

I have read the preceding information thoroughly. I have had an opportunity to ask questions and all of my questions have been answered to my satisfaction. I agree to participate in this study. I understand that I will receive a signed copy of this form.

Name	Signature	Date
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Person obtaining consent:

I have discussed this study in detail with the participant. I believe the participant understands what is involved in this study.

Name, Role in Study	Signature	Date
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This study has been reviewed by the Hamilton Integrated Research Ethics Board (HIREB). The HIREB is responsible for ensuring that participants are informed of the risks associated with the research, and that participants are free to decide if participation is right for them. If you have any questions about your rights as a research participant, please call the Office of the Chair, Hamilton Integrated Research Ethics Board at 905.521.2100 x 42013.

Appendix 2. Interview guide (policymaker/health professional/HTA professional)

Social values and public policy on drug funding decisions for children in Canada

INTERVIEW DATE/TIME: _____

Pre-interview

- Review purpose of study and why participant selected
- Review and collect informed consent
 - Review anonymity conditions
 - Review withdrawal rights (any point during/after conduct of interview)
- Describe nature/structure of interview

Introduction

- **State date**
- **State professional role:**
 - Policymaker
 - HTA professional
 - Clinician (physician, pharmacist)

Preamble:

- This study is one part of a larger project examining health technology assessment and drug policy for children in Canada. The focus of the project is trying to understand if our existing HTA processes and outputs meet the needs of children – that is, whether they are relevant to the realities of child health and health care in our country. In particular, the project seeks to understand whether the social values that motivate and structure HTA are, or should be, different with respect to the assessment of child health technologies.
- This particular study seeks insights from those involved in, or impacted by, HTA for child health technologies – clinicians, HTA professionals, and patient families – about the context for paediatric drug funding and access in Ontario, the values that predominate in that context, and the strengths and challenges that result.

Research questions:

- What social values are relevant to child HTA? What unique considerations should inform the appraisal and selection of child health technologies for public coverage?

Questions

Topic: Child health and novel therapeutics

Preamble:

- One of the motivating factors for this study is the perceived increasing relevance of novel drugs and diagnostics in paediatric medicine, and the rising costs of the same, coupled with an acknowledgement that the wider context for drug research, development and regulatory environments often creates challenges in access to medicines for children.

Questions:

- What is your sense of the relevance of novel drug therapies in paediatrics? How do you think this compares to adult medicine?
- What are your perceptions about the current state of the drug development and regulatory pipeline for paediatric medicines in Canada?
- What challenges, if any, do you perceive in access to novel drug therapies for children in Canada?

Alternatives for health professionals:

- Have you experienced successes and/or challenges with obtaining access to existing or novel drugs that you thought would benefit your patients? Please describe.
- How, in your view, do the dynamics of access for children relate to drug licensing and/or funding in Canada?

Topic: HTA and access to paediatric drugs

Preamble:

- The relationship between HTA and drug policy decisions is not 1:1. Sometimes HTA recommendations are not followed by policymakers; sometimes there are no HTA recommendations to follow, either because they are not initiated or are not feasible (e.g. due to lack of evidence or time).

Questions:

- What is your sense of the current role of HTA in drug access dynamics for children in Canada? What strengths and challenges do you perceive with current models of HTA for paediatric drugs and diagnostics in Canada?
 - Perceived relevance of existing HTA processes and methods to child health conditions and system realities in Canada

- Perceived deficiencies and/or inefficiencies of such methods vis-à-vis novel drug assessment and funding for children in Canadian and Ontario context(s)

Alternatives for health professionals:

- Are you aware of HTA processes/institutions in Canada/Ontario? Do you think these impact your clinical milieu or care of patients? If so, how?
- In what ways, if at all, have provincial drug funding decisions impacted your care of patients?
- What is your sense of the relationship between HTA processes and provincial drug coverage decisions for children in Ontario?

Topic: Social values, health policymaking and child HTA

Preamble:

- Social values may be said to be the shared moral sensibilities or intuitions that motivate or justify collective programs of action, be they social policies or programs, political endeavours, or that mediate the nature of relationships between individuals in a given society.
- In the context of HTA, certain ‘values’ have tended to predominate:
 - **certainty** or truth, founded on particular types of knowledge or evidence;
 - **value** for money, based on notions of efficiency; and
 - **feasibility**, gauged with reference to system and societal impact.

Questions:

- What values do you think are most important to HTA processes or outcomes? Are there important social values that you feel aren’t well represented in our current HTA paradigms?
- Are there any social values that you think should attach specially or more centrally to HTA for children?
- Do you think that the principle and/or processes for HTA for child health technologies – such as drugs, diagnostics and services – should differ from those for adult technologies? If so, why? How?
 - Are children owed different opportunities or protections when health systems adopt new technologies? Why or why not?
- Which stakeholders do you think are important to engage in drug funding decision-making in the province? Please describe.
 - (Perceptions of the respective roles of health care practitioners, HTA professionals, patients and the public in drug funding decision-making)
- What types of evidence/knowledge do you think are important to consider in the context of provincial public drug funding decisions? How, if at all, do you think

the relevance of these sources of knowledge differ between HTA for adult and child technologies?

- What are your thoughts on the relative importance of clinical evidence, health system economics, and patient or public values in drug funding decisions and policy?
 - Potential differentiating features/dynamics in paediatric vs. adult populations
 - Potential differentiating features of child HTA and drug funding from rare disease/orphan drug dynamics and policies

Topic: Future directions

- Given the discussion above, do you think we need to develop/incorporate different policies, programs or processes to guide child HTA or drug funding decisions, either provincially or nationally?

Chapter 4. Preface

The final study in this dissertation builds on the insights from the foregoing two studies to test societal preferences for health resource allocation to children, as compared to adults. The population-level perspective afforded by its large-scale survey approach provides a complementary perspective on health care funding decisions for children that triangulates the conceptual and qualitative findings presented in chapters 2 and 3, respectively. The study's inclusion of a randomized moral reasoning intervention operationalizes a number of the key normative concepts related to public policymaking for children that emerged from the critical interpretive synthesis and were explored in greater depth in the qualitative case study of Canadian drug policymaking for children. In so doing, the study provides unique evidence relating scholarly, professional and patient perspectives about child health policymaking to public preferences regarding health system priority setting.

I conceptualized the study and designed the survey instrument. A survey firm, AskingCanadians, administered the online survey and collected the data. I undertook data analysis, interpretation and preparation of the written manuscript. Shiyi Chen provided important intellectual and technical support for the statistical analyses presented. Jeremiah Hurley and Wendy Ungar contributed detailed input on the methodological and analytical components of the study through successive rounds of edits to written drafts. Julia Abelson reviewed iterations of the study manuscript, adding valuable high-level feedback on study framing and interpretation of results.

**Societal values regarding health care priority setting for children:
A stated preference survey**

Authors: Denburg AE, Chen S, Abelson J, Hurley J, Ungar WJ

Keywords: societal preferences, resource allocation, priority setting, health systems, children, moral reasoning, stated preference survey, age, rationing

Word count: 8,491 (main text); 12,795 (inclusive of abstract, references, and exhibits)

Abstract

Introduction: A growing academic literature has sought to address the measurement and interpretation of societal value judgements for health system priority setting. Age represents one of the most prominent issues explored in this context. Despite this focus on age as a morally relevant variable, the extant literature contains little dedicated inquiry into allocative preferences regarding children *per se*. There is a need for more and better knowledge of the social values attached to health care priority setting affecting children. To address this need, we sought to explicitly assess societal preferences for allocation to children, to generate evidence that could inform priority setting on health technologies within Canada's publicly funded health system. We further sought to test the influence of structured deliberation – in the form of a moral reasoning exercise – on allocative preferences in a population-based survey of the public.

Methods: We conducted a population-based stated preference survey of societal views on the prioritization of health resources among children and adults, administered to a nationally representative sample drawn from the adult population of Canada.

Development of the survey instrument drew on theoretical constructs that emerged from the integration of prior conceptual and qualitative studies on social values relevant to child health policy and technology assessment. Participants randomized to the intervention group were subjected to a moral reasoning exercise prior to each choice task. We analyzed responses through univariate and multiple regression mixed models to: 1) evaluate the direction and strength of societal preferences for health resource allocation between children and adults for disparate health care scenarios, 2) assess the impact of a moral reasoning exercise on the expression of such preferences, and 3) identify sociodemographic factors that significantly impact the expression of societal preferences on health resource allocation between children and adults.

Results: Our final study sample was comprised of 1,556 participants, with 773 randomized to the intervention group and 783 to the control group, and was largely representative of the general Canadian population. Unadjusted and regression analyses demonstrated a consistent aggregate preference by participants to allocate scarce health system resources to children across most scenarios in both experimental groups. Exposure to the moral reasoning exercise weakened allocative preference for children. Younger respondent age and parenthood were associated with greater preference for children. The three moral principles most endorsed by participants as determinative of their choices were equal treatment, relief of suffering, and rule of rescue.

Conclusions: Our study reaffirms the relevance of age in public preferences for the allocation of scarce health care resources, extending evidence of this calculus to trade-offs involving children. It both supports and challenges paradigms of health care resource

allocation predicated primarily on notions of QALY maximization. Despite evidence of fairly consistent priority attached to children, our results suggest that the ways in which we prize children seem to differ by circumstance and social context. Related to this, our findings affirm the importance of process in priority setting exercises. The observed changes in public preferences in the face of competing moral principles imply the impact, and potential relevance, of ethical deliberation when making such consequential decisions.

Introduction

Eliciting public values for health system priority setting

Faced with both scarce resources and pressures to keep pace with technological innovation, health systems in most developed nations have come to emphasize the comparative value of health interventions in resource allocation decisions (1). Such appraisals of value commonly seek to incorporate assessments of clinical efficacy, economic efficiency, and societal preference (2). While approaches to measuring clinical and economic value are well-specified, the means of identifying and assimilating relevant social values^a in health technology assessment (HTA) are not (3). This reality complicates attempts to incorporate social values and public input into health system funding decisions in an increasing number of developed countries.

To bridge this gap, a growing academic literature has sought to address the measurement and interpretation of societal value judgements for health system priority setting. Two contrasting approaches to the elicitation of societal values have prevailed: population-based surveys and exercises in deliberative engagement. Both admit of strengths and limitations. While survey methods are able to elicit preferences from a large swath of the public, they often preclude in-depth reflection and discussion about the complex ethical issues involved in setting priorities (4,5). By contrast, deliberative engagement with patients or publics offers rich opportunities for nuanced and recursive

^a We distinguish ‘social values’ from ‘societal values’, and use both deliberately here. We adopt an inclusive definition of social values that incorporates different means of sourcing and integrating values in public policy decisions, including through expression in public discourse or deliberative engagement. We use societal values in a narrower methodological sense, in keeping with the health economics literature, to mean the elicitation of values through sampling from members of the public.

consideration of the values that motivate allocative decisions, but from the bounded perspective of a small and select group of persons (6,7). A few attempts have been made to marry deliberative and survey methods, either by bookending deliberative events with survey questions or by embedding opportunities for deliberation within survey designs (8-10). We adapt an approach to the latter to investigate societal preferences for allocating health care resources to children as compared to adults.

Why children?

Age represents one of the most prominent issues explored in the literature on social values for health system resource allocation (11-13). The focus on age stems in part from the utilitarian assumptions that undergird prevailing methods of health economic evaluation (14,15). Quality-adjusted life years (QALYs) have played a favoured role in assessing the value of health technologies, as a universal metric for comparisons of benefit among different technologies that incorporate quantity and quality of life into a unified indicator. The value of QALYs in cost-utility analyses of health sector interventions include: accounting for diverse health effects in a summative measure; enabling comparisons of efficiency across varied interventions and health states; and valuing health gains in non-monetary units, thereby disentangling issues of income and wealth from the valuation of health care interventions (16,17). Closely allied to the use of QALYs as an outcome measure in applied health economic evaluation is the assumption of utilitarian QALY maximization as a normative goal – and thus decision-criterion – when selecting the best alternative among competing interventions (18). This

has prompted theoretical and empirical inquiry into the strength of societal preference for QALY maximization, to test its legitimacy as a yardstick for value in HTA (19-22).

Moral philosophers and social choice theorists have challenged the normative legitimacy of purely consequentialist approaches to health care rationing, of which QALY maximization is a prominent example (23). Rawls famously stresses the importance of distributive justice in the adjudication of outcomes; Scanlon explores its actualization through priority to the worst off or the assignation of *a priori* value to distributive equity in the evaluation of outcomes (24,25). Sen advances a capability approach which emphasizes both the intrinsic and instrumental value of capabilities – the “substantive freedoms [one] enjoys to lead the kind of life he or she has reason to value” – in assessments of individual welfare (26: p.87). This premise disentangles health entitlements and outcomes, and admits considerations beyond aggregate utility (e.g. the importance of individual freedoms and capacities to realize desired outcomes) into the moral arithmetic for appraising health interventions (27). Kolm criticizes the hegemony of utilitarianism in the normative canon of neoclassical economics, arguing that definitions of the social optimum as either utility maximization or Pareto efficiency (an allocative state wherein any reallocation to benefit one person would disadvantage another) violate common conceptions of justice (28,29). Theoretical objections to utilitarianism notwithstanding, the use of QALY maximization as a decision-criterion in applied health economic evaluation retains prominence in academic and policy spheres, including by HTA institutions in Canada and internationally.

Empirical research into societal preferences for QALY maximization often employs age as a proxy for QALY gains in the elicitation of public values on health system resource allocation. Studies of societal preferences have yielded considerable evidence favouring allocation to the young (12,30-33). Such studies have often compared adults of various ages; select studies include a childhood age range among their comparators (32,34-37). However, few studies have undertaken sustained inquiry into public rationing decisions related to children as such. Moreover, the reasons underlying societal preference for the young remain incompletely understood. Crucial questions persist: Does QALY maximization drive precedence to the young or is it independent of life years gained? Are there other normative considerations at play? How do different moral ideas guide age-based prioritization by study participants? Are there specific values that inform allocative decision-making about children *qua* children?

A number of studies have tried to tease apart the normative presumptions behind age-based rationing decisions. Tsuchiya et al. distinguish and test the evidence for different types of ‘ageism’ underlying societal preferences for health resource allocation. They reify moral intuitions about the role of age in health care rationing into three main concepts: 1) ‘health maximization ageism’ (constant relative value of life-years, irrespective of age); 2) ‘productivity ageism’ (higher value of life-years in young adulthood, related to greater social and economic productivity); and 3) ‘fair innings ageism’ (emphasis on opportunity for equal aggregate lifetime health (or QALYs) through priority to those expected to experience less, such as the young or disadvantaged) (33). Each of these approaches is outcome-oriented and concerned with maximizing

health gains, though calibrated to prioritize different groups based on alternative ethical arguments.

‘Health maximization ageism’, which corresponds to pure QALY maximization, receives its strongest support in age-based stated preference studies that focus on life-saving interventions, or those that result in more aggregate QALYs for younger recipients. Even so, evidence for societal disavowal of pure QALY maximization exists, with some studies yielding majority preferences for equal allocation in the face of discrepant potential QALY gains across age groups (14,37). Importantly, studies that test preferences for age-based allocation in terms of QALY maximization alone cannot discern whether distinct moral principles inducing priority to the young (be it children or younger adults) are at play.

When controlling for QALYs gained, the evidence in support of priority to younger groups is mixed. Studies that standardize duration of benefit across age groups – thereby in effect neutralizing ‘health maximization ageism’, or pure QALY maximization – demonstrate that consistent prioritization by age breaks down, with participants alternately preferring allocation to children, people in middle age, or equal allocation across age groups (32-34,38,39). The potential relevance of both ‘fair innings ageism’ and ‘productivity ageism’ is evident here. The concept of ‘fair innings’, articulated most clearly in the health economics literature by Williams, builds on the instinctive moral sense that everyone should have the opportunity to live a normal life span, and by corollary, that the denial of such opportunity is unfair (40). As Williams notes, the ‘fair innings’ argument is concerned with equality in aggregate health outcomes between

individuals, based on the entirety of a person's life-course, and can be quantified in life-years. It prioritizes the allocation of resources to interventions that would benefit those who have had less share of their fair allotment of healthy life, such as the young and those with chronic disabilities. By contrast, 'productivity ageism' attaches priority to the productive years of life, measured in terms of social and economic contribution to society. This conceptual approach typically values the middle years (e.g. age 20-50) most; historically, it has been invoked to justify equity weights in health economic evaluation used by the World Bank, among others (41,42).

Stated preferences consistent with both 'fair innings ageism' and 'productivity ageism' are evident in select studies examining age-based trade-offs in the context of fixed benefits; it is, however, often difficult to disentangle evidence in support of one of these forms of ageism from the other in the extant literature. Moreover, the impact of framing effects on the expression of preferences corresponding to different forms of ageism is also discernable. Tsuchiya et al. test changes in allocative preferences between scenarios that alternately stipulate fixed duration and lifetime benefits, revealing logical inconsistencies in participant choices across successive rounds of testing (33). Presented first with only fixed benefits to consider, participants seem to privilege a 'fair innings' approach to allocation, with preferences diminishing in stepwise fashion as age increases. However, when subsequently confronted with an explicit juxtaposition of fixed and lifetime benefits, participants' age-based allocative decisions in the face of fixed benefits change substantially, revealing a preference 'hump' in the middle years – perhaps hinting at a predilection for 'productivity ageism'. The authors hypothesize that incomplete

apprehension of differences in the duration of the benefit between scenarios – perhaps driven by subconscious attempts to simplify complex choice tasks – drove participants to alter their preferences in ways that belied prior responses. Other authors have demonstrated both comparable and distinct effects of framing on participant preferences (32,43-45).

In addition to studies of age-based priority setting that focus on health *outcomes*, a number of studies explore the moral bases for allocative decision-making by examining the relevance of *causes*. Anand and Wailoo demonstrate weak societal preference for consequentialist rationing rules, including QALY maximization, through experimental rationing decisions that force trade-offs between hypothetical adult recipients of different ages (14). Notably, they also empirically examine the relevance of deontological considerations in health care rationing, including personal responsibility for one's health state, socioeconomic status, and procedural considerations in priority setting. Their work demonstrates a disavowal by participants of pure QALY maximization, and highlights other salient normative considerations for potential incorporation into rationing exercises, including equality of treatment, individual rights and duties, and procedural fairness (14,46). Relatedly, a limited body of evidence points to the impact of embedded moral reasoning on attenuated public preference for the young, suggesting that deliberation on a range of ethical principles can influence stated preferences for allocating resources based on age (10). However, this evidence pertains to age variations amongst adults.

Remarkably, despite this focus on age as a morally relevant variable, the extant literature contains little dedicated inquiry into allocative preferences regarding children

per se (47). This lack of evidence has contributed to a vacuum of both theoretical and context-specific knowledge about societal preferences related to the prioritization of health system resources for children. The need for more and better knowledge of the social values attached to health care priority setting affecting children is underscored by inherent challenges associated with the assessment of child health technologies (48-50). Health system funding decisions for children are often constrained by limited evidence for the clinical efficacy or economic efficiency of child health technologies (51). Childhood diseases are typically rare, the conduct of research in pediatric populations is complex, and standard metrics of clinical and economic assessment fail to incorporate unique dimensions of childhood, such as family context and life-course impacts (1,52). Greater uncertainty in clinical and economic domains may confer greater importance on social values in decisions about the prioritization of child health technologies.

In light of these realities, we sought to explicitly assess societal preferences for allocation to children, to generate evidence that could inform priority setting on health technologies within Canada's publicly funded health system. We further sought to test the influence of structured deliberation – in the form of a moral reasoning exercise – on allocative preferences in a population-based survey of the public. In contrast to prior evidence demonstrating diminished preference for younger adults induced through moral deliberation (10), we hypothesized that a moral reasoning exercise would increase the strength of public preference for allocation to children, as compared to adults. This hypothesis was predicated on insights from foregoing normative analyses of public policies for children, which have identified distinguishing characteristics of childhood –

such as vulnerability, dependency, and future potential – as drivers for policy development (53-57). We postulated that the moral reasoning exercise, which incorporated a number of values-based considerations specific to children, would prompt participants to consider their allocative preferences in light of these unique concerns.

Aims

Our major aims were to understand the direction and strength of societal preferences for health resource allocation between children and adults for disparate treatment scenarios (Aim 1), assess the impact of a moral reasoning exercise on the expression of such preferences (Aim 2), and identify sociodemographic factors that significantly impact the expression of societal preferences on health resource allocation between children and adults (Aim 3). We also sought to test the divergence of participant preferences for children or adults from an assumption of neutrality, to understand the treatment scenarios within which significant preferences for either children or adults emerge (Aim 4). Finally, we aimed to characterize the principles that most influenced participants' allocative decisions, to gain a deeper understanding of the moral reasoning behind societal preferences for health resource allocation (Aim 5).

Methods

Study sample

We conducted a population-based stated preference survey of societal views on the prioritization of health resources among children and adults, administered to a nationally representative sample drawn from the adult population of Canada. Participants

were recruited through letters of invitation sent via email to a random sample from a standing panel of over one million Canadians maintained by a marketing research firm (AskingCanadians). Interlocking quotas for stratified sampling (age, gender and region), balanced against Statistics Canada norms, were applied to ensure national representativeness. The survey itself was web-based and completed online, with both English and French versions available to participants. Incentives in the form of loyalty program rewards were offered to encourage participation.

Survey design and development

Development of the survey instrument drew on theoretical constructs that emerged from the integration of prior conceptual and qualitative studies on social values relevant to child health policy and technology assessment, supplemented by review of the literature on ethics of health system resource allocation (57,58). The survey underwent iterative development and refinement by the study team, including a pilot phase with both experts ($n=3$) and laypersons ($n=2$) and field testing with members of the public ($n=32$). The survey package included a preamble, choice questionnaire, and a demographic questionnaire. The preamble gave context for the study and asked participants to imagine themselves citizen advisors to government on decisions about resource allocation to hypothetical competing health programs in the context of a finite budget. The questionnaire directed respondents to assign numerical preference scores (range -5 to +5) for the allocation of scarce resources in different health care scenarios based on age-related criteria. It presented each participant with the same five hypothetical treatment scenarios (chronic blood disease, liver transplant, cancer therapy, palliative care, and

eating disorder); these scenarios were developed with the intention to provide variation in disease characteristics such as acuity, morbidity, mortality, potential for cure, and nature of treatment. Participants were tasked with making choices about the funding for treatment among adult (average age 40) and child (average age 10) patients, from the perspective of a citizen advisor to a health system administrator. Preferences were captured as continuous variables on a visual analog scale from -5 (full preference for children) to +5 (full preference for adults), with zero representing neutrality.

Intervention

Blinded randomization of participants to either an intervention or control group was achieved via a ‘least fill’ approach, which employs computational logic to assign respondents through selection of the group with the lowest current quota count. We subjected participants in the intervention group to a moral reasoning exercise prior to each discrete choice scenario. The exercise presented subjects in the intervention cohort with a list of twelve ethical principles relevant to allocative decisions (Table 1). We based the selection and development of principles on evidence from prior related studies and published literature as described above. In particular, we fashioned principles to capture key concepts identified as uniquely germane to health resource allocation involving children, including ‘fair innings’, vulnerability, dependency, future potential, and distinction (57). Balance was sought between principles that might inherently favour allocation to either children or adults. In addition to considering these principles in the context of their response to each health care scenario, participants in the intervention arm were asked to select the three principles that most influenced their choice in that scenario.

Subjects in the control arm responded to the choice scenarios without exposure to a moral reasoning exercise. To minimize question order bias, we randomly rotated the order by which health care scenarios were presented to participants; in addition, we randomly rotated the order of principles within the moral reasoning exercise for the intervention cohort. Participants were prevented from referring to or revising their prior responses as they proceeded through the questionnaire.

Sample size calculation

The main determinant of sample size was our primary comparison: the difference in mean strength of preference between the intervention and control groups. PASS (Version 15) was used to calculate the required sample size assuming a two-sided, two-sample t-test with equal variance. Planned sample sizes of 750 in each group (total $n=1500$) allowed us to achieve 80% power to reject the null hypothesis of equal means with a population mean difference of 0.3, assuming a standard deviation for both groups of 1.67 and a significance level (α) of 0.01.^b

Ethics approval for this study was granted by the Hamilton Integrated Research Ethics Board (HiREB) affiliated with McMaster University. Informed consent was obtained online as part of the survey panel opt-in and invitation process prior to individual survey initiation. The study questionnaire is available upon request.

^b Given the lack of real-world data on which to base a population mean difference, we adopted 0.3 as a ‘policy-relevant difference’, based on a subjective estimation of meaningful change, given the scale, balanced against feasibility in terms of recruitment. Standard deviation was estimated from division of the scale range (10) by 4-6 (following the range rule for standard deviation), in the absence of information on the population standard deviation in this domain.

Statistical Analysis

Quantitative survey data were imported into SPSS (Version 24.0) for analysis. Descriptive statistics were employed to characterize the respondent population, with categorical variables expressed as counts and proportions, and continuous variables as medians with ranges or means with standard deviations (SD). Comparison of demographic differences between the intervention and control groups were undertaken through use of the Student's *t*-test for continuous variables (age) and chi-squared analysis for categorical variables. We compared select sociodemographic variables from the overall sample with general Canadian population demographics from the 2016 Statistics Canada Census of Population using one-sample proportion tests (59).

Aim 1: To understand the direction and strength of societal allocative preferences between children and adults, we quantified the preference score mean and standard deviation, as well as median and interquartile range, by experimental group for each hypothetical treatment scenario.

Aims 2 and 3: To assess the impact of a moral reasoning exercise on the expression of participant preferences, we first tested for unadjusted differences in preference scores between experimental groups for each scenario using Student's two-sample *t*-tests. Univariate and multiple regression mixed models examined the impact of experimental group, scenario, and sociodemographic variables on mean preference scores. We employed a linear mixed-effects random intercept model to analyze the strength of participant preferences for each of the scenarios presented and assess the

impact of the moral reasoning intervention thereon. Given the large sample size, all covariates from the univariate regression model were included; only variables causing multi-collinearity (preferred vs first language, continuous vs categorical age) were dropped. We retained variables that were not significant (e.g. gender, education) in the model, on the premise that their non-significance might have inherent meaning, and is therefore salient to report. Likelihood ratio tests were conducted to evaluate the overall significance of the mixed model. We compared the full model with all predictors against the null model with no predictors. We also compared a parsimonious model (inclusive of only statistically significant demographic covariates, $p < 0.01$) against the full model, to assess any improvements to model fit.

The multiple regression mixed model examined: 1) the difference in mean preference scores by group, scenario, and demographic characteristics and 2) the difference in mean preference scores between the intervention and control for each scenario. Scenarios and the moral reasoning exercise served as the two respective independent variables; numerical stated preference scores in each scenario constituted the dependent variables. Differences in mean responses from the control versus intervention groups constituted the between-subjects main effect, whereas differences in mean responses across scenario types constituted the within-subjects main effect. We analyzed the interaction of group and scenario on preference scores to understand whether group mean preference scores varied by scenario type, controlling for covariates (including age, geographic region, gender, language, education, employment, income, health, and family structure). The linear mixed model was formulated as follows:

$$\text{Score}_{ij} = \beta_0 + \beta_1(\text{group}_i) + \beta_2(\text{scenario}_{ij}) + \beta_3(\text{group}_i * \text{scenario}_{ij}) + \beta_4(\text{region}_{ij}) + \beta_5 * (\text{age category}_{ij}) + \beta_6 * (\text{gender}_{ij}) + \beta_7 * (\text{first language}_{ij}) + \beta_8(\text{education}_{ij}) + \beta_9(\text{employment}_{ij}) + \beta_{10}(\text{household income}_{ij}) + \beta_{11}(\text{health}_{ij}) + \beta_{12}(\text{marital status}_{ij}) + \beta_{13}(\text{children}_{ij}) + u_{0j} + e_{ij}$$

Where, for individual j at scenario i:

Score_{ij} = is the score for each child j at scenario i

β_0 = average estimate of score at reference level

β_1 = group. Group_i = "intervention" if the i^{th} participant is in the intervention group, and group_i = "control" otherwise

β_2 = scenario. Scenario_{ij} = "cancer therapy", "chronic disease", "eating disorder", "liver transplant", "palliative care"

β_3 = group and scenario interaction term

β_4 = region. Region_{ij} = "Ontario", "others"

β_5 = age (categorical). Age category_{ij} = "18-34", "35-44", "45-54", or "55+"

β_6 = gender. Gender_{ij} = "male", "female"

β_7 = first language. $\text{First language}_{ij}$ = "english", "french"

β_8 = education. Education_{ij} = "high school or less", "some college and higher"

β_9 = employment. Employment_{ij} = "full time", "others"

β_{10} = household income. $\text{Household income}_{ij}$ = "low income" (<\$20,000), "medium to high income" (≥\$20,000)

β_{11} = health. Health_{ij} = "good, very good, excellent", "fair or poor"

β_{12} = marital status. $\text{Marital status}_{ij}$ = "married or living with a partner", "single or divorced"

β_{13} = children. Children_{ij} = "has children", "no children"

u_{0j} = random intercept; deviation from the average intercept for individual j

e_{ij} = measurement error

Aim 4: To further characterize the strength of participant preferences for children or adults, we analyzed the proportions of respondents displaying any allocative preference beyond the bounds of a 'neutral' construct (score -0.5 to 0.5), and modelled differences in neutral versus preferential responses (as a binary outcome) between groups and across scenarios through generalized estimation equation (GEE) modelling. The GEE model is a marginal model that allows for analyses of longitudinal data (including binary data), while accounting for correlations between repeated measures from the same subject. In our study, scenario, group, and a scenario-group interaction term were

included in the GEE model. Odds ratios with 95% confidence limits were computed to assess the likelihood of a neutral response for each scenario in the intervention and control groups, respectively, using chronic disease as the reference scenario; and to assess the likelihood of a neutral response by experimental group in each scenario, with moral reasoning as the exposure. The GEE model was formulated as follows:

$$\mathbf{Log}\left\{\frac{\Pr(Y_{ij}=1)}{\Pr(Y_{ij}=0)}\right\} = \beta_0 + \beta_1(\text{group}_i) + \beta_2(\text{scenario}_{ij}) + \beta_3(\text{group}_i * \text{scenario}_{ij})$$

$Y_{ij}=1$ if the i^{th} participant was neutral at the j^{th} scenario, and $Y_{ij}=0$ otherwise
 $\beta_1 = \text{group}$. $\text{Group}_i = \text{“intervention”}$ if the i^{th} participant is in the intervention group, and $\text{group}_i = \text{“control”}$ otherwise
 $\beta_2 = \text{scenario}$. $\text{Scenario}_{ij} = \text{“cancer therapy”}$, “chronic disease” , “eating disorder” , $\text{“liver transplant”}$, “palliative care”
 $\beta_3 = \text{group and scenario interaction term}$

Aim 5: To characterize the principles that influenced preference scores in each scenario, we quantified the proportion of respondents selecting each allocation principle overall and by scenario. We conducted tests of equality of proportions across scenarios to assess for significant differences in the proportions of respondents selecting a given allocative principle. Chi-squared analyses were used to compare the proportions of participants selecting each moral reasoning principle in a given scenario, using one scenario (chronic disease) as a referent.

To account for the effect of multiple comparisons, a conservative alpha level of 0.01 was used throughout.

Results

Study sample

Between May and June 2017, a total of 12,803 invitations to participate in the survey were sent by e-mail; 2,777 invitees initiated the survey, for a response rate of 21.7%. From the pool that responded, we excluded 1,048 for incomplete surveys, either due to partial completion (516), full quotas (500), or failure to meet inclusion criteria (32). A total of 1,729 respondents completed the internet survey; 173 were subsequently excluded for evidence of poor quality (e.g., racing). Our final study sample was comprised of 1,556 participants, with 773 randomized to the intervention group and 783 to the control group. Respondent characteristics were similar across experimental groups (Table 2). As compared with 2016 Canadian population census data, our sample evinced an over-representation of individuals with higher educational attainment ($p < 0.0001$). Statistically significant, though slight, differences across both age and income brackets were also observed in comparison to the general Canadian population; the significance of these differences was likely driven by the large sample size.

Outcomes

Allocative preferences

Our unadjusted analysis of mean preference scores demonstrated a consistent aggregate preference by participants to allocate scarce health system resources to children across most scenarios, in both experimental groups (Figure 1; Table 3). The exception to this was near-equal preference for children and adults (0.04, $SD \pm 2.50$) in the chronic disease scenario among participants in the intervention cohort. Graphical representation

of the raw data by box-plot reveals that first quartile scores in the control group were consistently lower than those in the intervention group; third quartile scores were roughly the same. Standard deviations of the raw data were roughly similar across scenarios in each experimental group, and 10-20% narrower in the intervention group than the control group. Examining preferences by experimental group, mean scores were statistically significantly higher in the intervention group across all scenarios, suggesting weaker preference for allocation to children in those subjected to the moral reasoning exercise (Table 3). Whether these mean score differences across experimental groups constitute policy-relevant differences in societal preferences is uncertain.

Separate univariate regression analyses examining the effects of respondent characteristics on mean scores demonstrated preference for allocation to children among respondents of younger age ($p < 0.0001$); there were similar trends among those whose first language was English ($p = 0.02$), with full-time employment ($p = 0.04$), and with low household income ($p = 0.02$), though they did not reach significance (Table 4).

The multiple regression mixed model included group, scenario, an interaction term, and sociodemographic covariates (Tables 5, 6). It reaffirmed the relationship between exposure to the moral reasoning intervention and weaker allocative preference for children across all scenarios (Table 6). Participants in the control group displayed statistically significantly greater preference for allocation to children across all scenarios. In the intervention group, a significant preference for allocation to children (as compared to zero, or equal allocation) was retained in the cancer therapy (-0.83 , $p < 0.0001$) and eating disorder treatment (-1.11 , $p < 0.0001$) scenarios, but there was no preference for

either children or adults in the chronic disease drug, liver transplant and palliative care scenarios. When analyzing the difference in mean preference scores between experimental groups for each scenario, the intervention had the largest absolute impact for the cancer therapy (0.94, 95% CI 0.68 to 1.21, $p < 0.0001$) and eating disorder treatment (0.90, 95% CI 0.63 to 1.16, $p < 0.0001$) scenarios, reflecting the pronounced strength of preference for children in these scenarios in the control group. The model confirmed the role of respondent age on preferences, demonstrating stepwise decrements in preference for children with widening age gaps among participants ($p < 0.0001$), and revealed a relationship between parenthood and stronger preference for allocation to children ($p < 0.0002$) (Table 5).

Proportions of neutral response (i.e., score between -0.5 and +0.5) were consistently higher in the intervention group across all scenarios (Table 7). The univariate GEE model revealed the impact of the moral reasoning intervention on neutrality of preference for children or adults, with those in the intervention group significantly more likely to give a neutral response than those in the control group (OR=1.69, 95% CI 1.45 to 1.96, $p < 0.0001$). When examining the impact of scenario, taking chronic disease as the referent, neutral responses were significantly more likely in the palliative care scenario (OR=1.27, 95% CI 1.13 to 1.43, $p < 0.0001$) and significantly less likely in the eating disorder treatment scenario (OR=0.63, 95% CI 0.56 to 0.71, $p < 0.0001$). The multiple regression GEE model affirmed greater odds of preference neutrality in the intervention group as compared to the control group across all scenarios ($p < 0.0002$) (Table 8).

Moral reasoning analysis

Participants exposed to the moral reasoning exercise demonstrated remarkable consistency in their prioritization of principles for allocative decision-making. The top three principles guiding participants' allocative decisions were stable across the scenarios: 1) treat equally (54.3% – 63.9%), 2) relieve suffering (39.6% - 66.1%), and 3) rescue those at risk of dying (37% - 40.8%). In all cases except for palliative care, 'treat equally' ranked number one, with a proportion uniformly greater than 50%; subjects deemed 'relieve suffering' most important (66.1%) in the context of palliative care, followed closely by 'treat equally' (63.9%). The least endorsed principles ($\leq 10\%$) for assigning allocative preference were: priority to rare diseases, priority to special populations, and priority based on societal productivity.

Despite consistency in ranking of principles, the proportion of participants selecting a given principle to guide allocative decision-making varied significantly across scenarios (Table 9). For each principle, pairwise comparisons between scenarios, using chronic disease as the reference scenario, furnish insights into the changing moral logic behind participant preferences. The cancer therapy scenario prompted significantly more participants to cleave to principles that, in theory, justify preferential allocation to children: opportunity to live a full life ($p < 0.0028$), duration of benefit ($p < 0.0001$), and concern for special populations ($p < 0.0026$). They also tended to disavow principles favouring allocation to adults, including family responsibilities ($p < 0.0001$) and economic productivity ($p < 0.0001$). A similar pattern was observed for the eating disorder treatment scenario, with the addition of vulnerability ($p < 0.0001$) to the principles endorsed. By

contrast, participants displayed significantly more concern for equality of treatment ($p < 0.0005$) and relief of pain and suffering ($p < 0.0001$) in the palliative care scenario, and less concern for ‘fair innings’ (the entitlement to a full lifespan) or duration of benefit. The liver transplant scenario evinced no significant differences in the choice of principles to justify participant preferences, as compared to the chronic disease referent.

Discussion

Main findings

A principal finding of our study is the consistent preference for allocation to children across health care scenarios in the overall cohort. This finding is in keeping with much of the extant evidence on societal preferences for allocation to the young discussed above, but adds depth and specificity in relation to health care resource allocation to children *per se*, as most prior literature primarily examines the normative relevance of age variations among adults (14,30,31,38,39). Our focus on allocative trade-offs between children and adults allowed for sustained examination of societal preferences related to children in the face of changing health conditions and outcomes, distinguishing it from prior literature.

The strength of the preference for children in our study varied by scenario, and was influenced by a number of factors, some intrinsic to the population surveyed and others experimentally conditioned. It was greatest in relation to cancer therapy and eating disorders treatment. These were the only scenarios where the gain in life-years from treatment was not bounded by the natural history of the condition and equalized across hypothetical programs, but instead tagged to normal life expectancy. Consequently, there

was a clear expected difference in the benefit to be gained (as measured in length of life) between the idealized adult and child populations of interest. This may represent a preference for life years gained rather than children *per se*. As discussed above, Tsuchiya et al. have demonstrated altered patterns of age-based allocative preference in response to changes in the duration of benefit from a given intervention (33). In the face of life-long benefits (e.g. life-saving interventions), their study participants gave consistent precedence to younger groups when allocating scarce resources. By contrast, when juxtaposed with life-long benefits, fixed benefits induced a preference pattern that privileged young to middle adulthood. Our results may indicate similar moral intuitions behind participant choices, though with the notable difference of an equal allocation option. Where ‘health maximization ageism’ (or pure QALY maximization) was possible – namely, in the cancer therapy and eating disorders treatment scenarios – participants seemed to adjudge the life-long benefits that would accrue to children too large to overlook. Conversely, in the scenarios with fixed benefits, preference for allocation to children was weaker in the control group, and a trend toward preference for equal allocation emerged in the intervention cohort. An alternative explanation centres on the perception of, rather than preference for, greater duration of benefit. Participants may have perceived scenario-specific differences in duration of benefit more readily than other benefits that, though not explicitly mentioned, may also retain moral relevance in the context of these and similar scenarios. Such benefits could include reduction in inequality of outcomes – for instance, founded on inherent characteristics of the disease

(rarity) or population (vulnerability, dependency) – or equitable chances to live a full life ('fair innings') (60-64).

In designing the moral reasoning intervention, we made a conscious attempt to incorporate principles related to an array of individual and societal benefits and costs, to induce reflection on the range of moral reasons one might consider germane to health system resource allocation. We also sought balance between principles that might intrinsically engender preference for children or adults. However, as alluded to above, the cognitive work involved in connecting abstract moral principles to the dynamics of a given scenario may have been far greater for outcomes left unspoken than those made explicit. Where the benefits of an intervention were most obvious and different between adults and children – as they were in respect of life-years gained from cancer and eating disorders therapy – a choice to prioritize those benefitting most may have seemed easiest.

This explanation is supported by theories of rational decision-making from the field of cognitive psychology that posit dual-process thinking, distinguishing intuition from reasoning. Kahneman and Tversky, among others, describe and provide empirical grounding for two systems of human cognition: System 1, corresponding to intuition, whose operations are fast, automatic, and associative; and System 2, corresponding to reasoning, whose operations are slow, controlled, effortful, and rule-governed (65,66). The relative accessibility of thoughts – how quickly and effortlessly thoughts come to mind – is explained by the operation of these two systems of cognition. Intuitive thoughts are readily accessible, reasoned ones require effort to access; skill acquisition enhances the accessibility of thoughts along this continuum. Accessibility is determined both by

the operative dynamics of our cognitive systems and by features of the object and environment on which they are trained. Context is a key determinant of accessibility: the conditions within which an object or idea is presented shape the cognitive responses to it. Because intuitive thoughts are mediated in part by similarity and associative fluency, intuition does not readily accommodate uncertainty; the resolution of incompatible thoughts about something is a function of analytical intelligence, the domain of System 2. The intrinsic limits placed on uncertainty in intuition deepen the impact of both context and experience on intuitive judgments.

The design of our study – including the survey format and pacing, question framing, and lay sample – may have induced intuitive responses from some participants, in the face of complex moral problems characterized by inherent uncertainty. In particular, participants may have allowed more obvious differentiators, such as discrepant benefits in length of life in the cancer therapy and eating disorders scenarios, to intuitively shape their preferences, rather than take the time and cognitive effort to work through conflicting moral choices in a rule-bound manner. This is likely particularly true of those unexposed to the moral reasoning intervention, and might explain why preference score differences between the intervention and control groups were largest in respect of cancer therapy and eating disorders treatment. It may also explain why variance in preference scores narrowed consistently across scenarios in the intervention group as compared to the control group: it is possible that this reduction in variance represents a reduction in choice uncertainty, in the context of enhanced participant reliance on analytical reasoning induced by the study intervention.

However, the possibility of a continued reliance on intuition, at least in part, may pertain to those in the intervention group as well, given the accessibility of intuitive thought processes and the corresponding effort required to reason past them. It is difficult to make a moral choice in favour of one at the expense of another; that choice is made more difficult when the reasons for it are oblique or laden with uncertainty. Even when explicitly presented with a range of relevant reasons, participants may have found it difficult to adopt a different normative stance through reasoned deliberation, particularly in the scripted and time-bound context of a survey. An alternative explanation for intervention group preferences could posit a tendency to reject such choice (by stating no preference), one that pulled responses closer to zero and limited stronger preferences to scenarios where obvious benefits made the moral leap less daunting.

Interestingly, our results at once confirm and challenge a prior hypothesis by Nord et al. that decision-making from an impersonal vantage point (e.g. a budgetary decision-maker) makes it easier to discriminate in favour of one group as against another (32). They elicited allocative preferences from study participants within two different assumed perspectives: a Rawlsian ‘veil of ignorance’, in which the participants themselves might need the health intervention in question one day; and a health system administrator role, in which they were tasked with decisions about resource allocation to others from a budgetary standpoint. Nord et al. found that the tendency to privilege younger people in allocative decisions was more evident amongst those who assumed the latter perspective, and argued that the degree of emotional remove induced by the shift in perspective might account for this difference (32). Evidence from our study for the moderating effect of a

moral reasoning exercise on participant preferences for allocation to children, from an administrative perspective, suggests the opportunity for ethical reflection mitigated participant willingness to discriminate between groups on the basis of age. As discussed above, this may reflect choice uncertainty and a resultant instinct for preference neutrality, rather than evidence of real, rich moral deliberation. Alternatively, this may represent a ‘depersonalizing’ effect of moral deliberation on allocative decision-making, one sufficient to impact societal preferences for health resource allocation – but in the opposite direction to that observed by Nord et al.

Again, theory from cognitive psychology on rationality and decision-making provides a useful frame for interpretation. Stanovich and others have argued that the manner in which we construe tasks is determined in importantly different ways by our dual cognitive systems, intuition and reasoning. Intuition creates task construals that are highly personalized and contextualized; reasoning, by contrast, construes tasks in a depersonalized, decontextualized manner, rendering cognitive judgments in terms of underlying rules and principles (67). Whereas participant intuitions might have led them to support allocation to children – through associative, personalized and affective processes of thought – the structured moral reasoning intervention forced them to construe the task at hand in impersonal terms, deferring to the explicit principles presented in preference decisions. In policy terms, such evidence could imply a role for enhanced opportunities for moral deliberation in the context of public policy decisions about health system funding decisions, including for health technologies. We return to this below.

Counter to our hypothesis, exposure to a moral reasoning intervention did not increase participant preferences for allocation to children, but diminished it in every scenario. The potential reasons for this might include the impact of a more varied ethical palette with which to draw conclusions, as posited in prior work by Johri et al. (10). Interestingly, this is the same consideration that motivated our hypothesis of *increased* preference for children through moral reasoning. As noted above, we presumed that the ethical nuances attached to funding health interventions for children – including distinguishing features such as vulnerability, dependency, neglect, and future potential, that stood out in prior normative analyses of child health and social policy – would come through more clearly to participants when exposed to a range of principles touching on them (53-57,61,62).

This reasoning is, however, belied somewhat by the apparent disjuncture between participant principles and preferences in our study. The consistency with which participants from the intervention group selected the same three principles – equal treatment, relief of suffering, and rule of rescue – as their guiding ones was out-of-sync with the variation in preferences seen across groups and scenarios. Put differently, participants seemed to infer different implications from the same principle, at least with respect to assigning preference scores to children versus adults. Indeed, no clear pattern emerged of the relationship between principles and preference scores, apart from the pure fact of exposure to the former altering the latter. By corollary, no simple explanation of the role of moral reasoning on participant choices is apparent. In some scenarios, a priority placed on equality seems to have guided participants toward neutrality of

preference; in others, a similar strength of conviction in equality framed a strong apparent preference for children. Even in the cancer and eating disorder treatment scenarios, it was not, as considered above, a defense of fair innings or QALY maximization that participants leveraged to justify preferential allocation to children. As with scenarios as varied as palliative care and liver transplant, it was a persistent, and comparably prevalent, endorsement of equality.

It is of course possible that participants understood equality as encompassing fairness in length and quality of life, though the principles were formulated in a way that sought to disentangle these ideas. It is notable, then, that the strength of preference for equal allocation increased amongst those randomized to the moral reasoning exercise, despite exposure to a range of ethical considerations to inform their choices. One interpretation of this is that the intervention caused participants to evaluate the relationship between their intuitive moral sensibilities and their stated preferences, and reinforced a reasoned judgment about the primacy of equality as a guiding principle for resource allocation. Our baseline proclivity to prioritize children may not be based on clearly considered ethical arguments, but rather a jumble of ideas about fairness, equality, vulnerability and the imperative of rescue. When unpacked, some of these ideas may have fallen away for participants: their notion of equality honed through structured moral reasoning, participants' tendencies to prioritize children may have faltered. An alternative explanation is that, despite the study intervention, it remained cognitively difficult for participants to reason through the uncertainty inherent in weighing competing moral principles. As surmised above, the greater predilection for neutrality in the experimental

group may have represented retreat to a commonly endorsed principle (equality) in the face of difficult choices. Unfortunately, our results do not allow us to distinguish which of these explanations is the correct one. Both, in fact, may reflect dimensions of a multifaceted truth about the way we think, and how our thinking determines our preferences.

Strengths and limitations

Our study admits of potential limitations. These relate, narrowly, to limitations in questionnaire design, and, more broadly, to the shortcomings of idealized experimental studies into allocative preferences. The brief statements used to evoke the meaning of each moral principle may have been insufficient to the task. Nuanced understanding of the norms of evidence appraisal in medicine, and its unique dynamics in children, is hard to engender through a bounded statement such as “since it is harder to study treatments in children, evidence is usually stronger for adult treatments”. It is conceivable that different framing of the principles would have led to different patterns of preference among participants (43,68). In this regard, as discussed above, the nature of the study may have precluded real, rich deliberation on the ideas at issue. While it sought to balance the benefits of depth and scope afforded by qualitative deliberation and population-based surveys, respectively, in trying to do both, the study may have suffered from some of the distinct limitations inherent to each. A related limitation is that the study was not designed to measure the time it took to read the principles in the moral reasoning intervention separately from completing the choice tasks. This could have given a proxy sense of participants’ degree of rumination on the ethical ideas and choices involved,

enabling further inferences about the impact of the intervention on the role of intuitive versus reasoned modes of cognition in participant decision-making.

The assembly and composition of our study sample may have also introduced limits to the generalizability of results. The survey firm (AskingCanadians) generates survey cohorts from an opt-in panel of eligible Canadians recruited and incentivized through brand loyalty points programs. Though we strove for population representativeness (e.g., use of interlocking quartiles to mirror Statistics Canada demographics), some of the inherent selection bias associated with online opt-in panels persisted, privileging those with higher education who are web literate. The lack of statistically significant impacts of education and income on preference scores in the multivariate model attenuates theoretical concerns about sociodemographic bias. Nevertheless, limits to the external validity of our findings remain.

Despite these potential limitations, our study has important strengths. It is, to our knowledge, the first to experimentally examine the values behind health and social policy decisions about children, their valence in relation to adult needs and priorities, and their stability in the face of moral deliberation. Its randomized design and large, heterogeneous population-based sample allow for robust conclusions about the effect of the intervention on participant preferences. Our findings demonstrate a convincing relationship between exposure to a range of moral principles relevant to priority setting and the priorities set. This affirms the complexity of such decisions and the impact of ethical deliberation on them. These findings challenge reflexive trust in survey-based preference elicitation, and imply the need to complement such modalities with deliberative modes of public

engagement on questions of broad social importance, such as the allocation of scarce public resources.

Implications for research and policy

This research suggests that answers about whom to prioritize in our society are not simple, and that media and political portrayals that seek to simplify them undervalue our collective capacity for informed moral choices. Despite evidence of fairly consistent priority attached to children, our results complicate this narrative: the ways in which we prize children seem to differ by circumstance and social context. While we did not explicitly examine culture in this work, cultural overlay may indeed play a deterministic role in the construction of personal and collective values attached to children (69-71). Different societies, or groups within societies, might have different ideas about the role and value of children that in turn influence their respective preferences regarding health resource allocation. Further research exploring the role of culture in values-based decision-making about children in our society could illuminate important normative considerations for setting health and social policies.

In policy terms, our work both supports and challenges paradigms of health care resource allocation predicated primarily on notions of QALY maximization. Dominant modes of health economic evaluation privilege interventions that maximize aggregate individual and societal utility, typically in the form of the duration and magnitude of benefits reaped and the size of population reached. Our results demonstrate a stronger preference for children in the hypothetical scenarios (cancer and eating disorders) in which the duration of benefit accrued mainly to children; this may represent an

underlying motivation by participants to maximize benefits. However, the three principles deemed most salient to priority setting were equal treatment, relief of suffering, and rule of rescue. None of these prioritizes age as a relevant variable; each starts from a belief in the intrinsic value of all human life, and resists grading that value by social context or circumstance. If nothing else, this finding suggests the need to incorporate other value systems into health care priority setting, as some value frameworks for funding decisions have begun to do (72).

Allied to this, our study affirms the importance of process in priority setting exercises. The observed changes in public preferences in the face of competing moral principles imply the impact, and potential relevance, of ethical deliberation when making such consequential decisions. The space to hear multiple voices and consider varied ideas appears crucial to informed allocative decisions based on public values. These findings redouble the importance of deliberative public engagement to health and social policymaking, particularly in domains where distinct ideas about the public good may compete. Few efforts to incorporate public deliberation in research and policy on child health care priorities have prevailed to date. In the face of resource scarcity, evidence-informed child health and social policies will depend on the careful elicitation and integration of public values. Crucial future areas of inquiry and application include the inclusion of child voices in research and policymaking, and the exploration of social values for priority setting within public policies and programs for children.

Conclusion

Our study reaffirms the relevance of age in public preferences for the allocation of scarce health care resources, extending evidence of this calculus to trade-offs involving children. Nevertheless, it demonstrates the mutability of such preferences in the face of structured moral deliberation. This finding has three main repercussions. It furnishes a critical lens for the interpretation of stated preference surveys; introduces a note of caution into dominant modes of health care funding allocation decisions premised on utility maximization; and implies the value of deliberative methods as a complement to both. We observed a strong inclination for equality and humanitarianism amongst study participants, regardless of experimental group. These moral impulses prevailed over consequentialist logic, including priority to the young founded on aggregate benefit. The stability of these principles in the face of changing allocative preferences signals their importance as public values – but it also hints at the complexity of values-based decision-making. The public seems, at face value, to believe in equality of access and defend a set of shared human entitlements to care. It also seems to assign intuitive priority to children. The challenge of reconciling these convictions demands processes nimble enough to negotiate this paradox. Spaces for moral deliberation – whether in large-scale surveys or focused qualitative engagement – are essential to arrive at health care priorities that reflect what we collectively hold dear.

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Tables and Figures

Table 1. Moral reasoning exercise: Principles and rationales

Fund treatment based on evidence that it works <ul style="list-style-type: none">• "Fund treatments best proven to be safe and effective."• "Since it is harder to study treatments in children, evidence is usually stronger for adult treatments."
Help everyone to live a full life <ul style="list-style-type: none">• "The older patients have had their turn."• "Give the younger patients a chance for a full life."
Treat people who will benefit longer <ul style="list-style-type: none">• "Giving the treatment to the younger group makes sense, since they will enjoy it longer."• "Lifelong potential should be factored into decisions about which health interventions to fund."
Treat people with family or other responsibilities <ul style="list-style-type: none">• "At 40, people may be raising families or have others who rely on them."
Treat the most vulnerable <ul style="list-style-type: none">• "Resources should be directed to help those that cannot protect or advocate for themselves."• "Children are still developing, so can suffer lifelong consequences from untreated disease."
Treat people who are productive <ul style="list-style-type: none">• "Helping people who are in the workforce has benefits for all."
Treat everyone equally <ul style="list-style-type: none">• "All patients deserve equal access to medical care."• "Both groups should have the same chance."
Treat those who are dependent on others <ul style="list-style-type: none">• "Children are dependent on their parents or caregivers, so their illness has direct impacts on the lives of others."

- "We should take into account all the people affected by a patient's illness, including families and caregivers."

Relieve pain and suffering

- "When it comes to relieving suffering, other factors shouldn't count."
- "We should always relieve pain when we can."

We should rescue those at risk of dying

- "Everyone deserves the same chance of rescue from life-threatening circumstances."
- "Saving someone's life is important, regardless of age."

Treat those society considers special

- "Children are a distinctly valued social group that deserves privileged treatment."

Give priority to rare diseases

- "Rare diseases are often neglected, so should receive special priority."
- "Childhood disease are often rarer than adult ones, so might be unfairly overlooked in health system planning."

Table 2. Respondent sociodemographic characteristics

	Overall (n=1556)	Canada	Intervention (n=773)	Control (n=783)	
	<i>n</i> (%) or Mean (SD)	%	<i>n</i> (%) or Mean (SD)	<i>n</i> (%) or Mean (SD)	p value
Age (mean)	47.82 (15.58)		47.25 (15.63)	48.38 (15.53)	0.15
Age (range)					0.21
18 - 34	426 (27.38%)	25.13%*§	226 (29.24%)	200 (25.54%)	
35 – 44	261 (16.77%)	16.65%	119 (15.39%)	142 (18.14%)	
45 – 54	318 (20.44%)	18.46%*	163 (21.09%)	155 (19.80%)	
55+	551 (35.41%)	39.75%*	265 (34.28%)	286 (36.53%)	
Gender					0.39
Male	744 (47.81%)	49.11%	378 (48.90%)	366 (46.74%)	
Female	811 (52.12%)	50.89%	394 (50.97%)	417 (53.26%)	
Other	1 (0.06%)		1 (0.13%)	0 (0%)	
First language					0.13
English	1187 (76.29%)		584 (75.55%)	603 (77.01%)	
French	294 (18.89%)		158 (20.44%)	136 (17.37%)	
Other	75 (4.82%)		31 (4.01%)	44 (5.62%)	
Education level					
None	4 (0.26%)		4 (0.52%)	0 (0%)	
Elementary school	18 (1.16%)		10 (1.29%)	8 (1.02%)	
High school (Diploma/GED)	205 (13.17%)		103 (13.32%)	102 (13.03%)	
Some college	195 (12.53%)		97 (12.55%)	98 (12.52%)	
College diploma	344 (22.11%)		174 (22.51%)	170 (21.71%)	
Bachelor’s degree	495 (31.81%)		237 (30.66%)	258 (32.95%)	
Master’s degree	208 (13.37%)		108 (13.97%)	100 (12.77%)	
Doctoral/Professional degree	87 (5.59%)		40 (5.17%)	47 (6%)	
Education (dichotomized)					0.54
High school or less	227 (14.59%)	44.74%#	117 (15.14%)	110 (14.05%)	
Some college and higher	1329 (85.41%)	55.26%#	656 (84.86%)	673 (85.95%)	
Employment status					
Employed full time	852 (54.76%)		440 (56.92%)	412 (52.62%)	

Employed part time	141 (9.06%)		65 (8.41%)	76 (9.71%)	
Unemployed	64 (4.11%)		35 (4.53%)	29 (3.70%)	
Retired	389 (25%)		182 (23.54%)	207 (26.44%)	
Student	44 (2.83%)		24 (3.10%)	20 (2.55%)	
Other	66 (4.24%)		27 (3.49%)	39 (4.98%)	
Employment (dichotomized)					0.09
Employed full time	852 (54.76%)		440 (56.92%)	412 (52.62%)	
Others	704 (45.24%)		333 (43.08%)	371 (47.38%)	
Annual household income					
< \$20,000	94 (6.04%)	9.73% [#]	49 (6.34%)	45 (5.75%)	
\$20,000 - 49,999	310 (19.92%)	25.06% [#]	154 (19.92%)	156 (19.92%)	
\$50,000 - 74,999	350 (22.49%)	32.79% ^{#^}	178 (23.03%)	172 (21.97%)	
\$75,000 - 99,999	291 (18.70%)		138 (17.85%)	153 (19.54%)	
\$100,000 - 150,000	337 (21.66%)	32.42% [^]	164 (21.22%)	173 (22.09%)	
> \$150,000	174 (11.18%)		90 (11.64%)	84 (10.73%)	
Household income (dichotomized)					0.62
Low income (< \$20,000)	94 (6.04%)		49 (6.34%)	45 (5.75%)	
Medium to high (≥ \$20,000)	1462 (93.96%)		724 (93.66%)	738 (94.25%)	
Health status					
Excellent	249 (16%)		125 (16.17%)	124 (15.84%)	
Very good	692 (44.47%)		347 (44.89%)	345 (44.06%)	
Good	477 (30.66%)		224 (28.98%)	253 (32.31%)	
Fair	117 (7.52%)		61 (7.89%)	56 (7.15%)	
Poor	21 (1.35%)		16 (2.07%)	5 (0.64%)	
Health status (dichotomized)					0.13
Good, very good and excellent	1418 (91.13%)		696 (90.04%)	722 (92.21%)	
Fair or poor	138 (8.87%)		77 (9.96%)	61 (7.79%)	
Marital status					
Single/never married	392 (25.19%)		194 (25.10%)	198 (25.29%)	
Married	763 (49.04%)		385 (49.81%)	378 (48.28%)	

Divorced/separated/widowed	200 (12.85%)		95 (12.29%)	105 (13.41%)	
Living with partner	201 (12.92%)		99 (12.81%)	102 (13.03%)	
Marital status (dichotomized)					0.59
Married or living with a partner	964 (61.95%)		484 (62.61%)	480 (61.30%)	
Single/never married/divorced	592 (38.05%)		289 (37.39%)	303 (38.70%)	
Do you have children?					0.69
Yes	815 (52.38%)		401 (51.88%)	414 (52.87%)	
No	741 (47.62%)		372 (48.12%)	369 (47.13%)	

*p<0.05; #p<0.0001

§ StatsCan 2016 census data on age range 20-34, so imperfect comparison with our reported sample age range of 18-34

^Comparison made on composite income categories (i.e. \$50,000-99,999 and >\$100,000, respectively)

SD = standard deviation

Table 3. Mean preference scores by experimental group, unadjusted

Scenario	Intervention group (n=773) Preference Scores	Control group (n=783) Preference Scores	p value*
Chronic disease drug	0.04 (2.50)	-0.61 (2.98)	<0.0001
Liver transplant	-0.13 (2.43)	-0.65 (2.88)	0.0001
Cancer therapy	-1.01 (2.45)	-1.92 (2.67)	<0.0001
Palliative care	-0.22 (2.25)	-0.60 (2.80)	0.0031
Eating disorder treatment	-1.32 (2.33)	-2.17 (2.57)	<0.0001

*Student's two-sample t-test

Preference score values are expressed as mean (SD)

Table 4. Impact of demographic and experimental variables on difference in mean preference scores between groups: Univariate mixed model results

Variable	Preference Score Difference	Standard Error	T value	p value
Intervention (vs control) (<i>n</i> =7780)	0.66	0.09	7.41	< 0.0001
Scenario				< 0.0001
• Liver transplant (vs chronic disease drug)	-0.11	0.08	-1.39	0.16
• Cancer therapy (vs chronic disease drug)	-1.18	0.08	-15.51	< 0.0001
• Palliative care (vs chronic disease drug)	-0.12	0.08	-1.60	0.11
• Eating disorders treatment (vs chronic disease drug)	-1.46	0.08	-19.15	< 0.0001
Ontario (vs others)	-0.05	0.09	-0.52	0.61
Age categories (respondents)				0.0003
• 35 – 44 (vs 18-34)	0.14	0.14	0.98	0.33
• 45 – 54 (vs 18-34)	0.32	0.13	2.41	0.02
• 55+ (vs 18-34)	0.48	0.11	4.16	< 0.0001
Female (vs male)	0.07	0.09	0.74	0.46
English (vs French)	-0.28	0.12	-2.39	0.02
Education: some college or higher (vs high school or less)	-0.14	0.13	-1.09	0.27
Full-time employment (vs others)	-0.19	0.09	-2.10	0.04
Medium-to-high household income (vs low income)	-0.45	0.19	-2.35	0.02
Good-to-excellent health (vs fair or poor)	-0.08	0.16	-0.49	0.62
Married or living with partner (vs single or divorced)	-0.04	0.09	-0.43	0.67
One or more children (i.e. parenthood) (vs none)	-0.15	0.09	-1.66	0.10

Table 5. Impact of demographic and experimental variables on mean preference scores: Multiple regression mixed model results

Variable	Estimate	Standard Error	T value	p value
Intervention (vs control)	0.72	0.14	5.40	< 0.0001
Scenario				< 0.0001
• Liver transplant (vs chronic disease drug)	-0.02	0.11	-0.16	0.87
• Cancer therapy (vs chronic disease drug)	-1.30	0.11	-11.78	< 0.0001
• Palliative care (vs chronic disease drug)	0.05	0.11	0.41	0.68
• Eating disorders treatment (vs chronic disease drug)	-1.53	0.11	-13.89	< 0.0001
Group and scenario interaction				0.0021
• Intervention (vs control) and liver transplant (vs chronic disease drug)	-0.18	0.16	-1.16	0.25
• Intervention (vs control) and cancer therapy (vs chronic disease drug)	0.22	0.16	1.42	0.16
• Intervention (vs control) and palliative care (vs chronic disease drug)	-0.31	0.16	-2.00	0.05
• Intervention (vs control) and eating disorders (vs chronic disease drug)	0.17	0.16	1.11	0.27
Ontario (vs other regions)	0.02	0.10	0.23	0.82
Age categories				< 0.0001
• 35 – 44 vs 18-34	0.35	0.14	2.39	0.02
• 45 – 54 vs 18-34	0.54	0.14	3.92	< 0.0001
• 55+ vs 18-34	0.71	0.14	5.06	< 0.0001
Female	0.12	0.09	1.30	0.19
English (vs French)	-0.28	0.12	-2.32	0.02

Education: some college or higher	0.04	0.13	0.29	0.77
Full-time employment	-0.04	0.11	-0.39	0.70
Medium-to-high income (vs low income)	-0.40	0.20	-1.99	0.05
Good-to-excellent health (vs fair or poor)	0.11	0.16	0.69	0.49
Married or living with partner (vs single or divorced)	0.06	0.10	0.55	0.58
One or more children (i.e. parenthood)	-0.40	0.11	-3.73	0.0002

Overall model significance: Log-likelihood ratio tests suggest the full model is significantly better than a null model (LR = 1049.38, $p < 0.0001$), but reveals no significant difference in fit between the full and parsimonious models (LR = 14.1, $df=7$, $p=0.95$).

R^2 : The full model with predictors explained 9.7% of within-subjects variance and 4.3% of between-subjects variance, as compared with the null model (without predictors). Comparing the full model with a parsimonious model (non-significant predictors removed), the two models were almost identical. The parsimonious model explained 0.05% more of the between-subjects variance; there was no difference in within-subjects variance explained.

Table 6. Mean deviation of preference scores from zero difference between groups: Multiple regression mixed model results

Scenario	Intervention		Control		Difference		
	Deviation from zero	95% CI	Mean	95% CI	Estimate	95% CI	p value
Chronic disease	0.25	(-0.03, 0.53)	-0.47	(-0.76, -0.18)	0.72	(0.46, 0.99)	<0.0001
Liver transplant	0.05	(-0.23, 0.34)	-0.49	(-0.78, -0.20)	0.54	(0.28, 0.80)	<0.0001
Cancer therapy	-0.83	(-1.11, -0.54)	-1.77	(-2.06, -1.48)	0.94	(0.68, 1.21)	<0.0001
Palliative care	-0.02	(-0.30, 0.27)	-0.43	(-0.72, -0.14)	0.41	(0.15, 0.67)	0.0021
Eating disorder treatment	-1.11	(-1.39, -0.82)	-2.01	(-2.30, -1.71)	0.90	(0.63, 1.16)	<0.0001

CI = confidence interval

Table 7. Characterization of neutral responses by experimental group across scenarios

Neutral	Chronic disease drug	Liver transplant	Cancer therapy	Palliative care	Eating disorder treatment
Intervention group (<i>n</i> =773)					
Yes	324 (41.91%)	326 (42.17%)	324 (41.91%)	372 (48.12%)	274 (35.45%)
No	449 (58.09%)	447 (57.83%)	449 (58.09%)	401 (51.88%)	499 (64.55%)
Control group (<i>n</i> =783)					
Yes	256 (32.69%)	255 (32.57%)	214 (27.33%)	297 (37.93%)	150 (19.16%)
No	527 (67.31%)	528 (67.43%)	569 (72.67%)	486 (62.07%)	633 (80.84%)

Table 8. Multiple regression GEE model analysis of preference neutrality

	df	Wald chi-square	p value
Scenario	4	143.19	<0.0001
Group (intervention vs control)	1	48.07	<0.0001
Scenario * group	4	19.33	0.0007

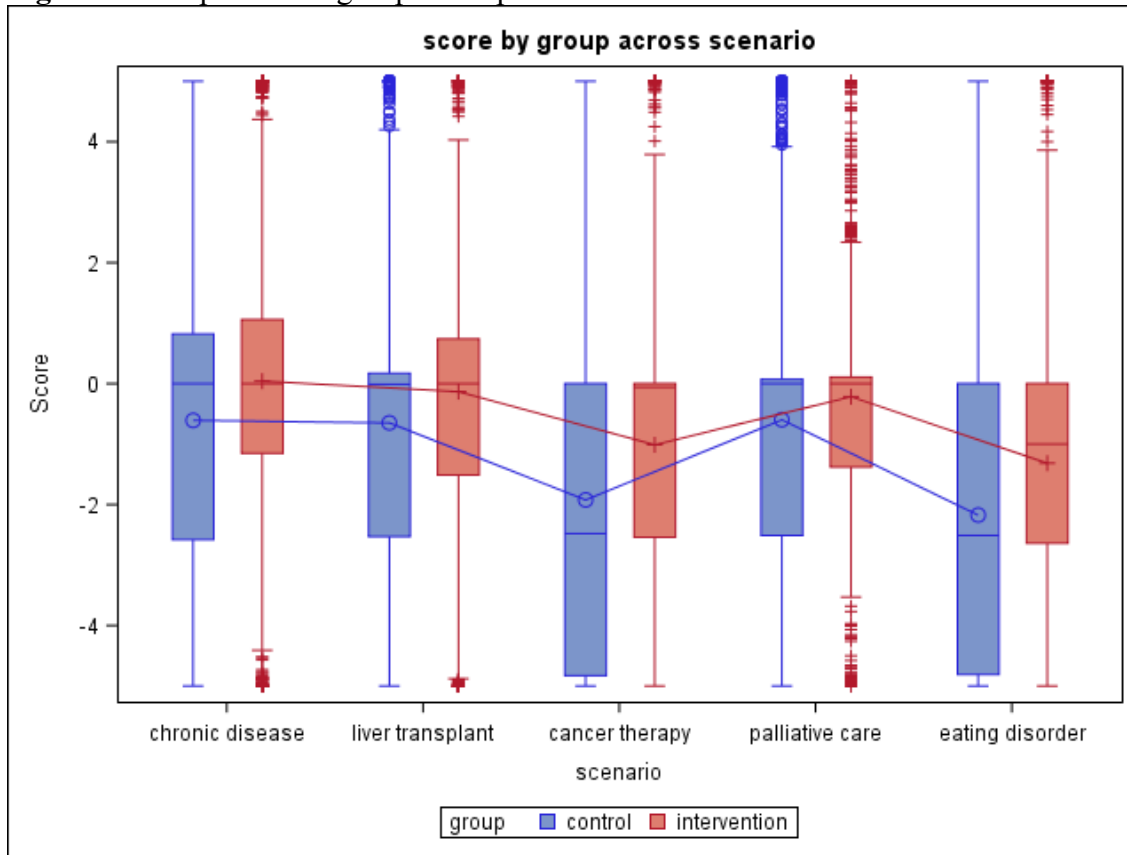
Odds Ratio	Odds ratio	95% CI: Lower, Upper		p value
Control				
• Liver transplant (vs chronic disease)	0.994	0.859	1.151	0.9379
• Cancer therapy (vs chronic disease)	0.774	0.623	0.919	0.0033
• Palliative care (vs chronic disease)	1.258	1.053	1.504	0.0116
• Eating disorder treatment (vs chronic disease)	0.488	0.399	0.596	<0.0001
Intervention				
• Liver transplant (vs chronic disease)	1.011	0.891	1.146	0.8685
• Cancer therapy (vs chronic disease)	1.000	0.864	1.158	0.99
• Palliative care (vs chronic disease)	1.286	1.10	1.502	0.0016
• Eating disorder treatment (vs chronic disease)	0.761	0.655	0.884	0.0004
Scenario-specific				
• Chronic disease: Intervention (vs control)	1.485	1.208	1.826	0.0002
• Liver transplant: Intervention (vs control)	1.510	1.228	1.857	<0.0001
• Cancer therapy: Intervention (vs control)	1.919	1.552	2.373	<0.0001
• Palliative care: Intervention (vs control)	1.518	1.241	1.858	<0.0001
• Eating disorders treatment: Intervention (vs control)	2.317	1.839	2.920	<0.0001

Table 9. Participant selection of allocative principles by scenario

Principle	Overall (%)	Chronic disease drug	Liver transplant	Cancer therapy	Palliative care	Eating disorder treatment	Aggregate p value [§]
Equal treatment	57.75	55.24	58.99	54.33	63.91*	56.27	0.0008
Relief pain and suffering	45.33	39.59	40.75	40.10	66.11*	40.10	<0.0001
At risk of dying	40.44	44.11	42.56	40.62	37.90*	37.00*	0.02
Capacity to benefit longer	24.89	19.53	24.71*	34.54*	15.91	29.75*	<0.0001
Most vulnerable	24.71	21.86	18.76	22.51	24.32	36.09*	<0.0001
Evidence that it works	24.14	25.87	26.65	23.42	20.44*	24.32	0.04
Live a full life	20.65	19.15	17.98	24.71*	17.21	24.19*	<0.0001
Treat those dependent on others	17.46	16.56	17.34	18.50	16.30	18.63	0.65
Family responsibility	16.56	24.71	20.57	14.23*	13.07*	10.22*	<0.0001
Other considerations	14.41	13.45	16.56	11.90	15.27	14.88	0.09
Productive people	10.45	16.04	14.10	7.89*	7.50*	6.73*	<0.0001
Special people	10.25	7.37	9.96	11.90*	11.00*	11.00*	0.04
Rare disease	7.37	9.96	7.63	7.24	6.34*	5.69*	0.02

*Statistically significant difference in proportion selecting the principle for indicated scenario compared to the chronic disease scenario at p<0.01 level; [§]Test of equality of proportions across scenarios

Figure 1. Comparison of group mean preference scores across scenarios



Circle = mean; centre line = median; box = interquartile range (IQR: 1st and 3rd quartiles of the data); whisker (inner fences): lower = 1st quartile - 1.5SD, upper = 3rd quartile + 1.5SD; suspected outliers are noted with a circle (control group) or plus sign (intervention group) beyond the upper and lower inner fences

Chapter 5. Conclusions

The research studies presented in chapters 2-4 generate new and valuable insights that advance current knowledge about HTA and drug policy for children. Each study makes substantive, theoretical and methodological contributions; together, they represent a cohesive and distinct body of research with important academic and policy implications. In this concluding chapter, I review the principal findings of the studies exhibited in chapters 2-4. I then consider the impact of the thesis as a whole: I review its contributions in aggregate, address its limitations, and consider the implications of its findings for policy and future research.

Principal Findings

Chapter 2: The moral foundations of child health and social policy

In view of the challenges related to current paradigms of drug assessment and funding for children, in Canada and internationally, this thesis undertakes a mixed methods approach to generate policy-relevant knowledge that can address them. The CIS presented in chapter 2 identifies foundational values and normative concepts related to child health and social policies from a wide array of disciplines and content domains. It proposes a conceptual schema based on a detailed analysis of the role of these values and concepts in different policy spheres, and their interactions across them. The analysis yields three fundamental values attached to child health and social policy: potential, rights, and risk. It further identifies three core concepts that influence the interpretation of these values in different policy domains: well-being, best interests, and participation. Finally, a meta-theme of embedding, which captures the layered sociopolitical context in

which children exist, highlights the role of family, community and society in the expression and interaction of these essential ideas about children.

Comparison of the use of moral tropes and policy frames across time and content domains identifies patterns that help explain the design and impact of certain policies. For example, economic arguments couched in notions of potential have long been ascendant in the health systems and policy literature on children; the rise to prominence of such arguments in policies on education and poverty, however, is a more recent phenomenon (1,2). Comparably, the invocation of ideas about well-being and best interests in the public health and child welfare canons reveal different, though not incompatible, approaches to assessing the outcomes of policies in these areas (3-6). Mapping the normative landscape within which child health and social policymaking takes place is key to work aimed at understanding the play of values in a particular policy domain. In its effort to map the broad moral contours of public policies for children, this study provides the necessary foundations for the work that follows in chapters 3 and 4.

Chapter 3: Social values and public policy on drug funding decisions for children in Canada

The qualitative study presented in chapter 3 explores the normative and system determinants of public funding decisions on paediatric drugs, through analysis of interviews with stakeholders involved in or impacted by HTA for child health technologies at the provincial (Ontario) and national levels in Canada. It contributes novel data to inform decision-making on public coverage of drugs and health

technologies for children, with direct policy relevance to health care priority setting bodies and government funders. The study adds to the existing literature on HTA and drug access in three important ways. Firstly, it provides some of the first empirical data on the political and health system dynamics of drug funding decisions for children in the Canadian context. By testing the fit of HTA's component parts – assembly, assessment and assimilation – to child health realities, chapter 3 highlights opportunities to optimize prevailing HTA paradigms for the appraisal of paediatric drugs and technologies. These include: reform of the principles by which technologies are selected for appraisal (assembly phase); inclusion of innovative approaches to evidence generation in assessments of effectiveness (assessment phase); and explicit assessment parameters and coverage standards to mitigate politicization of drug coverage decisions (assimilation phase). The study also identifies features of the political economy of drug access for children that require policy attention. As with the inquiry into HTA itself, this analysis yields insights specific to the Ontario and Canadian contexts, and broadly relevant to drug access in a wide range of jurisdictions. The market dynamics of drug development and sale for children are illustrative. The perceived need to better compel or incentivize industry to study, market and submit paediatric drugs for regulatory and HTA review provokes calls for regulatory reform in Canada in line with US and European legislation on paediatric drugs (7-9). This perception also motivates suggestions for a broader role for HTA itself: as a value-based guide for setting drug research and development priorities at the system level.

Secondly, this study generates insights into the social values relevant to such decisions from a range of key stakeholder groups, and assembles this evidence into a typology of values that can be used to assess HTA paradigms and drug funding decisions for children in a range of health system and societal contexts. Three categories of values emerge from the data: procedural values, structural values, and sociocultural values. Procedural values relate to the processes underlying HTA and health system priority-setting on drugs for children. Children's right to participate in the process of valuing health technologies is a novel and challenging theme in this domain (10). Structural values are those formative of the HTA framework itself. The increased relevance of considerations such as fair innings, unmet need, and family context captures the need to rebalance the moral bases upon which HTA assessment rests (11,12). Sociocultural values capture how wider social and cultural values condition drug policy decision-making for children. The legitimacy of paediatric exceptionalism, the importance of equity, and the space for cultural diversity in drug policy for children are key normative issues that demand more attention (13).

Thirdly, it applies this values typology to phases of the HTA process and elements of health system context to enable a rich normative analysis of key concepts related to drug funding for children. Among the lessons learned are: the importance of attention to the procedural legitimacy of HTA for children, with emphasis on the inclusion of child health voices in processes of technology appraisal and policy uptake; a role for national and provincial HTA institutions to consider the equity impacts of technologies, both in setting review priorities and in assessing the value of technologies for public coverage;

and the potential benefits of a distinct national framework to guide drug policy for children. Again, the insights generated have direct bearing on the Canadian health system, with particular applicability to Ontario, but also yield fundamental knowledge about the normative dimensions of HTA for children that are likely transposable to other jurisdictions.

Chapter 4: Societal values regarding health care priority setting for children

Chapter 4 presents a stated preference survey of the Canadian public on the allocation of scarce health resources among children and adults. It incorporates a randomized experimental intervention to evaluate the impact of moral deliberation on allocative preferences. This study adds valuable insight on the values and preferences that drive public priorities on access to health care; it serves as a powerful complement to the conceptual and qualitative findings on childhood drug access from chapters 2 and 3. The data evince a consistent preference for allocation to children, as compared to adults, across all health care scenarios tested. This preference is strongest when the life-years gained from a given health intervention are greatest, and weakest when suffering is pronounced, such as in chronic disease and palliative care circumstances. Randomized exposure to a range of competing moral principles to guide decision-making diminished the strength of preference for allocation to children. The exercise in moral deliberation among the study intervention group may have heightened participants' tendency to favour equality and relief of suffering as moral justifiers for resource allocation. These results underscore the importance of deliberative engagement with publics to policymaking on

health care priority setting, including drug funding (14). This, in turn, corroborates the value of the studies presented in the foregoing chapters. Detailed empirical knowledge of the range and play of values attached to drug policy decisions for children is integral to informed debate about the value of individual technologies and to legitimate reform of the ways in which they are assessed.

Novel Contributions

The original scholarship presented in this dissertation makes novel contributions to the fields of HTA, child health, drug policy, and health system priority setting. In aggregate, this body of work represents the first sustained academic inquiry into HTA for children, and furnishes new knowledge about paediatric drug policy of relevance to health systems in Canada and internationally. Individually, each study innovates in important substantive, theoretical and methodological ways.

Substantive

A foundational understanding of the normative constructs used to motivate and adjudicate public policies for children is integral to critical analysis of the social values that inform HTA. Chapter 2 critically explores and catalogues the values attached to child health and social policies from a diverse body of academic literature. The broad canvas enables incorporation and juxtaposition of values from a far wider range disciplines and content domains than in prior normative analyses in public policies for children.

Chapter 3 generates substantive contributions in three domains. Firstly, it builds on the broad normative findings from chapter 2 in the specific realm of HTA and drug

policy. This yields a typology of values of direct relevance to the adjudication and system integration of individual child health technologies, as well as to higher-level endeavours to bring HTA paradigms into line with the realities of child health and illness. In this vein, it also unpacks the methodological challenges related to HTA for children, yielding broadly applicable insights for the structure and operation of HTA systems. Finally, the study maps the system dynamics of technology assessment and drug funding policy for children in Canada. This enables critical application of the proposed values typology to a real-world context for drug coverage decisions for children, testing its capacity to illuminate challenges and identify opportunities for improvement of paediatric drug policy.

The survey in chapter 4 is among the first studies of societal preferences on health resource allocation that explicitly tests trade-offs between adults and children, and that analyzes the role of moral reasoning on the strength and patterning of these preferences. It generates new data on the preferences of the Canadian public and on how its members generate and defend them. Participant predilection for equality, rescue and relief of suffering above other moral concerns in this context is illuminating – as is the tension between such impulses and the consistent, if attenuated, preference for allocation to children among those exposed to the moral reasoning exercise. The evident complexity of these decisions, and the role of deliberation in shaping them, underscore the need to better study and specify optimal approaches to incorporate patient and public voices in HTA (15).

Theoretical

The CIS presented in chapter 2 furnishes theoretical insights that can be applied to the normative analysis of child-focused policies on a wide array of issues. It reifies the often-oblique moral presuppositions of child health and social policies into three overarching categories – potential, rights, and risk – and explores their variable interactions with notions of well-being, best interests, and participation that inform scholarly and societal debates on policies for children. Specific to this body of research, this theoretical work gives context to the nuanced analysis of social values related to HTA and drug funding for children presented in chapter 3, and prefigures the development of the moral reasoning exercise utilized in the stated preference survey presented in chapter 4. Alongside a sociopolitical analysis of child health technologies, chapter 3 develops a novel typology of values that describes the core normative facets of HTA for children. Both this approach and the typology itself are applicable to future studies of technology assessment in child health, as well as to the real-world evaluations that comprise it.

Methodological

Methodologically, this thesis innovates in a few key ways. The application of results from the conceptual and qualitative phases to survey design in the quantitative phase draws on innovative mixed methods theory to augment the integration and cohesiveness of the findings (16). In chapter 2, the use of CIS to unearth the moral foundations of public policy for children draws on the epistemic strengths of systematic

and qualitative methods of literature review to permit both rigour and creativity in data collection and analysis (17). By buttressing sociologies of childhood with political theory on the social construction of target populations, chapter 2 takes a novel transdisciplinary approach to exploring the relationships between values and public policies for children. Chapter 3 employs theory on the role of actors, resources, knowledge, and power in the uptake of health technologies to sensitize its grounded theory analysis to the sociopolitical dimensions paediatric drug policy (18). Finally, Chapter 4 nests a randomized experimental design within a stated preference survey: this enables both the elicitation of public preferences on health resource allocation and analysis of their change in the face of a controlled moral reasoning intervention.

Limitations

This research admits of potential limitations. In chapter 2, analysis of the moral dimensions of child health and social policies is restricted to English-language academic literature, with the exception of a few translated texts. The potential for linguistic and cultural variation in the core values themselves, or their relative emphasis in various policy spheres, is therefore not fully captured. The additional insights that might have emerged from a parallel or merged analysis of the available grey literature – including policy documents from a range of jurisdictions on a panoply of child health and social issues – are likewise unaccounted for. The future application of chapter's 2 conceptual framework to normative analysis of grey literature in various public policy domains would add valuably to knowledge on the moral bases of child health and social policy. In

chapter 3, the use of an Ontario-specific case study limits applicability of the study's findings to other jurisdictions, within Canada and beyond. This includes inferences about the determinants of cross-provincial variations in drug coverage that might further illuminate the role of political culture and social values in drug policymaking for children. Comparative analyses of paediatric drug policy across Canadian provinces, or between Canada and comparable polities internationally, constitute worthwhile future studies. Lastly, potential limitations to external validity inhere in the survey research presented in chapter 4, related both to the nature of the study sample and the impact of question framing on outcomes. In comparing our sample with 2016 Statistics Canada census data, we observed an over-representation of subjects with higher educational attainment, arguably compromising the sample's approximation of Canadian demographics; it is possible that the use of brand loyalty programs to assemble the study sample accounted for this. Perhaps more significantly, it is likely that alternative framing of principles in the moral reasoning exercise would have induced different preference scores amongst participants (19). However, such limitations are the province of experimental attempts to elicit public preferences. Recognition of these limitations provides a useful corrective to blind trust in survey-based preference elicitation, and underscores the value of mixed methods approaches to normative policy analyses such as this. Indeed, the limitations discussed above are themselves checked by the integrated design and findings of the thesis as a whole. The triangulation of data from multiple sources and methods ensures a robust picture of the normative, paradigmatic, and systemic features of child HTA and drug policy in Canada.

Research and Policy Implications

Future research

This integrated, mixed methods body of work on HTA and drug policy for children surfaces new questions that call for creative lines of future research. The suite of interacting values and concepts identified in chapter 2 could contribute to normative analyses of existing and emerging health and social policies for children. The relevance and utility of this framework in different sociopolitical contexts requires examination. The qualitative results from chapter 3 open windows into varied spaces for future inquiry. Research into novel modes and standards of evidence generation for HTA on child drugs and technologies – including ways of theorizing about therapeutic safety and effectiveness – is an obvious and acute need. The system impacts of funding decisions on individual technologies also demand further exploration. The relationships between budget structures, decision choices, and the resultant opportunity costs of technology funding in health systems remain poorly understood (20). Relatedly, the tension between explicit decision-making criteria and the deliberative, participatory parts of HTA – including the impact, in the committee setting, of group dynamics on ultimate recommendations – could benefit from focused analysis. In chapter 4, the evident tension between a strong aggregate preference for children, on the one hand, and a consistent defense of equality and humanitarianism as moral ordering principles, on the other, demands further unpacking. It suggests fruitful lines of inquiry for future research centred on the variance of public conceptions of equality and priority across health conditions and

populations, including among children of different ages. Creative methods to incorporate measures of family utility and health impact from childhood diseases into economic evaluation are also required (21).

Policy relevance

Taken as a whole, this thesis paints a nuanced portrait of 1) the limitations of current HTA models in the realm of child health, and 2) political and health system challenges related to paediatric drug access. Two main policy implications issue from the evidence on these themes. Firstly, the shortcomings of current paediatric drug funding models in Canada warrant the development of a framework to guide HTA of drugs and technologies for children. Indeed, the absence of such a framework in major HTA institutions internationally suggests an opportunity for Canada to lead in this regard. A transparent and evidence-informed approach to child HTA would bolster the technical and normative foundations of drug funding decisions, and provide a benchmark for the uptake of national recommendations across provinces; this would augment coherence and equity of access to drugs and technologies for children. The careful incorporation of evidentiary, economic, and ethical principles geared to the realities of child illness and treatment is integral to such an endeavour. As with rare diseases, innovative approaches to evidence appraisal and trial design – including adaptive designs, basket trials, and access with evidence-development approaches – are required (22). Health economic models that strive to fold in familial, developmental, and life-course impacts require further specification and application (23). There is likewise a need to enhance inclusion

of the perspectives of stakeholders involved in or impacted by childhood illness in technology assessments. HTA institutions should involve child health experts in their clinical and economic reviews, as some have begun to do. The increasingly common incorporation of patient voices in HTA paradigms in Canada and internationally could be augmented by more routine elicitation of public input. Deliberative approaches that seek to integrate and juxtapose the distinct perspectives of patients and publics would add valuable colloquial evidence on the social values and priorities that should inform recommendations for public coverage (24).

Secondly, national coherence and equity in pediatric drug funding will require federal legislation and leadership. Reform of the current drug regulatory environment to support drug research and approval for paediatric indications is a priority. Canada lags behind both the United States (US) and Europe in its regulatory paradigm for pediatric drug testing, approval and marketing. These jurisdictions have legislated both carrot and stick mechanisms to induce drug companies to study and market pediatric indications for their drugs (25). Health Canada provides six-month data protection extensions to manufacturers that provide paediatric trial data; however, unlike the US Food and Drug Administration (FDA) and European Medicines Agency (EMA), it does not have the authority to compel such submissions (26). The lack of comparable provisions in Canada has abetted a sizable gap in the submission of pediatric trial data to Health Canada as compared with the FDA (27). Federal legislation to compel industry to conduct pediatric drug research would attenuate this gap. It could help set coherent priorities for pediatric drug research, develop public research databases to improve transparency and reduce

redundancy, and harmonize paediatric drug formularies across jurisdictions. Alongside regulatory change, federal stewardship of the adoption and pan-provincial application of drug funding standards for children is essential. In the context of pan-Canadian Pharmaceutical Alliance-led efforts to rationalize cross-provincial drug purchasing, there is an opportunity for the federal government to champion the national development of drug funding standards for children (28). It could empower the Canadian Agency for Drugs and Technologies in Health (CADTH) to lead this effort, and work with provincial ministries of health to ensure their adoption. This thesis has begun to generate the evidence base for such standards; further scholarly and applied work to build on these foundations will help make them possible.

Concluding Thoughts

The current HTA system in Canada gives little explicit regard to the differentiating features of childhood and child illness. This lack of regard – commonplace in HTA paradigms around the world – has permitted an *ad hoc* approach to the assessment of paediatric health technologies. This is both a highly imperfect use of scarce public funds and a disservice to children in need of evidence-based, equitable access to valuable health technologies. Efforts at system improvement should centre on: 1) the creation of an explicit set of standards by which to appraise child drugs and technologies; 2) reform of the regulatory environment to account for paediatric drug research and market realities; and 3) federal and provincial cooperation in the adoption of pan-Canadian funding recommendations. The health technologies we privilege, the modes of

innovation we prize, say a great deal about who we privilege, and what sort of society we prize. This thesis advances an important conversation about how children figure into the moral and political calculus of health care funding in Canadian society. I hope that its findings spur further work in this area, and contribute to real-world policies that improve drug access for children in Canada and elsewhere.

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