

Understanding Parental Knowledge of and Attitudes towards  
Youth Sport-Related Concussion

Samantha D. Roberts

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## Abstract

Youth sport participation positively influences the development of many Canadian children who engage in sports. However, there is growing concern about the risk of sustaining a concussion. In Canada, there is a limited understanding of the level of knowledge and associated attitudes about pediatric sport-related concussion reporting and management among parents, and it is unclear what factors may influence parental attitudes and knowledge. This study aims to better understand parental knowledge and attitudes of pediatric sport-related concussions, as well as understand how parental and child biopsychosocial factors may influence parental knowledge and attitudes. Ninety families (140 children) were included in the study. Parents scored an average of 76% accuracy on factual concussion knowledge, with parents reporting 74% confidence in their responses. Parents endorsed a favorable attitude towards concussion reporting and management. Social risk status (SRS) influenced perceived knowledge scores ( $F(2,72)=6.34, p=.003$ ). Parents with low SRS had higher perceived accuracy of knowledge than families in medium or high SRS. SRS also influenced over and under estimations of parent factual knowledge ( $\chi^2(4) = 9.80, p=.04$ , Cramer's  $V = .26$ ). Younger age of when the child first began sports was associated with greater concussion knowledge, and the level of sport contact the child participated in influenced the level of parental perceived concussion knowledge. Lastly, positive concussion history of the child influenced more positive parent attitudes about concussion reporting and management ( $t(117)= 2.05, p=.04, d= .49$ ). This study helps identify gaps in parental concussion knowledge and may help inform knowledge translation platforms and policies.

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## **Introduction**

### **Benefits of Youth Sport Participation**

Approximately 75% of Canadian youth participate in some form of sport (Canadian Heritage, 2013; Participaction, 2016). Researchers posit the importance of sport participation in the positive development of children including physical, psychological, and sociological benefits (Eime et al., 2013b). Participating in sports provide youth with the opportunity to flourish in diverse aspects of child development. Physical activity in the form of sport participation has benefits on cardiovascular fitness, weight control, as well as muscular strength, endurance, and flexibility in youth (Fraser-Thomas et al., 2005). In the long-term, researchers have found that active youth are less likely to develop heart disease, obesity, diabetes, stroke, and depression later in life (Canada, 2003; Fraser-Thomas et al., 2005; Sabiston et al., 2016).

The positive relationship between children and their environment (i.e., home, school, community) is likely to enhance their healthy developmental outcomes (Linver et al., 2009). Examples of these outcomes include: increased competence in academic and social settings; positive self-identity; feeling connected to their community, family, and peers; building the child's character, integrity and morals; as well as allowing the child to develop a sense of caring and compassion (Lerner et al., 2000). Personal and social benefits of children engaging in sports has been emphasized through parent and child interviews (Holt, 2008). Psychological aspects of emotional control and exploration of environment are positively related to youth sport participation. Furthermore, positive social development is established through relationships with coaches and teammates (Eime et al., 2013a; Holt, 2008). For elementary and high-school aged children, sport participation has been linked to better emotional regulation, stronger social skills, fewer depressive symptoms, interpersonal and athletic skills, building peer relationships, as well

as heightened self-esteem and confidence (Eime et al., 2013a; Holt, 2008; Mahoney et al., 2003; McHale et al., 2005; Simpkins et al., 2006; Slutzky & Simpkins, 2009). Additionally, youth sport participation is positively correlated with improved school grades, university or college enrollment, and career achievement later in adulthood (Finn, 1989; Fraser-Thomas et al., 2005; Holt et al., 2011; Larson & Verma, 1999; Linver et al., 2009). Sport participation equips youth with initiative, drive, and relevant social and emotional skills needed to excel later in life (Baker et al., 2010; Larson, 2000). Thus, it is critical that we maximize youth sport participation by better understanding factors that result in parents withdrawing their children from sports, including lack of parental knowledge and negative attitudes associated with sport.

### **Social Risk and Youth Sport Participation**

Social and environmental factors, such as social status or socioeconomic status, are related to the positive development of youth. Social risk status can be measured by quantifying six aspects of social status: family structure, education and occupation of primary caregiver, employment of primary income earner, maternal age at birth, and language spoken in the home (Roberts et al., 2008; Treyvaud et al., 2016). The factors that are encompassed in family social risk status have an impact the level of youth sport participation, as well as on parental confidence and attitudes (Marcen et al., 2013). Children who have higher socioeconomic status (SES) are likely to engage in more hours of physical activity and have increased participation in sports compared to children with lower SES (Erkelenz, Kobel, Kettner, Drenowatz, & Steinacker, 2014; Fairclough, Boddy, Hackett, & Stratton, 2009; Telford et al., 2016). Parents with higher SES are most likely to have the financial means and free time to provide their children access to sports compared to parents with lower SES (Fairclough et al., 2009; Seabra et al., 2008).

Factors such as parental education may influence the level of understanding that parents have on the positive health outcomes of youth sport participation (Fairclough et al., 2009; Saelens & Kerr, 2008; Stenhammar et al., 2007). Parents with higher education may, in turn, be more supportive and encouraging of athletic participation (Marcen et al., 2013; Stenhammar et al., 2007). The level of parental education may impact the degree of understanding adverse facets of sport participation, such as concussions (Lin et al., 2015). Lastly, there is strong support emphasizing the negative impact that stress associated with low SES has on parent attitudes and confidence in general (Belsky, 1984; Ontai et al., 2008). There is some evidence to suggest that lower parental socioeconomic status may adversely influence the recognition of concussion signs, symptoms, and knowledge of return-to-play protocols (Turner et al., 2017). However, understanding how social risk status influences parental knowledge and attitudes of pediatric sport-related concussions remains elusive. Furthermore, it remains unclear how social risk status may impact the level of sport contact a parent may enroll their child into.

### **Parental Knowledge of and Attitudes towards Concussion Reporting and Management and Youth Sport Participation**

Despite the many benefits associated with youth sport, there is growing concern about potential adverse aspects of sport participation, including the risk of sustaining one or multiple concussions. The prevalence of youth sport-related concussion is approximately 12%, with 46,000 child and/or youth sustaining a concussion each year in Canada (NACRS, 2018; Tsushima et al., 2019); and there is widespread concern regarding the short and long-term consequences of sustaining a concussion. A concussion is defined as a blow to the head or whiplash that causes any one or more of the following: witnessed loss of consciousness, loss of memory for events immediately before and/or after the injury, or feeling dazed or confused for at

least thirty seconds (as defined by Rosenbaum et al., 2010). Although most youth athletes who sustain a sport-related concussion recover from their symptoms relatively quickly (Kirkwood, Yeates, & Wilson, 2006), a subset of youth experience more adverse outcomes such as cognitive, behavioural, and socio-emotional difficulties (Li & Liu, 2013; Taylor et al., 2002). Parents play a major role in identifying and managing concussive symptoms, managing at-home recovery, as well as making decisions around sport participation and return to play (Lin et al., 2015). The media has become prominent in concussion education, providing knowledge and education regarding sport-related concussion across all ages. The use of media and educational websites draws attention to the impact of concussion in youth, importance of recognizing signs and symptoms, and educates individuals about receiving proper management or treatment (Provvidenza et al., 2013). A limitation of using media for knowledge transfer is the limited, incomplete and/or lack of standardized knowledge about sport concussion (Provvidenza et al., 2013) that influences parents of youth athletes. For example, there can be inconsistent information across websites about symptoms and recovery, vague descriptions about concussions, or general information about TBI that incorporates information about concussion but does not clarify differences between different injuries. Such information can misinform or instill fear in parents and foster a negative attitude about pediatric concussions, potentially limiting participation in certain youth sports. Misinformed knowledge and concerns about concussion injury, recovery, and management may impact the type of sport engagement, and potentially restrict youth sport participation.

Understanding parental attitudes towards importance of recognizing and reporting a concussion, and their view of concussion management, may be moderated by several family and child factors. Current research has focused on the athletes' knowledge and attitudes towards

sport-related concussions rather than the parents' perspective. Research targeting parental knowledge and attitudes highlighted that 85% of parents have heard about concussions, with older parents and frequent internet users being more aware of concussions than younger parents (Bloodgood et al., 2013). However, only one-quarter of parents reported a basic understanding of concussion symptoms and diagnosis criteria (Bloodgood et al., 2013). There appears to be a difference among sex of the parent, with approximately 68% of mothers feeling that concussions are a critical issue, whereas only 34% of fathers feel this way (Bloodgood et al., 2013). In another study conducted in the United States, researchers reported that the average parent concussion knowledge score was approximately 73%, with scores ranging from 24% – 96% (Lin et al., 2015). Higher knowledge scores in this study indicated more accurate knowledge about concussions. The same study found that the average parental concussion attitude score was 84%, representing a positive attitude toward concussions in all parents completing the studies questionnaire (Lin et al., 2015). A positive attitude of concussion is defined as favourable attitude toward reporting a concussion, importance of reporting a possible concussion, and an overall positive view of concussion management (Register-Mihalik et al., 2013).

Parental attitudes have been influenced by the gender of the parent completing the study, as well as household income and parental education being significantly associated with both parental knowledge and attitudes about concussions (Lin et al., 2015). Parents with more income and higher education were likely to have increased knowledge and more positive attitudes about concussion (Lin et al., 2015). Interestingly, parent and child concussion history, as well as parent and child sport participation have not been found to moderate the knowledge or attitude scores of the parents (Lin et al., 2015). The limited research suggests that parents have a general understanding of how to identify symptoms of concussion but lack knowledge about concussion

management protocols and the immediate steps necessary following the injury (Sullivan et al., 2009; Turner et al., 2017). The few Canadian studies that examined concussion knowledge used mixed samples of health care providers, coaches, athletes, teachers, and parents, finding that a significant amount of Canadians have a basic understanding of what a concussion is but lack the knowledge about details of a concussion (Public Health Agency, 2018; Cusimano, Chipman, Volpe, & Donnelly, 2009). Furthermore, they identified that virtually all Canadians believe that concussion is an important health issue (97%); however, a limited amount knew where to get concussion information (51%), how to recognize signs and symptoms (46%), and what to do if someone sustains a concussion (40%; Public Health Agency, 2018). Currently, there is a significant gap in the literature about what signs and symptoms are misunderstood among parents and what factors influence their knowledge and attitudes about concussion reporting and management.

### **What is Missing in the Literature**

Many studies to date have been focused on parent and athlete participants from hospital or clinic populations and have focused on high-school aged youth or older (Lin et al., 2015; Sullivan et al., 2009; Turner et al., 2017). Using these populations presents a potential bias such that these parents may have elevated levels of concussion knowledge and attitudes beyond what is found in the general community given that these parents are seeking medical attention for concussions. It is important to consider elementary aged youth apart from high-school aged children given that individuals in high-school often have established an athletic identity and choose whether they want to participate in specific sports, and are more involved in their symptom reporting and return to play following concussions. In elementary school aged youth, parents often guide sport participation and help choose activities that fit with the family attitudes

and dynamics, as well as play a more prominent role in concussion decision making, recovery, and return to play.

Additionally, research conducted in the United States lacks the ability to generalize to Canadian parents due to the significant differences in the setup of athletic or school teams (e.g., onsite athletic trainers/therapists are not as prevalent in Canada as in the United States), as well as the differences in health care systems. These differences may significantly impact the level of knowledge a parent has about youth concussions, as well as their attitudes about concussion reporting and management. In Canada, there is a limited understanding of the level of knowledge and associated attitudes about pediatric sport-related concussion reporting and management among parents. Furthermore, there is a paucity of research that examines factors that may influence parental knowledge and attitudes of concussion reporting and management.

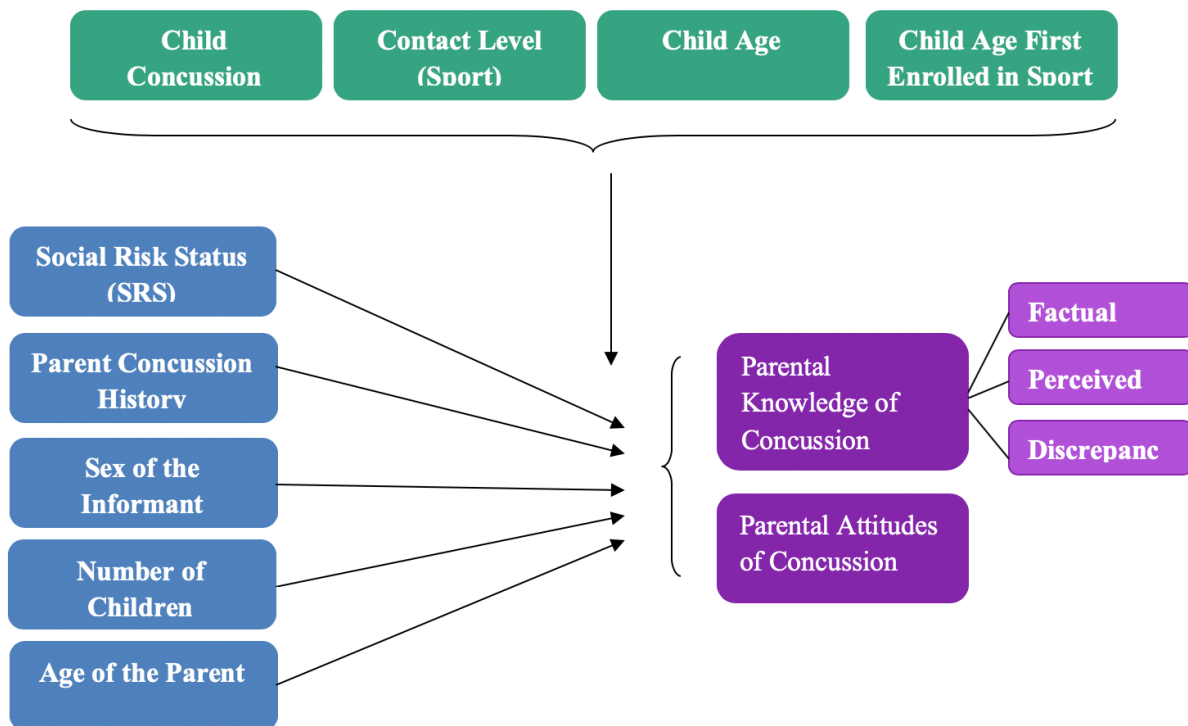


Figure 1. Conceptual Model of Study.

## **Objective and Hypotheses**

The specific objectives of the project are to: 1) describe parental attitudes and knowledge of pediatric sport-related concussions in a sample of parents from the Greater Toronto Area; 2) understand the relationship between parental knowledge of and attitudes toward youth concussion and parental biopsychosocial factors (i.e. social risk status, age of parent, parent concussion history, sex of the informant, number of children), and 3) examine child factors (e.g., child concussion history, sport contact level, child's age, child's age at first sport) that may influence parental knowledge of and attitudes toward youth concussion. First, it is hypothesized that the majority of parents or primary caregivers will have a positive attitude about concussion reporting and management, as well as an accurate knowledge of concussions in youth. Additionally, it is hypothesized that parents who are categorized as low social risk will likely be more knowledgeable of and have a positive attitude towards sport-related concussions.

## **Method**

### **Participants**

A community sample of eligible parents or primary caregivers of children between the ages of 6 and 14 years old were recruited from the greater Toronto area (GTA) and surrounding areas. Recruitment of participants took place over the course of 11 months, specifically between April 30<sup>th</sup>, 2019 and March 28<sup>th</sup>, 2020. Parents were eligible to participate if: 1) they were 18 years of age or older, 2) able to read and speak English at a grade 7 literacy level (self-declared by the parent), and 3) were parents or primary caregivers of children between the ages of 6 -14 years old. Parents who had multiple children within the described age range were asked to complete the concussion history and sport participation section of the study questionnaire for each child. There were 105 families enrolled in the study; 15 families were removed from the

final sample due to very low completion rates (i.e., approximately 40% and lower). The final sample was comprised of 90 families (n=140 children) who completed the study questionnaire. Predominantly mothers completed the study questionnaire (73%), four families had both parents or caregiver complete the questionnaire together, and families ranged from one-to-three children ( $M_{age} = 9$  years 5 months,  $SD = 2$  years 10 months).

## **Procedure**

The cross-sectional study was approved by the Human Participants Review Subcommittee of York University's Ethics Review Board in Toronto, Ontario. Participants gave consent prior to completing the questionnaire. In order to maximize recruitment, participants were recruited using two methods: an in-person approach, as well as distribution of an online link to the study questionnaire. For in-person administration, participants were recruited from athletic organizations, libraries, community centers, and a local festival in the Greater Toronto Area (GTA). Prior to recruitment at the mentioned sites, the principle investigator obtained written and/or verbal consent from the facility staff for recruitment of parents. A study team member and/or the principle investigator attended the aforementioned recruitment locations in person equipped with an Apple iPad that contained the study survey. Potential parent participants were approached by the research team member who introduced and explained the research study, as well as eligibility criteria. If the eligible parent expressed interest, the research team member obtained consent and then provided the participant with the study questionnaire. In situations where in-person recruitment is not feasible, parents were provided the study's link online for them to complete at a time that was more convenient.

## Measures

The study questionnaire was comprised of closed-ended questions broken into three sections; see Appendix 1 for the study questionnaire. The first section contained questions about parent and child demographic and medical history, parent and child concussion history, as well as previous and current sport participation. The next two sections of the questionnaire asked questions about parent sport-related concussion knowledge (factual and perceived knowledge) and attitudes about sport-related concussions management and treatment in youth. The study questionnaire was completed via Qualtrics (an online secure and anonymous survey platform). All data was exported from the Qualtrics survey platform and housed in a password protected SPSS database.

**Demographic and relevant sport and concussion information.** The first section of the survey focuses on demographic information (e.g. the number of children in the home, child's current age, parent who is completing the form, medical or psychological diagnoses of the child, family structure, marital status, age of mother at child birth, ethnicity, parent's current age, as well as maternal and paternal employment status (i.e. full or part time employment, or unemployed), education, and occupation) and questions necessary for calculating the social risk score (see *Social Risk Score* section below). Parents are also asked about history of concussion of both the parent and child. Finally, parents answered questions pertaining to the child's sport participation history (i.e. what sports the child has played in the past, what current sports the child plays in, level of sport the child engages in) and current parents' sport participation is also included in this section. Sport participation included a variety of sports played within the community, school, or on organized sport teams (e.g., soccer, swimming, football, equestrian sports), please see appendix A for the full list sports options included in the study. The sports the

children were engaging in were categorized based on the level of contact (i.e. collision, contact, or limited/no contact) for analysis purposes. The classification was based on guidelines published by the American Academy of Pediatrics (Rice et al., 2008), where collision included football, rugby, hockey, and lacrosse; contact included flag football, basketball, dodgeball, cheerleading, wrestling, and soccer; and limited/no contact included: baseball, volleyball, dance, equestrian sport, gymnastics, swimming, track and field, and water polo.

***Social risk score.*** Using specific demographic information, social risk was computed and categorized based on a rank system previously validated (Roberts et al., 2008; Treyvaud et al., 2016). The total social risk score is a composite score comprised of six aspects of social status scored as low social risk (score of zero), medium social risk (score of one), or high social risk (score of two) based on follow-up studies of other medically at-risk children (Roberts et al., 2008; Treyvaud et al., 2013): maternal age at birth (2 – less than 18 years old, 1 – 18–21 years old, or 0 – more than 21 years old), language spoken at home (2 – no English, 1 – some English, 0 – only English), education of primary income earner (2 – less than high school diploma, 1 – high school, 0 – college, university, or graduate studies), employment status of primary income earner (2 – unemployed, 1 – part time, 0 – full time), occupation of primary income earner (2 – unskilled, 1 – semi-skilled, 0 – skilled/professional), and family living structure (2 – single caregiver, 1 – separated parents with dual custody or cared for by other intact family, 0 – two caregivers). The total social risk score was calculated by summing the scores for the six aspects noted above. Each family was categorized as low social risk (total social risk score of 0), medium social risk (total social risk score of 1), or high social risk (total social risk score two or more).

**Rosenbaum concussion knowledge and attitudes survey (RoCKAS).** The Rosenbaum Concussion Knowledge and Attitudes Survey (Rosenbaum & Arnett, 2010), is a 55 item, 5 section questionnaire that was originally derived from several previous traumatic brain injury surveys designed by Gouvier, Prestholdt, and Warner (1988); and Simonds (2004). For the purpose of this study, sections 1, 2, and 5 from the RoCKAS were used to assess parental *factual* knowledge of concussions. Section 1 contains 18 items (e.g., “After 10 days, symptoms of a concussion are usually completely gone”) that are answered as ‘True’ or ‘False’. Section 2 assesses *factual* knowledge by asking three applied questions following a scenario (e.g., “It is likely that Player Q’s concussion will affect his long-term health and well-being”). Both section 1 and 2 are answered as ‘True’ or ‘False’ and scored with each correct answer scoring one point and each incorrect answer scoring no points. Sections 3 and 4 were omitted for the purposes of this study due to their overlap with concussion attitudes that is addressed below. Section 5 contains a checklist of 16 items that combine both commonly reported post-concussive symptoms (e.g., dizziness) and distracter symptoms (e.g., weight gain), and the participant was to select all of the symptoms that they believe are experienced immediately following a concussion. Each correct answer receives one point and each incorrect answer receives no points. A total *factual* concussion knowledge score was calculated by summing all of the points obtained in the three sections, with a higher score demonstrating more factual knowledge about concussions (total scores could range from 12 – 25). This measure displays moderate psychometric properties (intraclass correlation coefficient of .67; Rosenbaum & Arnett, 2010).

***Perceived knowledge.*** To assess *perceived* knowledge, there will be three questions following the *factual* knowledge sections that ask the participants to rate how confident they feel about their answers to the *factual* knowledge sections. These questions are a 7-point Likert-scale

(range 1-7) and a total *perceived* knowledge score was calculated by summing their responses (total score range from 3–21). Higher scores represent more *perceived* knowledge about concussions.

**Parent concussion survey (PCS).** The Parent Concussion survey (PCS) is a questionnaire that assesses knowledge of and attitudes towards concussions (Register-Mihalik et al., 2013a). For the purposes of this study only parental attitudes questions were used from the PCS. Parental attitudes are assessed with a nine-item sub-questionnaire, which asks about attitudes towards symptoms of concussion, concussion management, and return to play decisions. For the proposed study, participants' attitudes about concussion were assessed by the nine 7-point Likert-scale questions (range 1-7) from the PCS. A total attitude score was calculated by summing the responses to the Likert-scale with a total score range of 9–63. A higher score represents a more favourable attitude towards reporting concussions, importance of reporting a possible concussion, and an overall positive view of concussion management (Register-Mihalik et al., 2013). This measure demonstrates good psychometric properties, specifically internal consistency has been found to be acceptable for the attitude construct, with Cronbach alpha beyond .70 (Register-Mihalik et al., 2013a).

### **Design and Analysis plan**

**Objective 1.** Summary descriptive statistics were calculated to describe the sample characteristics, pattern of knowledge about concussions, and attitudes towards concussion reporting and treatment within our sample. Parental concussion knowledge was described by the percentage of factual knowledge (i.e. percentage of total questions correct from the RoCKAS) and perceived knowledge (i.e., average rating of perceived knowledge questions). Incorrect items

that were commonly endorsed by parents were identified and described. Parental attitude scores were described using the total attitudes score from the PCS.

In order to examine parents that over or underestimated their factual knowledge, discrepancy scores were calculated between the parental factual knowledge and perceived knowledge. Due to differences in scales, factual and perceived knowledge scores were converted to standardized t-score values. The difference was calculated between factual and perceived knowledge t-scores. Discrepancy scores were then grouped into three different categories: under estimation of factual knowledge, no/minimal discrepancy, and an over estimation of factual knowledge. Those who underestimated their factual knowledge (i.e., high factual knowledge and low perceived knowledge) had a t-score difference greater than 5 in the positive direction. Those with accurate perceptions of their factual knowledge (i.e., no or minimal discrepancy between factual and perceived knowledge scores) had a t-score differences within 5 points in either the negative or positive direction of zero. Lastly, those who overestimated their factual knowledge (i.e., low factual knowledge and high perceived knowledge) had a t-score difference greater than a 5 in the negative direction.

**Objective 2.** Independent samples t-tests, analysis of variance, and chi-square tests were used to examine the relationship between parental biopsychosocial factors (i.e., social risk status, parent concussion history, sex of the informant, number of children, parent age) and parental knowledge (i.e., factual knowledge and perceived knowledge scores) and attitudes. Chi-square tests with odds risk ratios were used to examine parental biopsychosocial factors and discrepancy scores.

**Objective 3.** Chi-square tests with odds risk ratios were used to examine child factors and discrepancy scores. Three linear regression models were used to examine associated child

factors (i.e., child concussion history, sport contact level, child's age, child's age at first sport) and parental knowledge and attitudes scores. Model 1 examined factual knowledge with child factors, model 2 examined perceived knowledge with child factors, and model 3 examined attitude score with child factors.

All data analyses were conducted with Statistical Package for the Social Sciences (SPSS) version 23 and 26 (IBM corp. Released, 2015 and 2019). Appropriate post-hoc analyses were conducted, and Bonferroni was used to control for multiple comparisons. For all analyses, two-tailed alpha values of less than .05 were considered statistically significant.

## **Results**

Table 1 presents participant descriptive information. Predominantly mothers completed the study questionnaire (73%). On average, parents were approximately 41 years of age at the time of the study completion, and the average child age was 9 years and 5 months. Eighty-nine percent of parents were Caucasian, with the remaining 11% of the sampling identifying as South Asian (2%), Chinese (1%), Filipino (1%), Caribbean (1%), Southeast Asian (1%), and other (5%). Children were predominantly engaged in swimming (54%), soccer (39%), hockey (31%), and basketball (21%) at the time of the study. There were only 6 children (4%) that were not currently engaged in some form of sport.

**Objective 1.** Parents scored an average of 76% accuracy on concussion factual knowledge ( $M = 21.29$ ,  $SD = 2.44$ ; RocKAS). Eighty-nine percent was the highest score achieved by a parent in the study, and the lowest factual knowledge score was 43% (total scores ranged from 12 – 25, with higher scores reflecting more accurate knowledge). Incorrect sign/symptoms of an acute concussion most commonly selected by parents were difficulty speaking (62%), panic attacks (31%), and reduced breathing rate (25%). See Table 2 for a

breakdown of the factual knowledge signs and symptoms. There were three factual statements where at least half of the participants answered incorrectly (see Table 3 for factual knowledge statements). For the statement, *after a concussion occurs, brain imaging (e.g., CAT scan, MRI, X-Ray) typically show visible physical damage (e.g., bruise, bleed, blood clot)*, 49% of parents responded incorrectly, indicating that they believe this was true. Additionally, 89% of parents incorrectly responded to the statement, *an athlete who gets knocked out after getting a concussion is experiencing a coma*. Lastly, 82% of parents reported that symptoms of a concussion typically last longer than 10 days, which was an incorrect response to the RoCKAS (please see discussion).

When examining parental perceived knowledge, parents on average reported feeling confident in their responses about knowledge symptoms and recovery (i.e., 74% confident in their responses; confidence ranged 38% – 100%). Discrepancy scores were examined in order to better understand parents that over or underestimated their factual knowledge about concussions. There were 14 (16%) parents that had overestimated their factual knowledge (had higher perceived knowledge than factual knowledge; scores ranged from -8.83 – -36.84). Thirty-six (40%) parents had accurate perceptions of their factual knowledge (had no or minimal discrepancy between factual knowledge and perceived knowledge), and there were 26 (29%) parents that had underestimated their factual knowledge (had higher factual knowledge than they perceived; scores ranged from 6.19 – 33.40). Parents on average displayed a generally favourable attitude (high positive) towards concussion reporting and concussion management ( $M = 48.45$ ,  $SD = 4.46$ , range is 36 – 54).

**Objective 2.** Twenty-eight parents reported that they had sustained a concussion in the past, with the number of concussions ranging from 1 – 5 (See Table 1). Number of children,

parental age at study completion, sex of the informant, and parental concussion history did not influence parental factual or perceived knowledge, discrepancy scores, or attitudes on concussion reporting and management ( $p$ s = .15 – .96). Social risk status influenced the level of perceived knowledge among parents ( $F(2,72) = 6.34, p = .003$ ), with parents with low social risk status having higher perceived accuracy of knowledge than those with medium social risk status ( $p = .019$ , with a large effect size  $d = 0.96$ ), or high social risk status ( $p = .035$ , with a large effect size  $d = 0.95$ ) families. Medium and high social risk status families had similar perceived knowledge scores. There was also a significant difference for social risk status groups and discrepancy scores ( $\chi^2(4) = 9.80, p = .04$ , with a large effect size of Crammer's  $V = .26$ ). Based on odds ratios, families with medium SRS are 15 times more likely to underestimate their factual knowledge compared to families with low SRS (95%CI: 1.68, 133.92); and families with high SRS are 2.7 times more likely to underestimate their factual knowledge compared to families with low SRS (95%CI: 0.62 – 11.53). Furthermore, families with medium SRS are 5.5 times more likely to overestimate their factual knowledge about concussions compared to families with low SRS (95%CI: 0.45, 66.31); yet families with low and high SRS have relatively equal odds of overestimating their factual knowledge about concussion (OR= .068, 95% CI: 0.07 – 6.78). Families in the low social risk status are more likely to have accurate perceptions of their factual knowledge than families of higher social risk groups. Factual knowledge scores and attitude scores were similar across social risk status groups. Further description of social risk status is displayed in Table 4.

**Objective 3.** Of the 140 children in the study, twenty-three children (16%) had a history of concussion, with the number of concussions ranging from 1 – 3. Youth were relatively equally distributed among sport contact level with 37% engaging in collision level sports, 31% engaging

in contact level sports, and 31% engaging in limited or no contact level sports. Furthermore, there were twenty-six (19%) youth who had switched from a higher contact sport to a lower level of sport contact (i.e. changed from a collision level to contact or limited/no contact sport, or from contact level to limited/no contact level) at some point during their sport participation. There were no differences between parent factual knowledge, perceived knowledge, discrepancy scores, or attitudes among those who changed from higher contact levels to lower contact levels ( $ps = .39 - .81$ ). Parental factual knowledge, perceived knowledge, and attitudes scores did not differ by the number of children the parents had (i.e. one child, two children, three children), and therefore all children were included in the regression analyses. In our analysis of discrepancy scores, no child factors were found to be significantly associated with discrepancies between parental perceived and factual knowledge ( $ps$  range from  $.12 - .63$ ).

A series of linear regression models were conducted to examine child factors (child concussion history, sport contact level, child's age, child's age at first sport) associated with parental factual knowledge, perceived knowledge, and attitudes scores. The model examining factual knowledge was not significant ( $F(4,106) = 1.53, p = .20, R^2 = .06$ ). However, within the factual knowledge regression model the age at which the children began playing sports was significant ( $\beta = -.22, p = .03$ ), with the younger age at which the children begin sports being correlated with higher factual knowledge. The model examining parental attitude scores was also not significant ( $F(4,105) = 1.20, p = .32, R^2 = .04$ ). However, there was a trend towards significance for youth concussion history ( $\beta = -.19, p = .056$ ), with follow-up post-hoc tests revealing that parents of children with a concussion history had a more favourable attitude about concussion reporting and management than parents of children without a concussion history ( $t(117) = 2.05, p = .04$ , with a moderate effect size  $d = .49$ ). The linear regression model for

perceived knowledge was found to be trending significance ( $F(4,104) = 2.37, p = .057$ ), with an  $R^2$  of .084. The child current level of sport contact significantly predicted parental perceived knowledge scores ( $\beta = .27, p = .006$ ). Parents with children participating in collision and contact level sports had similar perceived knowledge of concussions ( $p = .38$ ). However, those with children in collision level sports had higher perceived knowledge of concussions compared to parents with children in the limited/no contact sport level ( $p = .037$ , with a moderate effect size of  $d = .70$ ). Parents that had children in contact sport level had similar perceived knowledge than parents of children in limited/no contact sport level ( $p = .96$ ).

### **Discussion**

This study aimed to better understand parental knowledge and attitudes of pediatric sport-related concussions, as well as understand how parental and child biopsychosocial factors may influence parental knowledge and attitudes. Our results indicated that parents in our study had accurate knowledge about youth sport-related concussions, as well as favourable attitudes about concussion reporting and management. Families from lower SRS had greater confidence in their knowledge of youth sport-related concussions than families with higher SRS. Parents of children who began sports at a younger age had greater concussion knowledge than parents of children who began sports at an older age. Furthermore, parents had greater perceived knowledge about concussions when their child engaged in a sport of greater contact. Lastly, child concussion history influenced more positive parent attitudes about concussion reporting and management. The current study highlights many important findings regarding the understanding of parental knowledge and attitudes of youth sport-related concussion in the Greater Toronto Area and offers an initial platform for knowledge translation and educational initiatives.

Findings from the current study are aligned with several aspects of the 2018 report published by The Public Health Agency of Canada (PHAC; Public Health Agency, 2018) as well as other studies conducted in the United States; yet also highlights areas of consideration that were previously unaccounted for. Parents in our study had a moderate amount knowledge about concussion signs and symptoms – similar to rates found in prior literature that used mixed samples (i.e., parents, coaches, athletes, teachers, healthcare professionals; Bloodgood et al., 2013; Lin et al., 2015; Public Health Agency, 2018; Register-Mihalik et al., 2013, 2017). This is particularly important because our study consisted of a sample entirely of parents, uniquely providing a more in-depth understanding of parental knowledge and attitudes of sport-related concussion within the Greater Toronto Area. Despite these findings, there is a great deal of public misconception regarding brain injury within the general population. Consistent between the PHAC baseline study and our findings, Canadian parents incorrectly identify reduced breathing rate as a sign of an acute concussion and the majority have the misconception that physical damage to the brain following a concussive injury can be observed on clinical brain scans (e.g., MRI, CT; Public Health Agency, 2018). It is possible that the misconception of visible or permanent brain injury following an acute concussion may be due to parent’s unitary beliefs about brain injury and their attention to media about traumatic brain injuries, chronic traumatic encephalopathy (CTE) and other related head injuries; incorrectly classifying all brain injury as the same. A brain injury is rather dynamic, with implications differing based on three important factors relating to the injury. Specifically, brain injuries are classified into mild, moderate, and severe TBIs based on the length of loss of consciousness, Glasgow Coma scale, and duration of post-traumatic amnesia. For example, a concussion sustained from being checked into the boards during a hockey game would be a significantly different injury compared to

someone who sustained a head injury in a car accident – both are considered brain injuries, yet each have may very different clinical presentations due to potential differences in the mechanism of injury and acute clinical symptoms. Additionally, our study uniquely identified that a considerable proportion of parents incorrectly identify difficulty speaking and panic attacks to be a sign of a pediatric sport-related concussion, which was previously unexplored. This error analysis of factual knowledge further underlines gaps in current parental knowledge of sport-related concussions that should be addressed by education initiatives for Canadian parents. Inaccurate parental knowledge can negatively impact parent’s ability to correctly identify injuries, make informed decisions about concussion management and care, as well as inadvertently inhibit participation in certain youth sports. Therefore, it is important to educate parents about the differences between acute concussive injuries that their children may experience and TBIs of all forms (mild to severe, CTE etc.), emphasizing that not all brain injuries are alike with regard to clinical presentation of signs and symptoms, and not all leave lasting neurological damage that can be viewed by clinical brain scans.

Interestingly, the response that concussion recovery typically takes longer than 10 days, indicated by 82% of parents, was an incorrect answer on the measure used in the study (i.e., RoCKAS scale). Information about concussion recovery in the literature and in the media has been equivocal. There is literature supporting concussion recovery within 10 days among athlete populations (Guskiewicz et al., 2000, 2003; McCrea et al., 2003; Meehan et al., 2013); however, the parent perspective captured in our study is consistent with education platform reports that give broad descriptions of concussion recovery times. For example, both the Centre for Disease Control and Prevention (CDC) HEADS UP program and Parachute Canada describe that concussion recovery may take up to a couple of weeks and if symptoms persist for months, then

a diagnosis of post-concussion syndrome (PCS) may be explored (Centers for Disease Control and Prevention, 2019; Parachute Canada, 2020). Additionally, literature surrounding concussion recovery has emphasized that although adults typically recover from a concussion within 10 days, youth and high-school age children take longer to recover (approximately 15 days; Manzanero et al., 2017), and often display longer recovery times for cognitive symptoms (Kirkwood et al., 2006; McCrea et al., 2003; McCrory et al., 2017). It is possible that parents within our sample are accurately reflecting knowledge from information readily available to the public that is based on more recent statistics and information. Whereas, the RoCKAS was designed using questions developed from previous questionnaires that were dated from 1988 – 2004 and was originally assessed within a group of high-school aged students with only two-thirds participating in sport (Rosenbaum & Arnett, 2010). It is critical to appreciate recovery trajectories that may be different across age, sex, and various athlete and non-athlete populations. Not only is it vital to update current platforms with more specific details about concussion recovery and the variability of recovery times based on symptoms and developmental ages; but it is equally important to update measures used to assess concussion knowledge. Having this consistency will allow for researchers to have a more accurate understanding of gaps in knowledge, attitudes, and education; and therefore, the information gathered from studies can be used to fill knowledge gaps and education platforms in a way that is truly needed.

Results from our study indicated that parental concussion history, parental age, sex of the informant, and number of children did not influence parental knowledge or attitudes about youth sport-related concussion. Previous research has found sex differences among parental knowledge and attitude scores, with mothers being more cautious and feeling that concussions are a critical issue more-so than fathers (Bloodgood et al., 2013; Lin et al., 2015). It is possible that we did not

find the same sex differences given that mothers and fathers in our sample were equally knowledgeable about concussions and therefore, translated to similar attitudes about concussion management and treatment. Further research is needed to fully understand the role sex has on parent knowledge and attitudes in order to support those who are in need.

Moreover, social risk status was a significant factor associated with parental perceived knowledge and attitudes in our study. Our findings indicated that all parents had similar factual knowledge scores about concussion signs and symptoms yet, families with higher social risk status perceived themselves to have lower factual knowledge compared to families with lower social risk. Prior research has suggested that household income, parental education, and stressors associated with lower SES have a negative impact on parental attitudes about concussions and confidence in general (Belsky, 1984; Lin et al., 2015; Ontai et al., 2008; Turner et al., 2017). Our study uniquely used SRS to capture social status of families because it is a more robust, multifaceted measure that includes several aspects of social class (i.e., maternal age at childbirth, education, income, occupation, family structure, first language spoken in the home) rather than examining individual factors, like income alone. Furthermore, we had a fairly homogenous group of parents with the majority having low social risk (i.e., higher SES); yet despite the minimal variability, we were still able to find a relationship between perceived knowledge and social risk groups. This is particularly helpful because it highlights that families within the Greater Toronto Area that are faced with any variables that encompass higher social risk status may have lower perceived knowledge about concussions. Therefore, it is important to expand initiatives to uniformly provide parents with accurate facts about concussion signs, symptoms, and management. Given that all parents had similar knowledge regarding concussion signs and

symptoms, it is also important to take steps to increase parental confidence and perceived knowledge in families with higher social risk status within the community.

Interestingly, our data suggests that child factors such as age of when they first began sports, concussion history, and the level of contact are associated with parental knowledge of and attitudes towards concussion management. Parents who enrolled their children in sports at a younger age were more knowledgeable about concussions than parents who enrolled their children at an older age. Further, parents had a more favourable attitude about concussion reporting and management if they had a child that had sustained a concussion in the past. It is possible that parents who have a child in sports for a longer period of time are more likely to seek out concussion information as it is directly relevant to their child's sport participation, and they are more likely to be exposed to concussion information through the sport organizations. Parents of children with a past history of concussion were also likely to have a positive attitude about concussion reporting and management likely because they have utilized concussion management strategies in the past. Lastly, parents perceived their knowledge to be higher when their child was engaged in higher contact level sports. There are several possibilities as to why this may be. First, there is a higher probability of sustaining a concussion when engaging in higher contact level sports, and it is possible that these are the parents who have children with a past history of concussion. Additionally, it is possible that these parents had greater perceived knowledge because they received more formal or informal (e.g., from other parents) information about concussions than parents of children within the limited or no contact sport groups. More than half the parents in the Canadian PHAC baseline study believed that averting engagement in contact sports will prevent concussions (Public Health Agency, 2018). It is important to ensure knowledge about concussions is disseminated equally across all levels of contact sports in order

to provide parents with the knowledge, positive attitudes, and confidence that they need to make informed decisions about sport participation. Further, this is particularly important in order to preserve engagement in youth sports of all levels.

### **Limitations and Future Directions**

This study serves as a useful starting point for understanding knowledge and attitudes of youth sport-related concussion among Canadian parents. However, there are a number of additional avenues that are worth exploring that could not be addressed by the current study due to practical and other limitations. Conducting research using questionnaires relies on honesty and accuracy of the respondents and therefore, it is possible that parents may have answered some questions based on social desirability rather than accuracy and honesty. Furthermore, the study's participants were from a small sample of parents recruited from the GTA and surrounding areas due to the selection inherent in the recruitment strategy, thus limiting the generalizability of the findings. Rather than capturing the diversity of parents or primary caregivers in Canada, the results from the study are from a particular location in Canada and likely depict those who are typically active in the community and have youth involved in sports. Ninety-six percent of our sample of children were enrolled in sports which exceeds the national average of approximately 75% in Canada (Canadian Heritage, 2013). We attempted to mitigate this issue and capture a more diverse sample by including public libraries, and community and recreational centers; however, parents using sport facilities were more inclined to participate in the study. Further research is needed to fully understand parental knowledge of and attitudes towards youth sport-related concussion across Canada in rural and urban communities.

Moreover, our measure of parental knowledge was specific to signs and symptoms following an acute sport-related concussion and did not capture factual knowledge about

concussion management and return to play protocols in Canada. Our results identified that parents have a clear understanding of what signs and symptoms are and albeit important, future research is needed to better understand the level of parental knowledge about treating and managing a concussion at home. We were unable to examine the role youth sex has on the outcome variables given that this information was missing within our dataset. Future research is warranted to better understand how child sex can influence parent knowledge of concussions and attitudes towards concussion reporting and management. Finally, it was difficult to explore the relationship between child concussion history and children that changed level of contact in their sports (i.e., from high contact to limited/no contact) given the limited sample size of youth that had a concussion in our sample. Our sample of children were relatively young and therefore fewer had a history of concussion compared to high school or adolescent children due to fewer years in sport. This is important to explore in a larger sample to fully understand how child concussion history may impact youth sport participation and level of contact of the sport for elementary aged youth. Despite these limitations, the findings from the current study are advantageous for informing future research, clinical practice, as well as policies and educational initiatives.

### **Conclusions**

Results from this study offer a breadth of information that may be useful for informing knowledge translation platforms and education initiatives in our community, as well as add to the pan-Canada goal of raising awareness for parents, coaches and athletes about concussion knowledge, recovery, and treatment by the Ministry of Health and Ministry of Sport and Persons with Disabilities. This study offers unique insight into parental knowledge and attitudes of sport-related concussion in a small subset of Canadian parents. It helps identify factors that encumber

parental confidence, knowledge, and attitudes about concussion that may lead to a reduction in sport participation. This study also helps inform knowledge translation platforms and policies to increase parental factual and perceived knowledge about concussion, supporting youth sport engagement. Specifically, we can target misconceptions about TBI and concussion among all families within Ontario by providing accurate and up-to-date information about concussions uniformly across parents. Furthermore, we can aim to increase parental perceived knowledge about concussions among families that experience high social risk factors. It is important to tailor education initiatives to increase knowledge, confidence, and attitudes of parents due to the influence this has on youth flourishing socially and developmentally in community sports. There is variability about concussion management among health sectors in Canada (Public Health Agency, 2018), and this study helps to fill the gap by highlighting signs and symptoms that parents incorrectly identify, in order to support the national goal of creating a comprehensive pan-Canadian approach to concussion prevention, detection, and management. Furthermore, the findings compliment and expand on the knowledge currently known about knowledge and attitudes about concussions in sport, as outlined in the 2017 Berlin Consensus statement on concussion in Sport (McCrory et al., 2017). Taken together, the results from the current study can be used as a steppingstone to inform future research and government bodies as they improve the quality, format, and scope of concussion education through new initiatives or existing platforms, in order to promote active youth and their participation in sport.

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<b>Parent Factors (N=90)</b>		<b><i>M (SD) or n (%)</i></b>
Parent or Caregiver Participating <i>n(%)</i>		
Mother		66 (73%)
Father		21 (23%)
Both Parents/ Caregiver		4 (4%)
Number of children in the family <i>n(%)</i>		
One Child		47 (52%)
Two Children		36 (40%)
Three Children		7 (8%)
Social Risk Status Score <i>n(%)</i>		
Low Risk (0)		62 (69%)
Medium Risk (1)		13 (14%)
High Risk (2+)		14 (15%)
Parent Age <i>M(SD)</i>		41y 8m (6y 1m)
Parents with a Concussion History <i>n(%)</i>		
Range of concussions		1 – 5
Factual Knowledge Score <i>M(SD)</i>		21.29 (2.44)
Perceived Knowledge Score <i>M(SD)</i>		15.66 (2.66)
Attitude Score <i>M(SD)</i>		48.45 (4.46)
<b>Child Factors (N=140)</b>		<b><i>M (SD) or n (%)</i></b>
Child Age		
		9y 5m (2y 10m)
Child age when first began sports		
		3y 10m (1y 3m)
Children with a Concussion History <i>n(%)</i>		
Range of concussions		1 – 3
Child Sport Contact Level <i>n(%)</i>		
Collision		49 (37%)
Contact		42 (31%)
Limited/no contact		41 (31%)

Table 2. *Factual Knowledge: Concussion Signs and Symptoms*

<b>Sign or Symptom (n=71)</b>	<b>Response Selected n (%)</b>
Headache*	69 (97%)
Difficulty Speaking	44 (62%)
Arthritis	--
Sensitivity to Light*	64 (90%)
Difficulty Remembering*	62 (87%)
Panic Attacks	22 (31%)
Drowsiness*	56 (79%)
Feeling in a “fog”*	64 (91%)
Weight gain	2 (3%)
Feeling slowed down*	50 (70%)
Reduced breathing rate	18 (25%)
Excessive studying	1 (1%)
Difficulty concentrating*	63 (89%)
Dizziness*	64 (90%)
Hair loss	--

Note: An asterisk (\*) indicates correct symptoms

Table 3. *Factual Knowledge: Statements about sustaining a concussion*

<b>Actual Knowledge (n=71)</b>	<b>Correct Responses N (%)</b>	<b>Incorrect Responses N (%)</b>
There is possible risk of death if a second concussion occurs before the first one has healed	61 (86%)	9 (13%)
Running everyday does little to improve cardiovascular health	64 (90%)	7 (10%)
People who have had one concussion are more likely to have another concussion	51 (72%)	20 (28%)
Cleats help athletes' feet grip the playing surface	67 (94%)	4 (6%)
In order to be diagnosed with a concussion, you have to be knocked out	69 (97%)	1 (1%)
A concussion can only occur if there is a direct hit to the head	67 (94%)	4 (6%)
Being knocked unconscious always causes permanent damage to the brain	62 (87%)	9 (13%)
Symptoms of a concussion can last for several weeks	70 (99%)	--
Sometimes a second concussion can help a person remember things that were forgotten after the first concussion	61 (86%)	8 (11%)
Weightlifting helps to tone and/or build muscle	68 (96%)	3 (4%)
After a concussion occurs, brain imaging (e.g., CAT scan, MRI, X-Ray) typically show visible physical damage (e.g. bruise, bleed, blood clot)	36 (51%)	34 (49%)
If you receive one concussion and you have never had a concussion before, you will become less intelligent	71 (100%)	--
After 10 days, symptoms of a concussion are usually completely gone	13 (18%)	58 (82%)
After a concussion, people can forget who they are and not recognize others but be perfect in every other way	43 (61%)	28 (39%)
High-school and college freshmen tend to be the same age	69 (97%)	2 (3%)
Concussions can sometimes lead to emotional disruptions	67 (94%)	2 (3%)
An athlete who gets knocked out after getting a concussion is experiencing a coma	8 (11%)	63(89%)
There is rarely a risk to long-term health and well-being from multiple concussions	66 (93%)	5 (7%)

Note: There are some parents that did not complete every question and therefore, there are some missing data.

Table 4. *Participant Descriptives by Social Risk Status*

	<b>Low Social Risk</b>	<b>Medium Social Risk</b>	<b>High Social Risk</b>
<b>Parent Factors</b>	<b>n=62</b>	<b>n=13</b>	<b>n=14</b>
Parent or Caregiver Participating <i>n</i> (%)			
Mother	44 (71%)	8 (62%)	13 (93%)
Father	15 (24%)	5 (38%)	1 (7%)
Both Parents/ Caregiver	2 (3%)	-	-
Number of children in the family <i>n</i> (%)			
One Child	27 (44%)	10 (77%)	10 (71%)
Two Children	29 (47%)	2 (15%)	4 (29%)
Three Children	6 (9%)	1 (8%)	--
Parent Age <i>M</i> ( <i>SD</i> )	41y 7m (5y 0m)	41y 5m (6y 10m)	42y 5m (9y 3m)
Parents with a Concussion History <i>n</i> (%)	17 (27%)	4 (31%)	7 (50%)
Factual Knowledge Score <i>M</i> ( <i>SD</i> )	21.36 (2.64)	21.27 (1.62)	21.10 (2.18)
Perceived Knowledge Score <i>M</i> ( <i>SD</i> )	16.31 (2.35)	13.90 (3.38)	14.10 (2.23)
Attitude Score <i>M</i> ( <i>SD</i> )	48.24 (4.51)	48.55 (3.78)	49.00 (5.23)
<b>Child Factors (N=140)</b>	<b>n=108</b>	<b>n=13</b>	<b>n=17</b>
Child Age	9y 3m (2y 8m)	9y 4m (3y 9m)	10y 6m (3y 1m)
Child age when first began sports	3y 9m (1y 2m)	4y 4m (1y 11m)	3y 10m (1y 5m)
Children with a Concussion History <i>n</i> (%)	17 (16%)	3 (23%)	3 (18%)
Child Sport Contact Level <i>n</i> (%)			
Collision	41 (38%)	3 (23%)	5 (29%)
Contact	29 (27%)	6 (46%)	7 (41%)
Limited/no contact	34 (32%)	4 (31%)	3 (18%)

# Influence of Parental Knowledge and Attitudes on Youth Sport Participation

---

Start of Block: DEMOGRAPHIC INFORMATION © Wojtowicz, M., Roberts, S.D. 2018

Q1 How many children do you have in between the ages of 6 – 14 years old?

- one child (1)
  - two children (2)
  - three children (3)
  - four or more children (4)
- 

Q2 What is your child's current age?

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q49 What is your second child's current age?

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q50 What is your third child's current age?

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q51 What is your fourth child's current age?

---

Q3 What grade is your child currently enrolled in?

*\*(if summer months please report the grade the child is entering)*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q52 What grade is your second child currently enrolled in?

*\*(if summer months please report the grade the child is entering)*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q53 What grade is your third child currently enrolled in?

*\*(if summer months please report the grade the child is entering)*

---

Display This Question:

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q54 What grade is your fourth child currently enrolled in?

*\*(if summer months please report the grade the child is entering)*

---

---

Q46 Please enter the last three letters/numbers of your Postal Code:

---

---

Q47 Please select the ethnic or cultural origins that best describes you:

- White (1)
- South Asian (2)
- Aboriginal, First Nations, Métis, or Inuk (3)
- Chinese (4)
- Black (5)
- Filipino (6)
- Latin American (7)
- Arab (8)
- Southeast Asian (9)
- West Asian (10)
- Korean (11)
- Japanese (12)
- Other (13)

---

*Display This Question:*

*If Please select the ethnic or cultural origins that best describes you: = Other*

Q48 If other, please specify

---

Q4 Parent or primary caregiver completing the questionnaire

- Mother (1)
- Father (2)
- Both (3)
- Other\* (4)

---

*Display This Question:*

*If Parent or primary caregiver completing the questionnaire = Other\**

Q6 If *other*, please specify

---

---

Q7 How were you referred to this survey?

- School (1)
- Youth Sport League (2)
- Community or Recreational Center (3)
- Other\* (5)
- Library (6)

---

*Display This Question:*

*If How were you referred to this survey? = Other\**

Q8 If *other*, please specify

---

Q9 Has your child been medically diagnosed or received treatment for the following?

- Attention Deficit Hyperactivity Disorder (ADHD) (1)
- Learning Disorder (2)
- Headaches and/or Migraines (3)
- Special education (e.g., additional reading/writing, math support) (4)
- Mental Health Condition (e.g., for anxiety, depression, etc) (5)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q58 Has your second child been medically diagnosed or received treatment for the following?

- Attention Deficit Hyperactivity Disorder (ADHD) (1)
- Learning Disorder (2)
- Headaches and/or Migraines (3)
- Special education (e.g., additional reading/writing, math support) (4)
- Mental health conditions (e.g., for anxiety, depression, etc.) (5)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q55 Has your third child been medically diagnosed or received treatment for the following?

- Attention Deficit Hyperactivity Disorder (ADHD) (1)
- Learning Disorder (2)
- Headaches and/or Migraines (3)
- Special education (e.g., additional reading/writing, math support) (4)
- Mental health condition (e.g., for anxiety, depression, etc.) (5)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q59 Has your fourth child been medically diagnosed or received treatment for the following?

- Attention Deficit Hyperactivity Disorder (ADHD) (1)
- Learning Disorder (2)
- Headaches and/or Migraines (3)
- Special Education (e.g., additional reading/writing, math support) (4)
- Mental health condition (e.g., for anxiety, depression, etc.) (5)

---

Q10 What is your (parent) current age?

---

Q11 Age of mother at child birth

- 18 years or younger (1)
- 18 - 21 years (2)
- 21 years or older (3)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q60 Age of mother at the second child birth

- 18 years or younger (1)
- 18 - 21 years (2)
- 21 years or older (3)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q61 Age of mother at the third child birth

- 18 years or younger (1)
- 18 - 21 years (2)
- 21 years or older (3)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q62 Age of mother at the fourth child birth

- 18 years or younger (1)
  - 18 - 21 years (2)
  - 21 years or older (3)
- 

Q12 Highest degree level of school completed by mother

- < High school (1)
  - High school or General education development diploma (GED) (2)
  - College or university (3)
  - Graduate studies (4)
  - Doctoral studies (5)
- 

Q13 Highest degree level of school completed by father

- < High school (1)
  - High school or General education development diploma (GED) (2)
  - College or university (3)
  - Graduate studies (4)
  - Doctoral studies (5)
-

Q14 Marital status

- Married (1)
  - Divorced (2)
  - Single (3)
  - Common Law (4)
  - Prefer not to say (5)
- 

Q15 Structure of family living

- Two caregivers (1)
  - Separated parents with dual custody or cared for other intact family (2)
  - Single caregiver (3)
- 

Q16 Employment status of mother

- Full time (1)
  - Part time (2)
  - Unemployed (3)
  - Would rather not say (4)
- 

Q18 Occupation of mother

---

Q17 Employment status of father

- Full time (1)
  - Part time (2)
  - Unemployed (3)
  - Would rather not say (4)
- 

Q19 Occupation of father

---

---

Q20 What school board does your child (children) attend?

---

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Start of Block: CHILD ACTIVITY HISTORY

Q21 What activities does your child engage in?

- Leisure/ Intramural sports in the school (1)
  - Leisure/ Intramural sports in the community (2)
  - Organized (rep) sports in the community (3)
- 

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q56 What activities does your second child engage in?

- Leisure/ Intramural sports in the school (1)
- Leisure/ Intramural sports in the community (2)
- Organized (rep) sports in the community (3)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q57 What activities does your third child engage in?

- Leisure/ Intramural sports in the school (1)
- Leisure/ Intramural sports in the community (2)
- Organized (rep) sports in the community (3)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q63 What activities does your fourth child engage in?

- Leisure/ Intramural sports in the school (1)
- Leisure/ Intramural sports in the community (2)
- Organized (rep) sports in the community (3)

---

Q22 When did they start playing sports?

*(i.e. what year/ how old)*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

**Q64** When did your second child start playing sports?

*(i.e. what year/how old)*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

**Q65** When did your third child start playing sports?

*(i.e. what year/how old)*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

**Q66** When did your fourth child start playing sports?

*(i.e. what year/how old)*

---

Q23 What sports does your child play currently?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Volleyball (7)
- Dodgeball (8)
- Lacrosse (9)
- Cheerleading (10)
- Dance (11)
- Equestrian sports (12)
- Gymnastics (13)
- Soccer (14)
- Swimming (15)
- Track and/or cross country (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q67 What sports does your second child play currently?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Volleyball (7)
- Dodgeball (8)
- Lacrosse (9)
- Cheerleading (10)
- Dance (11)
- Equestrian sports (12)
- Gymnastics (13)
- Soccer (14)
- Swimming (15)
- Track and/or cross country (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q68 What sports does your third child play currently?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Volleyball (7)
- Dodgeball (8)
- Lacrosse (9)
- Cheerleading (10)
- Dance (11)
- Equestrian sports (12)
- Gymnastics (13)
- Soccer (14)
- Swimming (15)
- Track and/or cross country (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q69 What sports does your fourth child play currently?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Volleyball (7)
- Dodgeball (8)
- Lacrosse (9)
- Cheerleading (10)
- Dance (11)
- Equestrian sports (12)
- Gymnastics (13)
- Soccer (14)
- Swimming (15)
- Track and/or cross country (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If What sports does your child play currently? (Select all that apply) = Other\**

Q25 If *other*, please specify

---

Q24 What sports did your child play in the past?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Gymnastics (7)
- Soccer (8)
- Swimming (9)
- Track and/or Cross Country (10)
- Volleyball (11)
- Dodgeball (12)
- Lacrosse (13)
- Cheerleading (14)
- Dance (15)
- Equestrian Sports (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q70 What sports did your second child play in the past?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Gymnastics (7)
- Soccer (8)
- Swimming (9)
- Track and/or Cross Country (10)
- Volleyball (11)
- Dodgeball (12)
- Lacrosse (13)
- Cheerleading (14)
- Dance (15)
- Equestrian Sports (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q71 What sports did your third child play in the past?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Gymnastics (7)
- Soccer (8)
- Swimming (9)
- Track and/or Cross Country (10)
- Volleyball (11)
- Dodgeball (12)
- Lacrosse (13)
- Cheerleading (14)
- Dance (15)
- Equestrian Sports (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q72 What sports did your fourth child play in the past?  
(Select all that apply)

- Football (1)
- Flag Football (2)
- Basketball (3)
- Baseball (4)
- Rugby (5)
- Hockey (6)
- Gymnastics (7)
- Soccer (8)
- Swimming (9)
- Track and/or Cross Country (10)
- Volleyball (11)
- Dodgeball (12)
- Lacrosse (13)
- Cheerleading (14)
- Dance (15)
- Equestrian Sports (16)
- Wrestling (17)
- Water Polo (18)
- Other\* (19)

---

*Display This Question:*

*If What sports did your child play in the past? (Select all that apply) = Other\**

Q26 If *other*, please specify

---

End of Block: CHILD ACTIVITY HISTORY

---

Start of Block: CONCUSSION HISTORY OF PARENT AND CHILD

Q27

For this section, we define a concussion as a blow to the head or whiplash that cause d ANY ONE OR MORE of the following:· Witnessed loss of consciousness (being “knocked out”, and someone saw it),

- Loss of memory for events immediately before and/or after the injury, or
  - Feeling dazed or confused for at least 30 seconds.
- 

Q30 Using the above definition, have you (the parent) sustained a concussion or been diagnosed as having sustained a concussion in the past?

- No (1)
  - I have had a concussion but not diagnosed by a medical professional (2)
  - I have had a concussion which was diagnosed by a medical professional (3)
- 

*Display This Question:*

*If Using the above definition, have you (the parent) sustained a concussion or been diagnosed as hav... = I have had a concussion but not diagnosed by a medical professional*

*Or Using the above definition, have you (the parent) sustained a concussion or been diagnosed as hav... = I have had a concussion which was diagnosed by a medical professional*

Q31 How many concussions do you (the parent) think you have sustained during your whole life?\*

---

Q32 Using the same definition, has your child sustained a concussion or been diagnosed as having a sustained concussion in the past?

- No (1)
- My child has had a concussion but not diagnosed by a medical professional (2)
- My child has had a concussion which was diagnosed by a medical professional (3)

---

*Display This Question:*

*If Using the same definition, has your child sustained a concussion or been diagnosed as having a su... = My child has had a concussion but not diagnosed by a medical professional*

*Or Using the same definition, has your child sustained a concussion or been diagnosed as having a su... = My child has had a concussion which was diagnosed by a medical professional*

Q33 How many concussions do you think your child has sustained during your whole life?\*

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*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q82 Using the same definition, has your second child sustained a concussion or been diagnosed as having a sustained concussion in the past?

- No (1)
- My child has had a concussion but not diagnosed by a medical professional (2)
- My child has had a concussion which was diagnosed by a medical professional (3)

*Display This Question:*

*If Using the same definition, has your second child sustained a concussion or been diagnosed as havi... = My child has had a concussion but not diagnosed by a medical professional*

*Or Using the same definition, has your second child sustained a concussion or been diagnosed as havi... = My child has had a concussion which was diagnosed by a medical professional*

*And How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q73 How many concussions do you think your second child has sustained during your whole life?\*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q83 Using the same definition, has your third child sustained a concussion or been diagnosed as having a sustained concussion in the past?

- No (1)
- My child has had a concussion but not diagnosed by a medical professional (2)
- My child has had a concussion which was diagnosed by a medical professional (3)

*Display This Question:*

*If Using the same definition, has your third child sustained a concussion or been diagnosed as havin... = My child has had a concussion but not diagnosed by a medical professional*

*Or Using the same definition, has your third child sustained a concussion or been diagnosed as havin... = My child has had a concussion which was diagnosed by a medical professional*

*And How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q74 How many concussions do you think your third child has sustained during your whole life?\*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q85 Using the same definition, has your fourth child sustained a concussion or been diagnosed as having a sustained concussion in the past?

- No (1)
- My child has had a concussion but not diagnosed by a medical professional (2)
- My child has had a concussion which was diagnosed by a medical professional (3)

---

*Display This Question:*

*If Using the same definition, has your fourth child sustained a concussion or been diagnosed as havi... = My child has had a concussion but not diagnosed by a medical professional*

*Or Using the same definition, has your fourth child sustained a concussion or been diagnosed as havi... = My child has had a concussion which was diagnosed by a medical professional*

*And How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q75 How many concussions do you think your fourth child has sustained during your whole life?\*

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*Display This Question:*

*If Using the same definition, has your child sustained a concussion or been diagnosed as having a su... = My child has had a concussion but not diagnosed by a medical professional*

*Or Using the same definition, has your child sustained a concussion or been diagnosed as having a su... = My child has had a concussion which was diagnosed by a medical professional*

Q31 What age did your child sustain their most recent concussion?\*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children*

*Or How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q76 What age did your second child sustain their most recent concussion?\*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children*

*Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q77 What age did your third child sustain their most recent concussion?\*

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q78 What age did your fourth child sustain their most recent concussion?\*

---

*Display This Question:*

*If Using the same definition, has your child sustained a concussion or been diagnosed as having a su... = My child has had a concussion but not diagnosed by a medical professional*

*Or Using the same definition, has your child sustained a concussion or been diagnosed as having a su... = My child has had a concussion which was diagnosed by a medical professional*

Q32 Which of the following best describes your child's most recent concussion?

- Sport play (1)
  - Recess play or physical activity (2)
  - Accident (3)
  - Other (4)
- 

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = two children  
Or How many children do you have in between the ages of 6 – 14 years old? = three children  
Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q79 Which of the following best describes your second child's most recent concussion?

- Sport play (1)
  - Recess play or physical activity (2)
  - Accident (3)
  - Other (4)
- 

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = three children  
Or How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q80 Which of the following best describes your third child's most recent concussion?

- Sport play (1)
- Recess play or physical activity (2)
- Accident (3)
- Other (4)

---

*Display This Question:*

*If How many children do you have in between the ages of 6 – 14 years old? = four or more children*

Q81 Which of the following best describes your fourth child's most recent concussion?

- Sport play (1)
  - Recess play or physical activity (2)
  - Accident (3)
  - Other (4)
- 

Q33 Was their observed loss of consciousness at the time of the concussion? (i.e. did someone see the individual lose consciousness)

- Yes (1)
  - No (2)
  - Unsure (3)
- 

Q34 Did you seek medical attention for your child at the time of the concussion?

- Yes (1)
  - No (2)
  - Unsure (3)
-

Q35 Have you learned or been taught information about concussions?

- Yes (1)
  - No (2)
- 

Q36 If so, Where?  
(Select all that apply)

- Child's School (1)
  - Child's Sport Team (2)
  - Parent Sport Participation (3)
  - Community (4)
  - Self Searched Websites (i.e. Google) (5)
  - Government websites (6)
  - Parachute Canada Website (7)
  - Facebook groups (8)
  - Other (9)
- 

Q37 If applicable, what information did you find helpful on Parachute?

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End of Block: CONCUSSION HISTORY OF PARENT AND CHILD

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Start of Block: RoCKAS-ST - KNOWLEDGE OF CONCUSSIONS © Rosenbaum and Arnett, 2010

**Q39 Section 1:** DIRECTIONS: Please read the following statements and select TRUE or FALSE for each question.

	TRUE (1)	FALSE (2)
There is a possible risk of death if a second concussion occurs before the first one has healed (1)	<input type="radio"/>	<input type="radio"/>
Running everyday does little to improve cardiovascular health (2)	<input type="radio"/>	<input type="radio"/>
People who have had one concussion are more likely to have another concussion (3)	<input type="radio"/>	<input type="radio"/>
Cleats help athletes' feet grip the playing surface (4)	<input type="radio"/>	<input type="radio"/>
In order to be diagnosed with a concussion, you have to be knocked out (5)	<input type="radio"/>	<input type="radio"/>
A concussion can only occur if there is a direct hit to the head (6)	<input type="radio"/>	<input type="radio"/>
Being knocked unconscious always causes permanent damage to the brain (7)	<input type="radio"/>	<input type="radio"/>
Symptoms of a concussion can last for several weeks (8)	<input type="radio"/>	<input type="radio"/>
Sometimes a second concussion can help a person remember things that were forgotten after the first concussion (9)	<input type="radio"/>	<input type="radio"/>
Weightlifting helps to tone and/or build muscle (10)	<input type="radio"/>	<input type="radio"/>
After a concussion occurs, brain imaging (e.g., CAT Scan, MRI, X-Ray, etc.) typically shows visible physical damage (e.g., bruise, blood clot) to the brain (11)	<input type="radio"/>	<input type="radio"/>
If you receive one concussion and you have never had a	<input type="radio"/>	<input type="radio"/>

concussion before, you will become less intelligent (12)

After 10 days, symptoms of a concussion are usually completely gone (13)

After a concussion, people can forget who they are and not recognize others but be perfect in every other way (14)

High-school freshmen and college freshmen tend to be the same age (15)

Concussions can sometimes lead to emotional disruptions (16)

An athlete who gets knocked out after getting a concussion is experiencing a coma (17)

There is rarely a risk to long-term health and well-being from multiple concussions (18)

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**Q40 Section 2:** DIRECTIONS: Please read each of the following scenarios and mark TRUE or FALSE for each of the questions that follows the scenarios.

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Q41 **Scenario 1:** While playing in a game, Player Q and Player X collide with each other and each suffers a concussion. Player Q has never had a concussion in the past. Player X has had 4 concussions in the past.

	TRUE (1)	FALSE (2)
It is likely that Player Q's concussion will affect his long-term health and well-being (1)	<input type="radio"/>	<input type="radio"/>
It is likely that Player X's concussion will affect his long-term health and well-being (2)	<input type="radio"/>	<input type="radio"/>




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**Q42 Section 5:** DIRECTIONS: Think about someone who has had a concussion. Check off the following signs and symptoms that you believe someone may be likely to experience AFTER a concussion.

- Hives (1)
  - Headache (2)
  - Difficulty speaking (3)
  - Arthritis (4)
  - Sensitivity to light (5)
  - Difficulty remembering (6)
  - Panic attacks (7)
  - Drowsiness (8)
  - Feeling in a "Fog" (9)
  - Weight gain (10)
  - Feeling slowed down (11)
  - Reduced breathing rate (12)
  - Excessive studying (13)
  - Difficulty concentrating (14)
  - Dizziness (15)
  - Hairloss (16)
-

Q43 Additional Questions for Knowledge: DIRECTIONS: Rate on a scale of 1-7 how confident are you in your answers to the following:  
*(with 1 being the LEAST confident and 7 being the MOST confident)*

1 2 3 4 4 5 6 7







Section 1 (True/False) of the knowledge section ()	
Section 2 (Scenarios) of the knowledge section ()	
Section 3 (Symptom checklist) of the knowledge section ()	

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Q45 Rate on a scale of 1-7 how important or serious you think the following is:  
*(with 1 being the LEAST important/serious and 7 being the MOST important/serious)*

1 2 3 4 4 5 6 7

When an athlete experiences a headache or dizziness after a blow to the head or body ()	
For an athlete to not participate in physical activity (game or practice) when experiencing signs and symptoms of a concussion ()	
To be informed about how a concussion happened ()	
To be informed about how concussions can be prevented ()	
To know the steps to follow if an athlete has a concussion ()	
For an athlete to report possible signs and symptoms of a concussion to a medical professional or a coach ()	

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Q46 What is your level of agreement with the following statements:

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
In general, parents are under-educated (don't know enough) about concussions (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Currently, there is too much attention and focus on concussion in sports (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A coach should be actively involved in the prevention and return to play decisions following a concussion in an athlete (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Q47 Thank You!

You have completed all of the study questions. We thank you for your time and participation.

Sincerely,  
The NORTHlab

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