

PHYSICAL ACTIVITY SUPPORT BEHAVIOURS AMONG PARENTS OF CHILDREN
WITH INTELLECTUAL DISABILITIES:
EVALUATING AN ONLINE MESSAGING INTERVENTION

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Abstract

When developing targeted messages to promote parental support for physical activity (PA) among families of children and youth with intellectual disabilities (CYID), the extended parallel process model (EPPM) may be employed to guide the incorporation of risk information and framed PA messages. This study explored: 1) the effects of an online messaging intervention on EPPM constructs and parental support for PA among families of CYID, and 2) parents' perceptions of different messaging strategies. A four (time) x three (risk) x three (frame) repeated measures experimental design was employed. Parents of CYID ($N = 80$) received various combinations of risk information and framed PA messages, and completed online questionnaires. The risk information and framed PA messages evoked diverse message perceptions among participants. Additionally, decreases in EPPM constructs and parental support for PA observed over time, regardless of condition, suggested that participation in the study itself may have influenced these outcome variables.

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Table of Contents

Abstract.....	ii
Acknowledgements.....	iii
Table of Contents.....	iv
List of Tables.....	vi
List of Figures.....	vii
Introduction	
PA Among Children and Youth.....	1
Parental Support for PA.....	2
Persuasive Messaging.....	3
Prospect Theory and Message Framing.....	4
EPPM and Risk Information.....	6
Perceived Threat.....	7
Self-Efficacy.....	7
Intention.....	8
Message Perceptions.....	8
Purpose.....	9
Hypotheses.....	10
Method	
Participants.....	11
Sample Size.....	11
Procedure.....	12
Measures.....	14
Eligibility Assessment.....	14
Potential Covariates.....	14
Manipulation Checks.....	16
Message Perceptions.....	17
EPPM Constructs.....	17
Parental Support Behaviours.....	19
Statistical Analyses.....	19
Missing Data.....	19
Outliers.....	20
Distribution.....	21
Potential Covariates.....	21
Baseline Analyses.....	22
Manipulation Checks.....	22
Main Analyses.....	22

Results	
Participant Retention.....	24
Participant Characteristics.....	25
Baseline Analyses	28
Main Analyses.....	29
Comparison of Messaging Manipulations Between Conditions.....	29
Comparison of Message Perceptions Between Conditions	29
Comparison of EPPM Constructs Between Conditions Over Time	30
Comparison of Parental Support Behaviours Between Conditions Over Time...	30
Discussion	
Effectiveness of Messaging Manipulations	34
Message Perceptions	35
EPPM Constructs	37
Parental Support Behaviours.....	40
Implications.....	41
Strengths, Limitations, and Future Directions	43
Conclusion	48
References.....	49
Appendices	
Appendix A: Informed Consent.....	64
Appendix B: Phone Call Script.....	67
Appendix C: Newsletters	68
Appendix D: Debriefing Consent	77
Appendix E: Measures	80
Appendix F: Means, Standard Deviations, Skewness, and Kurtosis of Variables.....	93

List of Tables

Table 1: Presence of Risk Information and Message Framing among Conditions.....	12
Table 2: Covariates Included in the Manipulation Checks and Main Analyses.....	21
Table 3: Demographic Information among Participants at Baseline.....	25
Table 4: Demographic Information among Participants' CYID at Baseline.....	27
Table 5: Messaging Manipulations by Condition Immediately Following Message Exposure.....	31
Table 6: Message Perceptions by Condition Immediately Following Message Exposure.....	31
Table 7: EPPM Constructs by Condition over Time.....	32
Table 8: Parental Support Behaviours by Condition over Time.....	33

List of Figures

Figure 1: CONSORT 2010 Flow Diagram of Participants	24
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Introduction

Physical Activity Among Children and Youth

The Canadian 24-Hour Movement Guidelines recommend that children and youth aged 5 to 17 should participate in at least 60 minutes of moderate- to vigorous-intensity physical activity¹ (PA) daily, including a variety of activities through play, sport, active transportation, and recreation (Canadian Society for Exercise Physiology, n.d.). Adherence to these guidelines is positively linked with enhanced physical health and fitness, mental health, psychosocial wellbeing, and health habits for children and youth (Barr & Shields, 2011; Craigie et al., 2011; Murphy & Carbone, 2008; Taub & Greer, 2000; Wilhite & Shank, 2009).

Despite the well-established benefits of PA engagement, only 40% of Canadian children and youth meet recommended guidelines (Statistics Canada, 2019), and evidence suggests lower PA engagement rates among children and youth with intellectual disabilities (CYID; Aytur et al., 2018; Case et al., 2020; Stanish et al., 2019; Woodmansee et al., 2016; Wouters et al., 2020). These statistics are problematic, not only because PA may be particularly valuable for CYID (Anderson & Heyne, 2010), but also because CYID have a greater risk for experiencing reduced wellbeing and complications associated with low PA engagement compared to children without disabilities (Aytur et al., 2018; Belley-Ranger et al., 2016). For example, CYID often have poorer physical health and are more likely to be overweight or obese compared to children without disabilities (Aytur et al., 2018; Belley-Ranger et al., 2016). CYID are also at risk for experiencing secondary health conditions associated with their disability (Wilhite & Shank,

¹ PA refers to all bodily movements produced by skeletal muscles that require energy (World Health Organization, 2020). Moderate- to vigorous-intensity PA is measured by Metabolic Equivalents of Task, which describe the amount of energy required to engage in PA (Government of Canada, 2018).

2009). Considering the benefits of PA, alongside the health and wellbeing risks faced by CYID, it is necessary to assess the causes for low PA participation rates among CYID.

Low PA levels among CYID have been attributed to systemic PA participation barriers, such as discriminatory attitudes toward CYID, a lack of accessible PA venues, insufficient support from schools, undertrained recreation staff, inappropriate equipment, and limited access to inclusive programs (Aytur et al., 2018; Martin Ginis et al., 2016). Inadequate PA information and resources for CYID and their families also serves as a major barrier to PA participation (Bassett-Gunter et al., 2017a; Jaarsma et al., 2019; Martin Ginis et al., 2016). When developing strategies for promoting and supporting PA participation for CYID, these barriers must be considered. One recommendation to overcome some barriers to PA participation is to raise awareness regarding PA opportunities for families of CYID (Gorter et al., 2017). Current PA promotion initiatives often lack an empirical foundation (Bassett-Gunter et al., 2019), signalling a need for the development of evidence-based (i.e., empirically-supported) strategies to promote PA participation among CYID more effectively.

Parental Support for PA

One strategy to promote PA among CYID is to target parental support for PA, which is one of the strongest correlates of PA among CYID (Sallis et al., 2000). CYID who receive parental support for PA are more likely to meet recommended PA guidelines (Rhodes et al., 2015; Siebert et al., 2017; Zecevic et al., 2010; Zhao & Settles, 2014). Parental support for PA refers to behaviours that parents engage in to support their children's PA (Rhodes et al., 2015) such as providing their children with encouragement, facilitating their children's enrolment in PA programs, and participating in PA with their children (Martin & Choi, 2009). Research suggests that these behaviors are associated with parents' own motives and barriers, so

interventions aimed at promoting PA participation among CYID should focus on motivating parental support for PA (Rhodes et al., 2016; Tanna et al., 2017; Trost et al., 2003). Additionally, encouraging parents to engage in behavioural regulation techniques (e.g., goal setting, planning, and tracking progress) may promote enhanced parental support for PA (Rhodes et al., 2016). The notion of parental support for PA is especially relevant among CYID, who must often overcome unique challenges in comparison to children without disabilities to engage in PA (Bassett-Gunter et al., 2017a). Given the crucial role that parents play in facilitating PA participation among CYID (Siebert et al., 2017), it is imperative to investigate techniques to motivate parental support for PA.

Persuasive Messaging

Providing families of CYID with persuasive messages is one strategy to motivate parental support for PA. Persuasive messages have the capacity to stimulate positive behaviour change (Faulkner et al., 2011; Latimer et al., 2010; Rothman & Salovey, 1997). To be optimally effective and enhance relevance, persuasive messages must be designed using an evidence-based approach that considers the needs of the intended audience (e.g., parents of CYID) and the unique barriers that they face (Bassett-Gunter et al., 2017b; Larocca et al., 2021).

Developing and disseminating targeted PA information (i.e., motivational PA messages, such as those describing the benefits of PA; Bauman et al., 2006; Brawley & Latimer, 2007; Latimer et al., 2010; Williamson et al., 2020) is a useful PA promotion strategy. Not only are targeted PA messages more effective than non-targeted PA messages (Faulkner et al., 2011; Hawkins et al., 2008; Latimer et al., 2010), but a preference for these types of messages has also been expressed (Faulkner et al., 2011). Earlier research has demonstrated the value of persuasive messages to motivate parental support for PA among children without disabilities (Bassett-

Gunter et al., 2017a; Berry et al., 2014; Gainforth et al., 2016; Jarvis et al., 2014). However, although parents of CYID have expressed a need and preference for targeted PA information and messages, limited evidence exists to inform the development of effective messages for these parents (Bassett-Gunter et al., 2017a; Larocca et al., 2021).

There has been a call to further explore strategies for developing inclusive PA information (i.e., messages that are targeted to parents' unique needs; Bassett-Gunter et al., 2017a; Larocca et al., 2021; Smith et al., 2021; Williamson et al., 2020) to address the current lack of targeted PA information and resources and more optimally promote parental support for PA among parents of CYID (Bassett-Gunter et al., 2017a; Larocca et al., 2021). Providing families of CYID with inclusive PA information that is relevant (Letts et al., 2011) and meets their unique needs may be particularly effective in promoting enhanced parental support for PA (Hawkins et al., 2008). Some recommendations regarding the development of inclusive PA information for parents of CYID include providing targeted information about PA opportunities, PA safety and guidelines, the benefits of engaging in PA, strategies for overcoming barriers to PA, and behavioural regulation techniques related to parental support for PA (Bassett-Gunter et al., 2017a; Larocca et al., 2021).

Prospect Theory and Message Framing

To optimize the development of PA messages targeted to parents of CYID, it may be beneficial to draw on theoretical frameworks and messaging strategies that have been employed among parents of children without disabilities. Message framing is one predominant strategy used to optimize the effects of persuasive messaging (Gallagher & Updegraff, 2012; Latimer et al., 2008). Rooted in Prospect Theory, this approach postulates that behaviour is influenced by the way in which information is presented. For example, information about PA can incorporate

either gain-framed messages that emphasize positive outcomes of PA, or loss-framed messages that emphasize consequences of inactivity (Tversky & Kahneman, 1981). Given their different connotations, gain-framed and loss-framed messages are understood differently. Thus, according to Prospect Theory, an individual's decision regarding whether to engage in a behaviour depends on how they perceive the potential gains or losses associated with the target behaviour (Levin et al., 1998). Based on the application of Prospect Theory, gain-framed messages are thought to be more effective for persuading prevention behaviours with low-risk consequences (e.g., PA engagement and dental flossing; Latimer et al., 2008; Mann et al., 2004), whereas loss-framed messages are thought to be more useful to motivate detection behaviours where the potential outcome is risky or ambiguous (e.g., cancer screening and HIV testing; Hull & Hong, 2016; Lipkus, et al., 2019).

Despite the theory-based recommendations to rely on gain-framed messages to promote prevention-type behaviours, findings regarding the effectiveness of framed messages in the context of PA promotion are inconsistent. Generally, recommendations have been made to provide gain-framed messages when motivating parental support for PA (Williamson et al., 2020), given findings from studies that have investigated this approach (Jarvis et al., 2014; Latimer-Cheung et al., 2013). Alternatively, one study that explored the use of framed PA messages to promote parental support for PA found that gain-framed and loss-framed messages were equally effective (Bassett-Gunter et al., 2017b). When developing PA messages for families of CYID, the use of gain-framing versus loss-framing may differentially impact motivation for parental support for PA. However, there is no known research to consider the relative effects of differentially framed PA messages targeting parents of CYID.

Extended Parallel Process Model and Risk Information

Another strategy to inform the development of persuasive messages is the use of health risk information that precedes framed PA messages to motivate behaviour through stimulating a concern (Lithopoulos et al., 2017). Among parents of CYID, risk information may alter views regarding their child's vulnerability for various health concerns (Bassett-Gunter et al., 2013). The extended parallel process model (EPPM; Witte, 1992) may be useful in guiding the development of persuasive messages that combine risk information and framed PA messages.

While risk information has been coupled with framed PA messages to motivate PA among various populations, findings regarding the effectiveness of this strategy are inconsistent. That is, one study reported loss-framed messages to be more effective than gain-framed messages following risk information for promoting PA cognitions, beliefs, and intention among sedentary adults with spinal cord injury (Bassett-Gunter et al., 2013). Conversely, opposite results have been described when similar procedures were employed among sedentary able-bodied undergraduate students; participants paid more attention to gain-framed messages compared to loss-framed messages, although attention did not necessarily influence PA cognitions (Bassett-Gunter et al., 2014). Further, another messaging intervention among individuals with multiple sclerosis found that gain-framed and loss-framed messages were equally effective for motivating PA (Lithopoulos et al., 2017). To the researcher's knowledge, the use of risk information coupled with framed PA messages has not been explored as a strategy to motivate parental support for PA among families of CYID. The EPPM describes various constructs that are thought to influence each other, and ultimately behaviour through exposure to risk information. The following EPPM constructs have been shown to have positive associations

with one another (Rhodes et al., 2015), as well as with PA behaviours (Constant et al. 2020; Lithopoulos et al., 2017; Tanna et al. 2017).

Perceived Threat

According to the EPPM, when individuals receive risk information (e.g., information demonstrating that CYID are at risk of experiencing negative wellbeing), they may perceive the associated threat in different ways. Perceived threat refers to an individual's interpretation of an external stimulus that may elicit negative outcomes (i.e., risk information). This construct is composed of how individuals assess the severity and susceptibility of the threat. Severity refers to an individual's beliefs about how serious the threat is (e.g., seriousness of their child's risk for experiencing negative wellbeing). Susceptibility refers to an individual's beliefs about the likelihood of experiencing the threat (e.g., likelihood that their child will experience negative wellbeing; Witte, 1992).

Self-Efficacy

According to the EPPM, if risk information does not evoke a sense of threat, then individuals will be less likely to execute a target behaviour (e.g., parental support for PA). However, if the information is perceived as high risk and stimulates a threat, then individuals will subsequently evaluate their task self-efficacy and response efficacy with respect to the threat. Task self-efficacy refers to an individual's beliefs about their ability to perform a target behaviour that may act to alleviate the threat (e.g., confidence to perform parental support for PA such that their child's PA can increase). Response efficacy refers to an individual's beliefs about the extent to which a behaviour may be effective for preventing the threat (e.g., confidence that parental support for PA can facilitate their child's PA and decrease their child's risk for experiencing negative wellbeing; Witte, 1992). Additionally, although planning efficacy is not a

direct a component of the EPPM, it may be valuable to assess this construct in the context of promoting parental support for PA among families of CYID. Planning efficacy refers to an individual's beliefs about their ability to create a detailed plan to support their child's PA participation (Tanna et al., 2017). Planning is a behavioural regulation technique that likely encourages enhanced parental support for PA (Rhodes et al., 2016; Tanna et al., 2017). Given that task self-efficacy, response efficacy, and planning efficacy are major predictors of PA intention and behaviours (Rhodes et al., 2015; Rhodes et al. 2017; Tanna et al., 2017), it is necessary to evaluate the extent to which these constructs are influenced by PA messaging interventions.

Intention

Intention refers to an individual's motivation to execute a target behaviour (e.g., parental support for PA; Witte, 1992). According to the EPPM, intention is a key predictor of behaviours, and individuals will be motivated to form an intention to engage in a target behaviour if they possess high levels of both task self-efficacy and response efficacy. Ultimately, effective persuasive messages may help to enhance an individual's intention to engage in the target behaviour (Witte, 1992).

Message Perceptions

In addition to understanding how risk information and framed PA messages influence EPPM constructs (i.e., perceived threat, self-efficacy, and intention), it is valuable to examine message perceptions among message recipients. Message perceptions refer to an individual's reception of risk information and framed PA messages (Lithopoulos et al., 2017), which may influence parental support for PA. Tone perceptions refer to the extent to which an individual believes the general tone of a message is negative or positive (Latimer et al., 2008). Measures of

tone perceptions are commonly used in research investigating framed PA messages to compare gain-framed and loss-framed messages (Latimer et al., 2008). Previous research has found that loss-framed messages are perceived as having a more negative tone compared gain-framed messages (Latimer et al., 2008). Additionally, avoidance refers to the degree to which an individual avoids thinking or doing something about a message (e.g., avoid thinking or doing something about their child's risk for experiencing negative wellbeing or low levels of PA engagement; Lithopoulos et al., 2017). Discouraging avoidance may positively influence EPPM constructs and promote parental support for PA. Further, guilt refers to the degree to which an individual experiences emotions of guilt about a message (e.g., guilt about their child's risk for experiencing negative wellbeing or low levels of PA engagement; Mistry & Latimer-Cheung, 2014). Previous advertising and messaging research has suggested that guilt is negatively associated with persuading behaviours (Lerner & Keltner, 2001; Tracy & Robins, 2007). Providing risk information and framed PA messages that do not evoke cognitions about guilt may be beneficial given that guilt among parents has been found to motivate neither intention, nor parental support for PA (Mistry & Latimer-Cheung, 2014).

Purpose

The purpose of the current study was to explore the differential effects of an online messaging intervention using various combinations of risk information and framed PA messages to target EPPM constructs and motivate parental support for PA among families of CYID. A secondary purpose of this study was to evaluate parents' perceptions of the different messaging strategies. Given concerns of low PA levels among CYID and the crucial role that parents play in encouraging their children's PA behaviours, it is of utmost importance to investigate messaging approaches that motivate parental support for PA.

Hypotheses

Due to conflicting findings in the existing literature and the novel implementation of this messaging approach among parents of CYID, a priori hypotheses were not generated regarding effects of the messaging intervention on message perceptions, EPPM constructs, and parental support for PA.

Method

The following experimental design and protocol were approved by York University's Office of Research Ethics.

Participants

Parents of CYID were recruited for this study through partnerships with community-based organizations (e.g., Special Olympics), social media advertisements, emails to participants from previous studies, and word of mouth. Eligible participants included parents, legal guardians, or primary caregivers² of a child, youth, or young adult³ with an intellectual disability (e.g., Down syndrome, fetal alcohol spectrum disorder, or cerebral palsy) or autism⁴. Additional eligibility requirements included fluency in English and residence in Canada. Participation was voluntary and informed consent was provided at the beginning of each questionnaire.

Participants received up to \$25 in online gift cards for their contributions to this study.

Sample Size

A sample size calculation was performed using G*Power version 3 (Erdfelder et al., 1996). To achieve 80% statistical power ($\alpha = 0.05$) and detect a large effect size ($f = 0.40$), four participants were required per condition; to detect a medium effect size ($f = 0.25$), eight participants were required per condition; to detect a small effect size ($f = 0.10$), 45 participants were required per condition (Cohen, 1992; Erdfelder et al., 1996).

² Parent and legal guardian were defined as the individual legally responsible for taking care of and making decisions affecting their child. Primary caregiver was defined as the individual primarily responsible taking care of a child (Government of Canada, n.d.). Participants self-identified their status as a parent, legal guardian, or primary caregiver.

³ The United Nations includes individuals aged up to 24 in their definition of youth with disabilities (United Nations, 2012). Additionally, given that individuals with disabilities may require support throughout adulthood (Stewart et al., 2001), parents, legal guardians, or primary caregivers of young adults were able to participate in this study. Participants self-identified their children's status as a young adult.

⁴ Referred to as parents of CYID hereafter.

Procedure

This study was designed as a randomized controlled trial to identify the effects of exposure to various messages. Participants were randomized to one of five conditions: 1) risk information + gain-framed messages, 2) risk information + loss-framed messages, 3) no risk information + gain-framed messages, 4) no risk information + loss-framed messages, or 5) control (Table 1). Questionnaires were completed at four time points: 1) baseline, 2) immediately post-message exposure (follow-up questionnaire one; FQ1), 3) two weeks post-baseline (follow-up questionnaire two; FQ2), and 4) two months post-baseline (follow-up questionnaire three; FQ3). Questionnaires were completed online through SurveyMonkey. Given that this study was conducted during the COVID-19 pandemic, participants were instructed to answer the questionnaires to the best of their abilities based on their current behaviours and feelings.

Table 1

Presence of Risk Information and Message Framing among Conditions

Condition	Risk information	Message framing
Risk information + gain-framed messages	Included	Gain-framed
Risk information + loss-framed messages	Included	Loss-framed
No risk information + gain-framed messages	None	Gain-framed
No risk information + loss-framed messages	None	Loss-framed
Control	None	None

In the screening stage, participants gave informed consent (Appendix A), then completed an eligibility assessment and a demographics questionnaire. Participants self-identified their children's primary disability in the eligibility assessment. Follow-up phone calls (Appendix B) were performed to confirm eligibility⁵.

⁵ Due to the nature of recruitment via internet sources (e.g., social media and websites), phone calls were conducted in an effort to eliminate the inclusion of false participants (i.e., bots) in the study. The researcher personally contacted each participant via phone and administered screening questions (Appendix B) to ensure their legitimacy.

Next, eligible participants were assigned to different conditions. Assignment of participants to each condition was performed randomly and in a single-blind manner, as the researcher was required to send links to participants for the questionnaires that corresponded with their condition throughout the study. Participants completed a child characteristics questionnaire, followed by a baseline questionnaire measuring EPPM constructs and parental support for PA.

Participants then read an online newsletter (Appendix C) that corresponded with their assigned condition. Newsletters for all experimental conditions contained varying combinations of risk information and framed PA messages. All experimental newsletters also included the same basic descriptive information about parental support for PA and child PA. Participants in the risk information conditions received unframed risk information demonstrating that CYID are at an increased likelihood of experiencing issues related to their physical health, mental health, wellbeing, and health habits (e.g., “Children with disabilities often have poorer physical health and are 2-3 times more likely to be overweight or obese compared to children without disabilities.”). Additionally, newsletters for the gain-framed and loss-framed conditions included messages outlining the relationship between engaging in PA and various health concerns (e.g., physical and mental health). Gain-framed messages highlighted benefits of PA participation (e.g., “Children’s physical health and fitness may be improved if they engage in PA each day.”), whereas loss-framed messages highlighted risks of failing to engage in PA (e.g., “Children’s physical health and fitness may be reduced if they do not engage in PA each day.”). Participants in the control condition received a newsletter containing information about COVID-19 which was intended to serve as an attentional condition.

Immediately after reading the newsletter, participants completed FQ1. This questionnaire was similar to the baseline, with the addition of manipulation checks and measures pertaining to message perceptions. Two weeks following the baseline questionnaire, participants completed FQ2, which contained measures of EPPM constructs and parental support for PA. Lastly, two months post-baseline, participants completed FQ3, which was identical to FQ2.

Partial deception was required to avoid biasing responses and to blind participants to the study design. Throughout the study, participants were not informed about the meaning behind the newsletter's informational contents and therefore completed a Debriefing Consent Form (Appendix D) at the conclusion of the study.

Measures

The measures (Appendix E) included in the online questionnaires are described below.

Eligibility Assessment

Participants were provided with definitions and asked to self-identify whether their child has an intellectual disability⁶ or autism⁷. Ineligible participants were notified that they would not be able to continue participating in the study immediately following completion of this question.

Potential Covariates

Demographics. Participants indicated their age, sex, level of education, marital status, household income, province or territory of residence, racialized status, Indigenous status, disability status, number of children, and number of children with a disability, as well as where they learned about the study. Participants also indicated the age, sex, mode of school attendance

⁶ Intellectual disability was defined as: having significant limitations in intellectual functioning (including reasoning, problem solving, planning, abstract thinking, judgment, academic learning, and learning from experience) and adaptive functioning (such as personal care, communication skills, social skills, and other practical areas of living; Boat & Joel, 2015).

⁷ Autism was defined as: having consistent difficulties with social communication and rigid or repetitive behaviours or interests (Centers for Disease Control and Prevention, 2020).

during the study, and primary disability⁸ of their children, along with any other disabilities or psychological conditions for which their children had been clinically diagnosed.

Physical Morbidities. Participants indicated their children's overall physical health, responding on a 5-point Likert scale (from 1 = poor, to 5 = excellent), as well as their children's physical health conditions. Additional measures were taken from the National PA Monitoring Study on Children and Youth with Disabilities (Sharma et al., 2016). Participants indicated their children's difficulties with certain activities (i.e., seeing, hearing, walking, and remembering), responding on a 4-point Likert scale (from 1 = no difficulty, to 4 = cannot do at all). Participants also indicated their children's mobility aid usage.

Adaptive Behaviours. Measures were adapted from the Waisman Activities of Daily Living Scale (Maenner et al., 2013). Participants indicated their children's level of independence when performing various activities of daily living (e.g., cooking simple foods), responding on a 3-point Likert scale (from 0 = does not do at all, to 2 = independent or does on own). An average of the items was calculated to generate an overall score for adaptive behaviours.

Functional Cognitive Ability. Measures were taken from the National Longitudinal Transition Study-2, as cited by Weiss and Burnham Riosa (2015). Participants indicated how well their child completes cognitively-demanding activities (e.g., counting change), responding on a 4-point Likert scale (from 0 = not at all, to 3 = very well). An average of the items was calculated to generate an overall score for functional cognitive ability.

⁸ For the purposes of characterizing participants in this study, particularly in the data analysis stage, participants indicated their children's primary disability, which was defined as: the disability that most clearly manifests a child's experience of living with a disability (National Disability Services, n.d.). The researcher acknowledges that the complexities of living with a disability may not be accurately captured through this simple categorization approach.

Mental Health Difficulties. Measures were taken from the Strengths and Difficulties Questionnaire (Goodman, 1997). Participants indicated the accuracy of statements describing their children's behaviours (e.g., considerate of other people's feelings), responding on a 3-point Likert scale (from 0 = not true, to 2 = certainly true). Items were scored following the process described by Goodman (1997) to generate an overall score for mental health difficulties.

Depth of Sport Participation. Measures were adapted from the Participation and Environment Measure (Coster et al., 2012). Participants indicated how often their children participated in organized and unstructured PA prior to the COVID-19 pandemic, responding on an 8-point Likert scale (from 1 = never, to 8 = daily). An average of the items was calculated to generate an overall score for depth of sport participation.

Manipulation Checks

Risk Information Perceptions. Measures were adapted from Latimer and colleagues (2008), as cited by Lithopoulos and colleagues (2017). After reading the newsletter, participants indicated the extent to which they believed they were provided with information about their children's risk for various health concerns (e.g., poor physical health), responding on a 7-point Likert scale (from 1 = strongly disagree, to 7 = strongly agree).

Frame Perceptions. Measures were adapted from Toll and colleagues (2007), as cited by Latimer and colleagues (2008). After reading the newsletter, participants indicated their perceptions regarding how the information in the newsletter was framed, responding on a 7-point Likert scale (from 1 = focused heavily on the risks of inactivity, to 7 = focused heavily on the benefits of PA; there was also an option to respond with 0 = none of the above).

Message Perceptions

Tone Perceptions. Measures were adapted from Toll and colleagues (2007), as cited by Latimer and colleagues (2008). After reading the newsletter, participants indicated their perceptions regarding the general tone of the newsletter, responding on a 7-point Likert scale (from 1 = extremely negative, to 7 = extremely positive).

Avoidance. Measures were adapted from the Risk Behaviour Diagnostic Scale (Witte et al., 1996), as cited by Lithopoulos and colleagues (2017). Participants indicated the degree to which they did not want to think about the messages about various health concerns (e.g., poor physical health) in the newsletter, as well as the extent to which they wanted to avoid the messages, responding on a 7-point Likert scale (from 1 = strongly disagree, to 7 = strongly agree). Items were scored following the process described by Lithopoulos and colleagues (2017) to generate an overall score for avoidance.

Guilt. Measures were adapted from the Positive and Negative Affect Schedule (Watson & Clark, 1994), as cited by Mistry and Latimer-Cheung (2014). Participants indicated the extent to which they experienced emotions of guilt after reading the newsletter, responding on a 7-point Likert scale (from 1 = not at all guilty, to 7 = extremely guilty).

EPPM Constructs

Perceived Threat. Measures were adapted from the Risk Behaviour Diagnostic Scale (Witte et al., 1996), as cited by Lithopoulos and colleagues (2017). Participants indicated to what extent they believe their children were at risk for various health concerns (e.g., poor physical health), and how serious they perceive these risks to be, responding on a 7-point Likert scale (from 1 = strongly disagree, to 7 = strongly agree). An average of the items was calculated to generate an overall score for perceived threat.

Task Self-Efficacy. Measures were adapted from Rhodes and colleagues (2013).

Participants indicated their confidence in their ability to support their children to adhere to the PA guidelines⁹, responding on a 5-point Likert scale (from 1 = not at all confident, to 5 = very confident). An average of the items was calculated to generate an overall score for task self-efficacy.

Response Efficacy. Measures were adapted from the Risk Behaviour Diagnostic Scale (Witte et al., 1996), as cited by Lithopoulos and colleagues (2017). Participants indicated to what extent they believe that adherence to the PA guidelines will decrease their children's risk for various health concerns (e.g., poor physical health), responding on a 7-point Likert scale (from 1 = strongly disagree, to 7 = strongly agree). An average of the items was calculated to generate an overall score for response efficacy.

Planning Efficacy. Measures were adapted from Tanna and colleagues (2017). Participants indicated their confidence in their ability to create a detailed plan to support their children's PA participation, responding on a 7-point Likert scale (from 1 = not at all confident, to 7 = very confident). An average of the items was calculated to generate an overall score for planning efficacy.

Intention. Measures were adapted from Rhodes and colleagues (2015). Participants indicated their intentions to engage in behaviours to support their children's adherence to the PA guidelines (e.g., providing PA opportunities), responding on a 5-point Likert scale (from 1 = strongly disagree, to 5 = strongly agree). An average of the items was calculated to generate an overall score for intention.

⁹ Questionnaire content that pertained to the levels of PA recommended by the Canadian 24-Hour Movement Guidelines (Canadian Society for Exercise Physiology, n.d.) was adapted such that each participant received a newsletter and questions that corresponded to PA recommendations appropriate for their children's age group.

Parental Support Behaviours

Parental Support for PA. Measures were adapted from Rhodes and colleagues (2016). Participants indicated how often they engage in parental support for PA (e.g., encouraging their children to engage in PA), responding on a 5-point Likert scale (from 1 = never/rarely, to 5 = daily). An average of the items was calculated to generate an overall score for parental support for PA.

Behavioural Regulation of Parental Support for PA. Measures were adapted from Rhodes and colleagues (2016). Participants indicated how often they demonstrate behavioural regulation techniques for their parental support for PA (e.g., keeping track of the amount of PA their children are getting), responding on a 5-point Likert scale (from 1 = never/rarely, to 5 = daily). An average of the items was calculated to generate an overall score for behavioural regulation of parental support for PA.

Statistical Analyses

The following statistical analyses were performed using IBM SPSS Statistics version 28.

Missing Data

Descriptive statistics and frequencies were calculated to identify missing data and characterize the sample. For each variable, percentages and frequency counts reported reflect participants who responded (i.e., participants who did not answer questions for a given variable were excluded). Additionally, participants who did not answer at least one item for a given scale were removed from any analysis using that scale. Participants were excluded for each of the following demographic variables due to missing data: marital status ($n = 1$), intellectual disability

severity ($n = 40$)¹⁰, overall physical health ($n = 3$), physical health condition ($n = 2$), difficulty seeing ($n = 3$), difficulty hearing ($n = 2$), difficulty walking ($n = 1$), difficulty remembering ($n = 1$), adaptive behaviours ($n = 3$), functional cognitive ability ($n = 1$), and mental health difficulties ($n = 2$). Participants were also excluded for each of the following outcome variables due to missing data: risk information perceptions ($n = 1$), avoidance ($n = 2$), perceived threat (baseline, $n = 1$; FQ1, $n = 5$; FQ2, $n = 4$; FQ3, $n = 3$), task self-efficacy (FQ2, $n = 3$; FQ3, $n = 3$), response efficacy (FQ1, $n = 1$; FQ2, $n = 3$; FQ3, $n = 4$), planning efficacy (baseline, $n = 3$; FQ1, $n = 3$; FQ2, $n = 8$; FQ3, $n = 4$), intention (baseline, $n = 1$; FQ2, $n = 4$; FQ3, $n = 4$), parental support for PA (baseline, $n = 1$; FQ2, $n = 5$; FQ3, $n = 4$), and behavioural regulation of parental support for PA (baseline, $n = 1$; FQ2, $n = 5$; FQ3, $n = 4$). There were no individual scale items that had data missing from more than 50% of participants. Little's MCAR test (Little, 1988) was performed and all missing data were indicated to be missing completely at random.

Outliers

The next analysis involved identifying outliers with z-scores outside the $z = \pm 3.29$ criteria (Field, 2009). Outliers were identified for the following variables: depth of sport participation ($n = 1$), risk information perceptions ($n = 2$), and response efficacy (baseline, $n = 1$; FQ2, $n = 1$; FQ3, $n = 1$). Scores for outliers were changed to the next highest or lowest acceptable score within the $z = \pm 3.29$ criteria (Field, 2009).

¹⁰ Missing data is higher for “intellectual disability severity” compared to other variables as participants were asked to describe the severity of their children’s intellectual disability if they indicated “intellectual disability” as their children’s primary disability in the previous question. However, due to the online questionnaire format, even those participants who did not indicate “intellectual disability” as their children’s primary disability responded to this question as well. Therefore, “intellectual disability severity” was excluded as a potential covariate.

Distribution

Distribution was examined by calculating means, standard deviations, skewness, and kurtosis for continuous variables (Appendix F). Given that skewness and kurtosis of the variables were within an acceptable range of ± 2 (George & Mallery, 2012), no transformations were performed.

Potential Covariates

Potential covariates were tested via ANOVAs for categorical demographic variables, and via Pearson's correlation for continuous demographic variables. Demographic variables that were found to be significantly related to outcome variables are shown in Table 2. These covariates were included in the appropriate analyses.

Table 2

Covariates Included in the Manipulation Checks and Main Analyses

Outcome variable	Demographic variable	<i>p</i>
Risk information perceptions	Number of children	<0.01
	Avoidance	0.02
Guilt	Parent sex	0.01
	Child sex	0.04
Perceived threat	Number of children	<0.01
	Difficulty remembering	<0.01
	Overall physical health	<0.01
Task self-efficacy	Difficulty remembering	<0.01
	Mental health difficulties	<0.01
	Depth of sport participation	<0.01
	Response efficacy	0.02
	Race	0.03
Planning efficacy	Parent disability status	0.05
	Child sex	0.04
	Difficulty seeing	0.02
	Adaptive behaviours	0.03
	Depth of sport participation	0.02
	Race	0.01
Intention	Depth of sport participation	0.02
	Adaptive behaviours	<0.01
	Functional cognitive ability	<0.01
	Depth of sport participation	<0.01

Parental support for PA	Marital status	0.33
	Child age	<0.01
	Child sex	0.02
	Adaptive behaviours	0.03
	Functional cognitive ability	<0.01
Behavioural regulation of parental support for PA	Depth of sport participation	<0.01
	Adaptive behaviours	0.03
	Functional cognitive ability	0.01
	Depth of sport participation	0.04

Baseline Analyses

Preliminary between-group analyses were conducted for baseline demographic and outcome variables to ensure successful randomization to conditions. ANOVAs were performed for continuous variables, and chi-square analyses were performed for categorical variables.

Manipulation Checks

To examine whether risk information perceptions differed between conditions, a one-way (risk: risk information, no risk information, control) ANCOVA was conducted. To examine whether frame perceptions differed between conditions, a one-way (frame: gain-framed, loss-framed, control) ANOVA was conducted.

Main Analyses

To examine whether tone perceptions, avoidance, and guilt differed between conditions, separate three (risk: risk information, no risk information, control) x three (frame: gain-framed, loss-framed, control) ANOVAs/ANCOVAs were conducted.

To examine whether perceived threat, task self-efficacy, planning efficacy, and intention differed between conditions over time, separate four (time: baseline, FQ1, FQ2, FQ3) x three (risk: risk information, no risk information, control) x three (frame: gain-framed, loss-framed, control) repeated measures ANCOVAs were conducted. To examine whether response efficacy differed between conditions over time, a three (time: FQ1, FQ2, FQ3) x three (risk: risk

information, no risk information, control) x three (frame: gain-framed, loss-framed, control) repeated measures ANCOVA was conducted with baseline response efficacy scores serving as a covariate. Only follow-up data were used for this analysis of response efficacy due to between-group differences at baseline.

To examine whether parental support for PA and behavioural regulation of parental support for PA differed between conditions over time, separate three (time: baseline, FQ2, FQ3) x three (risk: risk information, no risk information, control) x three (frame: gain-framed, loss-framed, control) repeated measures ANCOVAs were conducted.

For all analyses, results were considered statistically significant when p values were less than 0.05. To further explore variation between conditions, Bonferroni post-hoc tests were performed, thus reducing the threshold for detecting statistically significant results to p values less than 0.01 and limiting the risk of Type I error (Chen et al., 2017). Small, medium, and large effect sizes were interpreted when η_p^2 values were greater than or equal to 0.01, 0.06, and 0.14, respectively (Cohen, 1988).

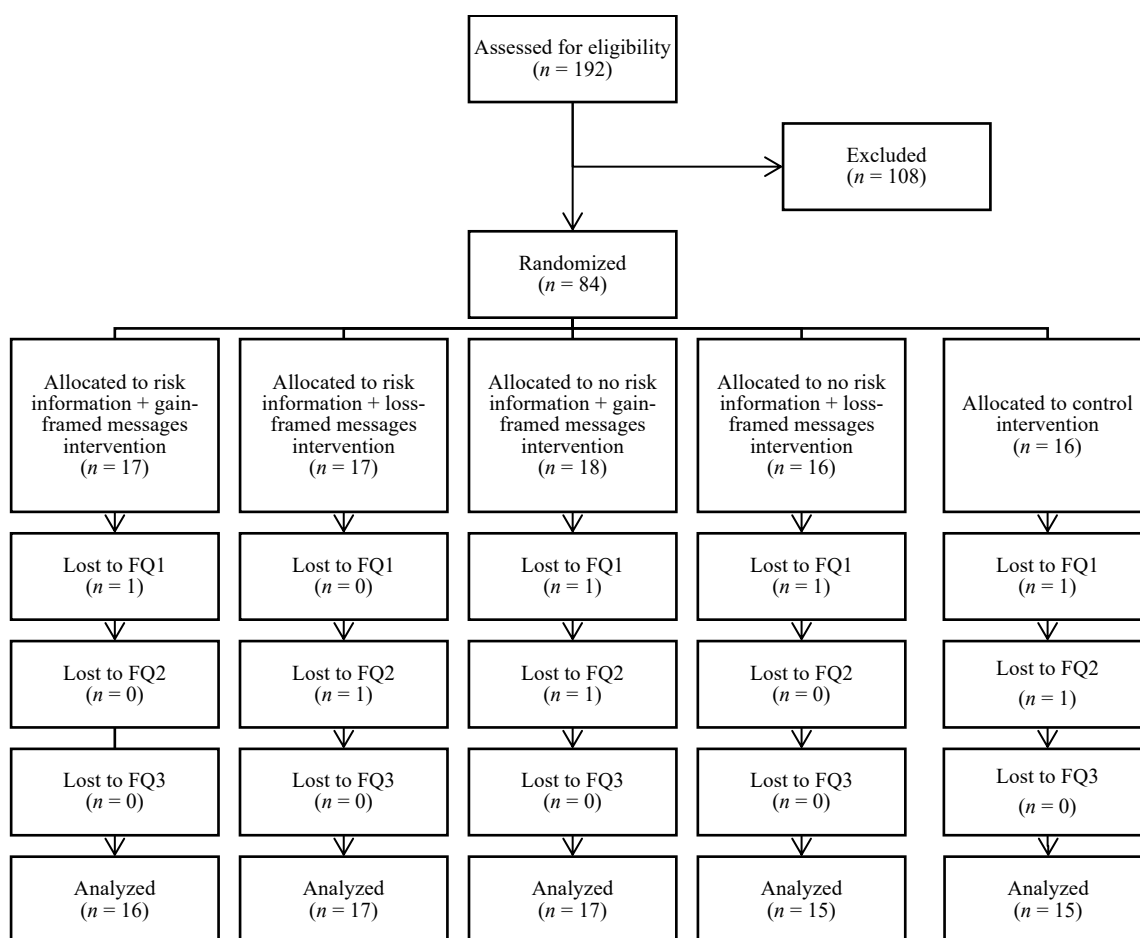
Results

Participant Retention

Figure 1 depicts participant flow throughout the study. Data were analyzed for participants randomized to the five conditions as follows: risk information + gain-framed messages ($n = 16$), risk information + loss-framed messages ($n = 17$), no risk information + gain-framed messages ($n = 17$), no risk information + loss-framed messages ($n = 15$), and control ($n = 15$).

Figure 1

CONSORT 2010 Flow Diagram of Participants



Participant Characteristics

Demographic information for participants ($N = 80$) and their CYID is displayed in Tables 3 and 4, respectively.

Table 3

Demographic Information among Participants at Baseline

Variable	Frequency % (<i>n</i>)
Age	
Under 30	2.5 (2)
30-34	5.0 (4)
35-39	16.2 (13)
40-44	11.3 (9)
45-49	21.2 (17)
50-54	22.5 (18)
55-59	6.3 (5)
60+	15.0 (12)
Sex	
Male	8.8 (7)
Female	90.0 (72)
Prefer not to disclose	1.2 (1)
Education	
Less than high school	1.2 (1)
High school	16.3 (13)
College degree	21.2 (17)
Bachelor degree	42.5 (34)
Master's degree	15.0 (12)
Doctorate degree	1.3 (1)
Professional post-graduate degree	2.5 (2)
Marital status	
Single	3.8 (3)
Married/common-law	79.7 (63)
Divorced	11.4 (9)
Other	5.1 (4)

Income	
Less than \$35,000	10.0 (8)
\$35,000-\$49, 999	6.2 (5)
\$50,000-\$64,999	8.8 (7)
\$65,000-\$74,999	7.5 (6)
\$75,000-\$99,999	13.8 (11)
\$100,000-\$149,999	27.5 (22)
\$150, 000+	10.0 (8)
Do not wish to report	16.2 (13)
Region	
Alberta	13.8 (11)
Manitoba	1.2 (1)
New Brunswick	6.2 (5)
Nova Scotia	6.3 (5)
Ontario	71.2 (57)
Quebec	1.3 (1)
Race	
Racialized	13.8 (11)
Non-racialized	86.2 (69)
Indigenous status	
Indigenous	2.5 (2)
Non-Indigenous	97.5 (78)
Disability status	
Disability	12.5 (10)
No disability	87.5 (70)
Recruitment source	
Community-based organization	
Abilities Centre	3.8 (3)
Autism Ontario	17.5 (14)
Down Syndrome Association of Hamilton	2.5 (2)
IWK Health	6.2 (5)
New Brunswick Association for Community Living	6.3 (5)
Special Olympics	20.0 (16)
Facebook	23.7 (19)
Participant pool	18.8 (15)
Word of mouth	1.2 (1)
Number of children	
1	25.0 (20)
2	45.0 (36)
3	21.2 (17)
4	3.8 (3)
5+	5.0 (4)
Number of children with a disability	
1	86.2 (69)
More than 1	13.8 (11)

Table 4***Demographic Information among Participants' CYID at Baseline***

Variable	<i>M (SD)</i>	Frequency % (<i>n</i>)
Age		
Under 5		5.0 (4)
5-17		63.7 (51)
18+		31.3 (25)
Sex		
Male		62.5 (50)
Female		36.3 (29)
Prefer not to disclose		1.2 (1)
Schooling		
In-person learning		50.0 (40)
Remote learning		23.8 (19)
Other		26.2 (21)
Primary disability		
Autism/Asperger's syndrome/autism spectrum disorder		47.5 (38)
Cerebral palsy		2.5 (2)
Down syndrome		12.5 (10)
Fetal alcohol spectrum disorder		3.8 (3)
Intellectual disability		23.7 (19)
Learning disability		1.2 (1)
Other		8.8 (7)
Intellectual disability severity		
Mild		27.5 (11)
Moderate		37.5 (15)
Severe		27.5 (11)
Profound		7.5 (3)
Other disability ¹¹		
Anxiety disorder		23.8 (19)
Attention deficit hyperactivity disorder/attention deficit disorder		28.7 (23)
Autism/Asperger's syndrome/autism spectrum disorder		37.5 (30)
Cerebral palsy		5.0 (4)
Depressive disorder		3.8 (3)
Down syndrome		8.8 (7)
Fetal alcohol spectrum disorder		3.8 (3)
Intellectual disability		36.3 (29)
Learning disability		31.3 (25)
Obsessive compulsive disorder		5.0 (4)
Oppositional defiant disorder		3.8 (3)

¹¹ Given participants were asked to “select all options that apply”, the data reported for “other disability” represent participants who selected each of the listed options. Therefore, the sums of reported percentages and frequency counts exceed 100.0% and $N = 80$, respectively. “Other disability” was also excluded as a potential covariate.

Overall physical health	3.69 (0.94)
Physical health condition	
Condition	38.5 (30)
No condition	61.5 (48)
Difficulty seeing	
Difficulty	28.6 (22)
No difficulty	71.4 (55)
Difficulty hearing	
Difficulty	14.1 (11)
No difficulty	85.9 (67)
Difficulty walking	
Difficulty	34.2 (27)
No difficulty	65.8 (52)
Difficulty remembering	
Difficulty	86.1 (68)
No difficulty	13.9 (11)
Mobility aid usage	
Walker	2.5 (2)
Manual wheelchair	7.5 (6)
Power wheelchair	2.5 (2)
No mobility aid	87.5 (70)
Adaptive behaviours	1.08 (0.51)
Functional cognitive ability	1.10 (0.91)
Mental health difficulties	16.76 (5.79)
Depth of sport participation	5.91 (0.16)

Baseline Analyses

Preliminary between-group analyses showed group differences for baseline response efficacy, $F(4, 75) = 3.21$, $p = 0.02$, $\eta_p^2 = 0.15$. Participants in the control condition ($M = 5.34$, $SD = 1.23$) had lower response efficacy at baseline compared to participants in the risk information + loss-framed condition ($M = 6.35$, $SD = 0.77$). Due to the between-group differences, baseline response efficacy was included as a covariate in the respective analysis. There were no differences between the conditions at baseline for other variables.

Main Analyses

Comparison of Messaging Manipulations Between Conditions

There was a main effect for risk, for risk information perceptions, $F(2, 75) = 19.97, p < 0.01, \eta_p^2 = 0.35$. Participants in the risk information ($M = 6.34, SD = 0.70$) and no risk information ($M = 6.12, SD = 0.75$) conditions perceived that they were provided with more risk information compared to participants in the control ($M = 4.33, SD = 1.88$) condition. There was a main effect for frame, for frame perceptions, $F(2, 77) = 20.57, p < 0.01, \eta_p^2 = 0.35$. Participants in the gain-framed ($M = 6.52, SD = 1.15$) conditions perceived that they were provided with more information pertaining to the benefits of PA compared to participants in the loss-framed ($M = 4.94, SD = 2.27$) conditions. Participants in the control ($M = 2.47, SD = 2.90$) condition perceived that they were provided with information pertaining neither to the benefits of PA, nor the risks of inactivity compared to participants in the gain-framed and loss-framed conditions. There were no other significant main or interaction effects observed for variables measuring manipulation checks (Table 5).

Comparison of Message Perceptions Between Conditions

There was a main effect for frame, for tone perceptions, $F(2, 75) = 8.42, p < 0.01, \eta_p^2 = 0.18$. Participants in the control ($M = 4.20, SD = 1.15$) condition perceived that the general tone of the information in the newsletter was more neutral compared to participants in the gain-framed ($M = 5.73, SD = 1.10$) and loss-framed ($M = 5.16, SD = 1.35$) conditions. There was a main effect for risk, for tone perceptions, $F(2, 75) = 8.56, p < 0.01, \eta_p^2 = 0.19$. Participants in the control ($M = 4.20, SD = 1.15$) condition perceived that the general tone of the information in the newsletter was more neutral compared to participants in the risk information ($M = 5.15, SD =$

1.33) and no risk information ($M = 5.75$, $SD = 1.11$) conditions. There were no other significant main or interaction effects observed for variables measuring message perceptions (Table 6).

Comparison of EPPM Constructs Between Conditions Over Time

There was a main effect for risk, for perceived threat, $F(2, 56) = 4.71$, $p = 0.01$, $\eta_p^2 = 0.14$. Participants in the risk information ($M = 5.21$, $SD = 1.43$) conditions had higher perceived threat compared to participants in the control ($M = 4.24$, $SD = 2.19$) condition. There was a main effect for time, for planning efficacy, $F(3, 61) = 5.25$, $p < 0.01$, $\eta_p^2 = 0.21$. Regardless of condition, participants had higher planning efficacy at baseline ($M = 5.13$, $SD = 1.95$) and FQ1 ($M = 5.14$, $SD = 1.99$) compared to at FQ2 ($M = 4.50$, $SD = 2.00$) and FQ3 ($M = 4.56$, $SD = 2.22$). There was a main effect for time, for intention, $F(3, 61) = 3.91$, $p = 0.01$, $\eta_p^2 = 0.16$. Regardless of condition, participants had higher intentions to support their children's PA at FQ1 ($M = 3.77$, $SD = 0.94$) compared to at FQ2 ($M = 3.46$, $SD = 1.01$) and FQ3 ($M = 3.50$, $SD = 0.84$). There were no other significant main or interaction effects observed for variables measuring EPPM constructs (Table 7).

Comparison of Parental Support Behaviours Between Conditions Over Time

There was a main effect for time, for parental support for PA, $F(2, 57) = 4.72$, $p = 0.01$, $\eta_p^2 = 0.14$. Regardless of condition, participants reported higher levels of parental support for PA at baseline ($M = 3.27$, $SD = 0.95$) compared to at FQ3 ($M = 2.99$, $SD = 0.89$). There were no other significant main or interaction effects observed for variables measuring behaviours (Table 8).

Table 5***Messaging Manipulations by Condition Immediately Following Message Exposure***

Messaging manipulations	FQ1 <i>M (SD)</i>					Frame	Risk <i>p (η²)</i>	Frame x Risk
	RG	RL	G	L	C			
Risk information perceptions	6.31 (0.60)	6.38 (0.81)	5.94 (0.56)	6.33 (0.90)	4.33 (1.88)		<0.01* (0.35)	
Frame perceptions	6.69 (0.70)	5.12 (2.29)	6.35 (1.46)	4.73 (2.31)	2.47 (2.90)	<0.01* (0.35)		

RG = risk information + gain-framed messages; RL = risk information + loss-framed messages; G = no risk information + gain-framed messages; L = no risk information + loss-framed messages; C = control.

Table 6***Message Perceptions by Condition Immediately Following Message Exposure***

Message perceptions	FQ1 <i>M (SD)</i>					Frame	Risk <i>p (η²)</i>	Frame x Risk
	RG	RL	G	L	C			
Tone perceptions	5.56 (1.15)	4.76 (1.39)	5.88 (1.05)	5.60 (1.18)	4.20 (1.15)	<0.01* (0.18)	<0.01* (0.19)	0.38 (0.01)
Avoidance	3.09 (1.00)	2.66 (1.45)	2.69 (0.98)	2.60 (0.93)	3.27 (1.27)	0.14 (0.06)	0.16 (0.05)	0.56 (0.01)
Guilt	4.13 (2.22)	3.65 (1.80)	3.24 (2.22)	4.00 (1.85)	3.13 (2.10)	0.32 (0.03)	0.33 (0.03)	0.29 (0.02)

RG = risk information + gain-framed messages; RL = risk information + loss-framed messages; G = no risk information + gain-framed messages; L = no risk information + loss-framed messages; C = control.

Table 7

EPPM Constructs by Condition over Time

EPPM constructs	Baseline <i>M(SD)</i>						FQ1 <i>M(SD)</i>						FQ2 <i>M(SD)</i>						FQ3 <i>M(SD)</i>					
	RG	RL	G	L	C		RG	RL	G	L	C		RG	RL	G	L	C		RG	RL	G	L	C	
Perceived threat	5.31 (1.39)	4.92 (1.34)	4.45 (1.98)	4.58 (1.40)	4.41 (1.29)	5.43 (1.28)	5.17 (1.47)	4.50 (1.76)	4.67 (1.32)	4.39 (1.02)	5.41 (1.02)	5.27 (1.32)	4.43 (1.50)	4.94 (1.22)	4.68 (0.89)	5.65 (0.89)	5.18 (1.26)	4.72 (1.58)	4.98 (1.10)	4.24 (1.06)				
Task self-efficacy	2.75 (1.22)	3.35 (1.28)	2.83 (1.41)	2.93 (1.47)	3.19 (1.31)	2.92 (1.20)	3.71 (1.13)	2.77 (1.43)	2.84 (1.41)	3.19 (1.34)	2.69 (1.33)	3.15 (1.23)	3.02 (1.15)	2.53 (1.15)	2.83 (1.37)	2.85 (1.28)	3.29 (1.30)	2.81 (1.40)	3.07 (1.30)	2.79 (1.49)				
Response efficacy	5.77 (0.97)	6.35 (0.77)	6.13 (1.00)	6.23 (0.67)	5.34 (1.23)	6.02 (0.70)	6.23 (0.84)	6.44 (0.50)	6.02 (0.71)	5.57 (1.02)	5.84 (0.68)	5.95 (1.30)	5.94 (0.96)	6.071 (0.85)	5.73 (0.98)	5.83 (0.69)	6.27 (0.76)	6.19 (0.93)	6.04 (0.90)	5.98 (0.74)				
Planning efficacy	4.87 (2.27)	5.88 (1.45)	4.41 (2.23)	4.72 (2.04)	5.64 (1.52)	4.84 (2.45)	5.81 (1.41)	4.59 (2.22)	5.03 (1.77)	5.62 (1.67)	4.13 (2.30)	5.48 (1.73)	3.59 (2.02)	4.47 (1.67)	4.95 (1.72)	4.29 (2.22)	5.10 (1.84)	3.67 (2.59)	5.11 (2.00)	4.85 (2.26)				
Intention	3.56 (0.89)	3.98 (0.75)	3.44 (0.93)	3.57 (1.02)	3.90 (1.07)	3.81 (0.86)	4.02 (0.82)	3.47 (0.94)	3.64 (1.04)	3.90 (0.96)	3.48 (0.83)	3.67 (1.05)	3.24 (0.91)	3.36 (1.26)	3.55 (0.91)	3.19 (0.78)	3.77 (0.93)	3.33 (0.68)	3.45 (0.88)	3.76 (0.82)				

EPPM constructs	Time	Frame	Risk	Time x Frame	Time x Risk	Frame x Risk	Time x Frame x Risk
$p(\eta_p^2)$							
Perceived threat	0.27 (0.07)	0.07 (0.09)	0.01* (0.14)	0.73 (0.01)	0.74 (0.01)	0.19 (0.03)	0.66 (0.01)
Task self-efficacy	0.20 (0.06)	0.80 (0.01)	0.68 (0.01)	0.30 (0.02)	0.41 (0.01)	0.37 (0.01)	0.49 (0.01)
Response efficacy	0.17 (0.06)	0.95 (<0.01)	0.96 (<0.01)	0.67 (0.01)	0.71 (0.01)	0.63 (<0.01)	0.29 (0.02)
Planning efficacy	$<0.01^*$ (0.21)	0.18 (0.05)	0.20 (0.05)	0.70 (0.01)	0.60 (0.01)	0.85 (<0.01)	0.34 (0.02)
Intention	0.01* (0.16)	0.53 (0.02)	0.23 (0.05)	0.83 (0.01)	0.32 (0.02)	0.65 (<0.01)	0.70 (0.01)

RG = risk information + gain-framed messages; RL = risk information + loss-framed messages; G = no risk information + gain-framed messages; L = no risk information + loss-framed messages; C = control. Due to between-group differences at baseline, only follow-up data were used for the analysis of response efficacy, and baseline response efficacy was included as a covariate.

Table 8***Parental Support Behaviours by Condition over Time***

Parental support behaviours	Baseline <i>M (SD)</i>					FQ2 <i>M (SD)</i>					FQ3 <i>M (SD)</i>				
	RG	RL	G	L	C	RG	RL	G	L	C	RG	RL	G	L	C
Parental support for PA	3.28 (0.95)	3.49 (0.89)	3.32 (1.01)	2.88 (0.82)	3.34 (0.96)	2.98 (0.85)	3.23 (0.80)	3.05 (1.08)	2.93 (1.03)	3.23 (0.80)	2.91 (0.97)	2.91 (0.86)	2.92 (0.84)	2.84 (1.01)	3.20 (0.89)
Behavioural regulation of parental support for PA	2.20 (0.85)	2.43 (0.93)	2.34 (0.84)	1.88 (0.81)	2.77 (1.15)	2.23 (0.84)	2.17 (0.84)	2.02 (1.01)	2.13 (1.09)	2.52 (0.95)	2.08 (1.03)	2.27 (1.07)	1.95 (0.91)	2.15 (1.20)	2.61 (1.01)

Parental support behaviours	Time	Frame	Risk	Time x Frame	Time x Risk	Frame x Risk	Time x Frame x Risk
	<i>p (η²)</i>						
Parental support for PA	0.01* (0.14)	0.99 (<0.01)	0.97 (<0.01)	0.59 (0.01)	0.13 (0.03)	0.60 (0.01)	0.10 (0.04)
Behavioural regulation of parental support for PA	0.44 (0.03)	0.28 (0.04)	0.26 (0.04)	0.70 (0.01)	0.71 (0.01)	0.84 (<0.01)	0.06 (0.04)

RG = risk information + gain-framed messages; RL = risk information + loss-framed messages; G = no risk information + gain-framed messages; L = no risk information + loss-framed messages; C = control.

Discussion

This study examined an online messaging intervention that used various combinations of risk information and framed PA messages to explore the effects on EPPM constructs and parental support for PA among families of CYID, while also exploring parents' perceptions of the different messaging strategies. To the researcher's knowledge, this was the first study assessing the utility of risk information and framed PA messages to motivate parental support for PA among families of CYID. Findings from this study will inform future PA messaging research and the development of PA promotion strategies for families of CYID.

Effectiveness of Messaging Manipulations

The purpose of performing manipulation checks following message exposure was to determine whether participants' message perceptions aligned with the intended message connotations for each condition. Ideally, significant differences in message perceptions that corresponded with the risk information and framed PA messages provided should have been observed between conditions; this would have indicated successful experimental manipulation. In some cases, the messaging intervention was successful in achieving the intended experimental manipulations. In other cases, unexpected message perceptions were observed that did not align with the messaging intervention. For example, simply providing framed PA messages was sufficient to evoke high perceptions of risk information among participants in the no risk information conditions. Additionally, although the control newsletter contained neither risk information, nor framed PA messages, low risk information perceptions were not observed among participants in the control condition. These findings suggest that perhaps parents of CYID have biased opinions about their children's health risks (Bassett-Gunter et al., 2014), which influence their risk information perceptions regardless of message content. Further, despite being

provided with information pertaining to the risks of inactivity, participants in the loss-framed conditions still perceived they were provided with information pertaining to the benefits of PA. Perhaps these participants were unable to detect the message framing as they were only provided with loss-framed messages; had participants been provided with both gain-framed and loss-framed messages, different results may have been observed.

Findings from the manipulation checks regarding risk information perceptions and frame perceptions must be considered when interpreting results for the other outcome variables of interest. Overall, risk information perceptions ranged from neutral to high regardless of condition. Additionally, participants in all experimental conditions (i.e., participants who received any PA information, regardless of the provision of risk information and framed PA messages) perceived that they were provided with gain-framed messages. In a similar study, where a lack of main effects for both risk information perceptions and frame perceptions were observed, it was suggested that participants were unable to detect the subtleties of the intended manipulations (Lithopoulos et al., 2017). Given that participants' message perceptions only partially aligned with the intended message connotations for each condition in the current study, this may explain why most of the main effects observed for the outcome variables of interest were for time, rather than for risk or frame. Nonetheless, findings provide novel contributions to the literature, as well as valuable insights regarding future research and the development of PA promotion messages for families of CYID.

Message Perceptions

Interestingly, participants in all experimental conditions perceived that the general tone of the information in the newsletter was positive, regardless of the inclusion of risk information and differentially framed PA messages. For example, participants in the risk information + loss-

framed condition did not perceive that the general tone of the information in the newsletter was negative. Perhaps tone perceptions were positive among participants in all experimental conditions because the information in the newsletters aligned with the needs and preferences of parents of CYID (Bassett-Gunter et al., 2017a). Unlike many existing PA messages which are often only appropriate for able-bodied individuals (Bauman et al., 2006; Jaarsma et al., 2019; Smith et al., 2021), the newsletters contained disability-specific PA information and inclusive images. Given that parents of CYID have expressed a need for these types of PA messages, the information in the newsletters may have been perceived as relevant and necessary, thereby stimulating positive tone perceptions among participants (Bassett-Gunter et al., 2017a). This finding may also be explained by the lack of consideration for message matching in the current study. That is, participants' tone perceptions may have been influenced by whether the messages they received were matched to their PA message preferences with respect to message framing. For example, if a participant received loss-framed messages, and they possessed a preference for loss-framed messages compared to gain-framed messages (i.e., the messages were matched to their preferences), this may have resulted in positive tone perceptions (Rothman et al., 2020). Future research may consider evaluating tone perceptions and the role of matching messages according to participants' framing preferences in the context of motivating parental support for PA.

The messages in the newsletters were effective for discouraging avoidance, which is desirable with respect to positively influencing EPPM constructs and promoting parental support for PA. Null findings for avoidance are similar to those reported by Lithopoulos and colleagues (2017). Notably, low avoidance immediately post-message exposure coincided with the highest levels of intention observed throughout the study regardless of condition, suggesting that

avoidance may act as a secondary indicator of intention. Findings also suggest that the messages in the newsletters were effective for failing to evoke cognitions about guilt, which may be beneficial given that guilt among parents has been found to motivate neither intention, nor parental support for PA (Mistry & Latimer-Cheung, 2014). Moreover, Faulkner and colleagues (2016) have cautioned against providing parents with PA information that stimulates feelings of guilt, as the possibility of failing to support their children's PA may further discourage already overburdened parents from attempting to engage in this behaviour. Collectively, results regarding participants' message perceptions suggest that the messaging intervention was not damaging in evoking undesirable feelings of avoidance and guilt, which helps to explain the effects of the messaging intervention on EPPM constructs.

EPPM Constructs

One of the main purposes of this study was to examine how the online messaging intervention influenced EPPM constructs. Findings from this study suggest that the various combinations of risk information and differentially framed PA messages were ineffective for influencing EPPM constructs among parents of CYID, as few differences were observed between and within conditions. In fact, decreases were observed for those EPPM constructs that changed over time. While EPPM constructs were not positively influenced by the messaging intervention, results provide valuable insights with respect to applying the EPPM to promote parental support for PA among families of CYID.

Notably, among the significant effects observed for EPPM constructs and behaviours, the only main effect for condition was for perceived threat. Participants in all experimental conditions perceived higher threat than participants in the control condition. However, despite differences in the provision of risk information, significant differences in perceived threat were

not observed between participants in the different experimental conditions. These findings are likely connected to the ineffective manipulation of risk perceptions through the provision of risk information. That is, regardless of whether participants received risk information, there was no difference in perceptions of risk information or subsequently perceived threat among participants in all experimental conditions.

Additionally, although a main effect was not observed for time, for perceived threat, the main effect for risk indicated that there were differences in perceived threat between the risk information conditions and control condition, despite a lack of differences between these conditions at baseline. This suggests that there may have been an effect for time, for perceived threat; that is, perceived threat may have increased in the risk information conditions following message exposure. However, given that the sample was underpowered to detect small effects, this effect was not observed as significant. Contrary to tenets of the EPPM (Witte, 1992), post-message exposure perceptions of threat did not appear to influence other EPPM constructs or parental support for PA. Findings for perceived threat suggest that it may be more valuable to develop messages that target other EPPM constructs (Rhodes et al., 2013) and parental support for PA directly, rather than developing messages that aim to generate perceptions of threat among parents of CYID.

Unlike findings from previous studies in which effects for time, for task self-efficacy (Latimer et al., 2008) and response efficacy (Lithopoulos et al., 2017) were observed, there were a lack of effects for these constructs in the current study. Neutral levels of task self-efficacy over time, regardless of condition, suggest that participants were neither confident, nor unconfident, in their ability to provide parental support for PA, and that the messaging intervention did not influence their confidence levels during the study. High levels of response efficacy regardless of

condition suggest that participants were well-aware of the benefits of PA, meaning the information in the newsletters about parental support for PA and child PA likely served as a reminder to them, rather than novel information.

The EPPM may help to explain the lack of effects observed for task self-efficacy and response efficacy. According to this model, individuals will evaluate their task self-efficacy and response efficacy if they perceive a threat (Witte, 1992); given that overall perceived threat ranged from neutral to moderate regardless of condition, perhaps participants' perceptions of threat were not sufficiently high to influence task self-efficacy and response efficacy. This explanation is also reasonable as the messages in the newsletters aimed to generate a threat among participants, rather than directly targeting their enhanced task self-efficacy and response efficacy. Therefore, a limitation of this work is that the newsletters did not target self-efficacy, which may be critical for promoting parental support for PA.

Intention is well-established as a proximal antecedent to PA behaviours including parental support for PA (Constant et al. 2020; Tanna et al., 2017). The decrease in intention observed over time contrasts findings from previous studies (Gallagher & Updegraff, 2012; Lithopoulos et al., 2017). Decreases in planning efficacy may be related to decreases in intention. Perhaps after completion of the initial questionnaires, participants felt somewhat confident in their abilities to create a plan to provide parental support for PA, and they were motivated to support their children's PA. However, participants may have attempted to enact planning and parental support for PA, yet they were unsuccessful due to receiving a lack of additional assistance. As a result, they may have felt less confident and motivated over time.

Participants received neither guidance regarding how to create a detailed plan for supporting their children's PA, nor information about other behavioural regulation strategies that

would have helped them to act on their intention to support their children's PA, therefore reducing their likelihood of successfully engaging in parental support for PA. Similar explanations were proposed in another study, which found that planning efficacy did not change over time among participants who received planning support, whereas planning efficacy decreased among participants in the control condition who did not receive planning support (Tanna et al., 2017). To promote enhanced planning efficacy and intention which may have translated into higher levels of parental support for PA, perhaps it would have been beneficial to offer participants with guidance regarding how to plan for and execute parental support for PA.

Parental Support Behaviours

In addition to examining how the online messaging intervention influenced EPPM constructs, another main purpose of this study was to explore the effects of the intervention on parental support for PA. Intervention efficacy was primarily determined by comparing parental support for PA between and within conditions over time. Findings from this study suggest that the various combinations of risk information and differentially framed PA messages were ineffective for influencing parental support for PA among families of CYID, as differences were not observed between and within conditions. Conversely, in a similar study that employed the EPPM to evaluate the influence of risk information and framed PA messages on PA engagement among individuals with multiple sclerosis, findings suggested that PA increased over time, regardless of condition. Further, participants in the risk information conditions displayed the highest levels of PA (Lithopoulos et al., 2017). Decreases in parental support for PA over time in the current study, despite a lack of differences in parental support for PA observed between the conditions, provide additional evidence to inform PA promotion strategies for families of CYID.

Findings suggest that in response to the messaging intervention, participants' cognitions influenced their parental support for PA. Although the messaging intervention was intended to enhance EPPM constructs and parental support for PA, unanticipated decreases in these outcomes were observed; that is, decreases in planning efficacy and intention aligned with decreases in parental support for PA. Despite changes in these variables over time occurring in the opposite direction from desired, results align with the EPPM, which postulates that self-efficacy and intention are predictors of behaviours (Witte, 1992).

While the behaviours of interest were analyzed independently, it is interesting to note that parental support for PA was correlated with behavioural regulation of parental support for PA at all time points ($p < 0.01$). These findings support conclusions from Rhodes and colleagues (2016), which suggested that parental support for PA and behavioural regulation of parental support for PA should be positively correlated. Additionally, findings regarding low levels of behavioural regulation of parental support for PA emphasize the presence of the intention-behaviour gap (Sniehotta et al., 2005), as well as the need to bridge this gap; perhaps if participants were provided with resources to support them with engaging in enhanced behavioural regulation of parental support for PA, higher levels of parental support for PA would have been reported.

Implications

This research highlights a variety of theoretical and practical implications regarding PA promotion among families of CYID. Although the use of risk information coupled with framed PA messages has been effective for promoting PA among various populations (Bassett-Gunter et al., 2013; Bassett-Gunter et al., 2014; Lithopoulos et al., 2017), results from the current study suggest that this messaging strategy was ineffective for influencing EPPM constructs and

motivating parental support for PA among families of CYID. Perhaps it would be beneficial to investigate different messaging strategies or theoretical frameworks, as well as to target alternate constructs when developing PA promotion messages for parents of CYID. For example, messaging interventions that target self-efficacy directly, rather than perceived threat, may be more effective for motivating parental support for PA. Further work is required to determine which theoretical constructs should be targeted within PA messages, and how to best target these constructs. Additionally, the researcher cautions against implementing a messaging intervention to motivate PA behaviour change without providing resources to support individuals with engaging in the desired change. Families of CYID should be provided with guidance regarding how to create a detailed plan, as well as information about other behavioural regulation strategies to promote parental support for PA once other EPPM constructs have been effectively targeted.

PA promotion messages should be developed in collaboration with parents of CYID to ensure these messages meet their informational needs and preferences (Bassett-Gunter et al., 2017a). Participants' positive perceptions of the messaging intervention in the current study, regardless of the inclusion of risk information and differentially framed PA messages, highlight the importance of providing parents of CYID with inclusive, disability-specific PA information. Additionally, when investigating PA message preferences among parents of CYID, it is necessary to consider best practices for enhancing study design, to ensure participants have positive research involvement experiences. Feedback from participants should be obtained (e.g., via questionnaires and focus groups), analyzed, and applied in future studies. Despite anticipated drop-out due to the long-term nature of the current study (Rhodes et al., 2016), participant retention was high as almost all participants completed the follow-up questionnaires. Findings regarding retention suggest that a similar study design using online questionnaires and

personalized communication with participants via email at each time point should be employed in future research among parents of CYID to promote high retention.

In addition to establishing preferences among parents of CYID when developing targeted PA messages, optimal strategies for disseminating these messages must also be determined. Further investigation is required regarding the practical dissemination of optimally effective PA promotion messages targeting parents of CYID. PA and disability community-based organizations may serve as an ideal dissemination site due to their direct interaction with families of CYID (Gorter et al., 2017). As demonstrated through the current study's participant recruitment strategy, partnerships with community-based organizations are valuable for connecting researchers to families of CYID. However, given that community-based organizations often lack the knowledge required to implement evidence-based approaches for developing and disseminating PA messages (Bassett-Gunter et al., 2019), further efforts to collaborate are necessary to bridge the research to practice gap and ultimately affect meaningful change at the community level.

Strengths, Limitations, and Future Directions

It is necessary to consider the strengths and limitations of this work, both in the context of the current study's findings, as well as to guide future research directions. First, the sample was underpowered to detect small effects. There was also a lack of diversity among participants; the sample consisted largely of non-racialized (86.2%), female (90.0%) parents residing in Ontario (71.2%) whose CYID were male (62.5%). Additionally, utilizing community-based organizations as the primary means for recruitment increased the risk of sample homogeneity and sampling bias (Bassett-Gunter et al., 2017b). A ceiling effect may have also occurred (American Psychological Association, n.d.), as the families recruited were likely to already have

been involved in PA. That is, the potential to observe significant differences in these variables related to parental support for PA may have been limited given high baseline scores. Future studies should aim to amass larger, more diverse samples through a variety of recruitment strategies. There may also be value in specifically conducting research among families of CYID that engage in lower levels of parental support for PA at baseline, within a narrower age range, and with specific types of intellectual disabilities.

Second, while the longitudinal design was a strength of this study, one limitation of the timeline was the potential for participants to fail to recall the messages they had received through the intervention. For example, two participants contacted the researcher for support when completing the final questionnaire as they did not remember reading the newsletter at baseline. Repeated message exposure has been recommended to overcome this limitation and elicit greater behaviour change (Claypool et al., 2004; Latimer et al., 2008). Conversely, it may be argued that the two-month timeline was insufficient to observe meaningful behaviour changes; as proposed by Tanna and colleagues (2017), a longer study duration may have been beneficial for parents to develop mastery in skills related to planning for and executing parental support for PA. Future studies should experiment with different follow-up lengths when administering questionnaires.

Third, the researcher developed evidence-based newsletters that employed messaging strategies backed by theory (Tversky & Kahneman, 1981; Witte, 1992) and followed guidance from previous PA messaging research (Lithopoulos et al., 2017). However, risk information and message framing were not successfully manipulated. The development of these newsletters within a research context also limits their external validity. Additionally, the newsletters primarily contained information about child PA, rather than parental support for PA. The researcher designed the newsletters this way to align with: 1) the types of messages that parents

of CYID would be more likely to encounter outside of a research context, and 2) the recommendation to provide parents of CYID with specific information about the benefits of PA (Bassett-Gunter et al., Under Review). However, given that the messaging intervention aimed to motivate parental support for PA, it may have been beneficial to directly target this behaviour in the newsletters. For example, Bassett-Gunter and colleagues (2017b) provided parents with PA messages that contained information about both child PA and parental support for PA. Moreover, the mode of intervention delivery may have affected how participants processed the messages. Presenting information in a newsletter format may have elicited different responses compared to other conventional message delivery formats such as television advertisements or brief messages (Bassett-Gunter et al., 2017b). Perhaps the newsletters were not engaging, which may have caused participants to spend varying amounts of time reading the messages (Lithopoulos & Young, 2018) and fail to recognize the risk information and message framing (Lithopoulos et al., 2017). Future studies should further investigate the development of messaging interventions for parents of CYID.

Fourth, although the inclusion of a control condition as recommended by Lithopoulos and colleagues (2017) was a strength of this study, the information about COVID-19 in the control newsletter may have unintentionally evoked cognitions about health behaviours among participants. That is, EPPM constructs and parental support for PA were similarly influenced among participants in both the experimental and control conditions over time. Additionally, three participants in the control condition contacted the researcher for support when completing the questionnaires, as they did not understand why they were provided with information about COVID-19, rather than about PA. This suggests that participants may have been aware that they were in the control condition; as proposed by the John Henry effect, if participants are aware that

they belong to the control condition, then they may perceive that they are at a disadvantage compared to the experimental conditions, which in turn biases their responses to compensate for this disadvantage (Gammon & Bornstein, 2018). Future studies should explore the inclusion of control conditions that receive various types of messages, as well as no messages.

Fifth, participants' responses were limited by the measurement instruments employed within the study (Edwards, 2010; Saczynski et al., 2013), which have often been developed through research among families of children without disabilities. Given that existing measures may not fully capture parental support for PA among families of CYID, there has been a call for the development of enhanced measurement tools (Arbour-Nicitopoulos et al., Under Review). Future studies should develop enhanced measures of parental support for PA among families of CYID.

Sixth, findings suggest that participation in the study itself may have evoked changes in EPPM constructs and parental support for PA, regardless of the messaging intervention that participants received. The Hawthorne effect, which is a phenomenon whereby participants modify their behaviours due to their awareness that they are being researched (Adair, 1984), may explain these findings. The mere exposure effect may also help to explain the main effects observed for time, despite a lack of main effects observed for risk or frame. That is, an individual's participation in an intervention that involves exposure to messages and measurement instruments may influence their cognitions and behaviours, as well as their interpretation of questionnaire items (Zajonc, 1968, as cited in Baranowski et al., 2006). Perhaps involvement in a study containing PA messages and measures that were suggestive of parental support for PA was sufficient for participants to reflect on, and subsequently alter, their PA cognitions and behaviours. In fact, opposite effects from the intended purpose of the messaging intervention

were observed, as lower levels of planning efficacy, intention, and parental support for PA were reported at follow-up. Contrary to suggestions that that the provision of PA messages is beneficial regardless of their framing and presence of risk information (Lithopoulos et al., 2017), results from the current study align more closely with those reported by Tanna and colleagues (2017), which suggested that individuals require support to engage in parental support for PA. Findings emphasize the dangers of implementing a messaging intervention to motivate PA behaviour change without providing resources to support individuals with engaging in the target behaviour. Future studies should exercise caution when providing PA messages to participants, as these messages should be accompanied with resources to support positive changes in EPPM constructs and parental support for PA.

Finally, this study was conducted during the COVID-19 pandemic, which caused major disruptions in PA opportunities (Esentürk & Yarımkaaya, 2021). For example, structured PA programs were canceled or held virtually, the use of public play structures was prohibited, physical distancing was enforced, and modes of school attendance were affected. Therefore, participants' responses may not be reflective of their typical PA cognitions and parental support for PA, and findings from this study should be interpreted in the context of the COVID-19 pandemic.

Conclusion

This study evaluated an online messaging intervention that used various combinations of risk information and framed PA messages to enhance EPPM constructs and parental support for PA among families of CYID, and explored parents' perceptions of the different messaging strategies. The changes observed over time regardless of condition suggest that participation in the study itself influenced EPPM constructs and parental support for PA. Additionally, the risk information and framed PA messages evoked diverse message perceptions. Results indicate that risk information and framed PA messages alone may be of limited utility to motivate parental support for PA among families of CYID. Messaging interventions should target downstream antecedents to parental support for PA within the EPPM, and include resources to assist families of CYID with engaging in parental support for PA. Findings from this study will inform future evidence-based practice and research regarding the development of optimally effective messages for motivating parental support for PA among families of CYID, ultimately producing a positive community-level impact.

References

- A common vision for increasing physical activity and reducing sedentary living in Canada: Let's get moving.* (2018). Government of Canada. Retrieved from <https://www.canada.ca/en/public-health/services/publications/healthy-living/lets-get-moving.html>
- Adair, J. G. (1984). The Hawthorne effect: A reconsideration of the methodological artifact. *Journal of Applied Psychology, 69*(2), 334–345. <https://doi.org/10.1037/0021-9010.69.2.334>
- Anderson, L. S., & Heyne, L. A. (2010). Physical activity for children and adults with disabilities: An issue of “amplified” importance. *Disability and Health Journal, 3*(2), 71–73. <https://doi.org/10.1016/j.dhjo.2009.11.004>
- Arbour-Nicitopoulos, K., Vanderloo, L. M., Latimer-Cheung, A. E., Kuzik, N., Martin Ginis, K. A., James, M. E., Bassett-Gunter, R. L., Ruttle, D., DaSilva, P., Disimino, K., Cameron, C., Arthur, M., & Shikako-Thomas, K. (Under Review). A Canadian report card on the physical activity of children and youth with disabilities. *Adapted Physical Activity Quarterly.*
- Aytur, S., Craig, P. J., Frye, M., Bonica, M., Rainer, S., Hapke, L., & McGilvray, M. (2018). Through the lens of a camera: Exploring the meaning of competitive sport participation among youth athletes with disabilities. *Therapeutic Recreation Journal, 52*(2), 95–125. <https://doi.org/10.18666/TRJ-2018-V52-I2-8774>
- Baranowski, T., Allen, D. D., Mâsse, L. C., & Wilson, M. (2006). Does participation in an intervention affect responses on self-report questionnaires? *Health Education Research, 21*(1), i98–i109. <https://doi.org/10.1093/her/cyl087>

- Barr, M., & Shields, N. (2011). Identifying the barriers and facilitators to participation in physical activity for children with Down syndrome. *Journal of Intellectual Disability Research, 55*(11), 1020–1033. <https://doi.org/10.1111/j.1365-2788.2011.01425.x>
- Bassett-Gunter, R. L., Latimer-Cheung, A. E., Martin Ginis, K. A., & Castelhana, M. (2014). I spy with my little eye: Cognitive processing of framed physical activity messages. *Journal of Health Communication, 19*(6), 676–691. <https://doi.org/10.1080/10810730.2013.837553>
- Bassett-Gunter, R. L., Latimer-Cheung, A. E., Tomasone, J. T., & Arbour-Nicitopoulos, K. A. (2019). *A workshop to establish evidence-informed recommendations for developing and disseminating sport and physical activity information targeting parents of children with disabilities*. Meeting Minutes.
- Bassett-Gunter, R. L., Martin Ginis, K. A., & Latimer-Cheung, A. E. (2013). Do you want the good news or the bad news? Gain- versus loss-framed messages following health risk information: The effects on leisure time physical activity beliefs and cognitions. *Health Psychology, 32*(12), 1188–1198. <https://doi.org/10.1037/a0030126>
- Bassett-Gunter, R. L., Ruscitti, R. J., Latimer-Cheung, A. E., & Fraser-Thomas, J. L. (2017a). Targeted physical activity messages for parents of children with disabilities: A qualitative investigation of parents' informational needs and preferences. *Research in Developmental Disabilities, 64*, 37–46. <https://doi.org/10.1016/j.ridd.2017.02.016>
- Bassett-Gunter, R. L., Stone, R., Jarvis, J., & Latimer-Cheung, A. E. (2017b). Motivating parent support for physical activity: The role of framed persuasive messages. *Health Education Research, 32*(5), 412–422. <https://doi.org/10.1093/her/cyx059>

- Bassett-Gunter, R. L., Tomasone, J. R., Latimer-Cheung, A. E., Arbour-Nicitopoulos, K. P., Disimino, K., Larocca, V., Tristani, L., Martin Ginis, K. A., Leo, J., Vanderloo, L. M., Sora, D., & Allison, A. (Under Review). Evidence-informed recommendations for community-based organizations developing physical activity information targeting families of children and youth with disabilities. *Adapted Physical Activity Quarterly*.
- Bauman, A. E., Nelson, D. E., Pratt, M., Matsudo, V., & Schoeppe, S. (2006). Dissemination of physical activity evidence, programs, policies, and surveillance in the international public health arena. *American Journal of Preventive Medicine, 31*(4S), 57–65.
<https://doi.org/10.1016/j.amepre.2006.06.026>
- Belley-Ranger, E., Carbonneau, H., Roult, R., Brunet, I., Duquette, M. M., & Nauroy, E. (2016). Determinants of participation in sport and physical activity for students with disabilities according to teachers and school-based practitioners specialized in recreational and competitive physical activity. *Sport Science Review, 25*(3–4), 135–158.
<https://doi.org/10.1515/ssr-2016-0008>
- Berry, T. R., Craig, C. L., Faulkner, G., Latimer, A., Rhodes, R., Spence, J. C., & Tremblay, M. S. (2014). Mothers' intentions to support children's physical activity related to attention and implicit agreement with advertisements. *International Journal of Behavioral Medicine, 21*, 131–138. <https://doi.org/10.1007/s12529-012-9279-5>
- Boat, T. F., & Joel, T. W. (2015). *Clinical Characteristics of Intellectual Disabilities*. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK332877/>
- Brawley, L. R., & Latimer, A. E. (2007). Physical activity guides for Canadians: Messaging strategies, realistic expectations for change, and evaluation. *Applied Physiology, Nutrition and Metabolism, 32*, S170–S184. <https://doi.org/10.1139/H07-105>

- Canadian 24-Hour Movement Guidelines for the Children and Youth (5-17 years): An integration of physical activity, sedentary behaviour, and sleep.* (n.d.) Canadian Society for Exercise Physiology. Retrieved from <https://csepguidelines.ca/guidelines/children-youth/>
- Case, L., Ross, S., & Yun, J. (2020). Physical activity guideline compliance among a national sample of children with various developmental disabilities. *Disability and Health Journal*, 13(2), 100881. <https://doi.org/10.1016/j.dhjo.2019.100881>
- Ceiling effect.* (n.d.). American Psychological Association. Retrieved from <https://dictionary.apa.org/ceiling-effect>
- Chen, S. Y., Feng, Z., & Yi, X. (2017). A general introduction to adjustment for multiple comparisons. *Journal of Thoracic Disease*, 9(6), 1725–1729. <https://doi.org/10.21037/jtd.2017.05.34>
- Claypool, H. M., Mackie, D. M., Garcia-Marques, T., McIntosh, A., & Udall, A. (2004). The effects of personal relevance and repetition on persuasive processing. *Social Cognition*, 22(3), 310–335. <https://doi.org/10.1521/soco.22.3.310.35970>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences, 2nd edition*. Lawrence Erlbaum Associates.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159. <https://doi.org/10.20982/tqmp.03.2.p079>
- Constant, A., Conserve, D. F., Gallopel-Morvan, K., & Raude, J. (2020). Socio-cognitive factors associated with lifestyle changes in response to the COVID-19 epidemic in the general population: Results from a cross-sectional study in France. *Frontiers in Psychology*, 11, 579460. <https://doi.org/10.3389/fpsyg.2020.579460>

- Coster, W., Law, M., Bedell, G., Khetani, M., Cousins, M., & Teplicky, R. (2012). Development of the participation and environment measure for children and youth: Conceptual basis. *Disability and Rehabilitation, 34*(3), 238–246.
<https://doi.org/10.3109/09638288.2011.603017>
- Craigie, A. M., Lake, A. A., Kelly, S. A., Adamson, A. J., & Mathers, J. C. (2011). Tracking of obesity-related behaviours from childhood to adulthood: A systematic review. *Maturitas, 70*(3), 266–284. <https://doi.org/10.1016/j.maturitas.2011.08.005>
- Diagnostic criteria for 299.00 autism spectrum disorder.* (2020). Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/ncbddd/autism/hcp-dsm.html>
- Disability types and description.* (n.d.). National Disability Services. Retrieved from <https://www.nds.org.au/disability-types-and-descriptions>
- Edwards, P. (2010). Questionnaires in clinical trials: Guidelines for optimal design and administration. *Trials, 11*, 2. <https://doi.org/10.1186/1745-6215-11-2>
- Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments, and Computers, 28*(1), 1–11.
<https://doi.org/10.3758/BF03203630>
- Esentürk, O. K., & Yarımkaaya, E. (2021). WhatsApp-based physical activity intervention for children with autism spectrum disorder during the novel coronavirus (COVID-19) pandemic: A feasibility trial. *Adapted Physical Activity Quarterly, 38*, 569–584.
<https://doi.org/10.1123/apaq.2020-0109>
- Faulkner, G. E. J., Kwan, M. Y. W., MacNeill, M., & Brownrigg, M. (2011). The Long Live Kids campaign: Awareness of campaign messages. *Journal of Health Communication, 16*(5), 519–532. <https://doi.org/10.1080/10810730.2010.546489>

- Faulkner, G., White, L., Riazi, N., Latimer-Cheung, A. E., & Tremblay, M. S. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: Exploring the perceptions of stakeholders regarding their acceptability, barriers to uptake, and dissemination. *Applied Physiology, Nutrition, and Metabolism*, *41*, S303–S310. <https://doi.org/10.1139/apnm-2016-0100>
- Field, A. (2009). *Discovering statistics using SPSS, 3rd edition*. SAGE Publications, Ltd.
- Gainforth, H. L., Jarvis, J. W., Berry, T. R., Chulak-Bozzer, T., Deshpande, S., Faulkner, G., Rhodes, R. E., Spence, J. C., Tremblay, M. S., & Latimer-Cheung, A. E. (2016). Evaluating the ParticipACTION “Think Again” campaign. *Health and Education Behaviour*, *43*(4), 434–431. <https://doi.org/10.1177/1090198115604614>
- Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. *Annals of Behavioral Medicine*, *43*(1), 101–116. <https://doi.org/10.1007/s12160-011-9308-7>
- Gammon, C., & Bornstein, M. (2018). John Henry effect. In B. Frey (Ed.), *The SAGE encyclopedia of educational research, measurement, and evaluation* (pp. 909–912). SAGE Publications, Inc. <https://doi.org/10.4135/9781506326139.n364>
- George, D., & Mallery, P. (2012). *IBM SPSS Statistics 19 step by step, 12th edition*. Pearson.
- Goodman, R. (1997). The strengths and difficulties questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, *38*(5), 581–586. <https://doi.org/10.1111/j.1469-7610.1997.tb01545.x>

- Gorter, J. W., Galuppi, B. E., Gulko, R., Wright, M., & Godkin, E. (2017). Consensus planning toward a community-based approach to promote physical activity in youth with cerebral palsy. *Physical and Occupational Therapy in Pediatrics, 37*(1), 35–50.
<https://doi.org/10.3109/01942638.2015.1127868>
- Hawkins, R. P., Kreuter, M., Resnicow, K., Fishbein, M., & Dijkstra, A. (2008). Understanding tailoring in communicating about health. *Health Education Research, 23*(3), 454–466.
<https://doi.org/10.1093/her/cyn004>
- Health fact sheets: Physical activity and screen time among Canadian children and youth, 2016 and 2017.* (2019). Statistics Canada. Retrieved from
<https://www150.statcan.gc.ca/n1/en/pub/82-625-x/2019001/article/00003-eng.pdf?st=NWKVinkp>
- Hull, S. J., & Hong, Y. (2016). Sensation seeking as a moderator of gain- and loss-framed HIV-test promotion message effects. *Journal of Health Communication, 21*(1), 46–55.
<https://doi.org/10.1080/10810730.2015.1033113>
- Jaarsma, E. A., Haslett, D., & Smith, B. (2019). Improving communication of information about physical activity opportunities for people with disabilities. *Adapted Physical Activity Quarterly, 36*(2), 185–201. <https://doi.org/10.1123/apaq.2018-0020>
- Jarvis, J. W., Gainforth, H. L. & Latimer-Cheung, A. E. (2014). Investigating the effect of message framing on parents' engagement with advertisements promoting child physical activity. *International Review on Public and Nonprofit Marketing, 11*, 115–127.
<https://dx.doi.org/10.1007/S12208-013-0110-Z>

- Larocca, V., Arbour-Nicitopoulos, K. P., Tomasone, J. R., Latimer-Cheung, A. E., & Bassett-Gunter, R. L. (2021). Developing and disseminating physical activity messages targeting parents: A systematic scoping review. *International Journal of Environmental Research and Public Health*, *18*(13), 7046. <https://doi.org/10.3390/ijerph18137046>
- Latimer, A. E., Brawley, L. R., & Bassett, R. L. (2010). A systematic review of three approaches for constructing physical activity messages: What messages work and what improvements are needed? *International Journal of Behavioral Nutrition and Physical Activity*, *7*(36), 1–17. <https://doi.org/10.1186/1479-5868-7-36>
- Latimer, A. E., Rench, T. A., Rivers, S. E., Katulak, N. A., Materese, S. A., Cadmus, L., Hicks, A., Keany Hodorowski, J., & Salovey, P. (2008). Promoting participation in physical activity using framed messages: An application of prospect theory. *British Journal of Health Psychology*, *13*(4), 659–681. <https://doi.org/10.1348/135910707X246186>
- Latimer-Cheung, A. E., Rhodes, R. E., Kho, M. E., Tomasone, J. R., Gainforth, H. L., Kowalski, K., Nasuti, G., Perrier, M. J., Duggan, M., & The Canadian Physical Activity Guidelines Messaging Recommendation Workgroup. (2013). Evidence-informed recommendations for constructing and disseminating messages supplementing the new Canadian Physical Activity Guidelines. *BMC Public Health*, *13*, 419. <https://doi.org/10.1186/1471-2458-13-419>
- Lerner, J. S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology*, *81*(1), 146–159. <https://doi.org/10.1037/0022-3514.81.1.146>

- Letts, L., Martin Ginis, K. A., Faulkner, G., Colquhoun, H., Levac, D., & Gorczynski, P. (2011). Preferred methods and messengers for delivering physical activity information to people with spinal cord injury: A focus group study. *Rehabilitation Psychology, 56*(2), 128–137. <https://doi.org/10.1037/a0023624>
- Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes, 76*(2), 149–188. <https://doi.org/10.1006/obhd.1998.2804>
- Lipkus, I. M., Johnson, C., Amarasekara, S., Pan, W., & Updegraff, J. A. (2019). Predicting colorectal cancer screening among adults who have never been screened: Testing the interaction between message framing and tailored risk feedback. *Journal of Health Communication, 24*(3), 262–270. <https://doi.org/10.1080/10810730.2019.1597950>
- Lithopoulos, A., Bassett-Gunter, R. L., Martin Ginis, K. A., & Latimer-Cheung, A. E. (2017). The effects of gain- versus loss-framed messages following health risk information on physical activity in individuals with multiple sclerosis. *Journal of Health Communication, 22*(6), 523–531. <https://doi.org/10.1080/10810730.2017.1318983>
- Lithopoulos, A., & Young, B. W. (2018). Sport gain-framed messages, possible selves, and their effects on adults' interest, intentions, and decision to register in sport. *International Journal of Sport and Exercise Psychology, 16*(3), 313–326. <https://doi.org/10.1080/1612197X.2016.1216003>
- Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*(404), 1198–1202. <https://doi.org/10.2307/2290157>

- Maenner, M. J., Smith, L. E., Hong, J., Makuch, R., Greenberg, J. S., & Mailick, M. R. (2013). Evaluation of an activities of daily living scale for adolescents and adults with developmental disabilities. *Disability and Health Journal*, 6(1), 8–17.
<https://doi.org/10.1016/j.dhjo.2012.08.005>
- Mann, T., Sherman, D., & Updegraff, J. (2004). Dispositional motivations and message framing: A test of the congruency hypothesis in college students. *Health Psychology*, 23(3), 330–334. <https://doi.org/10.1037/0278-6133.23.3.330>
- Martin Ginis, K. A., Ma, J. K., Latimer-Cheung, A. E., & Rimmer, J. H. (2016). A systematic review of review articles addressing factors related to physical activity participation among children and adults with physical disabilities. *Health Psychology Review*, 10(4), 478–494.
<https://doi.org/10.1080/17437199.2016.1198240>
- Martin, J. J., & Choi, Y. S. (2009). Parents' physical activity-related perceptions of their children with disabilities. *Disability and Health Journal*, 2(1), 9–14.
<https://doi.org/10.1016/j.dhjo.2008.09.001>
- Mistry, C. D., & Latimer-Cheung, A. E. (2014). Mothers' beliefs moderate their emotional response to guilt appeals about physical activity for their child. *The International Journal of Communication and Health*, 3, 56–62.
- Murphy, N. A., & Carbone, P. S. (2008). Promoting the participation of children with disabilities in sports, recreation, and physical activities. *Pediatrics*, 121(5), 1057–1061.
<https://doi.org/10.1542/peds.2008-0566>
- Physical activity*. (2020). World Health Organization. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/physical-activity>

- Primary caregiver or their spouse and/or custodial parent/legal guardian.* (n.d.). Government of Canada. Retrieved from https://www.canada.ca/content/dam/canada/employment-social-development/migration/documents/assets/portfolio/docs/en/student_loans/resp/forms/sdr0093-b.pdf
- Rhodes, R. E., Berry, T., Craig, C. L., Faulkner, G., Latimer-Cheung, A. E., Spence, J. C., & Tremblay, M. S. (2013). Understanding parental support of child physical activity behavior. *American Journal of Health Behavior, 37*(4), 469–477.
<https://doi.org/10.5993/AJHB.37.4.5>
- Rhodes, R. E., Janssen, I., Bredin, S. S. D., Warburton, D. E. R., & Bauman, A. (2017). Physical activity: Health impact, prevalence, correlates and interventions. *Psychology and Health, 32*(8), 942–975. <https://doi.org/10.1080/08870446.2017.1325486>
- Rhodes, R. E., Spence, J. C., Berry, T., Deshpande, S., Faulkner, G., Latimer-Cheung, A. E., O'Reilly, N., & Tremblay, M. S. (2015). Predicting changes across 12 months in three types of parental support behaviors and mothers' perceptions of child physical activity. *Annals of Behavioral Medicine, 49*(6), 853–864. <https://doi.org/10.1007/s12160-015-9721-4>
- Rhodes, R. E., Spence, J. C., Berry, T., Deshpande, S., Faulkner, G., Latimer-Cheung, A. E., O'Reilly, N., & Tremblay, M. S. (2016). Understanding action control of parental support behavior for child physical activity. *Health Psychology, 35*(2), 131–140.
<https://doi.org/10.1037/hea0000233>
- Rothman, A. J., Desmarais, K. J., & Lenne, R. L. (2020). Moving from research on message framing to principles of message matching: The use of gain-and loss-framed messages to promote healthy behavior. *Advances In Motivation Science, 7*, 43–73.
<https://doi.org/10.1016/bs.adms.2019.03.001>

- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, *121*(1), 3–19.
<https://doi.org/10.1037/0033-2909.121.1.3>
- Saczynski, J. S., McManus, D. D., & Goldberg, R. J. (2013). Commonly used data collection approaches in clinical research. *The American Journal of Medicine*, *126*(11), 946–950.
<https://doi.org/10.1016/j.amjmed.2013.04.016>
- Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise*, *32*(5), 963–975.
<https://doi.org/10.1097/00005768-200005000-00014>
- Sharma, R., Bassett-Gunter, R. L., Leo, J., Latimer-Cheung, A. E., Martin Ginis, K. A., & Arbour-Nicitopoulos, K. P. (2016). Examining the relationship between motivation and the physical activity behaviour of Canadian youth with physical disabilities. *Journal of Exercise, Movement, and Sport*, *48*(1), 223.
- Siebert, E. A., Hamm, J., & Yun, J. (2017). Parental influence on physical activity of children with disabilities. *International Journal of Disability, Development and Education*, *64*(4), 378–390. <https://doi.org/10.1080/1034912X.2016.1245412>
- Smith, B., Mallick, K., Monforte, J., & Foster, C. (2021). Disability, the communication of physical activity and sedentary behaviour, and ableism: A call for inclusive messages. *British Journal of Sports Medicine*, *0*(0), 1–2. <https://doi.org/10.1136/bjsports-2020-103780>
- Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health*, *20*(2), 143–160.
<https://doi.org/10.1080/08870440512331317670>

- Stanish, H. I., Curtin, C., Must, A., Phillips, S., Maslin, M., & Bandini, L. G. (2019). Does physical activity differ between youth with and without intellectual disabilities? *Disability and Health Journal*, *12*(3), 503–508. <https://doi.org/10.1016/j.dhjo.2019.02.006>
- Stewart, D. A., Law, M. C., Rosenbaum, P., & Willms, D. G. (2001). A qualitative study of the transition to adulthood for youth with physical disabilities. *Physical and Occupational Therapy in Pediatrics*, *21*(4), 3–21. https://doi.org/10.1300/j006v21n04_02
- Tanna, S., Arbour-Nicitopoulos, K. P., Rhodes, R. E., & Bassett-Gunter, R. L. (2017). A pilot study exploring the use of a telephone-assisted planning intervention to promote parental support for physical activity among children and youth with disabilities. *Psychology of Sport and Exercise*, *32*, 25–33. <https://doi.org/10.1016/j.psychsport.2017.05.003>
- Taub, D. E., & Greer, K. R. (2000). Physical activity as a normalizing experience for school-age children with physical disabilities: Implications for legitimization of social identity and enhancement of social ties. *Journal of Sport and Social Issues*, *24*(4), 395–414. <https://doi.org/10.1177/0193723500244007>
- Toll, B. A., O'Malley, S. S., Katulak, N. A., Wu, R., Dubin, J. A., Latimer, A., Meandzija, B., George, T. P., Jatlow, P., Cooney, J. L., & Salovey, P. (2007). Comparing gain-and loss-framed messages for smoking cessation with sustained-release bupropion: A randomized controlled trial. *Psychology of Addictive Behaviors*, *21*(4), 534–544. <https://doi.org/10.1037/0893-164X.21.4.534>
- Tracy, J. L., & Robins, R. W. (2007). The psychological structure of pride: A tale of two facets. *Journal of Personality and Social Psychology*, *92*(3), 506–525. <https://doi.org/10.1037/0022-3514.92.3.506>

- Trost, S. G., Sallis, J. F., Pate, R. R., Freedson, P. S., Taylor, W. C., & Dowda, M. (2003). Evaluating a model of parental influence on youth physical activity. *American Journal of Preventive Medicine*, 25(4), 277–282. [https://doi.org/10.1016/S0749-3797\(03\)00217-4](https://doi.org/10.1016/S0749-3797(03)00217-4)
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458. https://doi.org/10.1007/978-1-4613-2391-4_2
- Watson, D., & Clark, L. A. (1994). The PANAS-X: Manual for the positive and negative affect schedule - expanded form. <https://doi.org/10.17077/48vt-m4t2>
- Weiss, J. A., & Burnham Riosa, P. (2015). Thriving in youth with autism spectrum disorder and intellectual disability. *Journal of Autism and Developmental Disorders*, 45(8), 2474–2486. <https://doi.org/10.1007/s10803-015-2412-y>
- Wilhite, B., & Shank, J. (2009). In praise of sport: Promoting sport participation as a mechanism of health among persons with a disability. *Disability and Health Journal*, 2(3), 116–127. <https://doi.org/10.1016/j.dhjo.2009.01.002>
- Williamson, C., Baker, G., Mutrie, N., Niven, A., & Kelly, P. (2020). Get the message? A scoping review of physical activity messaging. *International Journal of Behavioral Nutrition and Physical Activity*, 17(1), 51. <https://doi.org/10.1186/s12966-020-00954-3>
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 59(4), 329–349. <https://doi.org/10.1080/03637759209376276>
- Witte, K., Cameron, K. A., McKeon, J. K., & Berkowitz, J. M. (1996). Predicting risk behaviors: Development and validation of a diagnostic scale. *Journal of Health Communication*, 1, 317–341. <https://doi.org/10.1080/108107396127988>

- Woodmansee, C., Hahne, A., Imms, C., & Shields, N. (2016). Comparing participation in physical recreation activities between children with disability and children with typical development: A secondary analysis of matched data. *Research in Developmental Disabilities, 49–50*, 268–276. <https://doi.org/10.1016/j.ridd.2015.12.004>
- Wouters, M., Evenhuis, H. M., & Hilgenkamp, T. I. (2020). Physical fitness of children and adolescents with moderate to severe intellectual disabilities. *Disability and Rehabilitation, 42(18)*, 2542–2552. <https://doi.org/10.1080/09638288.2019.1573932>
- Youth with disabilities*. (2012). United Nations. Retrieved from <https://www.un.org/esa/socdev/documents/youth/fact-sheets/youth-with-disabilities.pdf>
- Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9(2)*, 1–27. <https://doi.org/10.1037/h0025848>
- Zecevic, C. A., Tremblay, L., Lovsin, T., & Michel, L. (2010). Parental influence on young children's physical activity. *International Journal of Pediatrics, 2010*, 468526. <https://doi.org/10.1155/2010/468526>
- Zhao, J., & Settles, B. H. (2014). Environmental correlates of children's physical activity and obesity. *American Journal of Health Behavior, 38(1)*, 124–133. <https://doi.org/10.5993/AJHB.38.1.13>

Appendix A

Informed Consent

Below is the informed consent information regarding the project. Please review the following:

Informed Consent Form
UNDERSTANDING PERSPECTIVES ON HEALTH BEHAVIOURS AMONG
PARENTS OF CHILDREN, YOUTH, AND YOUNG ADULTS WITH AN
INTELLECTUAL DISABILITY OR AUTISM
York University

Primary Researcher: Dr. Rebecca Bassett-Gunter, York University, School of Kinesiology and Health Science, Stong College, Room 310, 4700 Keele St. Toronto, ON M3J 1P3;
rgunter@yorku.ca

Background: This research project is focused on understanding the health behaviours of parents of children, youth, and young adults with an intellectual disability or autism. The following brief is intended to provide you with the necessary details prior to giving consent to participate in this study. Please read the following information carefully and feel free to ask any questions.

Purpose of the Research: To explore perspectives on health behaviours among parents of children, youth, and young adults with an intellectual disability or autism.

What You Will Be Asked to Do in the Research:

Stage 1: Following an eligibility assessment, you will be asked to complete a series of questionnaires. Firstly, a demographic questionnaire will be administered to provide the research team with information about you, followed by an online questionnaire exploring parental support behaviours towards physical activity. Together, these online questionnaires will take approximately 10 minutes to complete. Next, you will be provided with some information in the form of a newsletter. Immediately after reading the newsletter, you will be asked to complete another questionnaire. This questionnaire will take approximately 10 minutes to complete.

Stage 2: Two weeks after completing Stage 1, you will be contacted via email and asked to complete a second questionnaire, which will take approximately 10 minutes to complete.

Stage 3: Finally, approximately two months after completing Stage 2, you will be asked to complete a third series of questionnaires, which will take approximately 15 minutes to complete.

Participants will receive a \$25 online gift card for their participation in this study. The honorarium will be distributed across the three stages of this study as follows;

Stage 1: \$15

Stage 2: \$5

Stage 3: \$5

Should you withdraw during any stage, you will still be eligible for the honoraria up to and including the stage in which you withdrew, but not for subsequent stages.

Risks and Discomforts: The researchers strive to ensure that the psychological and emotional well-being of parents, legal guardians, and primary caregivers of children, youth, and young adults with an intellectual disability or autism are not adversely affected by their participation in this study. A document containing information regarding various organizations and support resources is available upon request.

Benefits of the Research: No direct benefits are anticipated for the participants.

Voluntary Participation: Your participation in this study is completely voluntary. Your decision not to volunteer will not influence your relationship with York University or any other group associated with this project either now, or in the future.

Withdrawal from the Study: You can stop participating in the study at any time, for any reason, if you should so decide. Your decision to stop participating, or refusal to answer particular questions, will not affect your relationship with the researchers, York University or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

Confidentiality: All information you supply during the research will be held in confidence. Your name and your child, youth, or young adult's name will not appear in any report or publication of the research. Your data will be safely stored in a locked facility and/or on a password protected computer and only research staff will have access to this information. Data will be stored for the duration of the study and will subsequently be destroyed. Confidentiality will be provided to the fullest extent possible by law.

The researchers acknowledge that the host of the online questionnaire (SurveyMonkey) may automatically collect participant data without their knowledge (e.g., IP addresses). Although this information may be provided or made accessible to the researchers, it will not be used or saved without your consent. Because this project employs e-based collection techniques, data may be subject to access by third parties as a result of various security legislation now in place in many countries and thus the confidentiality and privacy of data cannot be guaranteed during web-based transmission.

Questions About the Research? If you have questions about the research in general or about your role in the study, please feel free to contact Dr. Rebecca Bassett-Gunter by email (rgunter@yorku.ca). This research has been reviewed and approved by the Human Participants Review Sub-Committee of York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Senior Manager and Policy Advisor for the Office of Research Ethics, 5th Floor, York Research Tower, York University (telephone 416-736-5914 or e-mail ore@yorku.ca).

Legal Rights and Signatures: I consent to participate in **UNDERSTANDING PERSPECTIVES ON HEALTH BEHAVIOURS AMONG PARENTS OF CHILDREN, YOUTH, AND YOUNG ADULTS WITH AN INTELLECTUAL DISABILITY OR AUTISM** by Dr. Rebecca Bassett-Gunter. I have understood the nature of this project and wish to participate.

By clicking “I agree” below, I indicate my consent:

I agree

I disagree

Appendix B
Phone Call Script

Hello, am I speaking with **NAME**?

My name is Katerina and I am one of the researchers involved in the study that you completed the Screening Questionnaire for.

I am calling to thank you for your interest in the study and for completing the questionnaire.

In order to confirm your eligibility, I am wondering if you have a moment to answer three quick questions based on your responses from the questionnaire?

- 1) What is your child's age?
- 2) What is your child's primary disability?
- 3) Where did you learn about the study?

Thank you for your time. You will be receiving an email containing a link to complete the next questionnaire shortly.

Appendix C

Newsletters

Risk Information + Gain-Framed Messages Newsletter

PHYSICAL ACTIVITY FOR CHILDREN, YOUTH, AND YOUNG ADULTS WITH DISABILITIES

Canadian guidelines encourage children and youth (aged 5-17) to move and be active for at least 60 minutes each day. All children, youth, and young adults can engage in different forms of physical activities through play, sport, active transportation, and recreation.

As a parent, you can play a big role in helping your child to be physically active. In fact, children who receive parental support for physical activity are more likely to meet the recommended guidelines. There are many ways to support your child! For example, you can provide encouragement, enrol your child in physical activity opportunities, or do physical activity together.



BODY

Children with disabilities often have poorer physical health and are 2-3 times more likely to be overweight or obese compared to children without disabilities.

Children's physical health and fitness may be improved if they engage in physical activity. If children are active, they may lower their risk of developing negative health conditions and experiencing secondary health complications associated with their disability. Participating in physical activity may also reduce children's risk of becoming overweight or obese.

MIND

Children with disabilities commonly face greater behavioural or mental health challenges than children without disabilities.

If children are active, they are more likely to experience positive mental health, improved mood, and healthier brain functioning. Physical activity may also lead to reducing children's risk for depression and anxiety.



WELLBEING

Children with disabilities are often excluded and experience obstacles to wellbeing more frequently than children without disabilities.

Active children may experience improved wellbeing. Engaging in physical activity can boost children's self-esteem, quality of life, and independence. Physical activity may also provide opportunities for children to build friendships and showcase their talents.

HEALTH HABITS

Children with disabilities tend to engage in poorer health behaviours than children without disabilities, placing them at a greater risk for developing harmful long-term habits.

Children that establish positive physical activity habits may become active adults. Physical activity can also lead children to build other healthy habits, such as good sleep and nutrition behaviours.

If you wish to view the sources used to create this newsletter, the research team would be happy to share a compiled list of references

Created April 2021

Questions? Please feel free to contact
Dr. Rebecca Bassett-Gunter
rgunter@yorku.ca

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BODY

Children with disabilities often have poorer physical health and are 2-3 times more likely to be overweight or obese compared to children without disabilities.

Children's physical health and fitness may be reduced if they do not engage in physical activity. If children are inactive, they may increase their risk of developing negative health conditions and experiencing secondary health complications associated with their disability. Not participating in physical activity may also elevate children's risk of becoming overweight or obese.

MIND

Children with disabilities commonly face greater behavioural or mental health challenges than children without disabilities.

If children are inactive, they are more likely to experience negative mental health, worsened mood, and less healthy brain functioning. Physical inactivity may also lead to increasing children's risk for depression and anxiety.



WELLBEING

Children with disabilities are often excluded and experience obstacles to wellbeing more frequently than children without disabilities.

Inactive children may experience reduced wellbeing. Not engaging in physical activity can lower children's self-esteem, quality of life, and independence. Inactivity may also limit opportunities for children to build friendships and showcase their talents.

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As a parent, you can play a big role in helping your child to be physically active. In fact, children who receive parental support for physical activity are more likely to meet the recommended guidelines. There are many ways to support your child! For example, you can provide encouragement, enrol your child in physical activity opportunities, or do physical activity together.



BODY

Children's physical health and fitness may be improved if they engage in physical activity. If children are active, they may lower their risk of developing negative health conditions and experiencing secondary health complications associated with their disability. Participating in physical activity may also reduce children's risk of becoming overweight or obese.

MIND

If children are active, they are more likely to experience positive mental health, improved mood, and healthier brain functioning. Physical activity may also lead to reducing children's risk for depression and anxiety.



WELLBEING

Active children may experience improved wellbeing. Engaging in physical activity can boost children's self-esteem, quality of life, and independence. Physical activity may also provide opportunities for children to build friendships and showcase their talents.

HEALTH HABITS

Children that establish positive physical activity habits may become active adults. Physical activity can also lead children to build other healthy habits, such as good sleep and nutrition behaviours.

If you wish to view the sources used to create this newsletter, the research team would be happy to share a compiled list of references

Created April 2021

Questions? Please feel free to contact
Dr. Rebecca Bassett-Gunter
rgunter@yorku.ca

PHYSICAL ACTIVITY FOR CHILDREN, YOUTH, AND YOUNG ADULTS WITH DISABILITIES

Canadian guidelines encourage children and youth (aged 5-17) to move and be active for at least 60 minutes each day. All children, youth, and young adults can engage in different forms of physical activities through play, sport, active transportation, and recreation.

As a parent, you can play a big role in helping your child to be physically active. In fact, children who receive parental support for physical activity are more likely to meet the recommended guidelines. There are many ways to support your child! For example, you can provide encouragement, enrol your child in physical activity opportunities, or do physical activity together.



BODY

Children's physical health and fitness may be reduced if they do not engage in physical activity. If children are inactive, they may increase their risk of developing negative health conditions and experiencing secondary health complications associated with their disability. Not participating in physical activity may also elevate children's risk of becoming overweight or obese.

MIND

If children are inactive, they are more likely to experience negative mental health, worsened mood, and less healthy brain functioning. Physical inactivity may also lead to increasing children's risk for depression and anxiety.



WELLBEING

Inactive children may experience reduced wellbeing. Not engaging in physical activity can lower children's self-esteem, quality of life, and independence. Inactivity may also limit opportunities for children to build friendships and showcase their talents.

HEALTH HABITS

Children that establish negative physical activity habits may become inactive adults. Physical inactivity can also lead children to build other unhealthy habits, such as poor sleep and nutrition behaviours.

If you wish to view the sources used to create this newsletter, the research team would be happy to share a compiled list of references

Created April 2021

Questions? Please feel free to contact
Dr. Rebecca Bassett-Gunter
rgunter@yorku.ca

WHAT YOU NEED TO KNOW ABOUT COVID-19

This newsletter will provide you with information about the COVID-19 lung illness, based on current information and best practices from Canadian health authorities.

SYMPTOMS OF COVID-19

Some symptoms of COVID-19 include fever, cough, and shortness of breath. It is recommended to call your healthcare provider if you or your child, youth, or young adult experience any of these symptoms.

HOW COVID-19 SPREADS

COVID-19 can spread from person to person in different ways. This can include spread through:

- The air (for example, by coughing or sneezing).
- Close personal contact (for example, by touching or shaking hands with an infected person).
- Touching your mouth, nose, or eyes after touching an infected object or surface.



HOW TO PREVENT COVID-19 TRANSMISSION

There are many precautions that you and your child, youth, or young adult can take to protect yourselves and prevent the spread of COVID-19:

- Avoid close contact with others by staying at least six feet apart.
- Avoid touching your eyes, nose, or mouth with unwashed hands.
- Stay home when you are sick.
- Cover your coughs and sneezes with a tissue.
- Clean frequently touched household objects and surfaces.
- Regularly wash your hands with soap and water for at least twenty seconds. When soap and water are not available, use an alcohol-based hand sanitizer.

If you wish to view the sources used to create this newsletter, the research team would be happy to share a compiled list of references

Created April 2021

Questions? Please feel free to contact Dr. Rebecca Bassett-Gunter
rgunter@yorku.ca

Appendix D

Debriefing Consent

Post-Debriefing Consent Form for Studies Involving Deception
UNDERSTANDING PERSPECTIVES ON HEALTH BEHAVIOURS AMONG
PARENTS OF CHILDREN, YOUTH, AND YOUNG ADULTS WITH AN
INTELLECTUAL DISABILITY OR AUTISM
York University

Thank you for participating in our study. The purpose of the research project is to evaluate physical activity support behaviours among parents of children, youth, and young adults with an intellectual disability or autism. We are interested in understanding how an online intervention affects parents' behaviours regarding their children's physical activity. Specifically, this project aims to evaluate the relative effectiveness of gain-framed (i.e., emphasizing the benefits of physical activity) versus loss-framed (i.e., emphasizing the risks of inactivity) persuasive physical activity messages targeted at parents of children with an intellectual disability or autism. Message framing refers to the emphasis of either the positive or the negative consequences of a behaviour. It is a popular communication strategy for persuading health behaviour change. Additionally, the value of incorporating risk information into these messages will be assessed.

When you enrolled in this study, we randomly assigned you to one of five conditions, which determined which of the following messages you viewed:

- 1) Risk information + gain-framed messages emphasizing the benefits of physical activity for children
- 2) No risk information + gain-framed messages emphasizing the benefits of physical activity for children
- 3) Risk information + loss-framed messages emphasizing the risks of physical inactivity for children
- 4) No risk information + loss-framed messages emphasizing the risks of physical inactivity for children
- 5) No risk information + no framed messages

Different types of physical activity messages have been found to have differential effects on people's thoughts and behaviours related to physical activity. We measured your child's physical activity participation and your support behaviours toward your child's physical activity behaviours so that we could compare the effects of the different types of messages.

It was necessary to not fully inform you of the nature of this study to ensure that your answers to the questionnaire were not skewed. Your condition was not disclosed to you to ensure bias was limited throughout the study. Your personal information, enrolment in this study, and answers to the questionnaires will remain confidential. Only the primary investigator and research assistants will have access to the information provided in this study. If you wish to have your information removed from this study, please contact Dr. Rebecca Bassett-Gunter at rgunter@yorku.ca

If you have questions or concerns about your child's health or physical activity behaviours, we recommend that you visit the following website for information about children's health and physical activity: <https://www.canada.ca/en/public-health/services/publications/healthy-living/physical-activity-tips-children-5-11-years.html>. You can also contact Telehealth Ontario at 1-866-797-0000, or speak to your family physician.

After reviewing the debriefing statement, I learned that it was necessary for the researchers to disguise the main purpose of this study. I realize that this was necessary since having full information about the actual purpose of the study might have influenced the way in which I responded to the tasks and this would have invalidated the results. Thus, to ensure that this did not happen, some of the details about the purpose of the study were not initially provided (or were provided in a manner that slightly misrepresented the main purpose of the study). However, I have now received a complete written explanation as to the actual purpose of the study and I have been provided with the contact information of the Principal Investigator, Dr. Rebecca Bassett-Gunter, should I have any questions regarding the study.

This study has been reviewed and received ethics clearance through the Human Participants Review Committee (HPRC). If you have questions for the Committee contact the Sr. Policy Advisor, Research Ethics, Office of Research Ethics, at 416-736-5914 or ore@yorku.ca

If you have questions about this study or would like to inquire about the results of this study, please contact Dr. Rebecca Bassett-Gunter via email at rgunter@yorku.ca

By clicking “I agree” below, I give permission for the researchers to use my data in their study. I am aware that I may withdraw this consent by notifying the Principal Investigator.

I agree

Appendix E
Measures

	Screening	Baseline	FQ1	FQ2	FQ3
Eligibility assessment	X				
Demographics	X				
Physical morbidities		X			
Adaptive behaviours		X			
Functional cognitive ability		X			
Mental health difficulties		X			
Depth of sport participation		X			
Risk information perceptions			X		
Frame perceptions			X		
Tone perceptions			X		
Avoidance			X		
Guilt			X		
Perceived threat		X	X	X	X
Task self-efficacy		X	X	X	X
Response efficacy		X	X	X	X
Planning efficacy		X	X	X	X
Intention		X	X	X	X
Parental support for PA		X		X	X
Behavioural regulation of parental support for PA		X		X	X

Eligibility Assessment

Throughout this research, intellectual disability will be defined as:

a person having significant limitations in intellectual functioning (including reasoning, problem solving, planning, abstract thinking, judgment, academic learning, and learning from experience) and adaptive functioning (such as personal care, communication skills, social skills, and other practical areas of living).

We have broadened the study to also include children, youth, and young adults with autism, or autism spectrum disorder, which involves:

consistent difficulties with social communication and rigid or repetitive behaviours or interests.

According to the above definitions, does your child have an intellectual disability or autism?

Yes

No

Potential Covariates

Demographics

The following questions pertain to **you** (the parent/legal guardian/primary caregiver).

What is your age?

- Under 25
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55-59
- Over 60

What is your sex?

- Male
- Female
- Prefer not to disclose

What is the highest level of education that you have attained? Less than high school

- High school
- College degree
- University - Bachelor degree
- University - Master's degree
- University - Doctorate degree
- University - Professional Post-Graduate degree (e.g., MD)

What is your marital status?

- Single
- Married/Common-Law
- Divorced
- Other

What is your household income? Less than \$35,000

- \$35,000 - \$49,999
- \$50,000 - \$64,999
- \$65,000 - \$74,999
- \$75,000 - \$99,999
- \$100,000 - \$149,999
- \$150,000 +
- Do not wish to report

In which province or territory do you currently reside?

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland
- Northwest Territories
- Nova Scotia
- Nunavut
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan
- Yukon Territory
- Other (please specify)

Do you identify as a Person of Colour or Racialized Person? Such groups in Canada are persons, other than Indigenous/Aboriginal People, who are non-Caucasian in race or non-white in colour.

- Yes
- No
- Prefer not to answer

Do you identify as an Indigenous/Aboriginal Person?

- Yes
- No
- Prefer not to answer

Do you identify as a person with a disability?

- Yes
- No
- Prefer not to answer

How/where did you learn about our study?

How many children do you have?

- 1
- 2
- 3
- 4
- 5 or more

Do you have more than one child with an intellectual disability?

- No
- Yes (please specify)

The following questions are specific to **your child with an intellectual disability**. If you have more than one child with an intellectual disability, you can answer the questions throughout the questionnaires thinking about your child with an intellectual disability who will celebrate their birthday next.

What is your child's age?

Under 5	16
5	17
6	18
7	19
8	20
9	21
10	22
11	23
12	24
13	25
14	Over 25
15	

What is your child's sex?

- Male
- Female
- Prefer not to disclose

How is your child attending school during the COVID-19 pandemic?

- In-person learning
- Remote learning
- Other (please specify)

Select the option that best describes your child's primary disability. Please note, the following options provide examples of different disabilities, but this is not an exhaustive list:

- Autism/Asperger Syndrome/Autism Spectrum Disorder
- Cerebral Palsy
- Down Syndrome
- Fetal Alcohol Spectrum Disorder
- Fragile X Syndrome
- Intellectual Disability
- Learning Disability
- Williams Syndrome
- Other (please specify)

If you selected “Intellectual Disability” in the previous question, please select the option that best describes the severity of your child's intellectual disability:

- Mild Intellectual Disability
- Moderate Intellectual Disability
- Severe Intellectual Disability
- Profound Intellectual Disability

Additionally, select all options that apply if your child has been clinically diagnosed with any other disability or psychological condition. Please note, the following options provide examples of different medical diagnoses which may coincide with an identification of an intellectual disability, but this is not an exhaustive list:

- Anxiety Disorder
- Attention Deficit Hyperactivity Disorder/Attention Deficit Disorder
- Autism/Asperger Syndrome/Autism Spectrum Disorder
- Cerebral Palsy
- Depressive Disorder
- Down Syndrome
- Fetal Alcohol Spectrum Disorder
- Fragile X Syndrome
- Intellectual Disability
- Learning Disability
- Obsessive Compulsive Disorder
- Oppositional Defiant Disorder
- Williams Syndrome
- Not applicable
- Other (please specify)

Physical Morbidities

Please rate the degree of your child’s overall physical health:

1	2	3	4	5
Poor	Fair	Average	Good	Excellent

Does your child have a physical health condition?

- Yes (If “yes”, please state)
- No

The following questions ask about difficulties your child may have doing certain activities. Does your child have difficulty:

- Seeing, even if wearing glasses or contact lenses?
- Hearing, even if using an assistive hearing device?
- Walking or climbing steps?
- Remembering or concentrating?

1	2	3	4
No difficulty	Some difficulty	A lot of difficulty	Cannot do at all

Does your child use a mobility aid or mobility device?

Yes

No

If **yes**, please select all aids or devices that your child typically uses:

Cane

Walker

Crutches

Manual wheelchair

Power wheelchair

Other (please specify)

Adaptive Behaviours

Indicate your child's current level of independence in performing the following activities of daily living:

Making their own bed

Doing household tasks, including picking up around the house, putting things away and light housecleaning

Doing errands, including shopping in stores

Washing/bathing

Grooming, brushing teeth, combing and/or brushing hair

Dressing and undressing

Toileting

Preparing simple foods requiring no mixing or cooking, such as sandwiches and cold cereal

Mixing and cooking simple foods, such as frying eggs, making pancakes, and heating food in the microwave

Preparing a complete meal

Setting and clearing the table

Drinking from a cup

Eating from a plate

Washing dishes (including using a dishwasher)

0	1	2
Does not do at all	Does with help	Independent or does on own

Functional Cognitive Ability

How well does your child:

Tell time using an analogue clock?

Read and understand common signs?

Child count change?

Look up telephone numbers?

Use a telephone?

0	1	2	3
Not at all	Not very well	Pretty well	Very well

Mental Health Difficulties

Think about your child's behaviours over the past week. Now read each of the following statements and indicate the degree to which you believe the following statements describe your child:

- Considerate of other people's feelings
- Restless, overactive, cannot stay still for long
- Often complains of headaches, stomach-aches or sickness
- Shares readily with other children (treats, toys, pencils, etc.)
- Often has temper tantrums or hot tempers
- Rather solitary, tends to play alone
- Generally obedient, usually does what adults request
- Many worries, often seems worried
- Helpful if someone is hurt, upset or feeling ill
- Constantly fidgeting or squirming
- Has at least one good friend
- Often fights with other children or bullies them
- Often unhappy, down-hearted or tearful
- Generally liked by other children
- Easily distracted, concentration wanders
- Nervous or clingy in new situations, easily loses confidence
- Kind to younger children
- Often lies or cheats
- Picked on or bullied by other children
- Often volunteers to help others (parents, teachers, other children)
- Thinks things out before acting
- Steals from home, school or elsewhere
- Gets along better with adults than with other children
- Many fears, easily scared
- Sees tasks through to the end, good attention span

0	1	2
Not true	Somewhat true	Certainly true

Depth of Sport Participation

Prior to the COVID-19 pandemic, typically how often did your child participate in one or more of the following types of activities:

- Organized physical activity, including sports teams or classes, martial arts, dance, horseback riding, swimming, gymnastics, etc.
- Unstructured physical activity, such as nature trail walks, bike riding, rollerblading, skateboarding, playing hide-and-seek or chase, playing pick-up games like basketball, active transportation, etc.

1	2	3	4	5	6	7	8
Never	Once every 4 months	Few times every 4 months	Once a month	Few times a month	Once a week	Few times a week	Daily

Manipulation Checks

Risk Information Perceptions

I was provided with information about my child's risk for poor physical health, facing mental health challenges, experiencing obstacles to wellbeing, and developing harmful health habits in the newsletter:

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Frame Perceptions

The information that I just read in the newsletter:

None of the above	Focused heavily on the risks of inactivity		Neutral		Focused heavily on the benefits of physical activity		
0	1	2	3	4	5	6	7

Message Perceptions

Tone Perceptions

The general tone of the information in the newsletter was:

Extremely negative			Neutral			Extremely positive
1	2	3	4	5	6	7

Avoidance

Indicate your level of agreement with the following statements:

When I read the messages in the newsletter, I did not want to think about them

When I read the messages in the newsletter, I wanted to do something to avoid the outcomes described by the messages

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Guilt

To what extent did you experience emotions of guilt after reading the messages in the newsletter?

Not at all guilty			Neutral			Extremely guilty
1	2	3	4	5	6	7

EPPM Constructs

Perceived Threat

Indicate your level of agreement with the following statements:

- My child is at risk of poor physical health
- My child is at risk of facing mental health challenges
- My child is at risk of experiencing obstacles to wellbeing
- My child is at risk of developing harmful health habits
- Poor physical health is a **serious** risk to my child
- Mental health challenges are a **serious** risk to my child
- Obstacles to wellbeing are a **serious** risk to my child
- Developing harmful health habits is a **serious** risk to my child

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Task Self-Efficacy

If you really wanted to, how confident are you that you can support your child in 60 minutes of physical activity per day:

- No matter how busy your day is?
- On a day when you don't feel like doing it?
- And still spend the time you want with your family?

Not at all confident	Somewhat confident	Neutral	Confident	Very confident
1	2	3	4	5

Response Efficacy

Participating in 60 minutes of physical activity daily will decrease my child's risk of:

- Poor physical health
- Facing mental health challenges
- Experiencing obstacles to wellbeing
- Developing harmful health habits

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Planning Efficacy

A detailed plan to support your child's physical activity participation should include WHAT you will do, WHERE it will occur, and WHEN you will do it.

Assuming you were motivated to do so, how confident are you that you can create a detailed plan to support your child's physical activity participation over the next two weeks:

Once per week?

Twice per week?

Three times per week?

Not at all confident	Neutral				Very confident	
1	2	3	4	5	6	7

Intention

In the next two weeks, I intend to:

Encourage my child to play outdoors most days of the week, for 60 minutes per day

Do physical activity with my child most days of the week, for 60 minutes per day

Provide opportunities for my child to do physical activity or play sports most days of the week, for 60 minutes per day

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

Parental Support Behaviours

Parental Support for PA

It is recommended that children and youth aged 5-17 should participate in at least 60 minutes of physical activity daily. Physical activity should include a variety of activities through play, sport, active transportation, and recreation.

In the past month, how often have you:

Encouraged your child to participate in physical activity or sports?

Participated in physical activity or played sports with your child?

Provided opportunities for your child to do physical activities or play sports?

Watched your child participate in physical activity or sport?

Told your child that physical activity is good for their health?

Never/ rarely	About once a week	2-3 times/week	Most days	Daily
1	2	3	4	5

Behavioural Regulation of Parental Support for PA

In the past month, how often have you:

Looked for information or opportunities to get active with your child on most days of the week?

Made a plan to ensure your child engages in physical activity?

Kept track of the amount of physical activity your child is getting?

Made plans regarding what to do if something interfered with supporting your child's physical activity?

Never/ rarely	About once a week	2-3 times/week	Most days	Daily
1	2	3	4	5

Appendix F

Means, Standard Deviations, Skewness, and Kurtosis of Variables

Variable	<i>N</i>	<i>M</i> (<i>SD</i>)	Skewness	Kurtosis
Overall physical health	77	3.69 (0.94)	-0.42	-0.17
Adaptive behaviours	77	1.08 (0.51)	-0.30	-0.73
Functional cognitive ability	79	1.10 (0.91)	0.58	-0.74
Mental health difficulties	78	16.76 (5.79)	0.10	-0.51
Depth of sport participation	80	5.91 (1.41)	-0.98	-0.05
Risk information perceptions	79	5.87 (1.28)	-1.66	2.58
Frame perceptions	80	5.13 (2.49)	-1.05	-0.42
Tone perceptions	80	5.21 (1.32)	-0.20	-0.89
Avoidance	78	2.86 (1.15)	0.36	0.14
Guilt	80	3.63 (2.03)	0.01	-1.18
Baseline perceived threat	79	4.74 (1.48)	-0.46	-0.36
Baseline task self-efficacy	80	3.03 (1.33)	-0.09	-1.30
Baseline response efficacy	80	5.98 (0.97)	-1.20	1.44
Baseline planning efficacy	77	5.18 (1.94)	-0.93	-0.30
Baseline intention	79	3.73 (0.92)	-0.88	0.77
Baseline parental support for PA	79	3.30 (0.94)	-0.09	-0.59
Baseline behavioural regulation of parental support for PA	79	2.38 (0.99)	0.91	0.38
FQ1 perceived threat	75	4.86 (1.50)	-0.54	-0.13
FQ1 task self-efficacy	80	3.13 (1.31)	-0.19	-1.24
FQ1 response efficacy	79	6.03 (0.84)	-0.83	0.46
FQ1 planning efficacy	77	5.23 (1.95)	-1.04	-0.06
FQ1 intention	80	3.78 (0.96)	-0.81	0.62
FQ2 perceived threat	76	4.94 (1.21)	-0.68	0.33
FQ2 task self-efficacy	77	2.85 (1.23)	0.15	-1.24
FQ2 response efficacy	77	5.89 (0.97)	-1.06	1.01
FQ2 planning efficacy	72	4.51 (1.98)	-0.50	-0.94
FQ2 intention	76	3.44 (0.99)	-0.56	0.10
FQ2 parental support for PA	75	3.08 (0.90)	-0.25	-0.61
FQ2 behavioural regulation of parental support for PA	75	2.25 (0.98)	0.81	0.02
FQ3 perceived threat	77	5.02 (1.25)	-0.50	-0.10
FQ3 task self-efficacy	77	2.97 (1.33)	-0.14	-1.30
FQ3 response efficacy	76	6.07 (0.80)	-1.00	1.08
FQ3 planning efficacy	76	4.65 (2.17)	-0.53	-1.15
FQ3 intention	76	3.47 (0.87)	-0.47	-0.18
FQ3 parental support for PA	76	2.97 (0.91)	0.11	-0.54
FQ3 behavioural regulation of parental support for PA	76	2.23 (1.04)	0.86	-0.16