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Evaluating Adult Decision-Making Modifiers in Support of Youth Contact-Sport Participation

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Context: Nearly 44 million youth participate in organized youth sports programs in the United States each year. However, approximately 25% of parents have considered removing their children from sports due to the fear of concussion.

Objective: To determine which adult decision-making modifiers (eg, gender, educational attainment, career type) influenced support for youth contact-sports participation.

Design: Cross-sectional study.

Setting: Midwestern university and medical center.

Patients or Other Participants: Convenience sample of staff and faculty (N = 5761; 73.9% female) from 2017 to 2018.

Main Outcome Measure(s): Support for youth contact-sports participation using multivariate binary logistic regression to calculate odds ratios and 95% CIs.

Results: The sample was split between adults with children (AWCs; n = 3465, age = 45.39 ± 13.27 years, 76.72% female) and adults without children (AWOCs; n = 2296, age = 30.84 ± 9.01 years, 70.26% female). Among AWCs, those who obtained a bachelor's degree or higher were more likely to support contact-sports participation. Females were more inclined to allow all contact sports, specifically football (odds ratio [OR] = 2.22; 95% CI = 1.64, 3.01) and ice hockey (OR = 1.98; 95% CI = 1.42, 2.78). Overall, previous adult sport participation, increasing number of children, and child gender were significant modifying variables in greater support of youth contact-sports participation among AWCs ($P < .001$). Among AWOCs, previous sport participation in football (OR = 3.27; 95% CI = 2.14, 4.87), ice hockey (OR = 4.26; 95% CI = 2.23, 8.17), or soccer (OR = 2.29; 95% CI = 1.48, 3.54) increased the likelihood of an adult supporting contact-sports participation. Lastly, all adults were less inclined to support a daughter participating in any contact sport than a son.

Conclusions: These results reveal adult- and child-specific variables that may influence youth contact-sports participation. These decisions may be developed through the lens of certain gender role beliefs and may lead adults to perceive certain sports as more appropriate for sons than daughters.

Key Words: mild traumatic brain injuries, collision sports, survey research

Key Points

- Adults were more likely to support youth contact-sports participation for male children and if the parent was female or college educated or personally participated in contact sports.
- Both adult cohorts (adults with and those without children) were less likely to support daughters participating in contact sports than sons.

The benefits of physical activity are well established; children and adolescents who participate in organized sports are at decreased risk for serious health conditions such as obesity, hypertension, cardiovascular disease, diabetes mellitus, and premature death.[1–3] Beyond physical health, youth sports participation is also suggested to improve educational outcomes,[4] promote a healthier self-image, and reduce emotional distress.[5] Despite the known mental and physical benefits, parents often weigh multiple factors when determining if their child(ren) should participate in organized sports.

One reason adults may be hesitant to support adolescents participating in certain sports may be an increased risk of injuries, with recent attention placed on sport-related concussions (SRCs). In fact, O'Connor et al (2017)[6] suggested that per 10 000 athlete-exposures (AEs) at the high school level, the greatest SRC rates occurred in football (9.21) and girls' soccer (6.11). Similarly, Pfister et al (2016)[7] reported that the highest incidence rates of SRC were in football (0.53/1000 AEs), ice hockey (1.20/1000 AEs), and rugby (4.18/1000 AEs) among adolescent athletes. How SRCs or head impacts without SRC relate to long-term brain health is an area of intense research interest, but those concerns have contributed to a notable decrease in youth football[8] participation over the past decade. This decline has been offset by sharply increased participation in contact sports such as soccer[9] and ice hockey,[10] indicating that adults may view the injury risk in those youth sports differently than in football.

Although the authors of several studies have investigated adult perceptions of children's SRC risk,[11–13] as well as

adult knowledge and attitudes regarding SRC,[14–17] the influence of specific adult- and child-related characteristics and if or how these may affect adults' decisions to support youth sports participation have not been evaluated. Further, current research[18] involving adults with children (AWCs) showed that parents tended to endorse their sport-related values with their children, yet this topic has yet to be assessed in adults without children (AWOCs). Therefore, the purpose of our study was to examine features that may influence adult support for youth sports participation between AWCs and AWOCs. A secondary purpose was to determine if these characteristics differentially affected their support for youth participation in collision sports, specifically football, ice hockey, and soccer.

METHODS

Participants

An anonymous, electronic survey (Qualtrics) was distributed via email to approximately 40 000 faculty and staff members at a large public university and affiliated medical center from 2017 to 2018. Once each participant provided informed consent, he or she was asked to answer a 19-question survey of demographics including age, education, previous sport participation, SRC history (diagnosed and undiagnosed), and employment setting, followed by a series of questions about support for youth sports participation (branching described in the following section), which took approximately 20 minutes to complete. This study was approved by the university's Institutional Review Board and was conducted in accordance with the Declaration of Helsinki.

Materials and Methods

It is unclear how adults generally perceive youth sports participation versus when they internalize these decisions using their own family's decision-making process. Therefore, we used branching logic in the survey demographic questions to tailor items specific to AWCs and AWOCs. The AWOCs were asked to reply to a question as a theoretical parent pertaining to sport allowance with a hypothetical son and daughter. Respondents were then asked if they would allow (a) child(ren) to participate in 27 sports; a binary *yes* or *no* answer was required. The final question was "How confident are you in your knowledge of concussion?" with 0 indicating *minimal understanding* and 100 equating to *full confidence*. Once the responses were recorded, respondents had the option to submit their contact information to be entered into a raffle to win either a $50 or $100 gift card.

Sport Category Definitions

The 27 sports presented for possible child participation were categorized based on contact level (eg, full, partial, or noncontact) using criteria of the American Academy of Pediatrics (Table 1).[19] For the purpose of this study, we focused on support of youth contact sports, especially football, ice hockey, and soccer, based on previous work[6] highlighting the SRC AE risk in adolescent sports participation.

Table 1. Sport Classification by Contact Level[a]

Contact Level		
Full	Partial	None
Basketball	Baseball	Bowling
Cheerleading	Fencing	Cross-country and track
Diving	Football, flag or touch	Crew or rowing
Field hockey	Skiing	Golf
Football	Softball	Rifle
Gymnastics	Track and field event	Swimming
Ice hockey	Volleyball, beach	Tennis
Lacrosse	Volleyball	
Rugby		
Soccer		
Water polo		
Wrestling		

[a] Table has been modified based on the classification system outlined by the American Academy of Pediatrics.[19]

Statistical Analysis

Responses to the demographic variables were described using measures of central tendency and compared those who did and those who did not report that they had children (AWCs versus AWOCs) using independent-samples *t* tests and χ^2 tests, with effect sizes calculated using the Cohen d and Cramér V, respectively. Statistical significance was set a priori at $P < .05$. All analyses were performed in Stata/SE (version 15.1).

To assess the potential for AWCs to allow their child(ren) to participate in contact sports, we calculated adjusted odds ratios via binary logistic regression of multivariate analyses. Cluster robust standard errors were grouped by respondent to account for the intercorrelation of responses. After conducting the analysis on the general contact-sport category, 3 separate binary logistic models were conducted, 1 for each contact sport (football, ice hockey, and soccer), using the same predictors across each model. After finalizing the AWCs analyses, we replicated the model on the AWOCs' data to determine which predictors influenced support of youth contact-sports participation.

RESULTS

Study Respondents

Participant demographics are presented in Table 2. Those who stated they were AWCs (n = 3465; mean age = 45.39 ± 13.27 years; No. of children = 2.16 ± 1.03) were 60.15% of the total respondents (N = 5761), and the majority were female (76.72%). Among the AWCs, 77.93% had obtained a bachelor's degree or higher, and most were not medical practitioners (82.10%). Most of the AWCs had not participated in contact sports (81.50%) and did not report an SRC history (71.98%). When asked to self-rate confidence in their SRC knowledge on a scale of 0 to 100, AWCs rated themselves as 55.94 ± 24.18.

Several differences existed between the 2 subsets of adults (Table 2). Specifically, most AWOCs (n = 2296; mean age = 30.84 ± 9.01 years) were female (70.26%). However, more AWOCs had obtained a bachelor's degree or higher than AWCs (90.26%; $P < .001$). Similar to AWCs, most AWOCs were not medical providers (84.95%), had not engaged in previous contact-sport participation (78.05%), and did not report an SRC history

Table 2. Survey Respondent Demographics

Characteristic	Adults With Children (n = 3465)	Adults Without Children (n = 2296)	*P* Value[d]	Effect Size[e]
	Mean ± SD			
Age, y	45.39 ± 13.27	30.84 ± 9.01	<.001	1.24[d]
Children, No.	2.16 ± 1.03	NA	NA	NA
Concussion confidence, %[a,b]	55.94 ± 24.18	46.19 ± 24.46	<.001	0.40[c]
	No. (%)			
Sex			<.001	0.07
Male	805 (23.28)	679 (29.74)		
Female	2653 (76.72)	1604 (70.26)		
Highest degree awarded			<.001	0.16
High school or other	754 (22.07)	221 (9.74)		
Bachelor's	1316 (38.52)	1085 (47.82)		
Master's	791 (23.16)	588 (25.91)		
Terminal[c]	555 (16.25)	375 (16.53)		
Medical practitioner?			.005	0.04
Yes	618 (17.90)	345 (15.05)		
No	2834 (82.10)	1948 (84.95)		
Personal previous contact-sport participation?			.001	0.04
Yes	641 (18.50)	504 (21.95)		
No	2824 (81.50)	1792 (78.05)		
Personal concussion history			.009	0.04
0	2494 (71.98)	1620 (70.56)		
1	494 (14.26)	296 (12.89)		
2+	477 (13.77)	380 (16.55)		

Abbreviation: NA, not applicable.

[a] Values rated on a self-reported scale of 0 to 100, with 0 referring to *minimal understanding* and 100 indicating *full confidence*.

[b] Effect sizes calculated using the Cohen d.

[c] Terminal degree includes MD, doctor of medicine; DO, doctor of osteopathic medicine; DPT, doctor of physical therapy; PhD, doctor of philosophy; JD, juris doctor; MD/PhD dual degree.

[d] Two-samples independent *t* tests were used to determine statistical significance for continuous variables; χ^2 tests of independence were used to determine statistical significance for categorical variables.

[e] Effect sizes calculated using the Cramér V unless otherwise specified.

(70.56%). Lastly, AWOCs displayed a lower self-reported score for confidence in their SRC knowledge relative to AWCs (46.18 ± 24.46; $P < .001$; Table 2).

Adults With Children

Analytical results for the AWCs cohort are presented in Table 3. As AWCs increased in age, they were more likely to allow their child(ren) to participate in contact sports (1.04, 95% CI = 1.03, 1.05; $P < .001$), specifically ice hockey (1.05, 95% CI = 1.03, 1.07; $P < .001$) and soccer (1.04, 95% CI = 1.03, 1.05; $P < .001$). Of the AWCs, those who identified as female were more likely to allow their child(ren) to play contact sports (1.42, 95% CI = 1.23, 1.63; $P < .001$) such as football (2.22, 95% CI = 1.64, 3.01; $P < .001$) and ice hockey (1.98, 95% CI = 1.42, 2.78; $P < .001$) than male parents.

Also, a statistically significant interaction existed with adult education level and support for youth contact-sports participation. For example, AWCs with a terminal degree were 1.36 times more likely to permit their child(ren) to participate in contact sports (95% CI = 1.11, 1.66; $P < .01$) as well as 1.89 times more likely to allow soccer participation (95% CI = 1.56, 2.28; $P < .001$). Conversely, AWCs who indicated obtaining a bachelor's degree or higher were less likely to permit their child(ren) to participate in football ($P < .05$; Table 3). More specifically, the higher the education, the less likely they were to allow football participation (bachelor's degree = 0.78, 95% CI = 0.62, 0.98; $P < .05$; master's degree = 0.58, 95% CI = 0.43, 0.77; $P < .001$; and terminal degree [eg, doctorate of philosophy, medical doctor, juris doctor] = 0.34, 95% CI = 0.23, 0.50; $P < .001$). Medical practitioners in the AWCs cohort were 1.62 times more likely to allow their child(ren) to participate in ice hockey (95% CI = 1.24, 2.12; $P < .001$).

In addition, AWCs who reported a personal sport history were more likely to allow their child(ren) to participate in the same sport, including contact sports (1.20, 95% CI = 1.01, 1.43; $P < .05$), football (2.25, 95% CI = 1.36, 3.71; $P < .01$), ice hockey (9.82, 95% CI = 6.15, 15.66; $P < .001$), and soccer (1.88, 95% CI = 1.51, 2.33; $P < .001$). However, those who had sustained a greater number of previous SRCs were less likely to allow contact sports (0.96, 95% CI = 0.92, 0.99; $P < .05$) and ice hockey (0.88, 95% CI = 0.80, 0.97; $P < .01$). Across all sport categories, AWCs with greater self-reported confidence in their SRC knowledge were more likely to allow sport participation (general contact sports = 1.01, 95% CI = 1.01, 1.02; $P < .001$; football = 1.02, 95% CI = 1.01, 1.02; $P < .001$; ice hockey = 1.02, 95% CI = 1.01, 1.02; $P < .001$; and soccer = 1.01, 95% CI = 1.01, 1.02; $P < .001$; Table 3).

In relation to child-specific variables, AWCs who reported more children were more likely to allow their children to participate in contact sports (1.09, 95% CI = 1.03, 1.15; $P < .001$) and football (1.11, 95% CI = 1.03, 1.19; $P < .01$). Furthermore, the older the child, the more likely the parent would be to allow him or her to participate in contact sports (1.03, 95% CI = 1.02, 1.04; $P < .001$) and football (1.06, 95% CI = 1.05, 1.08; $P < .001$). However, a negative relationship existed between child age and soccer

Table 3. Likelihood of Adults With Children Supporting Youth Sports Participation[a]

Predictors	Odds Ratio (95% CI)			
	All Contact Sports	Football	Ice Hockey	Soccer
Adult age	1.04 (1.03, 1.05)[c]	1.01 (0.98, 1.02)	1.05 (1.03, 1.07)[c]	1.04 (1.03, 1.05)[c]
Adult gender				
Male		Referent		
Female	1.42 (1.23, 1.63)[c]	2.22 (1.64, 3.01)[c]	1.98 (1.42, 2.78)[c]	1.13 (1.00, 1.29)
Adult education				
High school or other		Referent		
Bachelor's	1.39 (1.19, 1.62)[c]	0.78 (0.62, 0.98)[e]	1.14 (0.85, 1.55)	1.49 (1.29, 1.73)[c]
Master's	1.60 (1.34, 1.91)[c]	0.58 (0.43, 0.77)[c]	1.11 (0.79, 1.54)	1.98 (1.68, 2.33)[c]
Terminal	1.36 (1.11, 1.66)[d]	0.34 (0.23, 0.50)[c]	0.85 (0.56, 1.27)	1.89 (1.56, 2.28)[c]
Medical practitioner?				
No		Referent		
Yes	1.03 (0.88, 1.21)	0.95 (0.72, 1.24)	1.62 (1.24, 2.12)[c]	0.90 (0.78, 1.05)
Previous sport participation?[b]				
No		Referent		
Yes	1.20 (1.01, 1.43)[e]	2.25 (1.36, 3.71)[d]	9.82 (6.15, 15.66)[c]	1.88 (1.51, 2.33)[c]
Total No. concussions	0.96 (0.92, 0.99)[e]	0.95 (0.90, 1.02)	0.88 (0.80, 0.97)[d]	0.98 (0.95, 1.01)
Concussion confidence	1.01 (1.01, 1.02)[c]	1.02 (1.01, 1.02)[c]	1.02 (1.01, 1.02)[c]	1.01 (1.01, 1.02)[c]
Total No. children	1.09 (1.03, 1.15)[c]	1.11 (1.03, 1.19)[d]	0.99 (0.91, 1.07)	0.98 (0.94, 1.03)
Child age	1.03 (1.02, 1.04)[c]	1.06 (1.05, 1.08)[c]	1.01 (0.99, 1.02)	0.98 (0.98, 0.99)[e]
Child gender				
Male		Referent		
Female	0.83 (0.74, 0.93)[d]	0.01 (0.01, 0.02)[c]	0.22 (0.16, 0.28)[c]	0.66 (0.60, 0.74)[c]

[a] Adjusted odds ratios calculated via multivariate binary logistic regression with between-adults clustering for adults with children.
[b] Previous adult sport participation for the respective column (ie, previous adult participation in football).
[c] $P < .001$.
[d] $P < .01$.
[e] $P < .05$.

participation (0.98, 95% CI = 0.98, 0.99; $P < .05$). Lastly, child gender had a statistically significant effect on support of youth contact-sports participation across all categories; the AWCs were less likely to permit their daughter(s) to participate in any contact sport (0.83, 95% CI = 0.74, 0.93; $P < .01$). This effect was observed for football (0.01, 95% CI = 0.01, 0.02; $P < .001$), ice hockey (0.22, 95% CI = 0.16, 0.28; $P < .001$), and soccer (0.66, 95% CI = 0.60, 0.74; $P < .001$).

Adults Without Children

As AWOCs aged, they were statistically less likely to support all youth contact-sports (0.95, 95% CI = 0.94, 0.97; $P < .001$), football (0.98, 95% CI = 0.97, 0.98; $P < .001$), ice hockey (0.97, 95% CI = 0.86, 0.97; $P < .001$), and soccer (0.95, 95% CI = 0.94, 0.96; $P < .001$; Table 4) participation. Further, AWOCs who identified as female were 1.29 times more likely to support football (95% CI = 1.12, 1.49; $P < .001$) and 1.19 times more likely to support ice hockey (95% CI = 1.04, 1.37; $P < .05$) participation.

Regarding adult education across each specific sport category, those who had obtained a bachelor's degree or higher were less likely to support youth sport participation in football and ice hockey ($P < .01$; Table 4). Specifically, among all AWOCs who had earned at least a bachelor's degree, those with terminal degrees were the least likely to support football (0.29, 95% CI = 0.22, 0.38; $P < .001$) or ice hockey (0.37, 95% CI = 0.28, 0.50; $P < .001$) participation. Although no significant relationship existed between the level of degree obtained and support for all contact-sports participation, medical practitioners were 2.38 times more likely to be in support of youth contact-sports participation (95% CI = 1.16, 4.90; $P < .05$).

Further, AWOCs were more likely to support youth sports participation if they were the same sports that the adults had been involved in, including football (3.27, 95% CI = 2.14, 4.87; $P < .001$), ice hockey (4.26, 95% CI = 2.23, 8.17; $P < .001$), and soccer (2.29, 95% CI = 1.48, 3.54; $P < .001$). In addition, those with a greater SRC history were more inclined to support their hypothetical child's participation in football (1.06, 95% CI = 1.02, 1.11; $P < .001$). Adults without children who reported greater confidence in their SRC knowledge were more likely to support youth ice hockey participation (1.01, 95% CI = 1.01, 1.02; $P < .05$). Similar to the AWCs, the AWOCs were less inclined to support the participation of a hypothetical daughter than a hypothetical son in football (0.80, 95% CI = 0.71, 0.91; $P < .001$; Table 4).

DISCUSSION

Our study was designed to identify adult decision-making modifiers in support of youth contact-sports sparticipation for a real or hypothetical child. Overall, we found several modifiers across both cohorts (AWCs and AWOCs) that increased an adult's support for youth contact-sports participation. Among AWCs, female adult gender and the level of education were the strongest predictors of allowing contact-sports participation. Employment setting (ie, medical provider or not) and level of education were the strongest predictors of youth contact-sports participation among AWOCs. With respect to questions about specific sports, female gender remained a significant factor among AWCs for predicting consent for football and ice hockey,

Table 4. Likelihood of Adults Without Children Supporting Youth Sports Participation[a]

Predictors	Odds Ratio (95% CI)			
	All Contact Sports	Football	Ice Hockey	Soccer
Adult age	0.95 (0.94, 0.97)[c]	0.98 (0.97, 0.98)[c]	0.97 (0.96, 0.97)[c]	0.95 (0.94, 0.96)[c]
Adult gender				
Male		Referent		
Female	0.88 (0.60, 1.29)	1.29 (1.12, 1.49)[c]	1.19 (1.04, 1.37)[d]	0.89 (0.72, 1.11)
Adult education				
High school or other		Referent		
Bachelor's	1.51 (0.90, 2.52)	0.54 (0.43, 0.68)[c]	0.70 (0.54, 0.90)[e]	1.34 (0.97, 1.86)
Master's	1.37 (0.79, 2.38)	0.39 (0.31, 0.50)[c]	0.55 (0.43, 0.72)[c]	1.31 (0.93, 1.85)
Terminal	1.12 (0.59, 2.11)	0.29 (0.22, 0.38)[c]	0.37 (0.28, 0.50)[c]	0.82 (0.56, 1.20)
Medical practitioner?				
No		Referent		
Yes	2.38 (1.16, 4.90)[d]	0.93 (0.77, 1.12)	1.14 (0.94, 1.39)	1.29 (0.94, 1.77)
Previous sport participation?[b]				
No		Referent		
Yes	1.71 (0.95, 3.09)	3.27 (2.14, 4.87)[c]	4.26 (2.23, 8.17)[c]	2.29 (1.48, 3.54)[c]
Total no. concussions	0.93 (0.84,1.04)	1.06 (1.02, 1.11)[e]	1.05 (0.99, 1.11)	0.98 (0.93, 1.04)
Concussion confidence	1.01 (1.00, 1.01)	1.00 (0.99, 1.00)	1.01 (1.01, 1.02)[d]	0.99 (0.99, 1.00)
Hypothetical child gender				
Male		Referent		
Female	0.94 (0.67, 1.33)	0.80 (0.71, 0.91)[c]	0.90 (0.80, 1.03)	0.92 (0.75, 1.11)

[a] Adjusted odds ratios calculated via multivariate binary logistic regression with between-adults clustering for adults without children.
[b] Previous adult sport participation for the respective column (eg, previous adult participation in football).
[c] $P < .001$.
[d] $P < .05$.
[d] $P < .01$.

followed by prior participation in those sports. Among the AWOCs, prior participation in football, ice hockey, or soccer was the single strongest predictive factor.

Furthermore, AWCs were less likely to allow a daughter to participate in all contact sports, especially football, ice hockey, and soccer. Adults without children were less inclined to support football participation, but no such relationship existed regarding ice hockey and soccer. One plausible influence may have been the adults' perception of sport appropriateness based on (a) child(ren)'s gender according to the Gender Schema Theory.[20] This theory proposed that societal pressures dichotomize gender based on biological sex and, therefore, individuals internalize and act upon sex-linked associations.[21] Adults may support this schema by viewing and labeling certain sports as more masculine or feminine and thus would consider those more suitable for their sons or daughters, respectively.[20,22] Heinze et al (2014)[20] investigated parents' perceptions of youth sports participation and concluded that gender role beliefs were strong factors regarding the sports their daughters participated in, and adults overall placed greater monetary value on their sons' sports in contrast to their daughters' sports. Overall, the adults in our sample may have perceived contact sports as masculine and, consequently, not carrying the same value for a current or hypothetical daughter's participation.

Across educational attainment, AWCs with at least a bachelor's degree were more inclined to allow a child to participate in all contact sports, especially soccer, than AWCs with a high school degree or some college. However, when we analyzed football on its own, we noted a decreasing trend in the likelihood of sport participation with increasing education status (terminal degree). This trend was also present among the AWOCs for football and ice hockey, with decreasing support for youth contact sports among those with higher degrees, yet AWOCs who identified as medical practitioners were 2.3 times more likely to support youth contact-sports participation. Waltzman and Daugherty (2017)[23] suggested that those with at least a bachelor's degree had stronger knowledge of SRCs than those with less educational achievement. These findings further support Lin et al (2015),[14] who reported that those with higher educational backgrounds endorsed more conservative attitudes regarding SRC. Overall, it is likely that the adults in the current sample perceived collision sports, such as football and ice hockey, as putting a child at greater risk of head injury than other contact sports.[19] However, several authors[24,25] have suggested that SRC rates in youth soccer were equal to or exceeded those in sports such as football and ice hockey. Collectively, our results and those of others suggest that adults may have misconceptions of the SRC risk in youth athletics, which may be affecting their decisions about youth sports participation. To address these misconceptions, athletic trainers can counsel adults regarding youth sports participation and associated injury risks so that they can make informed decisions for their child(ren).

Further, age was positively related to the likelihood of AWCs allowing their child(ren) to participate in all contact sports, specifically ice hockey and soccer. These findings parallel the effects of the child(ren)'s age ($r_{3463} = 0.82$), indicating that child age may be a surrogate measure for AWC age. Although we noted an increased chance that AWCs would permit football participation in older children, a notable decrease occurred for soccer participation. This may be because adults often enroll their child(ren) in soccer to gain team-building skills for future sports participation. In fact, Baxter-Jones et al (2003)[26] suggested that parents were the strongest influence in sport initiation, specifically in gymnastics, tennis, swimming, and

soccer. Also, a majority of respondents initiated child soccer participation (90.8%) before age 10.[27] Children are exposed to soccer participation at a young age, but their interest may decrease once they reach middle school or high school level athletics and thereby influence whether an adult would consider soccer enrollment. Thus, the decrease in soccer participation may not necessarily be due to the perceived SRC risk.

Interestingly, AWOCs who identified as medical practitioners reported increased likelihood of general contact-sports participation, and AWCs were more likely to allow their child(ren) to participate in ice hockey. These results parallel those of Sone et al (2018)[28]: high school contact-sports participation was 1.73-fold higher for neurosurgery chairs and 2.35-fold higher for orthopaedic chairs relative to their peers. In both cohorts, we observed that adults who previously participated in contact sports were more inclined to allow a child to be involved in the same sport. For example, AWCs who had participated in hockey were 9.82 times more likely to allow their child to participate. These results complement a prior finding[29] that adults with previous sport participation were more likely to allow their child(ren) to play.

Participants who reported a greater SRC history were less likely to allow their child to participate in football and ice hockey. In general, these decisions may be based on their own SRC experience and concerns regarding head-impact exposure. Identical methods were used to assess adult and student SRC knowledge[30] and demonstrated that, although parents scored higher on SRC knowledge questions, no association existed between SRC confidence and knowledge scores relative to sports participation for their children.[15] These findings are consistent with ours in that self-reported SRC confidence scores did not influence the likelihood of sports participation across all categories in either AWCs or AWOCs.

Despite the strengths of this investigation, we are aware of several limitations. The sample providing data for the study was one of convenience, making the results nonspecific to the broader adult population. Further, a potential for selection bias existed, especially among adults who were actively involved in youth athletics, health departments, or both, who may have had more knowledge regarding SRC risks, which was unaccounted for in these analyses. In addition, we did not obtain data regarding race, ethnicity, or socioeconomic status, all of which are possible confounding variables. For example, adults may be less inclined to allow a child to engage in club sports (eg, ice hockey) than school-funded sports due to costly participation fees. We also recognize that the reasoning behind each adult's response is theoretical, as we did not provide participants with the opportunity to explain why they chose certain sports over others, and factors apart from the questions asked (eg, time commitment) may have influenced their responses. Also, the mean age difference between AWCs and AWOCs may have had a strong influence on the prospect of sports participation, although it was unaccounted for in the analyses. Lastly, we used a single, self-reported question to assess participants' SRC knowledge, which may not have accurately reflected their knowledge as defined by evidence-based guidelines and recommendations. Additional research is warranted to investigate why an adult may or may not permit his or her child to participate in specific sports, such as fear of injury, financial burden, or availability of club sports, and how these may influence prospective youth sports trends in the United States.

Youth sports participation is critical to a child's emotional, physical, and behavioral development. These findings suggest that certain adult characteristics may influence decisions to support youth sports participation, especially contact sports, such as employment setting (ie, medical provider or not), level of educational achievement, and previous sport participation. It is noteworthy that, even though these findings generally supported societal norms, the outcomes were inconsistent when compared across the cohorts (ie, AWCs were less likely than AWOCs to support a daughter participating in contact sports) and are worth investigating in prospective studies. Overall, the decline in youth contact-sports participation has been partially linked to increased concern surrounding SRC[29]; however, these results illustrate the importance of looking beyond an athlete's individual characteristics when understanding sport decision making, instead considering the attitudes and characteristics of supporting stakeholders. Therefore, educational resources for parents, students, coaches, and other potential stakeholders in youth athletics should emphasize the SRC risk beyond that in typical collision sports in order for adults to make informed decisions on youth sports participation.

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