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Journal:	<i>Applied Physiology, Nutrition, and Metabolism</i>
Manuscript ID	apnm-2018-0314.R2
Manuscript Type:	Article
Date Submitted by the Author:	29-Sep-2018
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Keyword:	exercise, restriction, risk, adolescents, parent proxy report, medical condition
Is the invited manuscript for consideration in a Special Issue? :	Not applicable (regular submission)

Sensitivity, Specificity and Reliability of the Get Active Questionnaire for Identifying Children with Medically Necessary Special Considerations for Physical Activity

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Abstract

Physical activity is promoted for optimal health but may carry risks for children who require medically necessary activity restrictions. The sensitivity, specificity and reliability of the Get Active Questionnaire (GAQ) for identifying children needing special considerations during physical activity was evaluated among parents of 207 children, 3 to 14 years of age (97 (47%) female, mean age of 8.4 ± 3.7 years). GAQ responses were compared to reports obtained directly from the treating physician ($n=192/207$) and information in the medical chart (clinic notes/physician letter, $n=111/207$). Parent GAQ responses (either “No to all questions” or “Yes to 1 or more questions”) agreed with physician ($\text{Kappa} = 0.16$, $p=0.003$) and medical record ($\text{Kappa} = 0.15$, $p=0.003$) reports of the need for special consideration during physical activity (Yes/No). Sensitivity was 71% (20/28) and specificity was 59% (96/164), with few false negative responses. The GAQ was most effective for rheumatology and cardiology patients. False positives were 29% to 46%, except among chronic pain (80%) and rehabilitation (75%) patients. Test-retest reliability was moderate (Cronbach’s $\alpha = 0.70$) among 57 parents who repeated the GAQ one week later. The GAQ effectively identified children not requiring physical activity restrictions and those with medical conditions similar to those of concern among adults. Additional questions from a qualified exercise professional, as recommended for a “Yes” response on the GAQ, should reduce the false positive burden. Indicating the timeframe of reference for each question and including an option to describe other special considerations (e.g., medication, supervision) are recommended.

Key Words

Exercise, restriction, risk, adolescents, parent proxy report, medical condition

Introduction

An appropriate level of physical activity (PA) is essential for optimal health. For children, at least 60 minutes of moderate-to-vigorous PA and several hours of light intensity activity are recommended daily (Canadian Society for Exercise Physiology et al. 2017). However, the potential health risks from increased or intense PA for a small proportion of children who require medically necessary activity restrictions have not been adequately addressed (Longmuir et al. 2014). While physical activity is safe and beneficial for most children with medical conditions research indicates that, for the small proportion of these children, strenuous exercise can be associated with negative health outcomes. For example, exercise is a trigger for an acute asthma episode in 33% of children with asthma (Konig and Godfrey 1973)) and hypoglycemia resulting from exercise is a common fear among children with diabetes and their parents (Pivovarov et al. 2015). Although instances of sudden cardiac death in children are rare and associated with undetected cardiac disease, 24% of such deaths in children are reported as being in association with exercise or sport participation (Pilmer et al. 2014).

Safe and effective use of physical activity for health promotion depends on the identification of children at risk. Current practices are highly variable, with some children subject to extensive screening while others may start intense PA with no screening at all. The Canadian Society for Exercise Physiology position stand “Benefit and risk in promoting childhood PA” summarizes the currently recommended practice developed from expert opinion (Longmuir et al. 2014). To identify children with medically necessary PA restrictions, parents should be asked “Has a healthcare professional told you that there are some types of physical activity your child should not do?” Collection of this information was recommended for all structured PA opportunities, such as school-based activities, sport programmes, or PA lessons,

camps or clubs. The goal was not to restrict childhood PA, but to identify children who are known to have medically necessary PA restrictions so that PA opportunities can be made suitable for their safe and successful participation. A pilot investigation of the efficacy of the proposed screening question (Longmuir et al. 2014) among 200 children and their parents found specificity was 94% but sensitivity was only 27%. Test-retest reliability was 93%. The low sensitivity occurred among patients who were not restricted by type of activity, but had other precautions or special considerations.

The *Get Active Questionnaire*© (GAQ) was developed by the Canadian Society for Exercise Physiology (Figure 1). The goal was to develop a simple questionnaire to identify individuals who should seek advice from a health care provider or a CSEP Qualified Exercise Professional before changing the type or intensity of their physical activity (Canadian Society for Exercise Physiology 2016). It was proposed that, unlike the previous PAR-Q (Shephard 1988), the GAQ would be suitable for use with individuals of all ages. However, children have a wide range of unique characteristics that differ significantly from adults. Childhood is a dynamic phase of rapid growth and development and many chronic conditions (e.g., cardiac anomalies, type 1 diabetes) may emerge for the first time during childhood. While health risks related to loss of balance or musculoskeletal disorders may be similar between adults and children, other health risks assessed by the GAQ, such as heart disease or hypertension, are less relevant in the pediatric age group. There are also increased risks for acute health problems arising from conditions such as asthma or diabetes, when young children are involved in PA without direct supervision by a parent or knowledgeable caregiver. Having a quick and easy questionnaire that can effectively identify children who may be at risk for health consequences related to their physical activity participation would enable professionals in recreation, sport and exercise to

implement appropriate activity adaptations to encourage the participation of these children.

Therefore, the purpose of this study was to evaluate the sensitivity, specificity and reliability of the GAQ for use in children via parent proxy report.

Methods

Participants

Parents of children 3 to 14 years of age were eligible for the study. Parents were approached if their children were being seen for any reason (medication follow up, new diagnosis, chronic condition, acute injury, etc.) at the emergency medicine, neurology, respirology, rehabilitation medicine, chronic pain, rheumatology, or cardiology clinics. It was anticipated that children seen in the emergency medicine clinic would primarily have acute illnesses and injuries, and would not typically have a medical condition associated with an increased risk for physical activity participation. For the remaining clinics, the physicians responsible for these patients indicated that they may or may not have a condition that required the restriction of physical activity.

The research team reviewed lists of patients scheduled for each day to identify children 3 to 14 years of age whose parents would be eligible for study participation. As required by the CHEO Research Ethics Board, the physician responsible was required to consent to the approach of each patient. Physician consent to approach was not provided for patients whose medical status was unstable, who were newly diagnosed or in the process of being diagnosed, who had previously indicated they did not want to be approached about research, or when family circumstances were difficult or unstable. If parents returned a completed questionnaire during the clinic visit then consent was implied. Informed consent was obtained from all participating

parents who agreed to be contacted one week later to complete the GAQ a second time. The study was approved by the Children's Hospital of Eastern Ontario Research Ethics Board.

Get Active Questionnaire

The GAQ is a new physical activity readiness assessment tool. It is intended to replace the Canadian Society for Exercise Physiology (CSEP) *Physical Activity Readiness Questionnaire* (PAR-Q (Shephard 1988)). The GAQ is a 2-page document; with four screening questions found on page one (Figure 1). The screening questions ask about signs, symptoms or medical conditions affecting physical activity, pain or swelling in the body that would affect physical activity, whether a health care provider has recommended avoiding certain types of activity or advised certain precautions, and whether there is any other medical condition that affects physical activity. This study evaluated the accuracy of responses to these four questions in relation to data obtained from two sources that were assumed could provide accurate information: a) information provided directly by the responsible physician, and b) information contained in the child's medical chart. The second page of the GAQ provides advice about physical activity for individuals who answer "NO" to all of the questions on page one. The information on page two was not assessed during this study.

Data Collection Procedures

Research students collaborated with the clinicians in order to identify clinic dates and times when parents could be approached regarding study participation. For most clinics, the clinician completed one feedback form specifying whether patients to be seen that day were primarily those with or without physical activity restrictions (dichotomous response of "yes" or "no" to restrictions). This approach was used to minimize the response burden among physicians who indicated that their response would be similar for all patients seen during the same clinic.

Physicians in the emergency medicine clinic and one cardiology clinic completed a separate report for each patient seen. Physician reports for all clinics were completed on the same day that the patient was seen. In order for the research student to remain blinded to the physical activity restriction status of patients, clinicians returned the completed form in a sealed envelope. Parents completed the GAQ while in clinic and then completed the questionnaire again 7 days later through an email link to the study REDCap database (Harris et al. 2009) (Version 8.4.5, Vanderbilt University Medical Center, Nashville, TN) hosted at the CHEO Research Institute. Comments and questions from parents about how to complete the GAQ and the observations of the research student were recorded in field notes. After the participants had completed all phases of the study, the research student reviewed the clinic visit note(s) and physician letter in the child's medical record for the hospital visit when the parent completed the GAQ. The purpose of the medical chart review was to ascertain whether information about the child's physical activity participation could also be obtained from that source. All text regarding physical activity was recorded verbatim in the study database. The text was subsequently coded (Yes/No) independently by two researchers (PEL, JJ, or EE) to indicate whether a special consideration during physical activity was required. Both researchers were required to provide the same Yes/No code. Discrepancies between codes were discussed to resolve any discrepancies.

Data Analyses

Our convenience sample included all parents who provided a completed questionnaire (implied consent) during a visit to one of the participating clinics. Data collection sessions were scheduled in conjunction with participating physicians from June 2016 to March 2017. The target sample size of 200 was designed to enable an estimate of specificity of 0.85, with precision = 0.05 and a 95% confidence level for an anticipated 5% prevalence of "yes"

responses on the GAQ (Malhotra and Indrayan 2010). Descriptive statistics (mean $\pm$ SD, median (range), and frequencies) summarized the demographic characteristics of the children whose parents participated in the study. Parent proxy responses on the GAQ (regardless of the child's age) were compared to physician reports (gold standard) and the information in the child's medical chart (secondary source) in order to calculate the sensitivity and specificity of the GAQ for children. Sensitivity, defined as the ability of the GAQ to correctly identify children with special considerations for physical activity, was calculated as: number of true positives / [number of true positives + number of false negatives], where true positives were a special consideration identified by the parent and in (i) the physician report, or (ii) the medical record, and false negatives were identified by in the physician report or medical record but not by the parent responses on the GAQ. Specificity, or the ability of the GAQ to correctly identify children who do not have special considerations for physical activity, was calculated as: number of true negatives / [number of true negatives + number of false positives], where true negatives occurred when the parent and the (i) physician report or (ii) medical record indicated that no special considerations were required and false positives were a parent response indicating the need for special consideration that was not identified by the physician report or in the medical record. An intra-class correlation coefficient, two-way mixed-effects model with absolute agreement (2, 1) (Koo and Li 2016) and Pearson correlations for comparison of each GAQ item evaluated the test-retest reliability of the GAQ responses over a one week interval. Statistical analyses were performed using SPSS statistical package version 24.0 (SPSS Inc., Chicago, IL).

Results

Participants

The parents of 207 patients (97 females (47%) from six different chronic disease clinics and the emergency medicine clinic at the Children's Hospital of Eastern Ontario consented to participate. The mean age of their children was 8.4 ± 3.7 years (range 3 to 14 years), which did not differ by gender except for cardiology patients where boys were younger than girls (Table 1). Physician reports of the child's physical activity considerations were not completed for 15 patients (8%) who were seen in the emergency medicine clinic. Completion of the research form was difficult when multiple patients with complex conditions were being treated simultaneously by the emergency medicine physicians, who were also unfamiliar with the child's detailed medical history. The clinic notes/physician letters in the medical records (paper or e-chart) of all study participants were reviewed for information pertaining to the child's physical activity. For 111 children (53% of participants), clinic notes/physician letters contained information about their physical activity participation. No information about physical activity was found in the medical records of the remaining 98 study participants. The medical charts of almost all children seen in the cardiology (92%), chronic pain (100%) or rehabilitation medicine (100%) clinics had information about the child's physical activity participation. Information about physical activity was less likely to be found ($p < 0.01$) in the medical charts of children seen in the emergency medicine (16%), neurology (36%) or respirology (38%) clinics.

The parents of all children 3 to 14 years of age seen in the participating clinics were eligible to participate. On average, 2 to 3 patients were approached per day in most chronic disease clinics. The rheumatology and cardiology clinics cared for a much larger number of patients, with an average of 6 eligible patients per day. There were 150 potential study participants per month while the student researcher was available for daily data collection (June to August 2016). An additional 6 data collection days were scheduled through the SUPPORT

research program in the emergency medicine clinic to acquire children who were not expected to have a chronic condition. Of the patient's approached, 20% to 25% agreed to participate during each data collection session.

Responses on the Get Active Questionnaire (GAQ)

Of the 207 parents who initially provided a completed GAQ, 93 (45%) responded "YES" to at least one question. The proportion of children whose parents responded "YES" to 1 or more questions on the GAQ was between 35% and 53% for all clinics, except for children seen in the chronic pain (5/6 or 83%) and rehabilitation medicine (7/8 or 88%) clinics. Items in the GAQ that asked about health care provider advice (23%), pain or swelling affecting activity (18%) and other medical conditions affecting physical activity (14%) were the most likely to elicit a "YES" response (Table 2). The parents of chronic pain, rehabilitation medicine and rheumatology patients were more likely to report pain or swelling affecting their child's activity (chi-square = 41.7, $p < 0.001$). Parents of chronic pain or rehabilitation medicine patients were more likely to report health care provider advice to avoid some types of activity (chi-square = 25.0, $p < 0.001$). Parents of rehabilitation medicine patients were also more likely to report having another medical condition affecting physical activity (chi-square = 21.2, $p = 0.002$). Parents of paediatric cardiology patients were not more likely to report heart disease/stroke, high blood pressure, dizziness, shortness of breath or loss of consciousness. These items on the GAQ were intended to identify adults at risk for cardiac complications with exercise. When parents reported a special consideration for physical activity that was not reported by the physician or recorded in the medical chart, the special consideration was most likely to be pain (30/68 or 44%), dizziness (19/68 or 28%), breathlessness (18/68 or 27%) or a heart condition (13/68 or 19%). Almost half

of these parents (30/68 or 44%) also reported that a health care provider had advised them of a special consideration for their child's physical activity participation.

Sensitivity

In order to calculate sensitivity and specificity, the dichotomous responses ("Yes" or "No" regarding whether the child required physical activity restrictions) from 192 physician reports were compared to dichotomized parent responses from the GAQ ("No" for all "no" responses; "Yes" for 1 or more "Yes" responses). Sensitivity of parent GAQ responses in comparison to physician reports about the child's physical activity was 71.4% or 20 true positives / (20 true positives + 8 false negatives) (Table 3). When comparing parent GAQ responses to information in the medical record of 111 children whose medical record mentioned physical activity, sensitivity was 100% (8 out of 8) (Table 4). These children were correctly identified by the GAQ as needing physical activity restrictions.

The 8 false negative responses (parent response "No", physician report response "yes") included one patient from cardiology and 7 from neurology. For the cardiology patient, the physician indicated that intense and sustained activities were not recommended but that these activities were not of interest to the child. The 7 neurology patients all had epilepsy and were restricted from some activities (e.g., swimming) unless adequately supervised.

Specificity

Specificity was 59% or 96 true negatives / (96 true negatives + 68 false positives) when comparing parent GAQ responses to physician reports (Table 3). When comparing parent GAQ responses to information in the child's medical record, specificity was 55% (57/103). These children were correctly identified as not requiring any special considerations for physical activity.

Agreement with Physician Report

There was significant agreement ($Kappa = 0.16$, $p=0.003$), beyond what would be expected by chance, between 1 or more “YES” responses on the GAQ and the physician-reported physical activity considerations. A small proportion of parents (4% or 8/192) did not indicate on the GAQ physical activity considerations reported by the child’s physician. One third of parents (68/192) answered “YES” to 1 or more questions on the GAQ when the physician report did not identify any special considerations for physical activity.

The sensitivity and specificity of the GAQ relative to physician reports varied depending on the child’s medical condition (Table 3). Sensitivity was 80% or higher among cardiology, chronic pain, rehabilitation medicine and rheumatology patients. Only 50% of neurology patients with physician-reported physical activity restrictions were detected by the GAQ. The specificity of the responses was 54% to 71% for cardiology, neurology, respirology, rheumatology and emergency medicine patients. The GAQ responses resulted in a high proportion of false positive responses for chronic pain (80%) and rehabilitation (75%) patients.

Agreement with Medical Record

Overall agreement between GAQ responses from parents and information obtained from the child’s medical record (Table 4) was significantly greater than would be expected from chance ($Kappa = 0.15$, $p=0.003$). There was significant agreement for children seen in the cardiology clinic ($Kappa = 0.37$, $p=0.001$) and a trend toward agreement for neurology clinic patients ($Kappa = 0.41$, $p=0.11$). Agreement could not be determined for all other clinics because none of the patients seen in other clinics had special considerations for physical activity recorded in the medical chart.

Test-Retest Reliability

The GAQ was completed twice over a 1-week interval by 57 parents, providing 75% power to detect an ICC of 0.70 with $\alpha = 0.05$ (Walter et al. 1998). When comparing GAQ responses (“YES” to 1 or more items versus “NO” to all items) completed during the initial study visit to those reported via online survey one week later, the ICC for average measures was 0.70 (95% CI: 0.49, 0.82, $p < .001$), which is considered moderate (Koo and Li 2016). The ICC for single measures was 0.54 (95% CI: 0.32, 0.70). When examining reliability for each area, reliability was good for cardiology (ICC=0.82), neurology (ICC=0.77) and emergency medicine (ICC=0.78) patients. Reliability was not acceptable for children seen in the rehabilitation medicine (ICC=0.00, 4 of 6 parents had the same outcome on the GAQ) and rheumatology clinics (ICC=0.36, 6 of 10 parents had the same outcome), and could not be calculated for chronic pain ($n=2$, both had different outcomes) or respirology ($n=2$, both had the same outcome) patients. Responses to individual items on the GAQ were significantly correlated (r range 0.32 to 0.76, $p < 0.02$) between the initial study visit and the online survey one week later. Paired t-tests indicated no significant difference between the first and second test for all items on the GAQ ($t \leq 1.4$, $p > 0.15$).

Discussion

The GAQ is a self-administered, pre-participation screening tool for individuals interested in increasing their physical activity (Canadian Society for Exercise Physiology 2016). The GAQ is designed to indicate whether a person should seek advice from a health care provider or qualified exercise professional before becoming more physically active. The Canadian Society for Exercise Physiology now recommends use of the GAQ rather than previous screening tools, such as the Physical Activity Readiness Questionnaire (PAR-Q, (Shephard 1988)) or the PAR-Q+ (Warburton et al. 2011).

GAQ Feasibility as a Parent Proxy Report

This study found that it was feasible to use the GAQ as a parent proxy report on behalf of a child 3 to 14 years of age (207/209 complete responses). Sensitivity of the GAQ parent proxy report was good (71%), while specificity was adequate (59%). The possibility that lower specificity resulted from the fluctuating nature of many childhood health conditions or parent reports of perceived physical activity restrictions that were not medically justified (e.g., overprotection (Moola et al. 2011; Thornton 1997)) should be investigated. Study participants included 141 parents of children being seen in the cardiology, chronic pain, neurology, rehabilitation, respirology, or rheumatology clinics at the Children's Hospital of Eastern Ontario and 66 children seen in the emergency medicine clinic for an acute illness or injury. Thus the rate of chronic illness among study participants (68%) was substantially higher than the 15% to 20% reported in the general pediatric population (Cadman et al. 1986; Weiland et al. 1992).

Negative Predictive Value

The GAQ is designed as a two-step process. Initially, four questions are designed to screen out those who do not require special considerations for physical activity. Individuals who response "Yes" to one or more GAQ questions are referred for a more detailed screening by a physician or qualified exercise professional (Canadian Society for Exercise Physiology 2016). This study evaluated only the initial four questions, making the negative predictive value of the GAQ of particular interest. Among our study population of children with a high prevalence of chronic disease, the negative predictive value of the GAQ was 92% (96/104). The negative predictive value would likely be higher in the general population where the prevalence of conditions resulting in a "Yes" response would be lower (Mausner and Kramer 1985). The high

negative predictive value supports the use of the GAQ as an initial screen, which is intended to exclude people who are not at risk from more in-depth screening.

Positive Predictive Value

The GAQ also includes a second phase, whereby 1 or more “Yes” responses directs the individual to a more in-depth assessment with a physician or qualified exercise professional (Canadian Society for Exercise Physiology 2016). This second phase was not evaluated during this study. The positive predictive value of the first phase of the GAQ was 23% in our study population, suggesting a relatively large burden of false positive responses. The second phase of the GAQ should be evaluated as a proxy report to determine whether it is effective at discriminating between children who would or would not be at risk during increased physical activity. If proven effective, the GAQ could make a substantial contribution to the on-going discourse regarding the extent of pre-participation screening in youth sports (Wingfield et al. 2004). Data from Italy, where systematic pre-participation screening is mandatory and done by specially trained personnel, indicates that multi-faceted screening can significantly reduce the incidence of sudden death during youth sport (Corrado et al. 2006). Others argue that the rates are very low, and similar between areas with more and less extensive screening regimes (Maron et al. 2009). If the second phase of the GAQ could effectively distinguish those truly at risk from the larger proportion of false positive results, it would increase the feasibility of more extensive (and expensive) pre-participation screening efforts by enabling them to be focused on children with the highest risk.

Risk of a False Negative Response

Although perfect sensitivity and specificity of an instrument is impossible to attain, the rate of false negative responses (29% (8/28) based on physician report) obtained with the initial

GAQ screening questions is of concern. Among the 8 children whose physician report indicated that they require special considerations during physical activity but who were not identified by parent responses to the GAQ, 7 had a diagnosis of epilepsy resulting in the need for close supervision during some types of physical activity (e.g., swimming). These results suggest that the GAQ questions may not provide sufficient sensitivity (50%) for children whose medical condition does not affect the child's ability to be physically active, but who nevertheless require special considerations in order to safely participate in physical activity. Children with epilepsy, cognitive disabilities or attention deficit may require greater supervision during some types of activity (Steadward et al. 2003). Children with diabetes or asthma may need to adjust their medications (Younk et al. 2011; Konig and Godfrey 1973) or children experiencing chronic pain may have to adjust the type of activities enjoyed. These types of special considerations for physical activity were often not identified by the GAQ questions which focus on symptoms or diagnoses within the individual rather than on other safety aspects of the physical activity experience. Although it may appear that these "undetected" special considerations relate to the supervision of children's activity, they are nevertheless associated with significant negative health consequences for the child. Including an additional question that would identify these special considerations may improve the sensitivity of the GAQ for identifying children who are at risk of negative health outcomes when participating in physical activity.

Impact of the Sampling Frame

It was recognized that sampling primarily from chronic disease clinics would not be representative of the general population, and the higher proportion of children with restrictions in our study population would impact the predictive values obtained. It is important to consider the impact of our sampling frame on the study results. We specifically chose a sampling frame with

a higher expected prevalence of special considerations for physical activity in order to increase the proportion of “yes” responses, facilitating the calculation of sensitivity and specificity. The higher prevalence of special considerations among our study sample decreased the probability of a negative (all “No”) GAQ result (Mausner and Kramer 1985). Negative GAQ results would be more common in the general population, as demonstrated among the patients seen in the emergency medicine clinic, improving the negative predictive value of the test and decreasing the rate of false negative responses. Thus we would anticipate that use of the GAQ in the general population would more accurately exclude those not at risk, and direct those potentially at risk to the more detailed screening offered by a qualified exercise professional.

Physician Report or Medical Chart as the Reference Standard

Physician reports were provided directly to the research team during the clinic visit, ensuring that physical activity information was available for study participants during the clinic visit when the GAQ was completed. By comparison, only half of the patients (53%) had information about physical activity recorded in their medical chart. GAQ sensitivity was higher when comparing responses to information in the medical chart, a finding that may reflect an increased likelihood that the medical chart would reflect important physical activity restrictions. Nevertheless, medical charts are not a reliable reference standard given that almost half (98/209 or 47%) did not contain any information about the child’s physical activity.

Special Considerations Reported Only by Parents

Forty percent (68/164) of parents indicated special considerations for their child that were not reported by the physician. Of these, almost half (44%) indicated that the special consideration was conveyed by a health care provider. Children with medical conditions and disabilities often are seen by many healthcare providers, so parents may be accurately reporting

information that was conveyed by a healthcare professional other than the physician participating in this study. Parent reports of pain as a reason for special considerations were also common (44%). Parent ratings of the child's pain align with child self-reports, and are typically higher than pain ratings assigned by healthcare personnel (Khin Hla et al. 2014). Higher ratings of pain may lead parents to view pain as being problematic or an indication that the underlying condition is being aggravated.

Feedback on Completion of the GAQ

Parent feedback, questions posed to the research student, and the need for additional guidance during GAQ completion suggest that the GAQ (Figure 1) was, at times, difficult to use as a parent proxy-report form. There were two major areas of concern. Parents who were completing the GAQ on behalf of their children reported that the wording was confusing. In this study, the research student gave clear instructions to parents to complete the GAQ on behalf of their child. The study consent form also explicitly stated that when the GAQ says 'you' we are referring to 'your child'. Despite these instructions, parents were often confused as to how they should answer when reading questions that asked about "you" or "your body", erroneously answering for themselves instead of their children. The second area of concern was the order in which the questions were presented. The first question indicated that the response referred to issues 'within the past six months'. This prompted some parents to apply the 'within the past six months' timeframe to subsequent questions which were not intended to have a restricted timeframe. As a result, some medical conditions diagnosed more than 6 months previously were missed. If the GAQ was implemented in community settings, without the need for a study consent form and individualized support from a research student, it is likely that a much higher proportion of parents would incorrectly respond. A parent proxy version of the GAQ should be

developed to enable parents to consistently provide accurate responses on behalf of their child, and to clearly indicate the timeframe for each question.

Conclusion

The GAQ has good sensitivity for identifying children who have medical conditions that are similar to those of concern among adults, such as those with cardiac diagnoses or arthritis. It also effectively excludes children who do not require special considerations during physical activity. Disabilities that directly impact the child's ability to physically perform an activity are also identified by the GAQ. However, 55% specificity indicates that use of the GAQ may produce a fairly high burden of false positive results. The 60% specificity among parents of children seen in the emergency medicine clinic suggest that specificity of the GAQ may be better in the general paediatric population, where the prevalence of "Yes" responses would be lower. Modifications to the GAQ or the GAQ process with a qualified exercise professional are required in order to ensure it is suitable for children who require special considerations during physical activity that are not defined by their symptoms (e.g., change of medication, enhanced supervision). Creating a separate parent proxy version of the GAQ, and clarifying the timeframe for each question, could enhance the ability of parents to respond accurately and independently. Further research is required to investigate the impact of these proposed changes to the paediatric GAQ and the test-retest reliability of parent-reported GAQ responses.

Acknowledgements

We gratefully acknowledge the support of all of the children, parents and physicians who made this research possible. The contributions of Natasha Cinanni and Anastasia Alpous to the coordination of this research project and of biostatistician Dr. Nicholas Barrowman are greatly

appreciated. This project was made possible through financial support from the Canadian Society for Exercise Physiology.

Conflict of Interest

The authors have no conflicts of interest to report.

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Reference List

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Table 1: Description of Study Participants

Demographic Characteristic		Boys n (% ²)	Girls n (% ²)	Both n (% ³)
N	All	110 (53)	97 (47)	207
Age	Mean Age $\pm$ 1SD (range)	8.3 $\pm$ 3.7 (3 to 14 years)	8.6 $\pm$ 3.6 (3 to 14 years)	8.4 $\pm$ 3.7 (3 to 14 years)
Clinic	Cardiology ¹	29 (59)	20 (41)	49 (23)
	Chronic Pain	4 (67)	2 (33)	6 (3)
	Neurology	14 (50)	14 (50)	28 (13)
	Rehabilitation	6 (75)	2 (25)	8 (4)
	Respirology	8 (40)	12 (60)	20 (10)
	Rheumatology	10 (33)	20 (67)	30 (14)
	Emergency Medicine	39 (59)	27 (41)	66 (33)

¹ Boys were significantly younger than girls in the cardiology clinic (mean difference 2.7 ± 1.1 years, $p=0.01$).

² Percent for boys and girls is among participants from the same clinic.

³ Percent for both sexes is among all study participants.

Table 2: Proportion of Parents Answering “YES” to each GAQ Question by Clinic

GAQ Item	“YES” Response							
	Total	Card ¹	ChP ¹	Neur ¹	Resp ¹	Reh ¹	Rhm ¹	Emg ¹
	N=207	N=49	N=6	N=28	N=8	N=20	N=30	N=66
	YES	YES	YES	YES	YES	YES	YES	YES
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
“YES” to 1 or more items on GAQ ²	93 (45)	22 (45)	5 (83)	11 (39)	7 (88)	8 (40)	16 (53)	24 (35)
Heart disease, stroke or chest pain	16 (8)	8 (16)	0 (0)	1 (4)	0 (0)	1 (5)	2 (7)	4 (6)
High blood pressure	6 (3)	3 (6)	0 (0)	1 (4)	0 (0)	1 (5)	0 (0)	1 (2)
Dizziness or lightheadness	24 (12)	5 (10)	0 (0)	5 (18)	0 (0)	4 (20)	1 (3)	9 (14)
Shortness of breath at rest	20 (10)	8 (16)	0 (0)	2 (7)	1 (13)	4 (20)	0 (0)	5 (8)
Fainting or loss of consciousness	12 (6)	4 (8)	0 (0)	3 (11)	0 (0)	0 (0)	0 (0)	5 (8)
Concussion	8 (4)	2 (4)	0 (0)	2 (7)	0 (0)	0 (0)	1 (3)	3 (5)
Pain or swelling affecting activity ³	37 (18)	4 (8)	4 (67)	1 (4)	4 (50)	2 (10)	14 (47)	8 (12)
Health care provider	48	14	4	4	6	5	7	8

advice to avoid or take precautions ⁴	(23)	(29)	(67)	(14)	(75)	(25)	(23)	(12)
Other medical condition affects ability to be active ⁵	28 (14)	6 (13)	0 (0)	6 (21)	5 (63)	3 (15)	2 (7)	6 (9)

¹ Card = cardiology; ChP = chronic pain; Neur = neurology; Resp = respiratory; Reh = rehabilitation medicine; Rhm = rheumatology; Emg = emergency medicine

² Significant difference in proportion of “YES” responses by clinic (chi-square = 13.4, p=0.04).

³ Significant difference in proportion of “YES” responses by clinic (chi-square = 41.7, p<0.001).

⁴ Significant difference in proportion of “YES” responses by clinic (chi-square = 25.0, p<0.001).

⁵ Significant difference in proportion of “YES” responses by clinic (chi-square = 21.2, p=0.002).

Table 3: Sensitivity and Specificity of Parent Report Get Active Questionnaire Responses
Compared to Physician Report: Overall and by Medical Clinic

Medical Clinic	Sensitivity (%)	Specificity (%)	Kappa	p value
Overall (all clinics)	20/28 (71)	96/164 (59)	0.16	0.003
Cardiology	4/5 (80)	26/42 (62)	0.18	0.07
Chronic Pain	1/1 (100)	1/5 (20)	0.08	0.62
Neurology	7/14 (50)	10/14 (71)	0.21	0.25
Rehabilitation Medicine	4/4 (100)	1/4 (25)	0.25	0.29
Respirology	--- ¹	12/20 (60)	---	---
Rheumatology	4/4 (100)	14/26 (54)	0.24	0.04
Emergency Medicine	--- ¹	32/53 (60)	---	---

¹ None of the patients in these clinics had physician-reported activity restrictions.

Table 4: Sensitivity and Specificity of Parent Report Get Active Questionnaire Responses
Compared to the Medical Record: Overall and by Medical Clinic

Medical Clinic	Sensitivity (%)	Specificity (%)	Kappa	p value
Overall (all clinics)	8/8 (100)	57/103 (55)	0.15	0.003
Cardiology	7/7 (100)	25/38 (66)	0.37	0.001
Chronic Pain	--- ¹	1/6 (17)	---	---
Neurology	1/1 (100)	7/9 (78)	0.41	0.11
Rehabilitation Medicine	--- ¹	1/3 (33)	---	---
Respirology	--- ¹	12/20 (60)	---	---
Rheumatology	--- ¹	5/16 (31)	---	---
Emergency Medicine	--- ¹	6/11 (55)	---	---

¹ Sensitivity and agreement could not be calculated because no information about a physical activity restriction was found in the child's medical chart.

List of Figures

Figure 1: Get Active Questionnaire, 1st edition, 2016, Canadian Society for Exercise Physiology.

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Get Active Questionnaire

CANADIAN SOCIETY FOR EXERCISE PHYSIOLOGY –
PHYSICAL ACTIVITY TRAINING FOR HEALTH (CSEP-PATH®)

Physical activity improves your physical and mental health. Even small amounts of activity are good, and more is better.

For almost everyone, the benefits of physical activity far outweigh any risks. For some individuals, specific advice from a Qualified Exercise Professional (QEP – has post-secondary education in exercise sciences and an advanced certification in the area – see csep.ca/certifications) or health care provider is advisable. This questionnaire is intended for all ages – to help move you along the path to becoming more physically active.

YES	NO	PREPARE TO BECOME MORE ACTIVE
☐	☐	The following questions will help to ensure that you have a safe physical activity experience. Please answer YES or NO to each question <u>before</u> you become more physically active. If you are unsure about any question, answer YES .
☐	☐	1 Have you experienced ANY of the following within the past six months?
☐	☐	A A diagnosis of heart disease or stroke, or pain/discomfort/pressure in your chest during activities of daily living or during physical activity?
☐	☐	B A diagnosis of high blood pressure (BP) and/or a resting BP of 160/90 mmHg or higher?
☐	☐	C Dizziness or lightheadedness during physical activity?
☐	☐	D Shortness of breath at rest?
☐	☐	E Loss of consciousness/fainting for any reason?
☐	☐	F Concussion?
☐	☐	2 Do you have pain or swelling in any part of your body (such as from an injury, acute flare-up of arthritis, or back pain) that affects your ability to be physically active?
☐	☐	3 Has a health care provider told you that you should avoid certain types of physical activity or take certain precautions?
☐	☐	4 Do you have any other medical condition (such as diabetes, cancer or osteoporosis) that affects your ability to be physically active?
<p>..... ➤ NO to all questions: go to Page 2 – ASSESS YOUR CURRENT PHYSICAL ACTIVITY ➤</p>		

YES to any question: go to Reference Document – ADVICE ON WHAT TO DO IF YOU HAVE A YES RESPONSE..... ➤

If you already have clearance for becoming more physically active from a health care provider or Qualified Exercise Professional (QEP), go to Page 2 – ASSESS YOUR CURRENT PHYSICAL ACTIVITY ➤