Female athletes, both para and able-bodied, experience a unique complement of cultural, medical and psychosocial issues throughout their careers that male athletes may not encounter. This manuscript aims to present a brief overview of three broad topics relevant to the female para athlete:

1. The impact of cultural representations of females entering or involved in sport.
2. The injuries and illnesses to which female athletes may be predisposed.
3. The cycles of violence, abuse and non-accidental harms into which female athletes may fall.

Most issues under each heading are common to both female para athletes and female able-bodied athletes, thus segments of our review summarise data that represents female athletes, generally. A few topics, however, are especially important for the female Para athlete. These subjects have garnered additional emphasis.

CULTURAL REPRESENTATION OF GIRLS AND WOMEN IN SPORT

Early participation in regular sporting activities has far-reaching benefits for girls and young women. Data suggest that participation in both team and individual sports is enjoyable for young girls in various settings and that for girls with and without impairment, sport enhances self-esteem, social integration and function, physical and mental health, satisfaction, feelings of pride and creativity. It also leads to more flexible attitudes towards social issues later in life. Participation in vigorous sports has been positively associated with cardiorespiratory fitness in adolescent girls. Despite this, participation in sport is low among girls with impairment. Moreover, young girls with and without impairment have a complex relationship with sport due to cultural factors.

Globally, gender stereotypes and cultural representations of women in the media clearly contribute to gender differences in adolescent levels of sports participation, an important predictor of activity levels and health as an adult. Gender stereotypes and the (often ambiguous) definition of heterosexual femininity can influence girls’ decision to engage in, commit to and excel in sport. For example, a cohort of young girls in Europe described certain activities as “too girly,” others as “boy” sports, felt pressure to appear and act feminine and reported that physical appearance and body image concerns (athletic versus lay clothing, sweaty versus composed, made-up versus...
natural) impacted their daily sporting behaviour.

Few studies have examined the unique cultural factors that influence and predict entry into sport among female children and adolescents with a physical or sensory impairment. Among disabled children of both genders however, Bloemen and colleagues have shown that numerous factors, including self-efficacy, physical fitness, increasing age and the availability of equipment and local facilities influence a disabled child’s decision to engage in sport. In addition to the gender stereotypes and cultural representations described above, parents and healthcare providers may play an important role in introducing sport to girls with impairment.

Media representations of a ‘thin-ideal’ for women impact the health behaviour of female athletes in both leanness-focused and non-leanness-focused sports. Body image concerns and body satisfaction among women with impairment has been examined: a case report describes the internalisation of the media’s thin-ideal in a visually impaired woman leading to bulimia nervosa. In a larger study comparing body satisfaction among sighted women to body satisfaction among women with a visual impairment, visually impaired women were more satisfied with their bodies than sighted women. The authors concluded that blind women’s protection from media representations of leanness and the thin-ideal lead to the study’s findings.

Beyond imagery projection, the media also impacts women in sport by perpetuating an over-representation of men’s sports and chronically under-representing women’s sports. Although there is limited data regarding female para sports, the proportion of global media sports coverage devoted to women is reported at between 1 and 6%, even after the commercial success of recent editions of the Olympic and Paralympic Games. As describes, “many personal, practical, social and cultural barriers have been recognised as contributors to the gender differences in physical activity, including female ‘invisibility’ in the media and the scarcity of female sporting role models.”

INJURY AND ILLNESS

Compared to able-bodied athletes, athletes with impairment generally have comparable patterns and incidence rates of injuries and illnesses. Winter sport athletes seem to be more injury-prone than their summer sport counterparts. Thus, physicians involved with female para athletes should have a strong understanding of general sports-related health problems among female athletes, before focusing on unique issues in para athletes. Autonomic dysreflexia, thermoregulation, bowel and bladder control, latex and other sensitivities, deep tissue injuries and phantom limb sensations and/or pain can affect both male and female para athletes; gender-specific issues, such as an increased prevalence of non-accidental harms, are emphasised in this paper.

Anterior cruciate ligament injuries

Female athletes, especially youth, have higher rates of non-contact anterior cruciate ligament (ACL) injuries than men in similar sports. This includes female para athletes with one or two sound lower limbs. Some questions are yet to be answered in the female para athlete: for instance, does the incidence of ACL injury change in the sound limb of amputee runners or skiers? What about female para athletes with asymmetric lower body hypertonia, ataxia or lower limb deficiency?

Patellofemoral pain

Previous studies have shown that patellofemoral dysfunction occurs more frequently in female athletes than in male athletes and this seems to be true for standing categories of female para athletes. However, we don’t yet have data reflecting how asymmetric biomechanics seen in amputee runners, athletes with hemiplegia or hemiplegia in athletes...
with scoliosis, for example, influence the occurrence, development or treatment of patellofemoral pain syndromes.

Fractures and bone stress injuries

In able-bodied sports, the overall prevalence of complete bone fractures is comparable between male and female athletes. However, stress fractures occur in a nearly 2:1 female-to-male ratio. Thus some populations of para athletes (athletes with spinal cord injury and spina bifida, for example) may have an increased risk of stress and/or complete fractures due to higher rates of osteopenia and osteoporosis among these competitors.

Relative Energy Deficiency in Sport

Relative Energy Deficiency in Sport (RED-S) is a condition caused by a negative balance between energy availability and energy demand. This deficiency causes abnormalities in metabolic rate, immunity, protein synthesis, athletic performance and cardiovascular health. RED-S is a more broadly applicable syndrome derived from the former term, Female Athlete Triad, a combination of eating disorders (energy consumption), amenorrhea and osteoporosis. Because a similar phenomenon can also occur in male athletes, the nomenclature has recently been attuned. RED-S is one of the primary considerations for doctors taking care of female athletes, both para and able-bodied. Scientists have shown that RED-S is prevalent among persons with impairment, but to our knowledge, there are no strong data regarding incidence and prevalence rates among female para athletes.

Some components of RED-S may manifest differently in athletes with impairment. For instance:

- Athletes with short stature or visual impairment may have minimal if any differences in energy requirements compared to able-bodied athletes with similar age and body habitus.
- Wheelchair racers may require less energy for activities of daily living such as ambulation.
- Amputee athletes (runners and others) will have a higher energy cost of ambulation, which will increase with higher levels of amputation.
- SCI and traumatic brain injury can affect the menstrual cycle, leading to higher prevalence of osteoporosis.

Taken together, these data suggest that RED-S may present differently in para athletes as compared to able-bodied competitors. Further studies on RED-S in female para athletes are warranted.

Concussion

Concussion rates are higher for females than for males in sport. The severity of and recovery from concussion differs between male and female athletes, with female athletes being more seriously affected. In certain para sports, there is high risk of concussion including: women's football 5-a-side, para alpine skiing, para ice hockey, para taekwondo and para boxing. Physicians caring for female para athletes should remain mindful of these athletes’ vulnerability to concussion.

Vitamin D insufficiency and deficiency

Individuals with SCI are at increased risk of vitamin D insufficiency or deficiency and indoor wheelchair athletes are at particularly high risk. Vitamin D status may be associated with athletic performance. In addition to training mostly indoors, habitual skin coverage by clothing (i.e. hijab or similar) can also exacerbate this risk. Nutritional strategies and supplementation recommendations are currently being developed to combat these conditions and others in para athletes. Targeting nutritional work in both seated and standing athletes with diverse clothing requirements is needed.

Many personal, practical, social and cultural barriers have been recognised as contributors to the gender difference in physical activity, including female ’invisibility' in the media and the scarcity of female sporting role models.
with a multi-disciplinary team including nutritionists, endocrinologists and sports physicians can help bridge this gap.

**Sexual dysfunction**
Many female para athletes will have sexual dysfunction. Physicians should be prepared to give advice and become familiar with female sexual rehabilitation assistive technologies. The Sexual Device Manual for Persons with Disabilities by Edith MacHattie, MOT, Kate Naphtali, MOT and Stacy Elliott, MD, provides research, clinical expertise and product information. It is a useful guideline for patients and clinicians. It is worth noting that oral contraceptives could have a deleterious effect on physical performance while the progestin-only pill may reduce bone density, decrease VO2 max, lower immunity, increase body and fat mass as well as increase water retention. Compared to contraceptives, pregnancy has an even greater impact on performance and can result in low energy, hormone-related changes in the gastrointestinal and musculoskeletal systems and reduced performance capacity. Options for contraception include hormonal preparations, barrier methods, intra-uterine devices, the rhythm method and abstinence.

To date, there are only a limited number of medical guidelines specifically designed for female athletes with impairment. Understanding of the physiological impact of the female para athlete’s sensory and/or physical impairment would assist multidisciplinary teams of clinicians to design evidence-informed pre-participation evaluation protocols, day-to-day medical care plans and injury and illness prevention programmes.

**HARASSMENT, ABUSE AND OTHER NON-ACCIDENTAL HARMs**
*Primum non nocare*, the classic Hippocratic principle ‘First do no harm’ is an important tenet of modern medicine and a fundamental principle that extends to the sporting world. Combined, athletes and non-athletes with impairment are at least three to four times more likely to be victimised than persons without impairment. A recent multi-national study found a 9% prevalence rate of maltreatment among non-disabled children compared to a 31% prevalence rate among children with impairment. Indeed, individuals with impairment often experience harmful, repeated and chronic abuse and assault, by paid service providers in both disability service settings and other familiar, non-service environments. Impairment status is correlated with risk of maltreatment: intellectually impaired individuals are at the highest risk. Furthermore, persons with impairment frequently have difficulty accessing appropriate medical and psychosocial treatment to address the environment of abuse.

Athletes are at high risk of abuse for a myriad of reasons. The power dynamic required for abuse to take place is an inherent, often central feature of athletic environments. Trainers, coaches, parents, senior peer athletes and other authority figures are often endowed with increased power relative to young, less experienced athletes. Authority figures are often instinctively given respect and trust even in the face of conflict or a feeling that something is not right. Many athletes also have a deep connection to sport, wanting to participate at all costs. Performance level, gender and impairment status impact risk: elite athletes, female athletes and female para athletes are particularly vulnerable to experiencing harmful non-accidental violence within their sporting environment. Peer athletes are perpetrators of abuse at higher rates than coaches and there are both same- and opposite-sex abusers.

**Types of abuse in sport**
A recent International Olympic Committee consensus statement outlines at least six categories of abuse in sport.

1. **Bullying and Hazing:** bullying (also called cyberbullying if/when online) is unwanted, repeated and intentional, aggressive behaviour usually among peers and can involve a real or perceived power imbalance. Bullying can include actions such as making threats, spreading rumours or falsehoods, attacking someone physically or verbally, and deliberately excluding someone. Hazing is an organised, typically team-based, form of bullying in sport, involving degrading and hazardous initiation of new team members by veteran team members.

2. **Neglect and Negligence:** neglect is the failure of caregivers, parents, coaches and members of an athlete's entourage, to meet a child's physical and emotional needs or failure to protect a child from exposure to danger. Negligence describes acts of omission regarding athlete safety. For example, depriving an athlete of food/or drink; insufficient rest and recovery; failure to provide a safe physical training environment; or developmental age-inappropriate or physique-inappropriate training methods.

3. **Physical Abuse:** physical abuse is non-accidental trauma or physical injury caused by punching, beating, kicking, biting, burning or otherwise harming an athlete. This could include forced
4. Psychological Abuse: psychological abuse is a pattern of deliberate, prolonged, repeated non-contact behaviours within a power differentiated relationship. This form of abuse is at the core of all other forms. Some definitions refer to emotional or psychological abuse interchangeably but the psyche consists of more than emotions. It also consists of cognitions, values and beliefs about oneself and the world. The behaviours that constitute psychological abuse target a person’s inner life in all its profound scope.

5. Sexual Harassment and Abuse: sexual harassment is any unwanted and unwelcome conduct of a sexual nature, whether verbal, non-verbal or physical. Sexual abuse is any conduct of a sexual nature, whether non-contact, contact or penetrative, where consent is coerced/ manipulated or is not or cannot be given.

6. Financial Abuse: financial abuse is the use of money to enforce a power imbalance or harm an athlete in any way. For example, withholding performance-based earnings, controlling or interfering with performance- or endorsement-based earnings, charging a fee for entry onto a team or into competitions, and the use of monetary bullying to influence athletes’ decisions.

Safe Sport
‘Safe Sport’ is defined as an athletic environment that is respectful, equitable and free from all forms of non-accidental violence. All athletes are entitled to Safe Sport, however, due to some para athletes’ individual daily care needs, responsibilities among athlete’s entourage can become blurred, further increasing the risk of maltreatment.

Cycle and signs of non-accidental violence
Classically, the cycle of violence follows a gradual, stereotyped pattern and has been well-described in the non-accidental violence literature. The gradual nature of abuse often reinforces the secrecy of maltreatment, the protection of the abuser and the compliance of the victim. Further, the collective normalisation of damaging practices in sport, in addition to the pervasive bystander effect, make victims’ likelihood of disclosure low.

Role of the clinician
Although the team doctor should not attempt to replace a qualified psychology expert, there are a number of actions concerned sports physicians can take to help prevent and detect maltreatment among athletes. All athletes are vulnerable and understanding which athletes may be at highest risk (i.e. female para athletes) is useful. Advocating for athlete protection policies and codes of conduct recognising the signs and symptoms of abuse and keeping accurate and timely records is important (Table 1). Once abuse is suspected, the physician should skilfully offer his/her patient a safe, confidential and private space in which to discuss it, starting the conversation about maltreatment with a neutral question or statement can help. Being sensitive to the guilt, fear and shame the victim commonly experiences, the team physician should listen with empathy, create a non-judgmental environment and offer psychological acknowledgement and support once maltreatment has been disclosed. To help athletes heal, team physicians should not work alone, but seek the expertise of qualified psychologists and/or socio-behavioural experts to create a comprehensive care team. Reporting abuse to appropriate authorities within the sporting organisation city and country is necessary, evoking our common mandate, ‘First, do no harm.’

CONCLUSION
Para sport is gaining popularity, membership and media coverage. At all levels of competition, the female para athlete may face specific cultural, medical and psychosocial challenges that her male counterpart may not. Data on the specific challenges female Para athletes encounter are often limited, as shown in this paper. In order to optimise her health and performance, physicians
should understand the physiological implications of a female Para athlete’s impairment and use best judgment to develop evidence-informed care protocols based on data available in similar athletic populations (e.g. female athletes without impairment). One notable exception, however, is evidence suggesting an increased risk of non-accidental harm and abuse among female athletes with impairment compared to other athletes. Thus, physicians can maintain a high index of suspicion when female para athletes present with one or more signs of abuse listed in this paper. Physicians can also take the lead in educating athletes, coaches and others on the principles of Safe Sport and help develop practical, context-appropriate protocols for reporting and addressing abuse.

Overall, the medical supervision of female para athletes offers specialists exciting clinical challenges and research opportunities. Issues relevant to this group of athletes extend beyond those described here, but cultural representations, injuries and illnesses and the cycles of abuse affecting female para athletes, have an important bearing on the contemporary sports clinician’s daily practice.

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