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SYSTEMATIC REVIEW

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A systematic review of in-person versus remotely delivered interventions for youth with chronic pain

Nicole E. MacKenzie[1,2] | Mica Gabrielle Marbil[3] | Sabine Soltani[3] | Diane L. Lorenzetti[4] | Kathryn A. Birnie[1,5]

[1]Department of Psychology and Neuroscience, Dalhousie University, Halifax, Nova Scotia, Canada

[2]Centre for Pediatric Pain Research, IWK Health, Halifax, Nova Scotia, Canada

[3]Department of Psychology, University of Calgary, Calgary, Alberta, Canada

[4]Health Sciences Library and Department of Community Health Sciences, University of Calgary, Calgary, Alberta, Canada

[5]Department of Anesthesiology, Perioperative and Pain Medicine, and Community Health Sciences, University of Calgary, Calgary, Alberta, Canada

Correspondence
Kathryn A. Birnie, Department of Anesthesiology, Perioperative and Pain Medicine, and Community Health Sciences, Alberta Children's Hospital, University of Calgary, B4-510-09, 4th floor, 28 Oki Dr NW, Calgary, AB T3B 6A8, Canada.
Email: kathryn.birnie@ucalgary.ca

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Abstract

The COVID-19 pandemic prompted a rapid shift from in-person to virtually-delivered care. Many youth with chronic pain have the ability to access care virtually; however, little is known about the efficacy of pain care for youth with chronic pain delivered virtually when compared to in-person. Such evidence is essential to guide youth in making decisions about their care, but also to inform what options health professionals present to youth. The purpose of this systematic review and meta-analysis was to examine the efficacy of interventions that are delivered in-person versus virtually for youth with chronic pain. Five databases (i.e., CINAHL, EMBASE, MEDLINE, APA PsycINFO, and Web of Science) were searched in October 2022 to identify randomized controlled trials that compare single/multimodal interventions for pediatric chronic pain delivered in-person versus virtually. A total 3638 unique studies were identified through database and other searching, two of which satisfied established criteria for inclusion in this review. Both studies compared psychological interventions delivered virtually versus in-person for youth with chronic pain and showed comparable efficacy across modalities. The planned meta-analyses could not be conducted due to different outcomes within each study that could not be combined. This systematic review highlights a critical gap in the evidence regarding the efficacy of virtually delivered interventions for youth with chronic pain. This evidence is necessary to inform treatment decisions for youth, and further research is required to develop the evidence to inform clinical interventions, especially as virtual treatments continue to be offered.

KEYWORDS
pediatric pain, shared decision making, systematic review, virtual care delivery

1 | INTRODUCTION

Using evidence to inform care for youth with chronic pain is essential for effective pain management and treatment. Youth with chronic pain require timely and consistent access to pain care.[1] Virtual delivery of evidence-based pain interventions can increase access to care through remote interactions between patients, caregivers, and their health care teams (e.g., video conferencing, telehealth, etc).[2,3] The COVID-19 pandemic accelerated a shift to virtual care in Canada and internationally, initially necessitating a

virtual-first approach and now settling on hybrid models of care that leverage both in-person and virtual options.[4] Despite this expanded use of virtual care, to date, there are no comprehensive reviews of the relative efficacy of in-person versus virtual care for youth with chronic pain to guide treatment decision-making, leaving the question of when to offer in-person versus virtual care unanswered.[5] Without this evidence, recommendations cannot be made to support youth or healthcare teams to determine the best options for care delivery that maintain effective chronic pain management. This is problematic, given that identification of when and what treatments to deliver for pediatric chronic pain is a priority for patients, caregivers, and health professionals.[1] Focusing on how in-person care compares to virtual care in terms of efficacy, harms, and benefits could help inform treatment decisions to address these disparities. To support these identified needs, evidence from direct head-to-head comparisons of in-person versus virtual care delivery is also essential to inform the development of implementation tools like decision aids to support youth in their decision-making about how they engage in treatment.

Emerging research has highlighted the benefits of virtual care for chronic pain. Studies conducted during the COVID-19 pandemic have demonstrated that youth with chronic pain and their caregivers benefit from virtual and hybrid models of care (i.e., ease of engagement and continuity of care).[3] Virtually-delivered psychological interventions are effective in reducing pain and disability in adults,[6] and other research has shown that their efficacy is comparable to in-person delivery of psychological interventions for adults with chronic pain.[7] In the pediatric literature, however, there is limited evidence regarding the efficacy of remotely delivered psychological interventions for youth with chronic pain.[8]

While there are benefits of virtual care, most research in youth has studied virtual care delivery without any comparison to traditional delivery methods (i.e., face-to-face),[8] while other research has focused on virtual care-adjacent treatments (e.g., self-guided e-health interventions, virtual peer support groups).[9–11] While this research can inform potential intervention options, this evidence is limited in its ability to inform when virtual or in-person care is best for youth with chronic pain because it does not directly compare similar interventions delivered virtually to in-person. Furthermore, conclusions about the efficacy of virtual interventions in chronic pain are limited to psychological interventions, failing to capture the full scope of interdisciplinary chronic pain care.[12]

The COVID-19 pandemic created a need for evidence on delivering virtual care effectively.[13] The focus must now shift to the long-term provision of virtual care to inform whether one modality of care is superior or equal to the other, for whom, when, and for what purpose. This will not only inform evidence-based care delivery from an ethical and inclusive perspective but will also support shared decision making regarding care, a process that must consider not only health professionals but also youth with chronic pain and their families. Indeed, youth with chronic pain and their families have expressly identified a desire to be more involved in treatment decisions surrounding in-person versus virtual care.[14] This is especially important when considering equity-related priorities, especially where virtual care is implicated, as these must inform guidelines for best practices for care to reduce disparities that exist in terms of access to and quality of care among underrepresented populations.[1,14–16] A systematic review bringing together the evidence comparing in-person to virtual care delivery for youth with chronic pain is essential to inform clinical decision-making around how care is delivered, as well as clinical practice guidelines to ensure pain management is delivered effectively. Equally important is the need for evidence to inform youths' decision-making when it comes to accessing care that meets their unique needs and circumstances.

2 | AIMS

With these goals in mind, the primary aim of this systematic review and meta-analysis was to determine the efficacy of interventions that are delivered in-person versus virtually for youth with chronic pain. The secondary aim was to examine this evidence specifically for racialized and/or equity-seeking groups. With the evidence gathered in this review, the goal is to use the evidence to inform the development of a decision aid to support youth in making a shared decision regarding their choice between in-person and virtual care for chronic pain management.

3 | METHODS

This review follows the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) reporting guidelines for systematic reviews.[17] The protocol for this review was registered on PROSPERO: CRD42022374579.

3.1 | Eligibility criteria

Eligible studies were (1) peer-reviewed, randomized controlled trials (RCTs) published in English since 2012; (2) included youth (i.e., mean age < 18 years) with any type of chronic pain (i.e., pain lasting at least 3 months); (3) directly compared in-person versus virtual delivery (e.g., telehealth, telemedicine, videoconference, telephone) of single and/or multimodal interventions of any type (e.g., physical, psychological) for chronic pain; and (4) included measurement of outcomes at pre-treatment, posttreatment, and follow-up (i.e., 3–12 months posttreatment). Study exclusion criteria were (1) publications in any language other than English; (2) articles primarily assessing adults (i.e., mean age of ≥18 years) without a sample of youth (i.e., no subgroup of youth with a mean age of ≤18 years); (3) samples that did not include a chronic pain group or less than half of the study sample endorsed having chronic pain; (4) comparisons of virtual interventions to a no treatment control; or (5) comparisons

of different types of chronic pain intervention types and modality (e.g., virtual psychological interventions to in-person physical therapy). Both non-inferiority trials and crossover trials were included (i.e., when data were available from before the crossover). Articles without specific description of treatment modalities (e.g., "standard care", "usual care") were included at the title and abstract screening stage until more detail could be obtained upon full-text screening. Studies involving intervention for parents were eligible if child outcomes were assessed.

3.2 | Information sources and search strategy

In late October 2022, electronic searches for eligible articles were conducted in five bibliographic databases (i.e., CINAHL, EMBASE, MEDLINE, APA PsycINFO, and Web of Science). In addition, posts were also made in 2023 to relevant listservs (Pediatric Pain, Pain in Child Health, American Psychological Association's (APA) Society of Pediatric Psychology Division 54) to solicit information on additional articles. The reference lists from included articles and clinical trials databases (i.e., ClinicalTrials.gov) were also searched for additional relevant references. Authors of any eligible abstracts that did not have linked full-text articles or full-text articles that required clarification were contacted to obtain further information, as needed.

Search strategies were developed in consultation with a medical librarian (DLL) (see Supplemental Materials for the comprehensive list of search terms). A four-concept search was developed, combining subject headings (as available) and title/abstract words for: (1) Chronic Pain; (2) Virtual Delivery of Health Care; (3) Children or Adolescents; and (4) Randomized Controlled Trials.

3.3 | Selection processes

Title and abstract screening were independently completed by two authors (NEM and either MGM or SS) for 10% of database search results, conducted via Covidence (Veritas Health Information, n.d.). Of the 10% double-screened, two conflicts arose, resulting in an interrater agreement rate of 99.5%. Any disagreements were resolved through discussion and/or consultation with KAB until consensus was met. The remainder of the title and abstract screening were completed by a single reviewer (NEM). Then, full-text screening was independently conducted by two authors (NEM and either MGM or SS) for 20% of the articles selected through abstract screening. There were no disagreements at this stage. The remaining articles were screened by a single reviewer (NEM).

3.4 | Data collection and data items

For each included study, a single author collected information regarding intervention details (e.g., treatment type [psychological, physical, pharmacological, interdisciplinary], modality, length, etc.), sample details (e.g., illness type, mean age, size, sex), number of follow-up periods, and primary outcomes. Primary outcomes included the core outcomes studied within each trial (e.g., pain-related outcomes, mental health-related outcomes, etc.). Planned data extraction include data necessary for meta-analysis and data pooling, including group size, means, standard deviations, etc.

3.5 | Study risk of bias assessment and reporting

For included studies, risk of bias was completed using the revised Cochrane Risk of Bias 2 tool for randomized trials (RoB 2).[18] The RoB 2 presents a series of signaling questions to gather information that contributes to risk assessment across five domains (i.e., randomization process, deviations from the intended intervention, missing outcome data, measurement of the outcome, and selection of the reported result). These questions were reviewed, and the tool produced a risk of bias judgment of "low" (i.e., minimal to no concerns across domains), "high" (i.e., a strong concern in one or more domain), or "some concerns" (i.e., some concerns in at least one domain, however none of which are rated as high). This process was independently conducted in duplicate by two authors (NEM and SS), and any disagreements were resolved through consensus.

3.6 | Synthesis methods, effect measures, and certainty assessment

Pending sufficient studies included for meta-analysis, the authors' intention was to pool data using the Review Manager version 5.4 software (RevMan 5; The Cochrane Collaboration, 2020). It was planned that risk ratios for dichotomous outcomes and standardized mean differences (SMDs) would be calculated using a random-effects model for continuous outcomes to analyze results over the differences in measures used across studies. Additionally, the authors planned to use the GRADE system[19,20] to examine the quality of evidence for each comparison of continuous outcomes. The quality of evidence would be considered in five areas (i.e., limitations of the study, imprecision of results, inconsistency of results, indirectness of evidence, and likelihood of publication bias).[20] Given the inclusion of RCTs in the meta-analysis, study quality was to be considered as "high" from the outset and would be downgraded as necessary according to its specific characteristics.

Where possible, pending sufficient information from included studies, subgroup analyses were planned to examine the sociodemographic factors that may account for or exacerbate systemic health system inequities for youth with chronic pain. Sociodemographic factors to be considered included race, ethnicity, gender, sexual orientation, and socio-economic status. Where possible, meta-regressions were planned to examine the predictive roles of these factors on the outcome variables of interest.

4 | RESULTS

4.1 | Study selection

A PRISMA flow diagram of our search results is shown in Figure 1. Searches of scientific databases identified 5130 records. Removing duplicates resulted in 3630 unique abstracts. An additional 8 records were acquired through direct callouts via three listservs, resulting in 3638 abstracts that were screened. Of the screened abstracts, 3614 records in total were removed as they were ineligible, and 24 records were retained for full-text review. Of the records retained for full-text review, only 2 met inclusion criteria and were retained. Reasons for full-text exclusion are shown in Figure 1.

4.2 | Study Characteristics

Because only two records that targeted different groups (i.e., youth vs. parents) and measured distinct outcomes among these groups (i.e., anxiety measures vs. pain ratings) met inclusion criteria, the planned comprehensive meta-analyses were unable to be performed. The study characteristics for the two records that were retained are presented in Table 1 and are described individually below in narrative form.

The study presented in Chadi and colleagues was a pilot RCT that compared a mindfulness-based intervention for youth with chronic illness delivered via eHealth (i.e., video conferencing) to in-person delivery.[21] The sample consisted of a heterogenous group of 14 youth (mean age = 15.3 years; range = 13–18 years) with various chronic illness conditions (e.g., epilepsy, anxiety, diabetes, somatic symptom disorder, cystic fibrosis). Majority (72%) of youth were white. Eight of the youth (four in each condition) endorsed having chronic pain. The intervention in each condition consisted of eight 90-min weekly sessions. The outcome measures of interest included symptoms of anxiety and depression, as captured by the Depression, Anxiety, and Stress Scale (DASS-21). Outcomes were assessed at baseline, prep- and post-intervention, as well as two-month follow-up. Paired *t*-tests showed a significant reduction in symptoms of anxiety and depression in the virtual intervention group at 8 weeks for the eHealth group (i.e., immediately post-intervention), $p = 0.048$, Cohen's $d = 0.934$; however, this effect was no longer significant at two-month follow-up, $p = 0.168$, $d = 0.592$. There were no significant differences with respect to DASS-21 scores at 2-month follow-up when the intervention was delivered via eHealth ($p = 0.168$, $d = 0.592$) or in-person ($p = 0.333$, $d = 0.398$), and the analysis of variance did not indicate a significant difference in outcomes between the intervention groups. Thus, the effects of the intervention delivered virtually were determined to

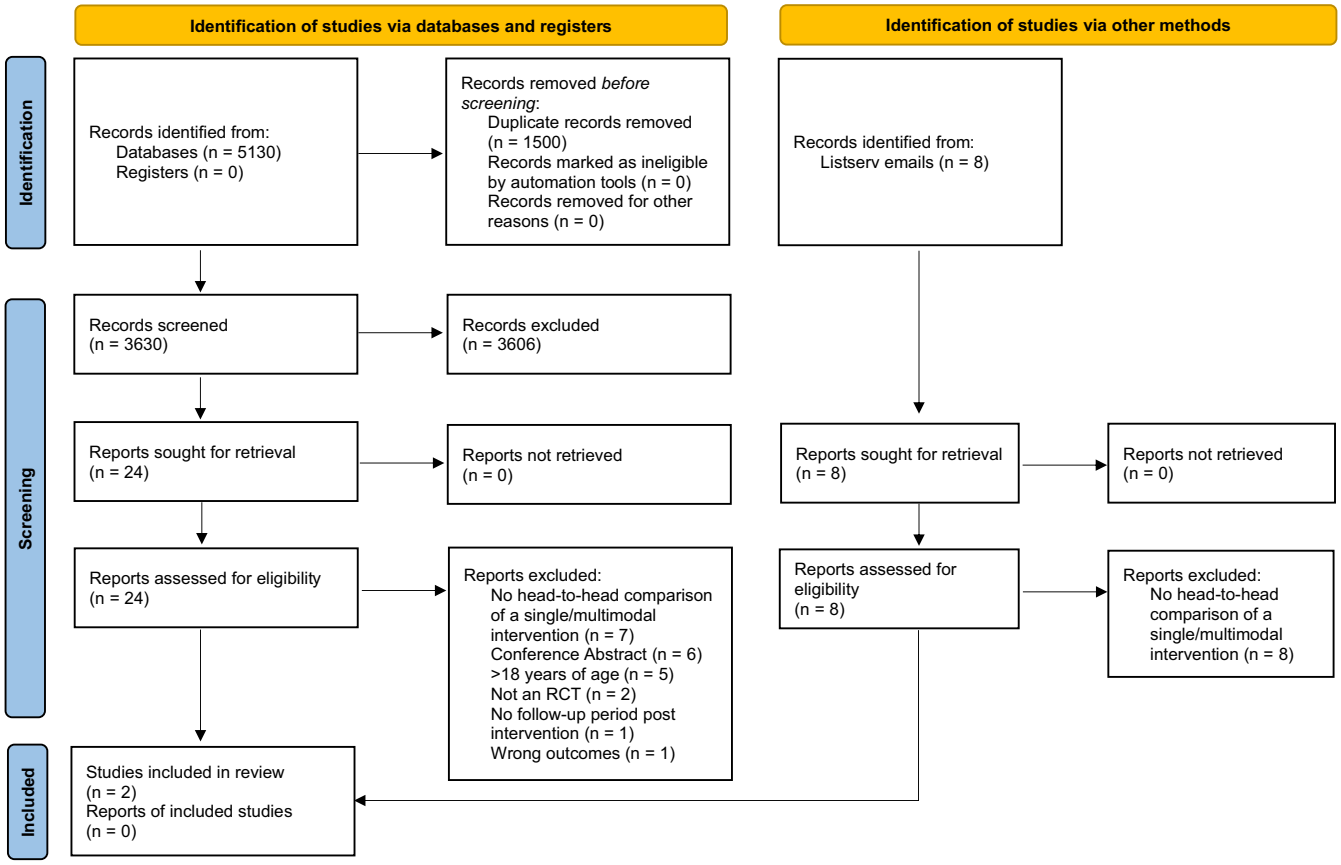

FIGURE 1 PRISMA flow diagram.

TABLE 1 Study characteristics.

	Study	
Characteristic	**Chadi et al.[21]**	**Levy et al.[22]**
Study type	Pilot randomized controlled trial; mixed method	Randomized controlled trial
Intervention type	Psychological (aimed at youth)	Psychological (aimed at parents)
Intervention name	Mindful Awareness and Resilience Skills for Adolescents (MARS-A) program	Social Learning and Cognitive Behavioral Therapy (SLCBT)
Intervention delivery modality	Video conference platform	Telephone
Intervention details	8 weekly 90-min sessions	Three 1-h sessions delivered approximately 1 week apart
Comparison	Same intervention delivered in-person	Two comparison groups: SLCBT delivered in-person Education and support condition by phone (ES-R)
Sample	Youth with chronic illness (heterogenous group); 4 youth in each intervention group endorsed chronic pain	Youth with functional abdominal pain disorders (FAPD) and a parent
Sample size	$n = 7$ per group who completed intervention ($N = 14$)	$N = 316$ dyads total $N = 100$ (SLCBT phone) $N = 107$ (SLCBT in-person) $N = 109$ (ES-R)
Mean age of sample and range (in years)	Mean = 15.3 years of age; Range = 13–18 years of age	Child: Mean = 9.4 years of age; Range = 7–12 years of age Parent: Mean = 39.9 years of age; Range = 24–77 years of age
Sex of sample, *n* (%)	Data for baseline sample ($N = 18$) Female = 14 (77.8%)	Child: Female = 204 (64.6%) Parent: Female = 300 (94.9%)
Race, *n* (%)	Data for baseline sample ($N = 18$) White = 13 (72.2%) Not White = 5 (27.8%)	Child: White = 246 (77.8%) Not White = 70 (22.2%) Parent White = 265 (84.1%) Not White = 50 (15.8%)
Number of follow-up periods	Baseline Pre-intervention Post-intervention 2-month follow-up	Baseline 1 week 3-month follow-up 6-month follow-up
Outcomes	Primary: Mindfulness skills acquisition (MAAS-A) Secondary: Depression scores (DASS-21) Anxiety scores (DASS-21) Self-esteem (Rosenberg Self-Esteem Scale) Illness perception (Illness Perception Questionnaire) Salivary cortisol levels Individual mindfulness practice (weekly frequency, type, duration)	Primary: Pain severity (API) Secondary: Parental solicitousness (ARCS) Pain beliefs (PBQ) Catastrophizing (PCS-P) Child-reported coping (PRI) Additional: Functional disability (FDI) Quality of Life (PedsQL) Pain behaviors (PBCL) School absences Health care utilization Gastrointestinal symptoms (CSI)
Effect of intervention (summary of results)	Effects on outcomes were comparable between virtual and in-person delivery.	No significant treatment effect found for primary outcome of pain severity. Several secondary outcomes improved in both SLCBT groups as compared to the ES-R control group. The effects on outcomes were comparable between the two SLCBT groups.

be comparable to those of in-person delivery by the authors of this study. Results were not specifically reported for the group of youth with chronic pain. This study did not report results on any differences in outcomes based on race or ethnicity variables.

The study presented in Levy and colleagues was an RCT that compared a social learning and cognitive behavioral therapy (SLCBT) intervention for parents of children with chronic pain delivered over the phone to in-person delivery and an education and support (ES-R) condition (three conditions in total).[22] The sample consisted of 316 child–parent dyads, wherein the child had a functional abdominal pain disorder (mean age_{Child} = 9.4 years; $range_{Child}$ = 7–12 years; mean age_{Parent} = 39.9 years; $range_{Parent}$ = 24–77 years). Within the dyads, 72% of children and 84% of parents identified as white. The interventions each consisted of three 1-h sessions delivered approximately one week apart. The primary outcome of interest was child pain severity, as assessed by the Abdominal Pain Index (API). Secondary outcomes included measures of parental solicitousness, pain beliefs, catastrophizing, and child-reported coping. Additional outcomes that were also examined included measures of functional disability, quality of life, pain behavior, school absences, health care utilization, and gastrointestinal symptoms. Outcomes were assessed at baseline and follow-up at 1 week, 3 months, and 6 months post-intervention. Linear mixed-effects regression models were conducted to compare the three conditions on the change from baseline to follow-up for the outcome variables of interest. The results of omnibus tests revealed no significant treatment effect found for the primary outcome of pain severity at 6-month follow-up ($p = 0.260$). Both SLCBT groups demonstrated significant improvements on measures of parental solicitousness, pain beliefs, and catastrophizing as compared to the ES-R control group (all $p < 0.001$). In addition, compared to ES-R, both SLCBT groups reported improved parent-reported functional disability ($p = 0.010$), child pain behaviors ($p = 0.020$), parent-reported physical quality of life ($p = 0.010$), parent-reported psychosocial quality of life ($p = 0.020$), and child-reported psychosocial quality of life ($p = 0.010$). No treatment effects were found for parent- or child-reported gastrointestinal symptoms, child-reported physical quality of life, or child-reported coping. The improvements in outcomes did not significantly differ between the in-person and phone conditions for SLCBT, suggesting the two modalities were comparable or similarly effective as the ES-R control condition. This study did not report results on any differences in outcomes based on race or ethnicity variables.

4.3 | Risk of bias in included studies

Risk of bias was assessed in both studies using the Cochrane Risk of Bias tool for randomized trials (ROB 2). Two coders (NEM and SS) independently completed the risk of bias assessment, and disagreements were resolved through consensus. Both studies were determined to be at high risk of bias (see Figure 2).

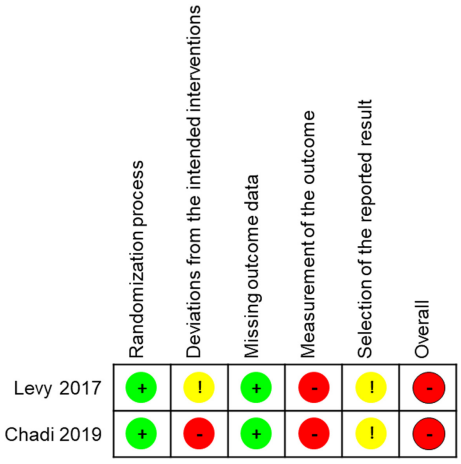

FIGURE 2 Risk of bias of included studies. + Low risk ! Some concerns - High risk

4.4 | Results of syntheses

Only two studies met inclusion criteria; thus, we cannot comment with any degree of certainty on the efficacy of interventions that are delivered in-person versus virtually for youth with chronic pain. Of the limited available evidence, the two studies included in this review do suggest that the psychological interventions delivered virtually were comparable to those delivered in person in these particular samples of youth. At this time, there is a lack of evidence to be able to draw robust conclusions. Lastly, the majority of the participants in both studies were white, precluding any conclusions to be made about evidence for racialized or equity-seeking groups.

5 | DISCUSSION

5.1 | Results in context

This systematic review is the first to synthesize randomized controlled trials comparing the efficacy of interventions delivered in-person versus virtually for youth with chronic pain. This review arose from an urgent need to guide when in-person versus virtual care is best to ensure quality pain care, as identified by the health system and diverse youth with chronic pain, families, and healthcare professionals.[12,14,23] This evidence was collected to inform the development of a decision aid for youth with chronic pain and their families to support shared decision making regarding selecting in-person or virtual care. The review identified two eligible studies, both of which involved psychological interventions for youth with chronic pain. These studies considered the experiences of youth with chronic pain as a primary condition or in the context of a chronic illness (secondary pain). No studies examined other interventions relevant for multi-modal pediatric pain management (i.e., physical, interdisciplinary).[12] Both included studies showed that virtual care

was comparable to in-person delivery, similar to psychological interventions for adult pain[7,24]; however, there is a need for further research to determine whether virtual and in-person modalities are comparably effective in managing pain.[25]

In this review, study design was one of the primary reasons for exclusion. Most studies did not evaluate head-to-head comparisons of a single and/or multimodal intervention delivered in person to virtually. Many of these studies evaluated the efficacy of an intervention compared to no active treatment (i.e., waitlist control) or usual care. Several studies examined specific virtual interventions, such as self-guided apps/websites,[9,10] and peer to peer support,[11] while others reported on the pivot from in-person to virtual care via retrospective review or commentary.[26] Such studies shed light on the nature of in-person versus virtual care through pre- and post-intervention measurement, as well as acceptability, feasibility, and engagement indices[27,28] They cannot, however, inform when and whether in-person or virtual care is more relevant or effective in the first place and for whom, therefore limiting their usefulness to support evidence-informed decisions about care delivery modalities. This review also highlights an emphasis of research on virtual care implementation by comparing virtual care to waitlist or usual care conditions. This line of research is important, given the increased adaptation of virtual care compared to pre-pandemic levels and the interest of patients, caregivers, and professionals on how to implement virtual care effectively.[14,29,30] Conclusions drawn from this research, however, may not directly relate to informing the choice between in-person and virtual care. This may have important repercussions in other identified areas for best practice, such as understanding how virtual care might be used to reduce health disparities. Using such research to inform these in-person versus virtual treatment decisions, therefore, warrants caution as it may not be appropriate. Other excluded research did not provide adequate follow-up in the study design; however, results from this study do suggest that offering virtual care does increase participation in interventions with a comparable engagement level between in-person and virtual intervention delivery.[28] This further suggests that there are benefits to offering a choice between these care modalities; however, the need for more rigorous assessment of how to inform these decisions remains.

The lack of literature providing evidence on the efficacy of in-person relative to virtual care reflects another critical evidence gap. There is an incongruence between the state of the literature and how health care delivery has rapidly changed since the COVID-19 pandemic, as clinics may offer patients the choice between in-person and virtual appointments and/or face decisions in their care policies, design, and delivery. Determining the efficacy of in-person versus virtual care is essential to address a top priority of youth with chronic pain, families, and health professionals to understand when different treatment modalities are most effective.[1] Only one review of critically low quality provides evidence to inform which treatments are effective and when.[31] Generating evidence to support health professionals and youth alike is necessary for systematic and intentional implementation of virtual care to ensure patients are well supported in both their decision and engagement in pain care.[13]

In future research, it is essential to use designs that can inform efficacy and effectiveness of care delivery options (e.g., head-to-head comparisons of in-person versus virtual, hybrid clinical trial designs with implementation effectiveness study design). Studies that assess implementation effectiveness and outcomes can offer a practical examination of multiple dimensions of success and impact among virtual and in-person care delivery for youth with chronic pain, such as patient outcomes and administrative data.[27] These results can directly inform adaptations and considerations when implementing care options in practice, but more evidence is required around how treatment modalities and exams can reliably be transitioned to virtual care, as well as accessibility and safety as compared to in-person care.[32] Research using head-to-head comparisons and RCTs remains necessary to address these factors as they are a robust approach to making meaningful recommendations regarding care delivery.

Unfortunately, this review also highlighted the lack of research that includes equity-seeking groups. The secondary aim of this review was to examine evidence specifically for youth with chronic pain in equity-seeking groups; however, of the two included studies, 72%–84% of participants were white. This reinforces known gaps in the literature around the issues in accessing pain services among equity-seeking groups,[15,33] and contributes to the ongoing exclusion of those affected by systemic, socially maintained inequities that impact access to resources like technology used in virtual care.[16] Lack of diversity in research that compares in-person and virtual care may therefore negate the potential increase to treatment access that virtual care might afford due to an inadequate understanding of the unique experiences of individuals who are already disadvantaged.[12,27] By failing to adequately consider and represent diversity and intersectionality in research, there is a risk of assuming a lack of difference in pain outcomes and treatment, perpetuating a false narrative of equality between all groups.[34] Recommendations, frameworks, and calls to action that aim to increase equity in pain research guide how to bridge this gap.[34–39] Approaches to inform both implementation and treatment decisions for in-person versus virtual care must engage patients and families from equity-seeking groups to ensure these perspectives are accounted for in research and future interventions.[34]

Ultimately, youth with chronic pain deserve access to evidence-based pain management and, as a component of that, require evidence to support their decisions about how they wish to pursue care. This review forms the first step of a larger study to create an equitable, patient-oriented decision aid to facilitate shared decision making between youth, parents, and health professionals as to when in-person versus virtual care is best for youth with chronic pain. This need was identified by equity-seeking youth with pain and their families (i.e., Black, Indigenous, complex medical needs, and/or neurodevelopmental disabilities) in response to the COVID-19 pandemic and rapid pivot to virtual care.[14] Shared decision making involves sharing evidence with youth and their caregivers and presents an opportunity to engage youth in making decisions for their pain management.[40] Considerations for how youth wish to access care, what options are most appropriate for whom, and what is most

feasible for the individual can set the foundation to support youth and their families make important decisions about their care with guidance from health professionals. When high-quality evidence is available to youth and health professionals alike, all partners can be best supported in making decisions about how to proceed with care,[41] leading to better treatment engagement.[42] Thus, the onus to generate evidence to inform such decisions is not only to improve evidence-based practice but also to improve patient outcomes and address patient priorities.

5.2 | Limitations of included studies and review process

Despite the eligibility of all treatment modalities, both identified studies focused on psychological interventions for youth with chronic pain. These studies fail to account for the interdisciplinary nature of pediatric chronic pain treatment and significantly limit the ability to generalize these findings to the delivery of other treatment modalities. Both studies had small samples, one of which specifically noted its limited statistical power.[21] Youth with chronic pain made up a subset of participants within this study, limiting the interpretation of these broader findings to a chronic pain population. Overall, any treatment effects noted within these studies must be interpreted with caution. The review was limited to English-language studies published within the past 10 years, which may have narrowed the scope of possible studies to be included. Furthermore, the review included RCTs exclusively. The inclusion of observational studies may have yielded additional evidence of relevance.

5.3 | Implications

Evidence resulting from a direct head-to-head comparison of in-person versus remotely delivered interventions for youth with chronic pain is highly valuable and must be mobilized among youth with chronic pain and their families through tools such as decision aids.[40] Such tools not only serve to share evidence related to a medical decision with patients in plain language but also provide support to weigh personal preference, values, and other important factors to aid in making a choice around care. For pediatric pain, this would involve presenting evidence for what type of intervention may work best for whom and under what circumstances, or indicating if there is equipoise among the treatment options. While clinical practice post-COVID-19 has evolved to often offer both in-person and virtual care options, evidence from direct comparison RCTs remains essential for health professionals, youth, and their families in their decision-making about care delivery. Future research should consider the characteristics of patients who sought treatment virtually as compared to in-person post-hoc to provide evidence regarding what modality may be most effective for whom. Efforts must also be made to meaningfully include diverse youth in this literature to account for their unique experiences accessing care for chronic pain, given a longstanding history of discrimination in the healthcare system. Taken together, this would result in evidence of both high quality and value for developing resources such as decision aids to empower youth, especially those disproportionately disadvantaged, who are making this decision about their care.

6 | CONCLUSION

This review was conducted to inform the development of a decision aid to support shared decision making regarding in-person versus remotely delivered care for youth with chronic pain. This review clearly highlights a dearth in the literature that directly compares in-person to remotely delivered interventions for youth with chronic pain. Further research is needed to fill this gap with evidence regarding what type of care is ideal and for whom, such that youth, families, and health professionals can be appropriately supported in their decision about how to pursue care. Future research must not only aim to fill this knowledge gap but also account for diverse perspectives in considerations around how effective care is delivered.

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ORCID

Nicole E. MacKenzie https://orcid.org/0000-0002-7097-5706
Kathryn A. Birnie https://orcid.org/0000-0002-8223-8834

REFERENCES

1. Birnie KA, Dib K, Ouellette C, et al. Partnering for pain: a priority setting partnership to identify patient-oriented research priorities for pediatric chronic pain in Canada. *CMAJ Open*. 2019;7(4):E654-E664.
2. Fernandes LG, Devan H, Fioratti I, Kamper SJ, Williams CM, Saragiotto BT. At my own pace, space, and place: a systematic review of qualitative studies of enablers and barriers to telehealth interventions for people with chronic pain. *Pain*. 2022;163(2):e165-e181.
3. Ruskin D, Tremblay M, Szczech K, et al. Virtual multidisciplinary pain treatment: experiences and feedback from children with chronic pain and their caregivers. *Physiother Theory Pract*. 2023;7:1-21.
4. Killackey T, Baerg K, Dick B, et al. Experiences of pediatric pain professionals providing care during the COVID-19 pandemic: a qualitative study. *Child Basel Switz*. 2022;9(2):230.
5. Shaw J, Jamieson T, Agarwal P, Griffin B, Wong I, Bhatia RS. Virtual care policy recommendations for patient-centred primary care: findings of a consensus policy dialogue using a nominal group technique. *J Telemed Telecare*. 2018;24(9):608-615.
6. Eccleston C, Fisher E, Craig L, Duggan G, Rosser B, Keogh E. Psychological therapies (internet-delivered) for the management of chronic pain in adults. *Cochrane Database Syst Rev*. 2014;2:CD010152. doi:10.1002/14651858.CD010152

7. Herbert MS, Afari N, Liu L, et al. Telehealth versus in-person acceptance and commitment therapy for chronic pain: a randomized noninferiority trial. *J Pain*. 2017;18(2):200-211.
8. Fisher E, Law E, Dudeney J, Eccleston C, Palermo TM. Psychological therapies (remotely delivered) for the management of chronic and recurrent pain in children and adolescents. *Cochrane Database Syst Rev*. 2019;4(4):CD011118.
9. Lalloo C, Harris LR, Hundert AS, et al. The iCanCope pain self-management application for adolescents with juvenile idiopathic arthritis: a pilot randomized controlled trial. *Rheumatology (Oxford)*. 2021;60(1):196-206.
10. Palermo TM, de la Vega R, Murray C, Law E, Zhou C. A digital health psychological intervention (WebMAP Mobile) for children and adolescents with chronic pain: results of a hybrid effectiveness-implementation stepped-wedge cluster randomized trial. *Pain*. 2020;161(12):2763-2774.
11. Stinson J, Ahola Kohut S, Forgeron P, et al. The iPeer2Peer program: a pilot randomized controlled trial in adolescents with juvenile idiopathic arthritis. *Pediatr Rheumatol*. 2016;14(1):48.
12. Birnie KA, Pavlova M, Neville A, et al. Rapid evidence and gap map of virtual care solutions across a stepped care continuum for youth with chronic pain and their families in response to the COVID-19 pandemic. *Pain*. 2021;162(11):2658-2668.
13. Eccleston C, Blyth FM, Dear BF, et al. Managing patients with chronic pain during the COVID-19 outbreak: considerations for the rapid introduction of remotely supported (eHealth) pain management services. *Pain*. 2020;161(5):889-893.
14. Birnie KA, Killackey T, Backlin G, et al. Ensuring equity and inclusion in virtual care best practices for diverse populations of youth with chronic pain. *Healthc Q*. 2022;24:25-30.
15. Craig KD, Holmes C, Hudspith M, et al. Pain in persons who are marginalized by social conditions. *Pain*. 2020;161(2):261-265.
16. Crawford A, Serhal E. Digital health equity and COVID-19: the innovation curve cannot reinforce the social gradient of health. *J Med Internet Res*. 2020;22(6):e19361.
17. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;29(372):n71.
18. Sterne JAC, Savović J, Page MJ, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ*. 2019;28(366):l4898.
19. Guyatt GH, Oxman AD, Schünemann HJ. GRADE guidelines—an introduction to the 10th–13th articles in the series. *J Clin Epidemiol*. 2013;66(2):121-123.
20. Guyatt GH, Oxman AD, Schünemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the journal of clinical epidemiology. *J Clin Epidemiol*. 2011;64(4):380-382.
21. Chadi N, Weisbaum E, Malboeuf-Hurtubise C, et al. In-person vs. eHealth mindfulness-based intervention for adolescents with chronic illnesses: a pilot randomized trial. *Adolesc Psychiatry*. 2019;9(1):11-23.
22. Levy RL, Langer SL, van Tilburg MAL, et al. Brief telephone-delivered cognitive behavioral therapy targeted to parents of children with functional abdominal pain: a randomized controlled trial. *Pain*. 2017;158(4):618-628.
23. Eccleston C, Fisher E, Howard RF, et al. Delivering transformative action in paediatric pain: a Lancet Child & Adolescent Health Commission. *Lancet Child Adolesc Health*. 2021;5(1):47-87.
24. Buhrman M, Skoglund A, Husell J, et al. Guided internet-delivered acceptance and commitment therapy for chronic pain patients: a randomized controlled trial. *Behav Res Ther*. 2013;51(6):307-315.
25. Mariano TY, Wan L, Edwards RR, Jamison RN. Online telethertherapy for chronic pain: a systematic review. *J Telemed Telecare*. 2021;27(4):195-208.
26. Reuter M, Reuter T, Horn P, Hershey A, Samaha MK. The impact of telehealth during the COVID-19 pandemic on the clinical evaluation and outcome of headache in children and adolescents (P7-2.005). *Neurology*. 2022;98(18 Supplement):3450.
27. Richardson PA, Parker DM, Chavez K, et al. Evaluating telehealth implementation in the context of pediatric chronic pain treatment during COVID-19. *Child Basel Switz*. 2021;8(9):764.
28. Shear D, Harrison LE, O'Brien S, et al. Rapid transition to virtual assessment and treatment in an interdisciplinary randomized clinical trial for youth with chronic pain: adaptations and implications for future trials. *Clin J Pain*. 2022;38(7):459-469.
29. Bhatia RS, Chu C, Pang A, Tadrous M, Stamenova V, Cram P. Virtual care use before and during the COVID-19 pandemic: a repeated cross-sectional study. *CMAJ Open*. 2021;9(1):E107-E114.
30. Shaver J. The state of telehealth before and after the COVID-19 pandemic. *Prim Care*. 2022;49(4):517-530.
31. Birnie KA, Ouellette C, Do Amaral T, Stinson JN. Mapping the evidence and gaps of interventions for pediatric chronic pain to inform policy, research, and practice: a systematic review and quality assessment of systematic reviews. *Can J Pain*. 2020;4(1):129-148.
32. Richardson PA, Kundu A. Pain Management in Children during the COVID-19 pandemic. *Curr Anesthesiol Rep*. 2021;11(3):214-222.
33. Anderson KO, Green CR, Payne R. Racial and ethnic disparities in pain: causes and consequences of unequal care. *J Pain*. 2009;10(12):1187-1204.
34. Janevic MR, Mathur VA, Booker SQ, et al. Making pain research more inclusive: why and how. *J Pain*. 2022;23(5):707-728.
35. Booker SQ, Bartley EJ, Powell-Roach K, et al. The imperative for racial equality in pain science: a way forward. *J Pain*. 2021;22(12):1578-1585.
36. Hood AM, Booker SQ, Morais CA, et al. Confronting racism in all forms of pain research: a shared commitment for engagement, diversity, and dissemination. *J Pain*. 2022;23(6):913-928.
37. Letzen JE, Mathur VA, Janevic MR, et al. Confronting racism in all forms of pain research: reframing study designs. *J Pain*. 2022;23(6):893-912.
38. Morais CA, Aroke EN, Letzen JE, et al. Confronting racism in pain research: a call to action. *J Pain*. 2022;23(6):878-892.
39. Palermo TM, Davis KD, Bouhassira D, et al. Promoting inclusion, diversity, and equity in pain science. *Pain Med*. 2023;24(2):105-109.
40. MacKenzie NE, Tutelman PR, Chambers CT, et al. Can sharing improve caring? A call to prioritize shared decision making in pediatric pain management. *Clin Pract Pediat Psychol*. 2023;11(3):253.
41. Boland L, Graham ID, Légaré F, et al. Barriers and facilitators of pediatric shared decision-making: a systematic review. *Implement Sci*. 2019;14(1):7.
42. Dennis D, Peggy C, Margaret B. Collaborative decision-making and promoting treatment adherence in pediatric chronic illness. *Patient Intell*. 2010;1:2.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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