

# Paediatric & Neonatal Pain

Open Access

## Using collaborative logic analysis evaluation to test the program theory of a pediatric specialized rehabilitation interventions for youth with pain-related disability

Journal:	<i>Paediatric and Neonatal Pain</i>
Manuscript ID	Draft
Wiley - Manuscript type:	Original Research
Date Submitted by the Author:	n/a
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Search Terms:	Logic Analysis, Program evaluation, Pediatric chronic pain, Pain Rehabilitation Program
Abstract:	<p>Pediatric pain rehabilitation programs are complex and involve multiple stakeholders. Mapping the program components to its anticipated outcomes (i.e., its theory) can be difficult and requires stakeholder engagement. Evidence is lacking however on how best to engage them. Logic analysis, a theory-based evaluation, which tests the coherence of a program's theory using scientific evidence and experiential knowledge, may hold some promise. Its use is rare in pediatric pain rehabilitation and few methodological details are available. This article provides a description of a collaborative logic analysis methodology used as the first step in the evaluation of an intensive interdisciplinary pain treatment program designed for youth with pain-related disability. A three-step direct logic analysis process was used. A 13-member expert panel, composed of clinicians, teachers, managers, youth with pain-related disability and their parents were engaged in each step. First, a logic model was constructed through document analysis, expert panel surveys and focus-group discussions. Then, a scoping review, focused on pediatric self-management, building self-efficacy, and fostering participation helped create a conceptual framework. Finally, an examination of the logic model against the conceptual framework by the expert panel followed, and recommendations were formulated. Overall, the collaborative logic analysis process helped raised awareness of clinicians' assumptions about the program causal mechanism, identified program components most valued by youth and their parents; and recognized the program features supported by scientific and experiential knowledge, detected gaps and highlighted emerging trends. In addition to proving a consumer-focused program evaluation option, collaborative logic analysis methodology holds promise as a novel strategy to engage stakeholders and to translate pediatric pain rehabilitation evaluation research knowledge to key stakeholders</p>



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## Collaborative Logic Analysis for IIPT

**Using collaborative logic analysis evaluation to test the program theory of a pediatric specialized rehabilitation interventions for youth with pain-related disability**

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**Conflict of interest:** The authors have nothing to declare.

**Acknowledgements:** We would like to thank all members of the expert panel who so willingly sharing their opinions and expertise with us. The first author was also supported by the Vanier Canada Graduate Scholarship, and by the Pain in Child Health (PICH) and the Canadian Child Health Clinician Scientist Programs.

**Authors Contributions:**

This study was conducted by Karen Hurtubise as a requirement for the Degree Doctor of Philosophy. Karen Hurtubise's contribution to this manuscript included its conceptualization, the literature and scoping review, the data analysis, creation of the conceptual framework, the presentation of the findings and the writing of this manuscript.

Dr. Astrid Brousselle provided methodological evaluation expertise in the development of this study, supervision and guidance during the various stages of the study. She also viewed all results and provided feedback on the manuscript prior to submission.

Dr. Chantal Camden provided expertise in stakeholder engagement processes and integrated knowledge translation strategies throughout the study, validated the results at the various stages of the study, reviewed and provided feedback on the manuscript prior to submission. She also provided supervision and guidance throughout the study.

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**Abstract:** Pediatric pain rehabilitation programs are complex and involve multiple stakeholders. Mapping the program components to its anticipated outcomes (i.e., its theory) can be difficult and requires stakeholder engagement. Evidence is lacking however on how best to engage them. Logic analysis, a theory-based evaluation, which tests the coherence of a program's theory using scientific evidence and experiential knowledge, may hold some promise. Its use is rare in pediatric pain rehabilitation and few methodological details are available. This article provides a description of a collaborative logic analysis methodology used as the first step in the evaluation of an intensive interdisciplinary pain treatment program designed for youth with pain-related disability. A three-step direct logic analysis process was used. A 13-member expert panel, composed of clinicians, teachers, managers, youth with pain-related disability and their parents were engaged in each step. First, a logic model was constructed through document analysis, expert panel surveys and focus-group discussions. Then, a scoping review, focused on pediatric self-management, building self-efficacy, and fostering participation helped create a conceptual framework. Finally, an examination of the logic model against the conceptual framework by the expert panel followed, and recommendations were formulated. Overall, the collaborative logic analysis process helped raised awareness of clinicians' assumptions about the program causal mechanism, identified program components most valued by youth and their parents; and recognized the program features supported by scientific and experiential knowledge, detected gaps and highlighted emerging trends. In addition to proving a consumer-focused program evaluation option, collaborative logic analysis methodology holds promise as a novel strategy to engage stakeholders and to translate pediatric pain rehabilitation evaluation research knowledge to key stakeholders

**Key Words:** Logic analysis, intervention theory, theory-based evaluation, logic model, pediatric chronic pain, interdisciplinary pain rehabilitation program.

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**INTRODUCTION**

Refractory pain affects eight percent of youth and can lead to significant functional disability (Huguet & Miro, 2008; Lewondowski *et al.*, 2013). Due to the complexity of impairments across academic, social, recreational and family domains, multidisciplinary rehabilitation approaches are required (Harrison *et al.*, 2019). Intensive interdisciplinary pain treatment (IIPT) is the treatment of choice (Eccleston *et al.*, 2003; Hechler *et al.*, 2009; Logan *et al.*, 2012; Banez *et al.*, 2014). Treatment activities are focused on self-management, whereby youth and their parents actively engaged in managing pain, using adaptive coping strategies, while returning to participating in age-appropriate activities (Stahlschmidt, Zernikow, Wager, 2016). Although these programs exist worldwide, their comparison and reproducibility are complicated by poor descriptions of the intervention components, and a lack transparency in how the components may produce the anticipated outcomes (Hoffman *et al.*, 2014; Stahlschmidt, Zernikow, Wager, 2016). Moreover, stakeholders' perceptions of the value of these programs are missing from the evidence, rendering judgment of their worth difficult.

Increasingly recognized as essential in health and rehabilitation program evaluation, stakeholder engagement is believed to increase accountability, broaden the underlying value base, and enhance the relevance and utilization of the findings (Galgliardi *et al.*, 2008; Moreau & Cousins, 2011). However, how best to engage stakeholders is less well-known. In pediatric rehabilitation, stakeholder engagement is defined as the involvement of individuals without traditional evaluation training and may include parents of youth with a chronic condition or disability, youth themselves, clinicians, or healthcare managers (Camden *et al.*, 2015; Shen *et al.*, 2017). As children with chronic pain use and often continue to use health and rehabilitation more than their peers, their active participation in program and service evaluation should be a

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requirement (Moreau & Cousins, 2014). Unfortunately, to date, their engagement has been limited (Moreau & Cousins, 2011, 2014).

Pediatric rehabilitation interventions, including those designed for youth with chronic pain, are recognized as complex, involving multiple sectors (e.g., health, education) and stakeholders (e.g., various medical specialties, rehabilitation therapies, and behavioral health) (Wiat *et al.*, 2010). The interaction of these multiple components within a defined clinical context generate the treatment effects (Moore *et al.*, 2014). These interactions can be represented by a program theory, (i.e., the specific activities by which an intervention achieves its anticipated outcomes) and illustrated by a logic model (i.e., a visual map of this theory) (Chen, 2014; Stewart *et al.*, 2014). However, for program theory and logic models to be useful, stakeholder engagement is essential to promote an understanding and agreement amongst vested parties on the program outcomes, a crucial evaluation component upon which the worth or value of programs is established (Chen, 2014). Without creating an in-depth understanding of how these programs work, treatment effects are difficult to explain and often poorly understood (Bonell *et al.*, 2012). An explicit theorization of IIPT and its contexts is currently lacking in the pediatric chronic pain intervention literature.

Theory-based evaluation is an approach that may facilitate stakeholder engagement (Astury & Leeuw, 2010). It aims to explain how and why programs work (or fail) in different contexts and for different stakeholders (Astury & Leeuw, 2010). Logic analysis, a relatively new theory-based evaluation methodology, not only theorized a program by maps the mechanisms by which the program activities are anticipated to achieve the expected outcomes (i.e., program theory), but also questions the coherence, plausibility, and credibility of these associations using existing evidence and experiential knowledge (Author & Champagne, 2011). It can be a useful preliminary evaluation option providing important insights into the program's evidence

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foundation, and reflections about the necessary and existing program's causal mechanisms and factors necessary to create the optimal program context and those that are present (Author & Champagne, 2011). Evaluations, using logic analysis, have yet to be applied in pediatric health or rehabilitation interventions, and some methodological gaps related to logic analysis, including how to engage stakeholder are missing (Tremblay *et al.*, 2013).

In an attempt to broaden the application of this evaluation approach in health and rehabilitation programs, this article aims to provide details on the methodology of logic analysis including the mechanisms targeting stakeholder inclusion, the data collected, and the analyses used. To do so, we will use the example of its application and share the findings of a preliminary evaluation of an implemented intensive interdisciplinary pain treatment (IIPT) program for youth with pain-related disability.

## METHODS

### Study Context:

With funding from a large philanthropic donation, the IIPT in Western Canada, was conceived in response to a growing number of youth presenting with pain-related disability. The IIPT aimed to return these youth to daily functioning in their communities. This cohort-based rehabilitation program was influenced by the day-hospital model described by Logan and her colleagues (2010, 2012). The program's theoretical foundations rested on two models: 1) The Life Need Pediatric Service Delivery Model and 2) the Expanded Chronic Care Model. The Life Needs Model is a transdisciplinary, socio-ecological, evidence-based, family-centred care model focused on improving community participation and quality of life for youth with disabilities (King *et al.*, 2002). The Expanded Chronic Care model encourages high-quality chronic disease management, including self-management support, and recognizes the need to develop productive patient-

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provider interactions (Barr *et al.*, 2003). The six-hour daily IIPT curriculum operated five days per week, and included individual, and group psychology, physical, family, occupational, art, music, and recreation therapies, as well as academic support, which emphasize self-management knowledge and skill development. Once implemented, an evaluation was requested by decision makers to determine the program's value, and to identify any improvement.

To determine if the core intervention components and critical contextual conditions were present to produce the desired outcomes, a direct logic analysis was used (Author & Champagne, 2011; Rey, Author, Debobbeleer, 2012, Tremblay *et al.*, 2013). From an organizational perspective, conducting a logic analysis prior to undertaking any type of evaluation allows for the verification of the program soundness based on scientific evidence and expert opinion (Tremblay *et al.*, 2013). This evaluation represented the second phase of a larger participatory study aimed at evaluating the effectiveness of this implemented IIPT program, and for which ethical approval was obtained. In the first phase of the study, the expert panel prioritized the program outcomes, using a recognized consensus methodology. The prioritized outcomes included: 1) participation in meaningful activities, 2) activities of daily living, 3) school engagement, 4) mood and affect, 5) social roles and relationships, and 6) self-efficacy (see Author *et al.*, 2018).

**Participants:** An expert panel composed of representatives from stakeholders involved in the services designed for youth with complex pain, was identified by facility leadership and recruited via email invitation. The 13-member panel included five health professionals, a program coordinator, and healthcare manager, all of whom had experience (range 2-15 years) treating youth with pain and/or disability (e.g. chronic pain, cerebral

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palsy). Also included were two teachers with over ten years of experience academically supporting youth with an array of physical and mental health conditions, two youth managing chronic pain, and their parents. Unfortunately, no standards exist to guide the appropriate number of stakeholders to engage in the panel. Guidance was therefore gleaned from the consensus building literature, where a diverse group of 5 to 15 participants has been recommended (Heiligenhaus *et al.*, 2012; Löwing *et al.*, 2011; Wainwright *et al.*, 2014).

**Procedures:** To foster an environment conducive to stakeholder engagement, activities preceded the evaluation process. First, a charter of the role and responsibilities was created, and once agreed upon, signature from all expert and research team members were obtained. Additionally, educational resources associated with the evaluation process were provided. A three-step logic analysis process described by Author and Champagne (2011) then followed.

**Step 1. Logic model construction:** An updated logic model was constructed. To do so, three data collection methods were used: document analysis, stakeholders surveys and focus group discussions. The documents included the initial program development proposal, the annual reports, program curricula, discipline-specific program goals and weekly objectives, admission criteria, and the youth and family information package (see Table 1 for full list). A stakeholder survey was developed and distributed electronically to the expert panel to supplement the document data. The survey explored stakeholders' assumptions about the program mechanisms crucial to outcome achievement and the optimal contextual factors. A form, based on the logic model components and their definitions, was used for extraction and deductive analysis of both the document and survey data (Bowen, 2009). A draft updated logic model was then created. Group meetings with the expert panel, guided by the interview protocol proposed by Gugiu & Campos (2007) and facilitated by a member of the research team, were held to gather further information about logic

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model components which remained inconsistent. To further enhance stakeholder inclusion, various communication methods were made available (e.g. face-to-face, Facetime, telephone, and email). At the first meeting, the program goal and objectives were discussed. During this meeting and the five that followed, each program component was discussed and updated, perceived linkages were outlined, and influential contextual features were identified. New iterations of the logic model, based on expert panel feedback, were distributed between meetings, and the process continued until agreement was reached. The sixth iteration was adopted.

**Step 2. Conceptual framework development:** A conceptual framework based on empirical evidence was developed upon which the scientific validity of the logic model was examined, and any potential program improvements were identified (Tremblay *et al.*, 2013). An adapted scoping review procedure was followed (Levac, Colquhoun, O'Brien, 2010). This procedure was chosen as synthesized literature relevance is deemed more important in logic analysis methodology than its exhaustiveness (Author & Champagne, 2011). As proposed in scoping reviews, the expert panel was involved throughout, including the formulation of the research question, the identification of study inclusion and exclusion criteria, and selection of the final articles. The search was guided by the question: "What principles and components should an interdisciplinary self-management program for youth with pain-related disability adopt to promote self-efficacy and participation in age-appropriate meaningful activities?" This question reflected the IIPT program's primary objectives, as determined in step 1. Medline, CINAHL, and PsychInfo electronic databases were consulted using the following key words: chronic pain; pain-related disability; chronic conditions; disability; pediatric\* or paediatric\*, self-manag\*; self-efficacy; participation. The target population was broadened to include youth with chronic conditions and disabilities for which pain is an important symptom, along with those with pain-related disability. Many authors have argued that

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youth with chronic conditions and disability share more comparable challenges than differences, and that disease specific orientations minimizes the efficiency with which solutions for these challenges can be identified (Sawyer *et al.*, 2007). To be included, studies had to incorporate youth, aged 8–18 years, be related to self-management, self-efficacy, and/or participation in leisure, recreation, or activities that promote productivity (e.g. school, work, volunteering), and have a multi- or interdisciplinary focus. Publications were excluded if study participants were adults, involved acute pain, pharmaceuticals or medical procedures only, and involved only one discipline. Literature reviews were favoured. Retrieved titles and abstracts were screened by two reviewers for relevance. Entire manuscripts were then examined by ■■■ and reference lists were inspected. A data extraction form and procedures were developed and validated by the primary author (KH) and a research assistant. Once consensus was achieved, was the extraction process was completed by ■■■ data were coded, clustered, themed and then culminated into a table format.

**Step 3. Intervention theory analysis:** The final step of the process consists of comparing the constructed logic model with the developed conceptual framework (Author & Champagne, 2011), examining its scientific validity (Tremblay *et al.*, 2013), and acknowledging the resulting program gaps (Author & Champagne, 2011). This step was completed collaboratively with the expert panel. It began with rereading of the program logic model, the appraisal of its components, and the examination of their relationship with those identified in the conceptual framework. Discrepancies and connections were identified by two members of the research team. Prior to the expert panel meeting, a compiled list of strengths and weaknesses, copies of the logic model and the conceptual framework were distributed electronically to members. At the meeting, the discrepancies were debated in relations to the members' experiential knowledge. Recommendations upon which consensus was achieved, were shared with hospital leadership.

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**FINDINGS****Logic model construction**

Fifteen key program documents and 13 stakeholder surveys were used to construct the draft logic model. Although the documents contained many important program details, when closely compared, inconsistencies emerged (see Table 1). Different program objectives were noted across documents. For example, stated goals/objectives focused on youth returning to age appropriate activities, or on the resumption of participation in social roles in various contexts (e.g. students at school); some specified goal achievement, despite pain, while others promised a gradual decrease in pain over time. Program resources, related to clinical disciplines, also varied. Program activities were described as a function of these disciplines, which, in some cases, varied depending on the cohort, and the chosen service model (e.g. individual-focused versus group-based). Although program outcomes were present in select documents, they were not linked to the program activities or resources, and their relationships with the program objectives were unclear. The anticipated causal mechanisms between the activities and the expected program outcomes were unidentifiable. Finally, contextual factors were scant.

[Insert Table 1 about here]

Survey responses assisted in further elaborating the logic model components, although discrepancies remained. A synthesis of the program resources, activities, causal mechanisms, and expected outcomes as perceived by the expert panel revealed that, similar to the document analysis, the expert panel members described program activities as a function of the disciplines. Perceived mechanisms varied and were considered unique to each activity. The service model (i.e., group- vs. individual-based), the program intensity, as well as pre-program activities were viewed to be important contributors (see Table 2). Despite these added details, the relationship between the mechanisms and outcomes remained ambiguous.

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[Insert Table 2 about here]

Contextual factors were also identified in the survey responses. Internal factors were most often linked to program structure and team dynamics, while external factors typically related to building community-based partnerships and securing future program funding. Although these factors helped to further understand the context and the conditions deemed essential for success, questions remained.

[Insert Table 3 about here]

At the first expert panel focus group meeting, a new program objective drafted and distributed prior to the meeting, was validated. The program objectives became “To provide youth with pain-related disability and their parents the knowledge, skills, and tools to self-manage their pain, build their self-efficacy, and promote their participation in meaningful activities, despite their pain”. Furthermore, based expert panel discourse as per the member below, the program reach was also extended to include school and community personnel.

“Our target population should include parents and the school, but also others in their community environment.” (Clinician 1).

Some activities and processes were omitted, while others were added, or further detailed. Program activities which provided support, most valued by parents and youth were underscored.

“I think two things are absolutely fundamental in this program: the education group sessions and the connections you have with the other participants” (Youth 2).

Youth also recognized activities that should be added to further improve their outcomes. Such as activities focused on self-advocacy, and the need to facilitate their transition back to their community following the program. The expected outcomes were also adjusted and further elucidated based on expert panel members’ experience.

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“In terms of long-term outcomes, it should be how much knowledge is retained. Because if you can refine the application of that knowledge; and you build routines, you’ve found a way to make it work for you” (Youth 1).

Finally, contextual factors believed to be essential for program success were discussed, and agreement was reached. These factors were associated with the pre-program screening, access to specialized health human resources, and participant characteristics. Figure 1 illustrates the final agreed upon logic model.

[Insert Figure 1 about here]

**Development of the Conceptual Framework**

Table 3 outlines the details of the eighteen articles selected for the integrative framework development. All samples included children and adolescents (aged 2–25 years) with a variety of disabling conditions for which pain is an important and prominent symptom.

[Insert Table 4 about here]

**Themes:** Table 4 synthesizes the salient evidence of the integrated framework, and its relationship with both logic model components and the themes supportive of the program’s key objective. Further description is provided below.

[Insert Table 5 about here]

**Promoting Self-Management:** Self-management refers to a person’s ability to acquire and apply the skills and knowledge to manage the symptom, treatment and lifestyle changes inherent to living with a chronic condition (Sattoe *et al.*, 2015). This ability is learned with the support of family and community members (e.g. friends, peers, teachers, coaches), and healthcare professionals (Sattoe *et al.*, 2015). Chronic conditions are experienced within the perspective of everyday life contexts (i.e. peers, family, school, occupation, leisure, community) (Lindsay *et al.*,

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2014; Sattoe *et al.*, 2015). Although medical management is important, emotional coping and role (social participation, occupation) management should also be considered (Lindsay, Kingsnorth, Hamdani 2011). Effective medical self-management is contingent on youth decreasing their reliance on those who had previously managed their illness (e.g. parents, healthcare professionals), and by acquiring independence, knowledge and skills (Stinson *et al.*, 2008). Psychoeducation and skills training are the cornerstones of self-management programs. Controversy exists surrounding the contribution of parents and health professionals in this transition. Parental education and parent-to-parent support are effective in addressing the gradual shift of self-management responsibilities (Lindsay *et al.*, 2014). Support from social networks, including friends and peers has also emerged as a facilitator (Stinson *et al.*, 2008; Lindsay, Kingsnorth, Hamdani, 2011; Lindsay *et al.*, 2014; Sattoe *et al.*, 2015). Many targeted activities deemed effective and emerging approaches are presented in the conceptual framework (see Table 5).

**Building Self-Efficacy:** In pediatric chronic pain, self-efficacy refers to youth's confidence in their ability to function effectively while in pain (Nicholas, 2007). Dynamic and situation dependent, self-efficacy is critical to self-management, to appropriate healthcare utilization practices, and to enhancing health-related quality of life (Frei *et al.*, 2009). Effective activities for building self-efficacy were highlighted in the framework (see Table 5). Appealing to youth's preferred information seeking practices is considered pivotal to the process, with web- and application-based resources emerging as promising option for this population (Johnson *et al.*, 2015; Lindsay *et al.*, 2018).

**Enhancing Participation in Meaningful Activities:** Participation, defined as one's involvement in life situations (e.g., education, employment, sports, recreation, leisure and community living) is an important pediatric rehabilitation outcome (Anaby *et al.*, 2013; Sattoe *et*

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*al.*, 2014). Social supports (e.g., school personnel, peers) are important facilitators to achieving participation (Anaby *et al.*, 2013). How to effectively communicate about one's condition and how to request the context supports required in various situation and circumstances are beneficial skills for this population (Anaby *et al.*, 2013; Adair *et al.*, 2015; Jones *et al.*, 2018). Other associated activities are presented in Table 3. School, the most meaningful activity of childhood, is a critical developmental environment (Logan, Coakley, Sharff, 2006; Logan *et al.*, 2008). Coaching youth and their parents on effectively communicating with teachers and enhancing school personnel's knowledge on how to support these youth are recognized area of need (Jones *et al.*, 2018).

**Creating the Ideal Context:** Contextual conditions essential for program success were also found in the literature. Admission criteria across IIPT programs worldwide are similar, of which, pain impacting function, and youth and parent allegiance to self-management approach dominated (Stahlschmidt, Zerikow, Wager, 2016). Other contextual factors are highlighted in the framework.

## Analysis of the Intervention theory

When detailed IIPT components, their links and anticipated outcomes are systematically compared to the conceptual framework, generally speaking, the scientific evidence support the program's plausibility. Furthermore, interconnectivity between the three IIPT program objectives is illustrated. Below the IIPT program component strengths are presented, followed by suggestions for improvements.

**IIPT strengths:** Regarding refining the self-management intervention for youth, our IIPT intervention aligned well with the conceptual framework. As per the evidence reviewed, psychoeducation is a recognized and valued tenet of the program. Many teaching approaches (e.g. peer learning) recognized as effective in the conceptual model are also incorporated in the program group activities, along with opportunities for practice in real-life environments (e.g. classroom,

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community field trips). These peer learning moments were highly valued by expert panel parent and youth members; yet a need to incorporate additional community-focused transition opportunities was also underscored.

In relation to building self-efficacy, our IIPT program also performed well against the conceptual framework. In addition to family and psychological counselling, many targeted activities identified as beneficial (e.g. self-awareness, self-reflection) in the conceptual framework are already incorporated in the program curriculum. Moreover, the community-based activities (e.g. field trip and recreation and leisure planning) are designed to foster the development of many of required skills, including problem-solving, decision-making, and self-management in real life situations, and to confront fear-eliciting activities and unexpected events as they arise, as suggested by the evidence reviewed. Youth expert panel members also underscored the importance of these program activities and requested that further guidance on safely returning to such activities be shared post-discharge.

With respect to fostering participation in meaningful activity, the IIPT curriculum included several components deemed effective. Sports, recreation and leisure counseling, advocacy education, and youth and parental training in activity and environment modification are already incorporated and for which conceptual framework support was found. Transition meetings with school personnel, part of the current program discharge process, provide youth and their parents with an opportunity to collaborate with teachers in a way that coincides with conceptual framework findings. Youth members on the expert panel not only valued these meetings but requested additional tools to facilitate their advocacy efforts in this context.

Finally, concerning creating an ideal context to achieve the anticipated program outcomes and its context fulfills many of the pre-requisite conditions identified. When compared, our IIPT

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admission criteria shared similarities, along with key program features (e.g. multidisciplinary team, with extensive training in pediatric pain management) and team memberships as identified in the conceptual framework.

**IIPT Improvements:** The conceptual framework highlights three main areas of program refinement: access to appropriate information related to youth's developmental phase, enhancement in creating supportive social networks, and the potential use of internet and application technologies. First, the importance of adopting a developmental lens to the knowledge acquisition and skills to different age groups was identified. Although our IIPT curriculum integrates school-based, sports, leisure and recreation activities, the evidence supports incorporating multi-session age-specific information sharing, coping and decision-making strategies related to vocation and work, independent living (e.g. housing), and the management of intimate relationships, particularly for older youth (i.e. 16–18 years). Youth expert panel members advocated for post-program support associated with the quickly changing responsibilities and mounting societal expectations inherent to this age group. To incorporate this empirical and experiential knowledge, developmental goals could be added to the already existing goal identification process. The conceptual framework also suggests the need to expand programming outside of youth with pain-related disability and their parents to include youth's broader social networks. Enhancing peer support through educating classmates and school personnel on chronic pain and how to provide support to those suffering from this condition can help reduce the associated stigma associated, improve emotional self-management, promote social acceptance and school engagement in this population. Expert panel clinicians, youth, and parents' members alike, identified this as a missing pillar in our IIPT program. Finally, the conceptual framework highlighted emerging evidence surrounding the use of the web- and application technology.

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Although the technological trials have been limited to one or two of the IIPT components (e.g., cognitive-behavioural therapy), they may hold promise for families for whom access to trained professionals, geographical distance, and long waiting times are major barriers. However, web-based expansion of any of our program component was not raised by our expert panel. Instead, upon review of the conceptual framework and organizational constraints, the expert panel prioritized three program recommendations: 1) modify information provided to older adolescents 2) incorporate self-management goals tailored to the developmental spectrum; and 3) broaden the psychoeducation to involve peers and school personnel.

## DISCUSSION

The purpose of this article was to further details the logic analysis methodology and to share the findings of the program theory testing of an IIPT using this approach. As a collaborative approach, this innovative evaluation methodology proved helpful in many ways. First, logic analysis provided an opportunity to create a shared understanding of the complexity of IIPT among stakeholders. Stakeholder engagement was critical in ensuring the intervention accuracy and validity and the integrity of its description. Furthermore, stakeholders' reflections were crucial in establishing those causal mechanisms and activities most valued. Complex interventions, like pediatric pain rehabilitation, are built on a number of components, which may be dependent and interdependent, and where interactions between the intervention and the context exist (Moore *et al.*, 2014). The effectiveness of these interventions may indeed rest within these intervention and context (e.g., group milieu, staff interactions) interactions, yet to date have been often left unexplored in other evaluation processes (Stahlschmidt, Zernikow, Wager, 2016). Logic analysis methods used in this study presented a standardized approach and allowed the identification of intervention and contextual interactions.

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Secondly, the logic analysis process assisted in unveiling health professionals' beliefs about the causal mechanisms thought to contribute to the achievement of the anticipated outcomes. Furthermore, it provided an opportunity to weigh these assumptions against two important sources of validity: scientific evidence and youth and caregivers' experiential knowledge and values. The conceptual framework used a recognized evidence review method and presented a synthesis of current evidence to expert panel members. This evidence-informed framework stimulating practice reflection and comparison with experiential knowledge and values. The logic analysis presents an innovative way to address the persisting knowledge-to-practice gap in pediatric rehabilitation, using integrative knowledge translation methods (IKT). IKT is collaborative model that engages stakeholder, including decision makers, health providers, caregivers and patients, as partners in research generation from conceptualization to implementation, for the purpose of engaging in mutually beneficial research to support decision-making, optimize healthcare delivery and system performance (Galgardi *et al.*, 2016). Discovering evidence to support many of the causal mechanisms of the evaluated program and those components most valued by youth and their families was noted by clinician expert panel members to be most enlightening part of this collaborative process.

Engaging stakeholders in logic analysis has been previously recommended (Tremblay *et al.*, 2013). Particularly unique in our application of this methodology was the involvement of patients (i.e. youth with pain-related disability) and their caregivers. The premise of engaging patients beyond the level of research subjects reflects a growing desire for more ethical, democratic and moral practices (Manafio *et al.*, 2018). However, the absence of parents and youth voices in the published evaluation of pediatric pain rehabilitation services and self-management interventions is a gap recognized by many (Birnie *et al.*, 2018; Moreau & Cousins, 2014; Sattoe *et al.*, 2015; Shen *et al.*, 2016). In our evaluation, early engagement in the process resulted in the consideration of previously unexplored outcomes in the field (i.e., those deemed important to youth and their parents) to be identified. As a result, weaknesses were uncovered in our program

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theory, program improvements were identified, and emerging trends recognized. Furthermore, youth and parents' perspectives also highlighted valued activities, assisted in identifying youth and their parents program expectations, as well as recognizing their ongoing challenges following program discharge. Also noteworthy was the fact that the most valued program components and those recommended as program improvement were supported by the conceptual framework. Building this shared understanding within the expert panel proved valuable in later prioritizing program refinements. Specific practices and strategies to foster stakeholder engagement, particularly of parents and youth, were incorporated into this logic analysis methodology. Targeted activities included 1) choosing a sample of parents and youth who have used the services (Moreau & Cousins, 2014), 2) creating clearly defined roles, responsibilities, and expectations for the expert panel members and research team (Belton *et al.*, 2019) 3) engaging stakeholders early and throughout in the evaluation process (Moreau & Cousins, 2013; Belton *et al.*, 2019), 4) providing training on evaluation principles (Belton *et al.*, 2019; Shen *et al.*, 2016), 5) ensuring regular interactions with panel to foster mutual understanding amongst members (Gagliari *et al.*, 2008), 6) embracing a variety of communication technologies to promote participation and discussion (Moreau & Cousins, 2014), and 7) distributing discussion materials prior to the meeting (Gagliari *et al.*, 2008).

Despite our best efforts, some study limitations exist. First, the non-equivalent numbers in each of our stakeholder groups on our expert panel may have biased our results and may have created a power imbalance in favor of clinicians in the discussion context. A variety of data collection methods were however used, incorporating anonymous strategies (e.g. electronic surveys) to ensure authentic perspective were expressed by expert panel member, decreasing social desirability biases. Second, despite expansive recruitment efforts, limited diversity. Was evident

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in our expert panel membership. Although youth and parents were representative of the population using this program, other recruitment strategies should be explored if this methodology is expanded to evaluate services with more cultural and ethnic heterogeneity. Third, the inclusion expert panel members into the conceptual framework development could be enhanced. In previously described logic analysis processes, the conceptual framework phase was completed solely by the evaluator. Although the expert panel was included in many ways in the framework construction, incorporating stakeholders in the data extraction process could be added.

Theory-based evaluation provides an opportunity to further detail the causal path of IIPT rehabilitation intervention and lead to a better understanding of these interventions. Program stakeholders are implicit to this process. The methods presented in this article, where scientific and experiential knowledge are weighed in a similar manner, provides a collaborative, pragmatic and realistic approach, representative of the clinical environment in which most health and social providers conduct evaluation. Engaging stakeholders, including parents and youth, in the logic analysis, may represent a catalyst for better understanding complexity of pediatric pain rehabilitation interventions and their evaluation in the future.

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Table 1: Document and survey analysis

		Program Logic Model Components							
Data Sources	Document Title (year)	Program Goals	Program Objectives	Reach	Eligibility	Program Resources	Program Activities	Program Outcomes	Program Context
Program Documents (n=15)	Initial Program Description (2013)	Not consistent	Absent	Not consistent	Absent	Not consistent	Absent	Not consistent	Absent
	Program Curricula (2015–2018)	Absent	Absent	Absent	Absent	Not consistent	Not consistent	Absent	Absent
	Program Goals and Objectives (2016)	Not consistent	Not consistent	Absent	Absent	Not complete	Not complete	Absent	Absent
	Program Implementation Evaluation (2016)	Not consistent	Not consistent	Not complete	Absent	Not complete	Not consistent	Not consistent	Absent
	Program Referral Guide (2017)	Absent	Absent	Absent	Complete for youth only	Not complete	Absent	Absent	Absent
	Program Information for Patients and Families (2016)	Not consistent	Not consistent	Not complete	Absent	Not consistent	Not complete	Absent	Absent
	General Information for Youth and Families (2016)	Not consistent	Absent	Not complete	Complete for youth & families	Not consistent	Not complete	Absent	Absent
	Overall judgment after document analysis	Not consistent	Not consistent	Complete for youth & families		Not consistent or complete	Not consistent or complete	Not consistent	Absent
Stakeholder surveys (n=13)	Survey questions	What are the goals & objectives of the IIPT?		Who should the program target?	No further information required	Who and what help accomplish the objective(s) of the program?		What are the effects of the program?	Context Analysis
	Overall judgment after survey analysis	Still not consistent		Complete for youth & families		Not consistent		Priority setting	Not consistent
Stakeholder focus groups (n=6)	Focus group guiding questions	Is each component representative of the current program?							
	Overall judgment after focus groups	Complete		Expanded to include school personnel		Causal mechanisms clarified		Validated	Complete

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**Table 2. Expert Panel themes about causal mechanisms and program structure assumptions**

Resources	Activities	Mechanisms
Physiotherapy	Behavioral activation or physical re-activation Improve physical endurance, tolerance, strength, flexibility and posture Goal-oriented physical activity and home programming Graded increase in physical activity Flare plan development Home Program activities	Increases activity and movement Reduces fear avoidance Improves fitness, endurance, and strength Fosters reconditioning Dampens pain signals in the brain Facilitates adherence Promotes improve coping Increases energy reserves Sets expectations for ongoing practice of learning and skills Promotes the establishment of a routine
Psychology	Active pain management and coping strategies Education and training on thoughts, feelings, behaviors, acceptance Individual and group coaching in self-management Sleep Education Flare plan development Focus on mindfulness	Improves youth's understanding of their pain at a physiological level Reduces fear, anxiety and depression Increases self-efficacy Teaches youth and their family to think and talk about pain differently Promotes functioning and participation, despite pain Enhances self-regulation Increases youth and parents feeling in control
Medicine	Provision of rational for rehabilitation approach & medical closure Medication management Progress updates	Improves treatment adherence Improves buy-in to rehabilitation approach
Family Therapy	Group and therapy session to coach parents on how to support their children Parental pain education Parental support Identification and management of family issues	Empowers family to support their child Creates a supportive family and transition environment for youth following program Keeps parents informed about what their child is learning
Occupational Therapy	Ergonomic assessment and recommendations Adaptation to activities of daily living Sleep Education Pacing	Supports youth in daily activities through to transition back into the community
Music Therapy	Development of music play-lists	Facilitates an alternate coping strategy Promotes motivation, relaxation or distraction a needed Self-expression

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Art Therapy	Alternative to express emotions & chronic pain experience	Promotes an alternate coping strategy Self-expression of chronic pain
Recreation	Graded increase in leisure activity and sports Exploration of alternative sport and leisure activities in community	Provides realistic contexts in which to apply self- management knowledge and skills Promotes transition to community activities post-program
Nursing	Parent and adolescent support Medication management	Supports families
Academics/School	Assessment of learning needs	Enables youth to maintain school some level of academic expectations Encourages a routine and normalcy Assists in identifying academic and social school-based challenges Eases transition back to community school setting Decreases isolation Teaches support of others and of self
Program Structures	Group-based service delivery  Intense duration  Signing of daily attendance expectations Contract pre-program	Validation of the experience by others Creation of a support network Peer discussions and learning Facilitates empathy towards others  Allows time for the immediate application of learnings and reinforcement Concentrates learning and practice Sets future expectations for daily school attendance

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**Table 3. Expert Panel survey Response Context Analysis**

	<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>
<b>Program structures &amp; organization</b>	<p>Program intensity</p> <ul style="list-style-type: none"> <li>• Re-establishes a daily routine</li> <li>• Focused learning and practice on self-management</li> <li>• Less disruptive to family life</li> </ul> <p>Decreases stress &amp; anxiety in youth as removed from some environments (e.g. school)</p> <p>Encourages fun</p> <p>Tailored for youth's learning capacity</p> <p>Development of support network for youth and parents</p> <p>Integration of academic component</p>	<p>Lack of a standardized intake process and clear criteria</p> <p>Difficulty recruiting patient</p> <p>Time demands and stress on youth, family and staff</p> <ul style="list-style-type: none"> <li>• Loss important learning and social opportunities</li> </ul> <p>Complexity of intervention</p> <p>Length of program</p> <p>Lack of coordination of program components</p> <ul style="list-style-type: none"> <li>• Need for clear transition early in the program</li> <li>• Stronger curriculum throughout program</li> </ul> <p>Need for additional components/time</p> <ul style="list-style-type: none"> <li>• Parent education about accommodations</li> <li>• More academic time</li> </ul>	<p>Streamlining and/or standardization of program</p> <p>Pan-Canadian recruitment &amp; marketing</p> <p>Integration of other hospital services</p>	<p>Not offering program to all youth who could benefit</p> <p>Competition with other programs</p>
<b>Team members and dynamic</b>	<p>Caring, positive, expert staff</p> <p>Wholistic &amp; comprehensive approach</p> <p>Multidisciplinary approach</p>	<p>Team dynamics and conflict</p> <ul style="list-style-type: none"> <li>• Communication</li> <li>• Lack of a shared philosophy on program components</li> </ul> <p>Too many professionals involved</p> <p>Lack of capacity building opportunities for program staff</p> <ul style="list-style-type: none"> <li>• Cross-coverage within and between disciplines</li> <li>• Development of additional expertise</li> </ul>		<p>Loss of key staff resources</p>
<b>Building partnerships</b>			<p>Development of community partnership</p> <p>Build in volunteer opportunities into program</p> <p>Expand space available,</p> <p>Creation of education and training for personnel</p>	<p>Lack of society knowledge and recognition of pediatric chronic pain</p>
<b>Program funding</b>				<p>Future funding</p> <p>Perceived as expensive</p>

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Table 4. Summary of studies retained for conceptual framework development

Authors & publication year	Country	Study Design	Study Aim	Population Characteristics	Feature of Included Studies	Key Findings
Self-management Interventions (SMI)						
Stinson, Wilson, Gill, Yamada, Holt (2008)	Canada	Systematic Review	To critically appraise the evidence on effectiveness of internet self-management interventions on health outcomes in youth with chronic conditions	Children and adolescents (6–18 years). Asthma, recurrent pain, encopresis, traumatic brain injury, obesity	7 randomized control trials, 1 pilot randomized control trail, and 1 quasi-experimental study	Internet-based SMI have demonstrated some evidence improving symptoms and disease self-management yet are inconclusive in whether as effective as in-person individualized or group interventions.
Lindsay, Kingsnorth, Hamdani (2011)	Canada	Integrative Review	To synthesise findings from empirical studies examining influential factors of adolescents' self-management of chronic illness	Adolescents and young adults (12–20 years). Diabetes, asthma, spina bifida, inflammatory bowel disease, juvenile idiopathic arthritis	34 studies, 16 qualitative, 14 quantitative and 4 mixed methods designs.	Psychosocial factors (e.g. self-efficacy), parent involvement, knowledge about illness are important facilitators of self-management. Youth self-management skills should be assessed, along with their social and developmental context to identify supports.
Lindsay, Kingsnorth, Mcdougall & Keating (2014)	Canada	Systematic Review	To systematically assess the effectiveness of SMI for school-aged children with physical disabilities	Adolescents and young adults (13–24 years) Children and adolescents (2–18 years) Spina bifida, juvenile rheumatoid arthritis, juvenile idiopathic arthritis.	2 randomized control trials; 4 before and after designs	Intervention components should include knowledge about condition, medication management, psycho-social factors (e.g. self-efficacy). Parental involvement can be a barrier to self-management and should be carefully assessed.
Sattoe, Bal, Roelofs, Bal, Miedema, van Staa (2015)	Netherlands	Systematic Review		Children (7–11 years) and adolescents (12–18 years)	45 randomized control trials, 29 cohort studies, 3 cross-sectional studies,	Role and emotional management should be included

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Authors & publication year	Country	Study Design	Study Aim	Population Characteristics	Feature of Included Studies	Key Findings
Bal, Sattoe, Roelofs, Bal, van Staa, Miedema (2016)	Netherlands	Systematic Review	To provide a systematic overview of the SMI for young people with chronic conditions.	Asthma, diabetes, cancer, chronic fatigue, chronic pain, chronic respiratory conditions, inflammatory bowel disease, juvenile fibromyalgia, juvenile idiopathic arthritis, migraine, physical disabilities, sickle cell	3 qualitative, 5 mixed methods, 1 case-study, 26 pilot evaluations	in SMI, along with medical management. Parents can either facilitate or hinder youth self-management. Experiential learning, peer-learning for others, and mastery experiences strategies are appropriate pediatric SMI. Developmental factors need to be considered.
Lindsay, Kendall, Kolne, Cagliostro (2019)	Canada	Systematic Review	To systematically explore the effectiveness and effective components of self-management interventions	Children to young adults (7–25 years) Asthma, diabetes, cystic fibrosis, cancer, HIV, sickle cell, spina bifida, hemophilia, juvenile fibromyalgia	42 randomized control trials	SMI should focus on medical, emotional, and role management in the context of youth's daily lives. Peer support stimulates self-efficacy Online peer-support could improve self-efficacy, problem-solving and coping behaviors.
			Synthesis and review literature on the impact of electronic mentoring for children with disabilities	Children to young adults (12 to 26 years). Rheumatic disease, juvenile arthritis, cerebral palsy, spina bifida, muscular dystrophy, pediatric transplant, visual impairments, chronic pain.	3 RCTs, 7 surveys, 1 case study, 1 feasibility study	Electronic mentoring is effective for children and youth with disabilities in improving career decision-making, self-determination, self-management, self-confidence, self-advocacy, social skills, attitude towards disability, and coping with daily life.
<b>Self-Efficacy</b>						

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Authors & publication year	Country	Study Design	Study Aim	Population Characteristics	Feature of Included Studies	Key Findings
Cramm, Strating, Roebroek, Nieboer (2012)	Netherlands	Cross-sectional study	To investigate the influence on general self-efficacy perceived by adolescents with chronic conditions and parents on quality of life	Adolescents, and young adults (12–25 year) & their parents Diabetes, juvenile rheumatoid arthritis, cystic fibrosis, urology conditions and neuromuscular disorders	Not applicable	Interventions aimed at improving general self-efficacy should include activities that seek to enhance confidence and the ability to deal effectively with difficult and unexpected events.
Johnson et al. (2015)	United States (US)	Cross-sectional study	To determine the preferred methods for health information among youths with chronic conditions and their relationship to health care transition readiness, self-efficacy and medication adherence	Children and adolescents (6–16 years) Diabetes, musculoskeletal conditions, cerebral palsy, heart disease, neurological and gastrointestinal condition	Not applicable	Youth with chronic conditions receive their health information from physicians/nurses, parents/family, and the internet. A range of health information should be considered to include those that deliver it directly to the patient, the family/parent, including the internet, allowing youth to select their preferred method.
Molter & Abrahamson (2015)	USA	Literature Review	To investigate the relationship among self-efficacy, transition and health outcomes	Children, adolescents and adults (6–55 years) Sickle cell	20 studies of various unspecified design	Knowledge of condition, body awareness, and spirituality are factors that affect self-efficacy. Journaling, self-awareness, scripture reading, and prayer activities can increase feelings of self-efficacy. Experiences of acting independently and developing patient-health provider partnerships are important. Education, counselling, and advocacy interventions to the broader public could be used to decrease stigmatization.

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Kalapurakkel, Carpino, Lebel, Simons (2015)	US	Cross-sectional study	To examine pain self-efficacy and pain acceptance in relation to functioning in pediatric headache patients	Children and adolescents (8–17 years); Headache	Not applicable	Higher levels of self-efficacy are associated with improved school functioning, fewer depressive symptoms, and lower disability levels, higher self-esteem and fewer somatic symptoms.
Tomlinson, Cousins, McMurthy, Cohen (2017)	Canada	Literature Commentary	To examine the resilience mechanism of pain self-efficacy	Children and adolescents	Not specified	Exposure to and mastery of feared activities reinforces self-efficacy. Generalizing prior successes that highlight mastery and increase confidence can enhance pain-self efficacy. Mindfulness and biofeedback are also helpful modalities. The identification of valued goals and utilizing graded exposure techniques to previously avoided activities promote self-efficacy.
<b>Participation</b>						
Pinquart & Teubet (2011)	Germany	Meta-analysis	To compare the levels of academic, physical, and social functioning of children and adolescents with chronic physical diseases with those of healthy peers	Children and adolescents (under the age of 18 years) Arthritis, asthma, cancer, chronic fatigue, cystic fibrosis, cerebral palsy, inflammatory bowel disease, headaches, diabetes, hemophilia, epilepsy, sickle cell, spina bifida	954 studies designed not specified	Sports and leisure activity counselling should be available to guide these youth. Teachers and coaches should promote participation in sports to improve physical functioning. School functioning can be improved with school accommodations. Group social skills training provide youth with strategies to deal with teasing and bullying.

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Anaby, Korner-Bitensky, Law, Cormier (2013)	Canada	Scoping Review	To identify and analyze research evidence regarding the effect of the environment on community participation of children with disabilities.	Children, adolescents and young adults (5–21 years). Cerebral palsy, physical disabilities (with restricted mobility due to neurological or musculoskeletal disorders), acquired brain injury, autism spectrum disorder, Down Syndrome	31 studies; 17 qualitative, 10 qualitative, review 3, 1 mixed-method design	Negative attitudes within the communities can be a barrier to participation. Parental involvement and advocacy can influence on social functioning, participation and friendship development. Peers, and teacher, service provider support fosters participation. Parental over-protectiveness and stress can limit participation. Parental education about recreation activities and advocacy supports participation.
Adair, Ullenhag, Keen, Granlund, Imms (2015)	Australia	Systematic review		Children and adolescents with disabilities (5–18 years) such as cerebral palsy, developmental coordination disorder, autism spectrum disorder, arthrogryposis, intellectual disabilities	7 randomized control or non-randomized trials	Tailored programs using both individual and group-based approaches can enhance participation Coaching approaches focused on mutually agreed upon goals are effective. Practice of desired behaviors in a social context is proven useful.
Forgeron, King, Reszel, Fournier (2018)	Canada	Systematic Review	To identify the psychosocial interventions found to be most promising in their effectiveness in	Children and adolescents (5–18 years) with diabetes, epilepsy/seizures, cerebral palsy, spina bifida, inflammatory bowel disease, burn scarring, chronic respiratory condition	13 studies; 10 non-randomized control trials, 3 randomized control trials	Most improvements in social functioning stemmed from interventions that focused on a broad range of social skill development rather than solely on communication about condition with peers. Interventions that consisted of more than one session targeting

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Authors & publication year	Country	Study Design	Study Aim	Population Characteristics	Feature of Included Studies	Key Findings
Jones, Nordstokke, Wilcox, Schroader, Noel (2018)	Canada	Narrative review	improving social functioning outcomes of children and adolescents with a wide range of chronic physical health conditions  To review selected studies that have made an impact on the field of school functioning in children and adolescents with chronic pain	Children and adolescents (8–18 years) with chronic pain such as abdominal, myofascial, neuropathic, limb, back pain, headache	13 non-randomized control trials.	social functioning were more promising. A paucity of evidence exists on effective interventions.  Evidence suggests that psychological factors (depression and anxiety), social factors (peer-relationships, perception of teachers support, parent protectiveness), physiological factors (sleep disturbance), and cognitive factors (self-efficacy, memory and attention deficits may interact to influence school functioning.
<b>Ideal Context</b>						
Stahlschmidt, Zernikow, Wager [2016]	Germany	Review	To present an international perspective on the structure and components of different pain rehabilitation programs worldwide.	9 different programs from 4 different countries.	15 descriptive or non-randomized studies.	Specialized rehabilitation programs for disabling chronic pain conditions worldwide have similar admission criteria, structure, and therapeutic orientation. Differences in exclusion criteria impede the comparability of these programs
Mirò, McGrath, Finley, Walco [2017]	Spain	Cross-sectional study design using surveys	To identify the features current chronic pain programs and describe the feature required to achieve an ideal state.	136 pediatric pain experts located in 12 different countries	Not applicable	Staff should be multi-disciplinary, with research and formal specialty training available. A wide variety of treatment options should be offered to youth with different chronic pain problems. The program should be publicly funded.

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**Table 5: Conceptual Framework**

Logic Model Components	Program Objectives		
	Self-management interventions	Building self-efficacy	Fostering participation
Program goals and objectives	Role, emotional and medical self-management relative to developmental expectations should be integrated within youth's daily life and relevant social contexts (Lindsay <i>et al.</i> , 2014; Sattoe <i>et al.</i> , 2015; Bal <i>et al.</i> , 2016)		
Program reach and eligibility	Parent involvement should be carefully assessed (Lindsay, Kingnorth, Hamdani, 2011; Lindsay <i>et al.</i> , 2014; Sattoe <i>et al.</i> , 2011)  Education should extend beyond youth with chronic conditions and parents, to include peers, teachers (Lindsay <i>et al.</i> , 2014; Sattoe <i>et al.</i> , 2014)		Education initiatives should target peers, classmates, teachers, and community leaders (e.g. coaches) (Pinquart & Teubet, 2011; Anaby <i>et al.</i> , 2013; Jones <i>et al.</i> , 2018)
Program activities	Psycho-education, combining information and skills training is the focus of self-management interventions (Sattoe <i>et al.</i> , 2015; Bal <i>et al.</i> , 2016)  Parent education, parent-to-parent support, and using parent coaching approaches are effective in fostering independence in youth self-management (Lindsay <i>et al.</i> , 2014)  Experiential approaches, varying delivery methods (group, individualized, internet-based), peers learning opportunities, and skill mastery experiences should be provided (Stinson <i>et al.</i> , 2008; Lindsay, Kingsnorth, Hamdani, 2011; Lindsay <i>et al.</i> , 2014; Sattoe <i>et al.</i> , 2015)  Communication, assertiveness and advocacy training is a need identified	Activities that build independence, life and leadership skills should be promoted (Cramm <i>et al.</i> , 2012)  Opportunities for youth to create their own patient-professional relationships can be enriching (Cramm <i>et al.</i> , 2012; Johnson <i>et al.</i> , 2015)  Self-awareness (e.g. journaling), self-directed learning (e.g. web-based resources), and spiritual program activities, using a variety of learning methods and mediums (e.g. health professionals, parents, internet-based modules) should be included (Johnson <i>et al.</i> , 2015; Molter & Abrahamson, 2015; Aloha <i>et al.</i> , 2018; Lindsay, Kolne, Cagliostro, 2018)  Biofeedback, self-regulation, relaxation, mindfulness,	Individualized and group-based interventions are effective when combined (Adair <i>et al.</i> , 2015)  Physical and leisure activity selection should be guided by mutually agreed upon participation goals and identified though coaching approaches (Adair <i>et al.</i> , 2015)  Training parents and youth on how to advocate for social inclusion and how to adapt and modify the activity and environment are effective strategies to minimize participation barriers (Anaby <i>et al.</i> , 2013)  Sport and leisure activity counselling and social skills training should be available (Pinquart & Teubet, 2011; Adair <i>et al.</i> , 2013)

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	<p>by youth to promote shared decision-making with professionals (Stinson <i>et al.</i>, 2008; Lindsay <i>et al.</i>, 2014)</p> <p>Opportunities for youth to create their own patient-professional relationships can be enriching (Stinson <i>et al.</i>, 2008)</p> <p>Peer-to-peer learning and mentoring is an emerging model showing promise Ahola <i>et al.</i>, 2016; Stinson <i>et al.</i>, 2016; Lindsay, Kolne, Cagliostro, 2018)</p>	<p>cognitive behavioural therapy, value-based goal identification nurture self-efficacy (Tomlinson <i>et al.</i>, 2017)</p> <p>Successful accomplishment of assigned tasks and generalization of prior successes, and graded exposure to fear-eliciting activities are also beneficial (Tomlinson <i>et al.</i>, 2017)</p>	<p>Coaching on how to communicate about the condition and the supports required may be beneficial for this population in peer and school settings (Anaby <i>et al.</i>, 2013; Adair <i>et al.</i>, 2015; Jones <i>et al.</i>, 2018)</p> <p>More complex age-specific in-person sessions expanding social skills training to peer interactions, conflicts (e.g. bullying), and intimate friendships may also be beneficial for older adolescents (Pinquart &amp; Teubet, 2011; Forgeron <i>et al.</i>, 2018).</p>
Program outcomes	<p>Increased knowledge and skills in problem-solving, decision-making and advocacy have been described (Sattoe <i>et al.</i>, 2015)</p> <p>Improvements in self-efficacy, psychosocial well-being, and family functioning, along with reduction in social isolation, school absenteeism and pain have been demonstrated (Stinson <i>et al.</i>, 2008)</p> <p>Reduced family and parent burden, reducing healthcare utilization, and improving overall health outcomes and quality of life have also been reported (Sattoe <i>et al.</i>, 2015)</p>	<p>Benefits to physical, emotional and school functioning have been recognized (Kalapurakkel <i>et al.</i>, 2015)</p> <p>Self-efficacy has been identified as a key contributor to chronic disease self-management, to promoting of long-term behavior change, to improving the appropriateness of health care utilization practices, and to enhancing health quality of life (Frei <i>et al.</i>, 2009)</p>	<p>Participation improved academic performance, social interactions, mental &amp; physical health, and helps develop life purpose and meaning (Mâsse <i>et al.</i>, 2012; Anaby <i>et al.</i>, 2013)</p>
<b>Creating the ideal context</b>			
Program Resources	<p>Program should be publicly funded (Miro <i>et al.</i>, 2017)</p> <p>A variety of health disciplines with specific training and expertise in pediatric pain (Stahlsmidt, Zernikow, Wager, 2016; Miro <i>et al.</i>, 2017)</p> <p>A clinical and research training role, along with a public education (e.g. school personnel) and advocacy mandate should be fulfilled by the program (Miro <i>et al.</i>, 2017)</p> <p>Youth with variety of pain conditions, regardless of the type and origin, and their parents should be targeted (Stahlsmidt, Zernikow, Wager, 2016; Miro <i>et al.</i>, 2017)</p>		

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Figure 1. Expert panel agreed upon logic model

