



Original article

Youth Soccer Parents' Attitudes and Perceptions About Concussions

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A B S T R A C T

Purpose: Parents are important figures in properly managing youth sport concussions. Although media attention has predominantly centered on concussions in contact/collision sports, evidence suggests that the concussion rate in soccer is comparable to those found in contact/collision sports. Given the high rate of concussions in youth soccer, this study aimed to examine parents of youth soccer athletes' attitudes and perceptions about concussions and associated factors.

Methods: A cross-sectional study was conducted by surveying parents of youth soccer athletes from the five largest organized youth soccer programs across the U.S. The researchers developed a questionnaire after an extensive literature review and by modifying previously used instruments.

Results: Overall, 419 parents completed the survey. The vast majority (85%) agreed that a concussion is a serious injury, but only 27.9% believed that their child could suffer a concussion during the next season. Parents were most concerned about permanent brain damage when their child suffers a concussion. The vast majority ($4.37 \pm .89$) perceived concussion reporting as an important injury prevention strategy. Greater appreciation and perceived risk about concussions was found particularly among parents who received concussion education and those who had witnessed or heard about a concussive incidence(s).

Conclusions: Findings suggest that youth soccer parents have high appreciation and perceived risk about concussions. However, the need for more targeted education was noted, as improvements to better manage and reduce concussions can be made. Future research should continue examining youth sport parents' belief and understanding about concussions as well as factors affecting them.

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IMPLICATIONS AND CONTRIBUTION

This study creates awareness about how parents of youth athletes understand and perceive concussions as they are typically primary responders and caretakers in properly managing this injury in youth soccer. The findings from this study can help inform policy makers to improve concussion-related educational interventions aimed at parents of youth athletes.

Recent estimates suggest that 1.1 to 1.9 million children in the U.S. suffer sport-related traumatic brain injuries, most of which are concussions [1]. Children and adolescents who suffer concussions face an increased risk for long-term sequelae and prolonged recovery time compared with adults [2]. One study

reported that National Football League athletes who started playing football before the age of 12 years suffered more severe cognitive and behavioral symptoms later in life compared to those who began playing after 12 years [3]. Furthermore, a history of concussion creates an increased risk and potential catastrophic consequences upon a subsequent blow to the head [4]. A link between repeated head trauma and conditions such as chronic traumatic encephalopathy and second impact syndrome further heightens concerns about concussions among the public and medical community [3,5].

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Several recent reports suggest that parents are concerned about concussions [6–8]. An Entertainment and Sports Programming Network poll found that youth sport parents cited concussion as the injury they worry most about when their children play sports [9]. Such high concern may stem from increased media coverage, cases profiling professional athletes' aftereffects of head trauma, and increased awareness from educational efforts. Parents who worry about concussions have the potential to dissuade children from participating in sports especially those with higher concussion rates. In fact, a recent decline in youth sport participation may be due in part to increased parental awareness and concerns about the frequency and severity of concussions [10].

Within the family unit, parents are important figures in promoting and protecting a youth athlete's health. In addition, previous research suggests that parental involvement can be the greatest influence on children's care-seeking behaviors [11]. Parents are in one of the best positions to identify suspected concussions, ensure their child sees a qualified health-care provider, and monitor at-home recovery before returning to sports. Parents can also educate and provide positive reinforcement for youth athletes' concussion-safety behaviors, such as reporting suspected concussions to coaches and medical professionals. However, without high appreciation and perceived risk about concussions, parents may be less inclined to report their child's symptoms, seek information about concussion prevention, and/or follow proper steps to recovery before returning to sports.

Attitudes are often studied in an attempt to predict behavioral intentions (as one of the primary antecedents of the theory of planned behavior) since research suggests that knowledge alone may not translate to behavioral intentions [12]. In addition, parents' motivation to protect their children from concussions may be derived by their threat perception. According to the Health Belief Model, changes in behavior are typically influenced by a person's perceived susceptibility and severity of a particular health condition [13]. Utilizing this model, parents may be more likely to engage in concussion-safety behaviors (e.g., reporting the injury) if they perceive a greater threat regarding the likelihood and severity of concussions. The level of attitude or perceived risk, however, may vary based on personal/demographic factors, such as parent's gender, socioeconomic status, race/ethnicity, concussion education(s) received, and previous history of concussions through their own experience or that of their child.

In the U.S., soccer has one of the highest participation rates both interscholastically and recreationally [14]. Although media attention has predominantly centered on concussions in football, research has found that concussion rates in soccer can be as high as those found in football [15,16] with potential for long-term neurological sequelae resulting from common use of the head in soccer [17]. Such a high rate of concussion and the associated risks have led to public concern about the safety of soccer and a subsequent class-action lawsuit against the Federation Internationale de Football Association, the leading international governing body of soccer. The lawsuit, filed in 2014, by a group of parents and athletes alleged that youth soccer organizations (i.e., US Soccer, American Youth Soccer) were negligent in properly managing head injuries.

Given the lack of research on parents' belief and perceived risk about concussions, along with the high concussion risk associated with soccer, we sought to examine youth soccer parents' attitudes and perceptions about concussions. A secondary aim was to examine whether their attitudes and perceptions were affected by various parent and child factors such as age, gender, coaching experience, concussion education received, and history of concussions. Previous studies note that beliefs about concussions can vary based on personal and/or demographic factors [7,18–20]. Understanding factors associated with attitudes and perceptions may help identify barriers and gaps in educational resources that may limit awareness and appreciation of concussions. To our knowledge, no study has specifically examined youth soccer parents' attitudes and perceptions about concussion despite the pivotal role parents play in managing concussions and deciding whether or not to allow their child to play soccer. Understanding parents' belief and perceived risk about concussions provides a foundation and reference point for public health practitioners and clinicians to improve concussion-related education and behavioral interventions.

Methods

Participants and procedures

The study sampled parents with at least one child (5–19 years old) who participated in one or more of the following four U.S. youth soccer programs: US Youth Soccer Association, American Youth Soccer Organization, US Club Soccer, and Soccer Association for Youth. Parents of a child exclusively enrolled in other soccer programs (e.g., municipal recreation agencies, YMCA/YWCA, church leagues, interscholastic, and so forth) were excluded from this study. We believe that the aforementioned four youth soccer programs represent the major, nationally recognized, competitive youth soccer programs in the U.S. Additional inclusion criteria for participants were adults aged 18 years and older and residing in the U.S. For this cross-sectional study, sampling and data collection were facilitated by the Qualtrics Research Services Team (Qualtrics hereafter) who conducted the screening procedures from their online panel (i.e., prearranged pool of respondents who agree to be contacted to respond to surveys) based on our inclusion criteria. In an attempt to ensure high-quality data, Qualtrics reviewed the survey response patterns and terminated participants who may not have been responding carefully. To ensure a geographically diverse sample across the U.S., approximately 80 participants who resided in each of the five U.S. geographic regions (i.e., Southeast, Northeast, Midwest, Southwest, and West) were recruited to complete the anonymous online survey hosted by Qualtrics software (Qualtrics, Provo, UT). Parents who had more than one child, who participated in organized youth soccer, were asked to respond with reference to their oldest child. The purpose of the study and information regarding informed consent were provided, and electronic consent was required to begin the survey. The survey took approximately 10–15 minutes to complete. Data were collected in July 2019 and analyzed in September 2019. All study procedures were approved by the Institutional Review Board at St. John's University, NY, before the study commenced.

Measures

The questionnaire was developed after a comprehensive literature review and by modifying previously used items from several relevant studies [18,20–26]. The questionnaire was then reviewed by youth sport experts, youth soccer coaches, youth soccer parents, and professors who specialize in measurement and statistics, for content validity. Parents' demographic information included gender, age, race, level of education, free/reduced school lunch status, and location of residence (urban, suburban, rural). Additional parents' data included experience with soccer as a player and/or coach, history of concussions, concussion education received, and whether they had heard about or witnessed any youth soccer concussions. In addition to parents' data, child's age, gender, years of playing organized youth soccer, and history of diagnosed concussion(s) were also recorded. Parental attitudes and perceptions regarding concussions were assessed with respect to three categories, including "overall belief" (e.g., whether a concussion is a serious injury; whether there is too much attention and focus on concussions in youth soccer), "susceptibility" (e.g., perceived worry about sustaining a concussion; perceived short- and long-term harm from concussions), and "prevention" (e.g., importance of being informed about how concussions are caused and reduced; likelihood of seeking further information about concussions). These

items were all assessed through 5-point Likert-type questions. Internal consistency for all three categories was acceptable, with Cronbach alpha greater than .70. Aggregate data for each category (i.e., overall belief, susceptibility, prevention) was calculated by summing all responses to items within the category. A higher score represented greater appreciation and perceived risk of concussions.

Statistical analysis

Data recorded from the Qualtrics software were imported into SPSS, version 21.0 (SPSS Inc, Chicago, IL) for statistical analyses. Frequencies and percentages were used for discrete variables (respondents factor items), while means and standard deviations were used for continuous variables (individual and aggregate attitude/perception items). The primary outcomes were participants' responses pertaining to attitudes and perceptions regarding concussions. To examine differences in these responses, independent-sample t-tests and analysis of variance were performed to assess the association of attitudes/perceptions items by categories (i.e., overall belief, susceptibility, prevention, aggregate) based on various respondent factors (gender, age, race/ethnicity, free/reduced lunch, concussion education received, child's soccer participation experience, child's previously diagnosed concussions, witnessed or heard

Table 1

Parent and child data

Parent demographics	n (%)	Specific child demographics	n (%)
Gender		Age	
Male	138 (32.9)	5–9 years old	178 (42.5)
Female	279 (66.6)	10–14 years old	160 (38.2)
Race/ethnicity		15–19 years old	81 (19.3)
Black/African-American	42 (10)	Gender	
Hispanic/Latino	42 (10)	Male	254 (60.6)
White/Caucasian	304 (73.1)	Female	165(39.4)
Asian	28 (6.7)	Playing experience	
Education/degree		<1 year	38 (9.1)
High school/some college	120 (28.6)	1–3 years	184 (43.9)
Associate's/bachelor's degree	192 (45.8)	3–5 years	120 (28.6)
Master's/doctoral/professional degree	107 (25.5)	5+ years	77 (18.4)
Free/reduced school lunch		Diagnosed concussion	
Yes	184 (43.9)	None	272 (64.9)
No	235 (56.1)	1–2 times	89 (21.2)
Location of residence		3–4 times	54 (12.9)
Urban	124 (29.6)	Unsure	4 (1)
Suburban	231 (55.1)		
Rural	64 (15.3)		
Organized soccer programs			
US Youth Soccer Association (USYSA)	202 (38.70)		
American Youth Soccer Organization (AYSO)	146 (27.97)		
US Club Soccer	79 (15.13)		
Soccer Association for Youth (SAY)	57 (10.92)		
Unsure	18 (3.45)		
Region of residence (U.S.)			
Southeast	85 (20.24)		
Northeast	84 (20)		
Midwest	84 (20)		
Southeast	83 (19.76)		
West	84 (20)		
Diagnosed concussion			
Yes	94 (38.2)		
No	152 (61.8)		
Concussion education received			
CDC's heads up	129 (33.6)		
CDC's heads up to parents	153 (39.8)		
NFHS's concussion in sports	84 (21.9)		
Other	18 (4.7)		

CDC = Centers for Disease Control and Prevention; NFHS = National Federation of State High School Associations.

about concussions). We also performed multiple-variable regression analyses to identify significant predictors (gender, age, race/ethnicity, education/degree, free/reduced lunch, location of residence, coaching experience, parent's previously diagnosed concussions, concussion education received, child's age, child's gender, child's soccer participation experience, child's previously diagnosed concussions, witnessed or heard about concussions) of the three attitudes/perceptions categories. A standard alpha level of .05 was set for statistical significance.

Results

Participant data

Descriptive statistics for parents and specific child (i.e., youth soccer participants) data are shown in Table 1. A small percentage of respondents (26.7%) were non-Caucasian and 71.3% completed at least an Associate's or Bachelor's degree. The vast majority of respondents (92%) completed at least one type of concussion education, with most (39.8%) completing the CDC's *Heads Up to Parents*. Regarding the child demographics, more than half (57.5%) of youth soccer participants were 10 years or older and the majority (90.9%) had participated in youth soccer for more than one year. Thirty-four percent of youth soccer athletes had been diagnosed with at least one concussion.

Attitudes and perceptions about concussions

The vast majority (85.5%) agreed (somewhat or strongly) that a concussion is a serious injury, but only (23.6%) agreed

(somewhat or strongly) that there is too much attention and focus on concussions in youth soccer. Only a small percentage (27.9%) of respondents believed (somewhat or most likely) that their child could sustain a concussion during the next season. Parents worried most about permanent damage (4.01 ± 1.09) while worrying least about inability to participate in organized sports (3.54 ± 1.28) when their child suffers a concussion. Importance of reporting possible concussion symptom(s) to adults ($4.37 \pm .89$) was the highest mean recorded within the "prevention" category. A notable percentage of respondents (37.9%) reported that participating in physical activity while experiencing concussion signs and symptoms is not at all important (Table 2).

Factors associated with attitudes and perceptions about concussions

Parents who had a child with five or more years of participation in youth soccer were more likely to report positive and/or favorable results on "overall belief" items compared to those whose child had less than 5 years of youth soccer participation (i.e., < 1, 1–3, 3–5 years). Differences in these attitude/perception scores among the four groups were statistically significant ($F = 8.614, p < .001$). In addition, white/Caucasian parents scored higher on "overall belief" ($t = 2.312, p = .02$, Cohen's $d = .26$) and "prevention" ($t = 3.650, p < .001$, Cohen's $d = .40$) items compared to nonwhite/Caucasian parents. The attitudes and perceptions regarding "overall belief", "susceptibility," and "prevention" were all positive and/or favorable

Table 2
Respondents' attitudes/perceptions regarding concussions

Attitude/perception items (5-point scale)	Range	M (SD)
Overall belief		
I think a concussion is a serious injury	1–5 (disagree to strongly agree)	4.40 (1.06)
I think concussions are a critical issues in youth soccer	1–5 (disagree to strongly agree)	3.84 (1.10)
It is inappropriate to refer to a concussion as a "ding" or "bell ringer"	1–5 (disagree to strongly agree)	3.78 (1.24)
Currently, there is too much attention and focus on concussions in youth soccer	1–5 (disagree to strongly agree)	2.44 (1.31)
I am fearful that my circle of friends would think I was overly cautious for caring about concussions ^a	1–5 (disagree to strongly agree)	3.48 (1.38)
Susceptibility		
Perceived worry about sustaining a concussion	1–5 (not to extremely concerned)	3.32 (1.23)
Perceived likelihood of sustaining a concussion next season	1–5 (unlikely to mostly likely)	2.95 (1.10)
Perceived harm from concussion over the short term (next year)	1–5 (none to severe)	3.34 (1.07)
Perceived harm from concussion over the long term (when an adult)	1–5 (none to severe)	3.37 (1.07)
Perceived worry when child experiences a headache and/or dizziness after a blow to the head or body	1–5 (not to extremely concerned)	3.35 (1.01)
Perceived worry:		
Future concussions	1–5 (not to extremely concerned)	3.98 (1.03)
Permanent damage	1–5 (not to extremely concerned)	4.01 (1.09)
Effects on school (academic progress)	1–5 (not to extremely concerned)	3.92 (1.11)
Inability to participate in organized sports	1–5 (not to extremely concerned)	3.54 (1.28)
Returning to sports prior to a full recovery	1–5 (not to extremely concerned)	3.78 (1.20)
Prevention		
Importance of being informed about how concussions are caused	1–5 (not to extremely important)	4.22 (.93)
Importance of being informed about how concussions can be reduced	1–5 (not to extremely important)	4.20 (.96)
Importance of knowing proper steps to follow if concussions are sustained	1–5 (not to extremely important)	4.32 (.93)
Importance of youth athlete to report possible concussion symptoms to adults	1–5 (not to extremely important)	4.37 (.89)
Likelihood of seeking further information about concussions	1–5 (unlikely to mostly likely)	4.09 (1.00)
Likelihood of talking to your children about concussions	1–5 (unlikely to mostly likely)	4.20 (1.00)
Likelihood of talking to your children's coaches about concussions	1–5 (unlikely to mostly likely)	3.96 (1.11)
Importance of child participating in physical activity while experiencing concussion symptoms ^b	1–5 (not to extremely important)	3.29 (1.54)

M = mean; SD = standard deviation.

^a Reverse scale (1 = strongly agree to 5 = strongly disagree).

^b Reverse scale (1 = extremely important to 5 = not at all important).

Table 3
Respondent factors associated with attitudes/perceptions regarding concussions (ANOVA, t-test)

	Overall belief		Susceptibility		Prevention	
	M (n)	Comparison statistics	M (n)	Comparison statistics	M (n)	Comparison statistics
Gender						
Male	17.01 (138)	$t = .221$	35.88 (138)	$t = -.372$	31.71 (138)	$t = -2.504^*$ Cohen's $d = .26$
Female	16.93 (279)		36.17 (279)		33.11 (279)	
Age						
18–35	17.66 (261)	$F = 6.004^{**}$	36.06 (261)	$F = 2.509$	32.13 (261)	$F = 7.077^{***}$
36–50	18.10 (123)		35.37 (123)		32.92 (123)	
51+	19.26 (35)		38.63 (35)		35.69 (35)	
Race/ethnicity						
White/Caucasian	18.10 (304)	$t = 2.312^*$	36.14 (304)	$t = .454$	33.23 (304)	$t = 3.650^{***}$ Cohen's $d = .40$
Others	17.41 (112)	Cohen's $d = .26$	35.76 (112)		31.08 (112)	
Free/reduced lunch						
Yes	17.68 (184)	$t = -1.580$	37.37 (184)	$t = 3.120^{**}$	32.29 (184)	$t = -1.215$
No	18.10 (235)		35.06 (235)	Cohen's $d = .31$	32.94 (235)	
Concussion education received						
Yes	18.18 (243)	$t = 2.396^*$	37.19 (243)	$t = 3.567^{***}$	33.32 (243)	$t = 2.962^{**}$
No	17.56 (176)	Cohen's $d = .23$	34.53 (176)	Cohen's $d = .35$	31.74 (176)	Cohen's $d = .29$
Child's playing experience						
<1 year	16.26 (38)	$F = 6.276^{***}$	34.66 (38)	$F = 1.079$	30.97 (38)	$F = 2.708^*$
1–3 years	17.87 (184)		35.67 (184)		32.30 (184)	
3–5 years	18.26 (120)		36.67 (120)		33.05 (120)	
5+ years	18.32 (77)		36.79 (77)		33.71 (77)	
Child's diagnosed concussion						
Yes	17.34 (147)	$t = 2.989^{**}$	37.39 (147)	$t = -2.620^{**}$	31.31 (147)	$t = 3.814^{***}$ Cohen's $d = .39$
No	18.23 (272)	Cohen's $d = .34$	35.36 (272)	Cohen's $d = .27$	33.39 (272)	
Witnessed or heard about concussions						
Yes	18.11 (283)	$t = 2.103^*$	37.10 (283)	$t = 4.043^{***}$	33.13 (283)	$t = 2.626^{**}$
No	17.52 (136)	Cohen's $d = .22$	33.94 (136)	Cohen's $d = .42$	31.66 (136)	Cohen's $d = .27$

* $p < .05$, ** $p < .01$, *** $p < .001$.

ANOVA = analysis of variance.

for parents who had received concussion education and personally witnessed or heard about concussions. The effect size (Cohen's d) of these differences ranged from .22 to .42 (Table 3).

Multiple regression analysis (Table 4) indicated that the respondent factors predicting "susceptibility" items were free/reduced school lunch status ($p = .012$), location of residence ($p = .004$), and parent's diagnosed concussion ($p = .049$). In addition, coaching experience ($p = .025$), concussion education received ($p = .023$), and witnessing or hearing about concussions ($p = .020$) were the respondent factor variables associated with "prevention" items.

Discussion

The present study is one of the first to investigate a national sample of youth soccer parents' attitudes and perceptions about concussions. Given the inherent relationship between parents and youth athletes, parents are key stakeholders capable of changing the culture of concussion safety in youth sports. The results overall suggest that youth soccer parents have a high appreciation and perceived risk about concussions. Our results are consistent with previous studies which have shown that most parents worry about concussions [6–8,18,19,27]. Overall, these findings suggest greater awareness of youth sport concussions which may be due to efforts such as the implementation of state concussion laws and concussion safety policies by many youth sport organizations [28].

A notable percentage of parents did not agree there is too much attention and focus on concussions in youth soccer. This

finding contradicts previous research that found youth sport parents of several different sports (football, soccer, basketball, ice hockey, lacrosse, and baseball) strongly agreed that "too much attention and focus" had been given on concussions in sports [21]. Based on such results, it seems plausible that media attention on concussions is still predominantly focused on contact/collision sports (e.g., football) and less on sports that have been traditionally viewed as safer (i.e., soccer). In fact, one study reported nearly 75% of parents were exposed to information about concussion risks in football, yet only 45% had heard about such risks in soccer [7]. While too much attention and focus on concussions, in any sport, may potentially decrease participation rates, there may be a need for additional emphasis on concussion risks in soccer since it does not receive the attention contact/collision sports typically receive. As previously noted, the rate of concussion in soccer can be comparable to other contact/collision sports such as football and hockey [15,16].

Another interesting finding was the number of parents that did not understand the importance of preventing participation in physical activity while their child is still experiencing signs and symptoms of a concussion. This finding is concerning as some parents are not aware of return-to-play (RTP) recommendations. There is widespread consensus in the scientific community that athletes who exhibit any signs and symptoms of a concussion be prevented from participating in symptom-exacerbating physical activity until the athlete is asymptomatic [29]. However, it should be noted that while symptom-exacerbating physical activities are detrimental in recovery, the consensus guidelines recommend symptom-limited activities (e.g., noncontact aerobic exercise) following 24–48 hours of cognitive and physical rest

Table 4
Respondent factors predicting attitudes/perceptions regarding concussions (multiple regression analysis)

Variable	Coef.	T-score	p
Overall belief			
Gender	-.007	-.093	.926
Age	.075	1.015	.311
Race/ethnicity	.020	.299	.765
Education/degree	-.031	-.426	.670
Free/reduced lunch	.017	.208	.835
Location of residence	-.021	-.303	.762
Coaching experience	.118	1.577	.116
Diagnosed concussion	.080	.994	.321
Concussion education received	-.126	-1.610	.109
Child's age	-.045	-.567	.571
Child's gender	.017	.238	.812
Child's playing experience	.153	1.956	.052
Child's diagnosed concussion	-.058	-.698	.486
Witnessed or heard about concussions	-.055	-.715	.475
Susceptibility			
Gender	.040	.588	.557
Age	-.062	-.886	.377
Race/ethnicity	-.095	-1.483	.139
Education/degree	.032	.471	.638
Free/reduced lunch	-.193	-2.547	.012*
Location of residence	-.190	-2.901	.004**
Coaching experience	.094	1.333	.184
Diagnosed concussion	.151	1.976	.049*
Concussion education received	-.124	-1.680	.094
Child's age	.040	.533	.594
Child's gender	-.059	-.860	.391
Child's playing experience	.086	1.167	.245
Child's diagnosed concussion	.114	1.462	.145
Witnessed or heard about concussions	-.135	-1.842	.067
Prevention			
Gender	.037	.535	.593
Age	.041	.576	.565
Race/ethnicity	-.121	-1.864	.064
Education/degree	-.028	-.405	.686
Free/reduced lunch	.017	.217	.828
Location of residence	-.123	-1.850	.066
Coaching experience	.162	2.261	.025*
Diagnosed concussion	.052	.665	.506
Concussion education received	-.171	-2.290	.023*
Child's age	.016	.217	.828
Child's gender	-.002	-.024	.981
Child's playing experience	.076	1.020	.309
Child's diagnosed concussion	-.110	-1.390	.166
Witnessed or heard about concussions	-.174	-2.352	.020*

* $p < .05$, ** $p < .01$.

[30]. In fact, recent research findings suggest that supervised exercise while recovering from concussion may promote an earlier return to sport [31,32]. Understanding when to begin and the limits of engaging in proper physical activity is an important part of RTP guidelines that parents should be aware of. However, a lack of understanding RTP guidelines is common among youth sport parents, as other research [33] also found only one-third of parents sampled were familiar with RTP guidelines. While state laws mandate all school sports adhere to RTP guidelines, a gap exists at the youth sport level as some programs are not required to follow RTP guidelines. As such, public health and sport professionals should address these gaps by increasing awareness of the most up-to-date RTP guidelines among parents of youth sport participants.

Our findings suggest some respondent factors were associated with greater appreciation and perceived risk about concussions. Most notably, parents who received concussion education were more likely to exhibit positive and/or favorable results on the

overall belief, susceptibility, and prevention items. Such findings suggest that parents who did not receive concussion education may not fully appreciate the likelihood and severity, as well as the importance of prevention efforts regarding concussions compared to peers who did. Findings from past studies have also shown that concussion-related educational interventions are typically effective for improving youth sport stakeholders' perception, awareness, and knowledge about concussions [25,34–36]. It is possible that less informed parents who may perceive a concussion as a minor injury are more likely to disregard concussion signs/symptoms and fail to report them to medical professionals. This is concerning given that parents are often in control of deciding whether their children need to seek medical care and/or can safely return to play. The present study further validates the positive effects of concussion education and the need for enhanced and continued educational efforts for youth sport parents.

Consistent with findings from Kroshus et al. [19], statistically significant differences emerged from the data in which parents with less per capita income (i.e., child has access to free and/or reduced school lunch) were more likely to show greater susceptibility about concussions. Similarly, our findings also suggest that racial/ethnic minorities were less likely to engage in certain concussion prevention efforts compared to white/Caucasian parents. These results may be explained by a lack of tangible (e.g., access to health care, transportation, educational training, etc.), interpersonal, and intrapersonal resources necessary to deal with health threats and/or feeling of being marginalized in general health-care settings [37]. Subsequently, such limitations could lead to lower literacy regarding health threats which may impact ability to seek proper medical treatment. In addition, the reserve capacity model [38] posits that perceived parental anxiety is associated with biological markers of chronic stress, which is often prevalent among socioeconomically disadvantaged parents and/or racial/ethnic minorities. It is also possible the media (i.e., popular press) portrays a particular health threat (e.g., concussions) with increased severity and perceived susceptibility [39], that some parents in these demographic groups (who are often less literate about health threats) may inaccurately process information contained in such exaggerated media reports. This stresses the need for targeted educational interventions among parents in the aforementioned demographic groups to create better awareness and appraisal regarding true concussion risk factors. Future research should continue to explore and identify potential factors predicting and/or modifying youth sport parents' attitudes and perceptions about concussions.

Limitations

The present study is not without limitations. The participants recruited from Qualtrics were a nonprobability sample, which may have excluded certain demographic groups such as those with limited or no access to the Internet. Qualtrics, however, provides survey respondents from high-quality online panels that resemble the general population [40]. The online survey may also have allowed some respondents to search for concussion-related responses while completing the survey. In addition, some parents may have misinterpreted the purpose of some questions. It is also possible that those with a greater awareness and interest in sport-related concussions may have self-selected into the survey sample. Also, our survey did not inquire as to when (i.e., what year) participants received concussion education. Components of concussion education and

best practices have changed significantly over the past several years. Although our sample were parents of athletes from the five largest organized U.S. youth soccer programs, the results are not generalizable to all youth soccer organizations due to potential differences in organizational support for concussion safety (e.g., parent's and/or coach's educational requirement). Finally, our survey was modified from previously used instruments and based on existing literature without conducting a test-retest or other measure known to strengthen validity and reliability. Despite these limitations, the current study is one of the first to investigate a national sample of youth soccer parents' attitudes and perceptions about concussions.

As parents are key figures in the identification and management of concussions, understanding their attitudes and perceptions is vital. Parents also play a pivotal role in shaping their child's attitudes and perceptions with respect to seeking appropriate medical care for suspected concussions and following RTP guidelines. The present findings revealed that youth soccer parents have high appreciation and perceived risk about concussions. Despite the promising findings, larger efforts should be made to expand educational approaches targeted to parents of youth soccer athletes. Specifically, concussion educational intervention developed from a theoretical basis may help improve parents' attitudes and perceptions about concussions. Further research is warranted to determine the cause of differences in concussion attitudes and perceptions based on other parent and/or child factors, in an effort to develop targeted educational interventions for parents with varying demographic background and experiences involving youth sport concussions.

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