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Interpersonal Violence in Elite U.S. Athletes: Prevalence and Mental Health Correlates

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ABSTRACT

This study assessed the prevalence of interpersonal violence (IV) experienced by elite U.S. athletes. Athletes were surveyed about experiences of emotional, physical, sexual violence, and deprivation of food or water, as well as questions about mental health indices, identity characteristics, and who perpetrated the harm. Of the total sample, 57.8% reported experiencing some form of IV in sport. Most athletes who experienced IV experienced multiple forms with a large overlap between emotional abuse and other forms of violence. A significant relationship was found between reporting any form of IV and having been diagnosed with one or more psychiatric disorders – particularly anxiety, depression and Post-Traumatic Stress Disorder. IV was also significantly associated with self-reported eating disorders. A particularly strong association was found between reporting being deprived of food in sport and reporting an eating disorder. This study reveals a critical need for more research focused on the traumatic effects of IV in sport. The potential for detrimental effects on athletes' mental health also underscores the need for improvements in the prevention and early detection of IV in sport.

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Recent media accounts, criminal investigations, and lawsuits have raised awareness about violence against athletes. One of the most publicized scandals is that of the former USA Gymnastics doctor Larry Nassar. In his position as a medical practitioner in various sports, it is estimated that he sexually abused more than 500 victims in a career spanning multiple decades (Evans & Benbow, 2021). The current study was conceived of by the Game Over Commission to Protect Youth Athletes. The Commission was comprised of an interdisciplinary group of experts who investigated all aspects of the systems that enabled Dr. Nassar's abuse and made recommendations to prevent future abuse (CHILD USA, 2022). Despite numerous scandals involving

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violence against athletes in the U.S., the Commission could find no studies looking at the prevalence of IV against U.S. athletes. The current study was formulated to help answer the question of whether the severe types of interpersonal violence (IV) found in USA gymnastics are prevalent in other Olympic teams and to examine mental health issues associated with IV.

Prevalence of IV in athletes

In the last decade, a growing body of work has begun to examine the potential for IV in sports. IV can include physical, sexual, and psychological violence and deprivation or neglect (Kilpatrick, 2004). IV in sport has been defined as violence between individuals including violence by an adult in a position of authority such as the coach, violence between athletes, and violence by spectators (Parent & Fortier, 2018). Studies show a high occurrence of psychological, physical, and sexual violence against child and adult athletes. Overall, psychological violence is most frequently reported by athletes, with 22–80% of athletes reporting at least one experience, followed by physical violence (11–66%), and sexual violence (9–38%; Alexander et al., 2011; Bermon et al., 2021; Hartill et al., 2021; Kerr et al., 2019; Ohlert et al., 2021; Pankowiak et al., 2023; Parent & Vaillancourt-Morel, 2021; Parent et al., 2023; U.S. Center for Safe Sport, 2020; Vertommen et al., 2016, Willson et al., 2022; Vertommen et al., 2022; World Players Association, 2021). The high variation in prevalence rates may be a result of several factors including different samples and ages along with different measures, methodologies, and operationalizations of the various forms of IV. Not surprisingly, researchers employing broader definitions of IV in sport tend to report higher prevalence rates. Most of the IV experienced by athletes is perpetrated by coaches and peer athletes (e.g., Hartill et al., 2021; Vertommen et al., 2017; Willson et al., 2021).

Risk factors

Risk factors for experiencing violence in sport include belonging to an ethnic minority (U.S. Center for Safesport, 2020; Vertommen et al., 2016), having a disability (Pankowiak et al., 2023; U.S. Center for Safesport, 2020; Vertommen et al., 2016), identifying as lesbian/gay/bisexual (Pankowiak et al., 2023; Parent & Vaillancourt-Morel, 2021; U.S. Center for Safesport, 2020; Vertommen et al., 2016), and a history of child maltreatment outside of sport (Parent et al., 2023). Research suggests that gender may also be a risk factor, although the data are inconsistent. A number of studies have found that more male athletes report physical violence, whereas female athletes were more likely to report sexual violence (Vertommen et al., 2016, 2022; World Players Association, 2021). However, two Canadian studies found females were more likely to report IV of all types (Kerr et al., 2019; Willson et al.,

2022); while Hartill et al.'s (2021) study of European athletes found the opposite – males were more likely to report having experienced IV of all types. Sports related risk factors include early sport specialization (Parent et al., 2023), family separation for sport practice (Parent et al., 2023), increased hours of weekly sport participation (Pankowiak et al., 2023; Parent & Vaillancourt-Morel, 2021; Vertommen et al., 2022), and competing at the elite level (Alexander et al., 2011; Hartill et al., 2021; Parent & Vaillancourt-Morel, 2021; Vertommen et al., 2016).

Long-term effects

Exposure to IV has been shown to increase individuals' lifelong vulnerability to a broad range of emotional, behavioral and physical health problems (e.g., Lippard & Nemeroff, 2020; Scott et al., 2012). While few studies have looked at indicators of mental health in relation to IV in sport, available data suggest that victimized athletes experience similar harmful effects. Studies have found that IV in sport is associated with increased psychopathology and lower quality of life in adulthood (Vertommen et al., 2018), psychological distress (Parent et al., 2022), post-traumatic stress disorder (PTSD) symptoms (Leahy et al., 2008; Parent et al., 2022), dissociative symptomatology (Leahy et al., 2008), disordered eating, self-harm, and thoughts of suicide (Kerr et al., 2019; U.S. Center for Safesport, 2020).

Aims of the study

The aims of this study were threefold: (1) to assess the prevalence of retrospectively self-reported IV (i.e., psychological, sexual, physical violence and deprivation of food and/or water) in elite U.S. athletes; (2) to identify the types and frequencies of violence perpetrated by specific actors (coaches, sports officials, peers, etc.); and (3) to examine the relationship between various forms of IV and both lifetime psychiatric diagnoses and self-reported eating disorders.

Method

Prevalence of IV in sport was measured using a retrospective web-based survey. The research was approved by the University of Pennsylvania Internal Review Board (Protocol 832,597). All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants included in the study. Olympic athletes aged 18 or older who had engaged in national or international

sport at the elite level were eligible to participate. The United States Olympic & Paralympic Committee Athletes' Advisory Council contacted the 50 USA Olympic team's National Governing Bodies (NGOs) on our behalf. Ten teams agreed to participate. Representatives of the Athletes Advisory Council sent out letters of recruitment to approximately 2,500 athletes through private electronic listservs. The anonymous survey was administered from February through May 2019. Respondents under age 18 were asked to exit the survey. All data was stored locally on password-encrypted laptops of the study team. Participants were offered a \$10 Amazon.com gift card for their participation.

Analysis

Data was cleaned in Microsoft Excel and SPSS. A codebook was created to cipher the cleaning and aid with analysis. All descriptive statistics and relational analyses were calculated in SPSS; most relational analyses involved either a chi-square test of independence or odds ratios. We used an alpha level of .05 for all statistical tests. When one or more respondents skipped a question, the new n is reflected in our reporting on that item.

Sample

To be eligible to participate, athletes had to have competed at the elite level and be age 18 or over. A total of 772 athletes initially responded to the survey. The overall response rate was 31% before data cleaning; however, it was impossible to gauge the actual response rate as it was unclear how many of the approximately 2,500 listserv members both received the invitation and met eligibility criteria. Respondents who revoked consent ($n = 3$), were under the age of 18 ($n = 88$), or who did not complete enough of the survey to indicate their primary sport or athlete status ($n = 209$), were excluded from analysis, leaving the study with a final sample of 473 current or former elite athletes above the age of 18. Respondents represented 10 elite sports groups. The percentage of respondents from each sport was: Track and Field (39.6%), Synchronized Swimming (17.9%), Swimming (non-synchronized) (11.9%), Judo (10.6%), Ski and Snowboard (8.7%), Luge (3.2%), Table Tennis (2.8%), Rowing (2.3%), Goal Ball (2.1%), and Fencing (0.9%). In addition, 5.5% of athletes competed as para-athletes.

The mean age of participants was 29 (SD = 9.4 years; Range 18–71). Most participants (70.2%) were female; 29.8% were male. Most (74.4%) of the sample identified as White, while 11.6% identified as Black or African American, 6.8% as multiracial, 4.2% as Asian, 0.4% as American Indian or Alaska Native, and 2.5% as “other.” Most (64.8%) respondents were single and

most had a college education: 40% held a bachelor's degree, and 29.4% had some form of graduate training at the time of the survey.

Survey tool

The survey consisted of 128 questions and covered a wide range of topics in addition to IV including physical injuries, funding sources, settings in which trainings took place, family stress related to participants' involvement in sports, etc. The questions on IV were drawn from two validated measures: the Cantor et al. (2017) Campus Climate Survey (Cantor et al., 2017; Krebs et al., 2016) and the National Survey of Children's Exposure to Violence (NatSCEV; Finkelhor et al., 2009; University of New Hampshire, 2014). For the purposes of this study, we focused on more severe forms of IV. The survey asked about athletes' sports-related experiences of IV in three main areas: (1) psychological violence, (2) sexual violence involving contact, and (3) physical violence involving contact. The survey also asked about food or water deprivation, mental health diagnoses, and whether the participant ever had an eating disorder. As IV in both adults and children can have damaging effects (e.g., Dworkin et al., 2017; Scott et al., 2012), we looked at IV regardless of the age of the athlete when the violence occurred.

In our survey, we relied on the definition of sexual violence provided by the Centers for Disease Control and Prevention (CDC). It defines sexual violence as "a sexual act that is committed or attempted by another person without freely given consent of the victim or against someone who is unable to consent or refuse" (Basile et al., 2014, p. 11). The sexual violence measure contained six questions, the first of which asked whether the respondent had experienced nonconsensual sex in the sports context. This was followed by five questions asking about specific sexual behaviors experienced in the sports setting. These included: (1) kissing, touching, or grabbing; (2) oral sex; (3) sexual penetration; (4) attempted sexual penetration or oral sex; and (5) unwanted sex while under the influence of alcohol or drugs. For all items answered with "yes," participants were asked to indicate the perpetrator's position in sports from a list of 15 choices. This list included peers and the following organizational roles: coaches (including parent, relative, and assistant coaches), trainers and assistant trainers, boosters, university/school sports organization members, National Governing Body (NGB) sports organization members, United States Olympic Committee (USOC) members, local/state/community sports organization members, sports facilities managers, physicians, psychologists, and "other"). Participants were asked if they were age 16 or younger when the event occurred. Through this method, we sought to capture participants'

underage sexual experiences without them having to conceptualize them as child sexual abuse (CSA). Previous studies have shown that underage sexual contacts with coaches may be perceived as consensual and can contribute to the underestimation of the problem if researchers only ask about nonconsensual contact (Parent et al., 2016). We operationalized sport-related CSA to mean sexual contact between a young person aged 16 or younger with an adult in a position of authority in sports, or nonconsensual sex with a peer athlete.

The physical violence measure consisted of two questions that asked whether the athlete had experienced the following in their sporting experience: (1) being slapped or pushed, and (2) being punched, kicked, or choked. For each question endorsed, the participant was requested to mark each sports related role of the person(s) who behaved this way and the frequency of this behavior. The psychological violence measure consisted of three questions that asked whether someone in sport had (1) verbally abused them, (2) attempted to intimidate them, and/or (3) threatened them with violence. We also asked participants if they had ever been deprived of food as part of their training, and a separate question asked about being deprived of water. It was difficult to determine how to best categorize food and water deprivation. Some have categorized it as physical harm based on its physical consequences, while others categorize it as psychological violence or neglect. Because it includes aspects of different types of IV, we decided to keep it in a separate category.

Because Olympic athletes usually have access to mental health care, and to avoid adding additional length to the survey, we asked about psychiatric diagnoses as a proxy for mental health status. This approach, while not ideal, can be supported by prior research which found that lifetime psychiatric diagnoses were a risk marker for past victimization in children (Cuevas et al., 2009). Mental health diagnoses were assessed by asking participants to select from a list of 11 common mental health disorder diagnoses and indicate whether they had ever received any of these diagnoses. If they had received a diagnosis not included on the list, they were instructed to mark “other” and write in the diagnosis. The life-time presence of an eating disorder was screened for by asking if participants had ever had an eating disorder including use of laxatives.

Results

Prevalence of IV in the overall sample

Of the total sample, 58% ($n = 259$) reported experiencing some form of IV in sport: 54.5% reported psychological violence, 12.3% food or water deprivation, 8.8% sexual violence, and 6.9% physical violence (see [Table 1](#)).

Table 1. Frequencies of each type of IV and main perpetrators.

Type of IV	<i>n</i> (% of N)	Females	Males	IV by Coach	IV by Peer	IV by Both ^f
Any Type IV	259 (57.8%)	181 (70%)	78 (30%)	150 (58%)	92 (36%)	72 (28%)
Psychological Violence	244 (54.5%)	167 (68.4%)	77 (31.5%)	134 (55%)	86 (35%)	68 (28%)
Sexual Violence ^a	39 (8.8%)	35 (90%)	4 (10%)	18 (46%)	15 (38.5%)	1 (2.5%)
–CSA ^b	18 (4%)	18 (100%)	0	9 (50%)	8 (44%)	1 (5.5%)
–Adult SA ^c	21 (4.7)	17 (81%)	4 (19%)	9 (43%)	7 (33%)	0
Physical Violence ^d	31 (6.9%)	17 (55%)	14 (45%)	17 (54.8%)	15 (48.4%)	1 (3%)
Food/Water Deprivation ^e	53 (11.8%)	44 (83%)	9 (17%)	53 (100%)	0	0

Note. Total sample was 448 except where otherwise noted.

^a*N*=445. ^bCSA=child sexual abuse. ^cAdult SA = sexual assault at age 17 or older. ^d*N*=446. ^e*N*=447. ^fOther sports-related perpetrators were sometimes indicated, so percentages may not add up to 100.

Psychological violence

At least one experience of psychological violence (i.e., verbal abuse, intimidation, threats of violence) was reported by 54.5% of the athletes surveyed. There was a large overlap between these three subtypes. Of those reporting psychological violence, 91.8% (*n* = 224) reported being insulted or sworn at, 64.3% (*n* = 157) experienced intimidation, and 8.7% (*n* = 21) indicated that they experienced threats of violence in sport. Most (86.4%) athletes who experienced threats of violence reported being threatened on multiple occasions. The main perpetrators were coaches or trainers (55%) and peer athletes (35%), with 28% reporting both. Among the 134 participants who reported psychological violence by a coach, 23% (*n* = 31) indicated that the coach was their parent. There were no significant gender differences in reporting psychological abuse.

Physical violence

Of the athletes surveyed, 6.9% (*n*=31) of elite athletes reported experiencing direct physical violence: 84% (*n* = 26) reported minor physical assault (i.e., slapped or pushed), 42% (*n* = 13) major physical assault (i.e., punched, kicked, or choked), and 25.8% (*n* = 8) reported experiencing both. Most (81.3%, *n* = 25) athletes who experienced physical assault reported being assaulted more than once. The main perpetrators were coaches or trainers (54.8%) and peer athletes (48.4%), with 3% reporting being assaulted by both. Of the 17 participants who reported psychological violence by a coach, 6 (35%) indicated that the coach was their parent. Males were significantly more likely to report having been physical assaulted compared to females, $X^2(1, N = 446) = 3.87$, $p = .049$.

Sexual violence

Sexual assault or attempted sexual assault was reported by 8.8% of the athletes surveyed. These 39 athletes experienced one or more of the following: 29 indicated that they experienced sex that was nonconsensual, 11 reported

sexual activity with an adult as a minor (i.e., CSA), 17 reported attempted rape, and 15 reported having unwanted sex forced upon them while they were inebriated. Of the 21 athletes who reported sexual assault or attempted assault over age 17, 44% ($n = 12$) were assaulted by a coach or trainer and 33% ($n = 7$) were assaulted by a peer. A third (33%, $n = 7$) reported being assaulted by other professionals in sport (1 by a facility manager, 2 by a sports physician) or indicated “other” without providing further information. Of the 18 participants who indicated that they had been age 16 or under when the sexual violence occurred, 61% ($n = 11$) reported being assaulted by an adult in sport (9 by a coach, 1 by a sportscaster, and 1 by a sports mentor), 44% ($n = 8$) by a peer, and one (5.5%) by both a coach and a peer. Of the nine participants who reported CSA by a coach, 33% ($n = 3$) indicated the coach was a parent. Females were significantly more likely to report having been sexually assaulted than males, $X^2(1, N = 445) = 7.57, p = .006$.

Deprivation of food or water

Of the athletes surveyed, 11.8% ($n=53$) indicated that a coach or trainer had deprived them of food and/or water at some point in their athletic career; 16% ($n = 9$) indicated the coach was a parent. Of those reporting deprivation, 69% ($n = 38$) reported being deprived of food and 58% ($n = 32$) reported being deprived of water, with 29.8% ($n = 17$) reporting being deprived of both. Female athletes were significantly more likely to report deprivation than male athletes, $X^2(1, N = 473) = 4.02, p = .045$.

Overlap between various types of IV

Of the 259 athletes who experienced IV, almost all (94.6%, $n=245$) reported experiencing more than one type: 80.3% ($n = 208$) reported two types, 12.4% ($n = 32$) three types, and 2% ($n = 5$) reported all four types of IV. There was a large overlap between psychological violence and all other types of IV, but little overlap between sexual and physical violence with each other (see Table 2).

Table 2. Overlap between various types of IV.

Type of IV	Psychological	Sexual	Physical	Food/Water Dep.
Psychological ^a	244			
Sexual ^b	32	39		
Physical ^c	30	3	31	
Food/Water Dep. ^d	45	10	14	53

Note. Dep.=deprivation.

^aTotal sample was 448 except where otherwise noted. ^b $N=445$. ^c $N=446$. ^d $N=447$.

IV and mental health

Relationship between IV and psychiatric diagnoses

Of the total sample, almost a third (31.7%, $n = 144$) reported that they had been diagnosed with a psychiatric disorder at some point in their lives with half having received multiple diagnoses. Athletes reporting IV were significantly more likely to report having a psychiatric diagnosis compared to athletes who did not report experiencing IV, $X^2 (1, N = 447) = 10.9(1) p < .001$, and were also more likely to have received multiple diagnoses, $t(455) = 3.71, p < .001$. Among athletes with IV, the most commonly reported diagnoses were depression (20.9%), anxiety (20.5%), ADHD (8.1%), and PTSD (6.6%).

Table 3 shows the odds ratio (OR) of having a psychiatric diagnosis based on IV status. The odds of having a psychiatric diagnosis were twice as high among participants who reported IV compared to those who did not. When each form of IV was examined individually, all showed significantly increased odds of having received a psychiatric diagnosis with the exception of sexual assault as an adult. The type of IV most strongly correlated with a psychiatric diagnosis was CSA. The odds of having a psychiatric diagnosis were over 8 times greater in athletes who reported CSA compared to athletes who did not. Indeed, 77.8% of those reporting CSA had at least one psychiatric diagnosis with the majority (79.4%) of these having received multiple diagnoses. The most common diagnoses CSA victims reported receiving were anxiety (52.9%), depression (52.9%), and PTSD (41.8%).

Food/Water Deprivation was also strongly correlated with having at least one psychiatric diagnosis. The odds of having a psychiatric diagnosis were 2.75 greater in those who reported Food/Water Deprivation compared nondeprived athletes. Of those reporting Food/Water Deprivation, over half (53%) reported at least one psychiatric diagnosis with the majority (62%) of these having

Table 3. Relationship between IV in sport and lifetime psychiatric diagnoses and self-reported eating disorders.

IV Type ^a	n	Psychiatric Diagnosis	Eating Disorder
		OR with 95% CI	
IV any	259	2.02 (1.33, 3.07)	2.19 (1.25–3.86)
Psychological Violence	244	1.88 (1.24–2.83)	1.74 (1.02–2.97)
Sexual Violence any age ^b	39	3.43 (1.75–6.71)	2.67 (1.28–5.56)
–CSA ^c	18	8.23 (2.66–25.49)	4.75 (1.80–12.49)
–Adult SA ^d	21	1.64 (0.67–3.98)	1.28 (0.42–3.91)
Physical Violence ^e	31	2.12 (1.02–4.42)	3.32 (1.51–7.28)
Food/Water Deprivation ^f	53	2.75 (1.55–4.88)	4.22 (2.27–7.82)
–Food only	22	2.73 (1.15–6.47)	7.44 (3.08–17.98)
–Water only	15	1.08 (0.36–3.22)	0.37 (0.05–2.86)
–Both	18	2.76 (1.56–4.89)	4.65 (1.77–12.23)

Note. OR=Odds ratio; CI=Confidence interval.
^aTotal sample was 448 except where otherwise noted. ^b $N=445$. ^cCSA=child sexual abuse. ^dAdult SA = sexual assault at age 17 or older. ^e $N=446$. ^f $N=447$.

received multiple diagnoses. The most common diagnoses reported were anxiety disorders (38.2%), depression (23.6%), and PTSD (14.5%). Female athletes who reported Food/Water Deprivation were significantly more likely to report a psychiatric diagnosis than males. $X^2(1, N = 448) = 4.08(1) p = .048$.

Other forms of IV were also associated with having received a psychiatric diagnosis. Among those reporting psychological violence, 38.1% had been diagnosed with at least one disorder. The most commonly reported disorders were depression (20.9%), anxiety (20.5%), and PTSD (6.6%). Almost half (48.4%) of those reporting physical violence had received at least one psychiatric diagnosis with the majority (60%) reporting multiple diagnoses. The most common diagnoses reported by victims of physical violence were anxiety (22.6%), depression (16.1%), and PTSD (16.1%). There were no gender differences among participants reporting either psychological or physical violence in regard to the presence of a psychiatric diagnosis.

Relationship between IV and self-reported eating disorders

Of the total sample, 12.3% ($n = 55$) indicated that they had an eating disorder at some point in their life. When each form of IV was examined separately, all were significantly associated with having an eating disorder except among those who reporting having been sexually assaulted as an adult (see [Table 3](#)). The strongest relationship was found in those reporting food deprivation. The odds of having an eating disorder were 7.4 times greater in those reporting food deprivation compared to nonfood deprived athletes. The relationship between water deprivation and eating disorders was not significant. Of note, only one athlete who reported Food/Water Deprivation reported having been formally diagnosed with an eating disorder.

Discussion

We found IV to be prevalent affecting almost 58% of the U.S. elite athletes surveyed. Psychological violence was the most frequently form of IV reported. Of the total sample, 54.5% reported having experienced psychological violence which is similar to the 58.6% prevalence of emotional harm reported by national team athletes in Canada (Kerr et al., 2019). While most other surveys have reported higher prevalence rates, direct comparisons between studies are complicated by the lack of consensus on the definition of IV in sport (Fortier et al., 2020) with resulting inconsistencies in definitions and measurement. For instance, the U.S Center for Safesport (2020) surveyed elite U.S. athletes and approximately 80% reported experiencing at least one indicator of psychological harm or neglect in sport. Safesport's larger prevalence rate can be explained by differences in how psychological violence was operationalized. Our survey only asked about three types of psychological violence: verbal abuse, intimidation, and threats of violence, while Safesport merged

psychological harm and neglect and had 18 different indicators. The most endorsed indicator of psychological harm in Safesport's study was "People gossiped or told lies about you"—something we did not assess.

The prevalence of physical violence reported by elite athletes in the U.S. (6.9%) was lower than the prevalence rates (11–66%) reported by other prevalence studies we reviewed. Our lower prevalence rate is likely due to our limited number of indicators and only asking about direct physical violence – a methodology recommended by Fortier et al. (2020) to avoid the risk of confusion as to the distinction between physical and psychological maltreatment in sport. Most other researchers have included excessive training and training while injured in their definitions which increased prevalence rates as these tended to be the most common forms of physical violence or harm reported (e.g., Kerr et al., 2019; U.S. Center for Safe sport, 2020). Surveys that reported rates of physical violence involving direct contact offer findings more in line with the 6.9% prevalence rate we found. For example, severe physical violence (defined as slapping, knocking down, beating, or choking) was reported by 8% of a sample from Belgium and the Netherlands (Vertommen et al., 2017), although Ohlert et al. (2021) reported a higher prevalence of severe physical violence in German athletes (17.5%).

The 8.8% prevalence of sexual assault reported by elite athletes in the U.S. was lower than the prevalence rates (9–38%) reported by most other prevalence studies we reviewed. Our lower prevalence rate is again largely explained by the fact that we used a conservative definition that only looked at sexual assaults or attempted assaults and did not include non-contact forms of abuse such as verbal or online sexual harassment. Studies that distinguished between contact and non-contact forms of sexual violence report findings similar to ours. For instance, U.S. Center for Safesport (2020) found that 9% of the elite athletes surveyed experienced inappropriate sexual contact. Studies that included nonelite athletes have reported somewhat lower rates of contact sexual violence. Vertommen et al. (2016) reported a prevalence rate of 5.5% in European athletes from all levels and Pankowiak et al. (2023) reported 4.1% in adolescents participating at the community sport level in Australia. The lower rates in community level athletes are not surprising given that competing at the elite level has been found to be risk factor for experiencing violence in sport (Alexander et al., 2011; Hartill et al., 2021; Parent & Vaillancourt-Morel, 2021; Vertommen et al., 2016).

Our finding that more female athletes report sexual violence and more males report physical violence, mirror findings by a number of other studies (e.g., Vertommen et al., 2016, 2022; World Players Association, 2021), but contrast with several other studies that found males were more likely to report sexual violence (Bermon et al., 2021; Hartill et al., 2021) and females were more likely to report physical violence (Kerr et al., 2019; Willson et al., 2022), or found no significant gender differences (Parent & Vaillancourt-Morel,

2021). The reason for the inconsistent relationship between gender and various forms of IV across studies is unknown, though it is likely due to sample differences and varying definitions of IV.

An important finding of our study is the high overlap between the various types of IV. The vast majority of athletes who reported IV in the sport context experienced more than one form of violence, suggesting that various forms of IV do not occur in isolation from one another. If an environment is conducive to one form of violence, it is likely conducive to other forms as well (Willson et al., 2022). This is of particular concern given that several recent studies of athletes have found that experiencing a greater number of different types of violence was associated with more severe symptomatology (Ohlert et al., 2019; Parent et al., 2022; Vertommen et al., 2018).

Other prevalence studies have also reported a high overlap between different types of IV, albeit lower than the one we found. For instance, 49.8% of elite athletes from the Netherlands, Belgium, and Germany (Ohlert et al., 2021), 71% of adolescent athletes from Australia (Pankowiak et al., 2023), 67% of adolescent athletes from Belgium (Vertommen et al., 2022) and 48.2% of adolescent athletes from Canada (Parent & Vaillancourt-Morel, 2021) experienced two or more forms of IV in sport. Like a number of other studies (e.g., Ohlert et al., 2021; Pankowiak et al., 2023; Vertommen et al., 2016), we found a large overlap between psychological violence and both sexual violence and physical violence, but little overlap between sexual and physical violence with each other. The large overlap between psychological violence and other forms of IV is not surprising given that psychological violence is present to some degree in all forms of IV (Kerr, 2022).

Another notable finding is the prevalence of parents as perpetrators of IV in sport. Of the total sample, 10.9% reported IV was perpetrated by parents acting in the role of their child's coach. Few researchers have investigated parents as perpetrators of IV in sport. The two studies we found reported higher rates of violence but did not restrict their focus to parents acting as coaches. For instance, 25% of Canadian adolescents (Parent et al., 2022) and 35% of Australian adults (Pankowiak et al., 2023) reported experiencing IV by a parent during their childhood sports participation. These findings point to the need for more research examining the magnitude of IV perpetrated by parents in sport and the contexts in which the violence occurs. These findings also suggest that sports organizations need to recognize parents as potential perpetrators in their prevention efforts.

Mental health correlates

Currently, limited research is available on mental health correlates of IV in sport. To our knowledge, the current study is the first to investigate the associations between IV in sport and psychiatric diagnoses. We found that

elite athletes who experienced any type of IV in sport had twice the odds of having been diagnosed with a psychiatric condition compared to athletes who did not report experiencing violence. Because many mental health issues are present without a formal diagnosis, our results are likely an underestimation of the true relationship. The direction of the relation between sport and psychiatric illness is unclear, as we did not assess the timing of IV and diagnosis. However, the top three disorders reported by those experiencing sport-related IV – anxiety, depression, and PTSD – are associated with IV in other contexts (e.g., Lansford et al., 2002; Scott et al., 2012). In addition, our results are consistent with a small, but growing, body of research that has investigated mental health problems associated with IV in sport. A study of athletes in the Netherlands and Belgium found that severe experiences with childhood IV in sport were associated with increased psychopathology (depression, anxiety, and somatic problems) and lower quality of life in adulthood (Vertommen et al., 2018). A study of Australian athletes found that abuse in sport was associated with posttraumatic and dissociative symptomatology (Leahy et al., 2008). Similarly, a study of young Canadian athletes found that physical, sexual, and psychological violence in sport were all independently related to higher psychological distress and PTSD symptoms (Parent et al., 2022). A study of elite Canadian athletes found that all forms of IV in sport were associated with disordered eating, self-harm, and thoughts of suicide (Kerr et al., 2019).

Of the various forms of IV, we found CSA to be the most highly correlated with having a psychiatric diagnosis. The odds of having a psychiatric diagnosis were over 8 times greater in athletes who reported CSA compared to athletes who did not. In fact, 77.8% of those reporting CSA and/or peer sexual assault as a minor had at least one mental health diagnosis with the most common diagnoses being anxiety (52.9%), depression (52.9%), and PTSD (41.8%). These findings are in line with those of other studies that have examined the relationship between sexual violence and mental health in athletes. A survey of elite German athletes found a higher risk for depression in athletes who had experienced sexual violence (Ohlert et al., 2019) and sexual abuse was the main determinant of suicidal ideation and attempts in elite female Swedish athletes (Timpka et al., 2021). The U.S. Center for Safesport (2020) found that 98% of elite athletes who reported sexual assault or attempted sexual assault reported at least one of six mental health problems (depression or anxiety, self-harm, suicidal thoughts, disordered eating behaviors, treatment for an eating disorder, or other mental health concern). The potential for CSA in sport to cause long-term harm in affected athletes suggests that sports organizations need to be particularly vigilant in screening personnel and creating safe environments for youth in sports.

While abundant research has shown elite athletes are at risk for eating disorders (e.g., Karrer et al., 2020; Kong & Harris, 2015), studies have mainly

focused on individual vulnerabilities such as gender, elite-level participation, and body dissatisfaction (Boudreault et al., 2022) along with pressure from coaches and teammates (Muscat & Long, 2008; Stirling & Kerr, 2012; Teixidor-Batlle et al., 2021). The current study suggests another potential risk factor – IV, particularly in the form of food deprivation. The odds of reporting an eating disorder were over 7 times greater in athletes who reported food deprivation compared to athletes who did not. In our survey, 11.8% of the total sample reported being deprived of food and/or water by a coach. The only study we found for comparison was the survey by US center for Safesport (2020) in which 5% of U.S. elite athletes reported having been denied water (food was not asked about). The number of athletes denied water in our sample was twice as high—11.9%.

It is noteworthy that the relationship between Food/Water Deprivation and both psychiatric diagnoses and disordered eating was stronger than these relationships for other forms of IV with the exception of CSA. The association between CSA and eating disorders is well described in the literature (e.g., Convertino et al., 2022); however, we could find no research focusing on food deprivation in athletes. Indirect support for the association between food deprivation and eating disorders is provided by Coffino et al. (2020) which found a correlation between eating disorders and a history of childhood food neglect. Based on our findings, addressing food and/or water deprivation as a form of IV is warranted, particularly in light of recent reports about coaches withholding water as punishment for poor performance (Szaniszlo & Johnson, 2018), and the death of a college wrestler related to this practice (O'Neill, 2022).

Limitations and future directions

Our results should be interpreted considering certain limitations. There was a recruitment bias as we had to rely on Olympic team officials to invite athletes to participate and not all teams agreed to do so, leading to a low diversity in sport disciplines. In addition, although athletes were informed the survey was confidential, the fact that team officials were involved in recruitment may have caused some athletes to distrust the survey. More females than males participated in the survey and a low proportion of respondents self-identified as nonwhite, LGBTQ2+, or with a disability, which limited the representativeness of our sample. In addition, the study targeted elite athletes in the U.S., as such, its findings may not generalize to lower-level athlete communities or athletes outside of the U.S. Future studies should investigate athletes' experiences at lower levels of sport, including high school and college athletes along with those involved in community and club-based sport. As the total survey consisted of 128 items, the length of the survey could potentially have been

a deterrent to participation or may have contributed to participants starting but not completing the survey.

Our findings are also limited by the fact that our questions on IV were not specific to the sporting context and although our questions on IV were drawn from validated measures of IV, our adaptation has not been validated. In addition, mental health was not directly measured by this survey. While lifetime psychiatric diagnoses correlated with IV status, some athletes may have had symptoms that had not been formally assessed by a mental health professional causing us potentially mischaracterize the true relationship between these variables. In addition, the retrospective design of the study does not allow for casual explanations. Future studies should directly measure post-traumatic correlates of violence in sport and assess when an athlete's symptoms began in relation to their experiencing IV.

Finally, aside from the questions on sexual violence, the survey did not measure the age of the respondent at the time of the IV. This is a limitation in that (1) characteristics of power dynamics between adults and children as opposed to those between two adults can vary greatly, and (2) developmental impacts of IV likely vary among age categories. Future studies should attempt to assess the age at which different forms of IV occurred. By doing so, we can better understand the impact of IV on athletes across their sports careers.

Conclusion and implications for practice

This study investigated the magnitude of serious psychological, physical, and sexual violence perpetrated against elite U.S. athletes and found that a large percentage experienced IV in the sporting context. We found that psychological violence was the most commonly form of IV reported but was rarely the only form experienced. Most athletes who experienced IV experienced multiple forms with a large overlap between psychological violence and other forms of IV such as physical violence, sexual violence and deprivation of food and water. These findings suggest that intervention strategies should extend beyond the current focus on prevention of sexual misconduct by coaches and sports officials. Preventive measures must encompass all forms of IV including food and water deprivation and IV perpetrated by peer athletes or parent volunteers.

Our results support a significant association between IV and being diagnosed with a psychiatric disorder – particularly anxiety, depression and/or PTSD. IV was also associated with self-reported eating disorders. As such, our study reveals a critical need for more research focused on the traumatic effects of IV that occurs in the context of sports and preventing IV in sport should be a high priority for all sports organizations. In

addition, more emphasis should be placed on mental health screening of athletes in competitive sports and better training of athletes, coaches, trainers and staff along with medical and mental health care professionals so that they can recognize and intervene when an athlete is struggling with psychological issues. Finally, the possibility of IV should be considered and inquired about by clinicians when athletes present with psychological symptoms, especially anxiety, depression, PTSD, and eating disorders.

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Ethical standards and informed consent

The research was approved by the University of Pennsylvania Internal Review Board (Protocol 832,597). All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

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