Under-19 Lightweight Rowing Review Working Group

Final Report

December 9, 2023

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Submitted to: Rowing Canada Aviron Board of Directors

Executive Summary

The mandate of the Under-19 (U19) Lightweight Rowing Review Working Group (the Working Group) was to gather a wide range of perspectives and evidence from the rowing community and relevant experts and provide the Rowing Canada Aviron (RCA) Board of Directors with recommendations to inform a safe, fair, and inclusive way forward which addresses the risks and concerns raised about weight-restricted rowing categories for junior rowers.

The Working Group completed an environmental scan that included a review of peer-reviewed and grey literature, interviews with 21 stakeholders, and an athlete survey. Findings from the environmental scan are documented in Parts Two, Three and Four of this report.

The findings from the environmental scan informed the seven recommendations below. Regarding the fate of the under-19 lightweight rowing category, the Working Group considered three options and used a risk-benefit matrix to guide their final recommendation.

Recommendation 1: Collect data to inform future health and safety initiatives based on risk.

Recommendation 2: Develop, fund and require mandatory education for all coaches regarding the safe management of lightweights; nutrition; athlete mental health; and the prevention and identification of disordered eating.

Recommendation 3: Create an environment where Canadian lightweight athletes feel equitably supported, included, and valued.

Recommendation 4: Create a guideline, specific to the sport of rowing, regarding the prevention, identification, and management of disordered eating, eating disorders and REDs.

Recommendation 5: Develop and launch an educational, body-positive campaign, targeted at all athletes.

Recommendation 6: Provide access to health practitioners and experts in nutrition, eating disorders, sport psychology.

Recommendation 7: In the under-19 age group, adopt height categories to support inclusion, fairness, and health while providing a meaningful race experience for athletes.

The Working Group would like to thank Rowing Canada Aviron for the opportunity to undertake this project, and to provide recommendations regarding this very important issue. Over the course of the last 12 months, the Working Group has learned that categories in sport are necessary for reasons of fairness, inclusion, safety and to provide meaningful competition in sport. We were happy to learn that, at a high school level, participation in team sport can lower the prevalence of eating disorders. Nevertheless, the Working Group did discover some risk to adolescents associated with dieting while they are still growing. For this reason, using an abundance of caution, the Working Group has recommended the adoption of height categories for lightweights until the age of 19. Six further recommendations have been provided for the benefit of all athletes in the rowing community. We hope that these seven recommendations will give RCA a useful roadmap forward which fosters broad participation in the sport of rowing, and a full sense of inclusion and equity for all rowers in a safe and healthy environment.

Table of Contents

Part 1 – Introduction

Purpose/Mandate

The mandate of the Under-19 (U19) Lightweight Rowing Review Working Group (the Working Group), according to its terms of reference, is to gather a wide range of perspectives and evidence from the rowing community and relevant experts and provide the Rowing Canada Aviron (RCA) Board of Directors with recommendations to inform a safe, fair, and inclusive way forward which addresses the risks and concerns raised about weight-restricted rowing categories for junior rowers.

Background

Canada has a thriving lightweight rowing community. Lightweight rowing programs across the country currently span from high school rowing to summer club programs to the national team level. Canada has a long history of support for lightweight rowing. The first known lightweight event held in Canada was at the Canadian Henley Regatta in 1906 (Lapinski, 2019); the first Canadian high school lightweight event is known to go at least as far back as 1948 (CSSRA, [1948]); and Canada hosted the first world championship events for lightweight women in Montreal in 1984. Many of Canada's international breakthroughs came in lightweight events. Its first men's FISA medal was a silver in the lightweight single; Canada's first international gold medal in a women's event was won by the lightweight double at the 1987 World Championships; and Canada's first World Champions in a sweep event were the women's lightweight four in 1990, registering Canada's first FISA World's Best Time in the process.

At the high school level, 40 percent of participants (997 out of 2,475) at the 2019 Canadian Secondary School Rowing Association (CSSRA) Championships were lightweight. World Health Organization Growth Charts for Canada show that more that 50 percent of the population of under-19 girls fall under the CSSRA weight limits of 59 and 63 kilograms; and more than 50 percent of the population of under-19 boys fall under the 72.5kg limit, but not the lighter 66kg limit (Dietitians of Canada, 2014a; 2014b). Any recommendations regarding weight classes in the Canadian under-19 population, will have broad implications to affect hundreds of young athletes.

In recent years, there has been in increase in focus upon athlete safety touching upon issues such as concussions, sexual boundary violations and bullying. In rowing, the issue of having lightweight events in junior/under-19 rowing was raised as a concern. In December 2021, the RCA Board received a preliminary review of evidence, drafted by sports physician Jane Thornton and subsequently, the Board considered the discontinuation of weight-restricted events in the under-19 population. Before making a decision, it struck this Working Group to further investigate the evidence and gain the perspective of a broad range of stakeholders in the rowing community.

Methodology

The Working Group was launched in December 2022. A workplan and tentative schedule was agreed upon in January 2023 (see Appendix 2). The group engaged in a discussion, supported by educational material, regarding how to read academic articles and how to consider levels of evidence.

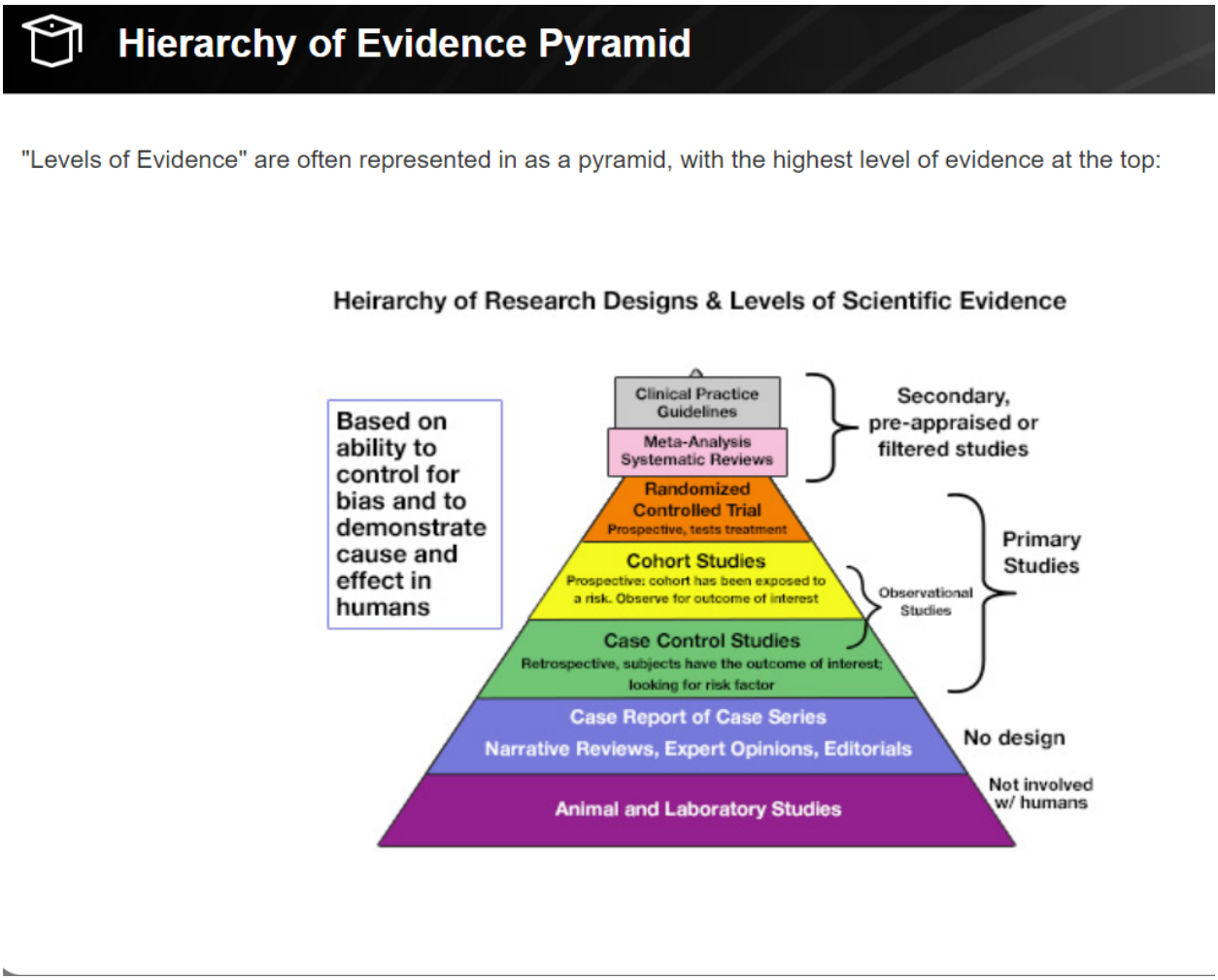


Figure 1: Levels of evidence.
Source: https://ecu.au.libguides.com/systematic-reviews/levels-of-evidence

Case reports and expert opinion, while valuable, fall lower down in the hierarchy of evidence (see Figure 1). In the literature review, the Working Group focussed, to the greatest extent possible, on cohort studies, systematic reviews and meta-analyses which are of higher evidential value. The group sought out expert opinions in the stakeholder interviews and kept anecdotal reports to a minimum.

To clearly define the issue and to guide the subsequent literature search and stakeholder interviews, the Working Group engaged in a discussion to answer the question: what is the problem we are trying to solve? The resulting series of questions is recorded in Appendix 3. In summary, the Working Group worked to understand:

- What, if any, are the risks to U19 lightweight rowers?
- What is the relative risk, comparing this group to the general population and other athletes?
- How might any risks discovered be reduced?
- How might any risks discovered compare to the risks associated with not participating in sport?

Peer-reviewed academic articles and grey literature were solicited from the following sources:

- A search for peer-reviewed academic articles was provided by PhD candidate Jacob Giesbrecht, Charles University, Prague, using a range of online resources and databases.
- Participaction and Sport for Life provided articles and information regarding the benefits of sports participation for adolescents;
- British Rowing, USRowing, and Rowing New Zealand provided related articles;
- Dr. Mark Hall, University of Alberta and Dr. Judy King, University of Ottawa provided articles on levels of evidence in academic literature.

Over 80 articles, both peer-reviewed and grey literature, were collected and shared, with every article read by at least one Working Group member. (See Bibliography) Meetings were held to discuss relevant findings obtained from the literature. Findings are summarized in Part 2 of this report.

A list of stakeholders to be interviewed was provided by Terry Dillon, CEO of RCA (see Appendix 4). The Working Group added two additional groups (coaches, other national sport organizations with weight categories) and proposed the development of an athletes' survey. In the spring of 2023, the Working Group developed questions specific to each group of stakeholders, to be used in the semi-structured interviews and it developed an athletes' survey. The survey was submitted to RCA to carry out a trauma-informed review. Dr. Ming-Chang Tsai, Data Analytics Lead with the Canadian Sport Institute Pacific, was recruited to assist the Working Group in the analysis of the survey results. The findings of the stakeholder interviews and athletes' survey are summarized in Parts 3 and 4, respectively, of this report. Recommendations are found in Part 5.

Part 2 – What we learned from the literature

Categories exist in sport for reasons of fairness and inclusion.

Why do lightweight categories, or any categories for that matter, exist in sport? The literature makes clear that categories based on age, sex, ability or size exist for reasons of fairness, inclusion and safety; they are fundamental to meaningful competition in sport.

Howe writes, "One conclusion we could draw is that sport participation should be, in effect, one great human category, that we should not be doing, e.g., 'men's sport' and 'women's sport' (or presumably, disabled rather than non-disabled, etc.), but just 'sport'. But…good sport would need to incorporate a sorting principle of fairness and there is no point having gross mismatches, for both sporting and safety reasons…Hence, classes based on age, weight, ability and so on would make more sense." Howe continues, "Even if I am only interested in my own development, [my competitors] must also be within the range of my own abilities…To always win or to always lose are equally pointless." (Howe, 2020)

Parry and Martinkova (2021) suggest that through categorization rules, sport strives for maximum fairness and inclusion. It allows different kinds of people to participate in sport and offers them a chance to succeed. Without categorization based on age, sex, size and skills, "there would just be one group that would dominate everybody else…and it would usually be big, strong, able-bodied 20–35 year-old male athletes."

The last publicly available Mission Statement of the Fédération Internationale des Sociétés d'Avirons (FISA), now known as World Rowing, is 'To make rowing a universally practiced and globally relevant sport. To spread the sport in all its forms' (worldrowing.com, accessed September 9, 2023). Denis Oswald, during his FISA presidency, stated that one of FISA's aims was to "enable people who do not have the typical physical characteristics needed for [heavyweight] rowing to participate in the rowing Olympic regatta under fair and equal conditions" (Global Media and Sport, 2017).

Meuret observed that lightweight rowing events (for men) were introduced to the Worlds as an attempt to "give positive encouragement to all those [men] in the world under 70 kilos who had until then been frustrated by the fact that 90 kilos were the average weight needed to have any chance of winning" (Meuret 1992).

The expansion to include lightweight rowing can be viewed as a success. Since the introduction of men's lightweight rowing events to the World Rowing Championships in 1974, and women's 10 years later, World Rowing's membership has tripled, from 50 to 150 countries. (Global Media and Sport, 2017) And an analysis of race times at the Olympics from 1996 to 2012 shows that the three lightweight events added were consistently the most competitive rowing events at the Olympics (Global Media and Sport, 2017).

But with lightweight events come certain risks, particularly for adolescents who are still growing. A fully informed decision regarding whether to have lightweight events in the under-19 population needs to carefully balance the benefits of enhanced fairness, inclusion and participation against the risks of weight management practices in this age group.

All sport involves risk, including rowing.

All sport involves risk. Whether considering football or mountain-bike racing, marathon running or platform diving, triathlon, combat sports, figure skating, equestrian jumping, ice hockey or field hockey, it is hard to imagine a sport without some risk of harm, injury or even death.

In this context, rowing is a relatively low risk sport. Google 'most dangerous sports' and quite predictably, rowing does not turn up in the top 20 lists. Boxing, ranked number 6 on two (admittedly unscientific) lists, reported 588 fatalities between 1950 and 2007 directly related to combat in the ring (Baird et al. 2010). In this context, it is easy to imagine that a non-contact, low-impact, middle-distance sport like rowing might fall far lower down the list in a risk-related ranking of all sports.

Nevertheless, there is risk in rowing. The greatest risk of death in rowing comes from drowning. RowSafeUSA.org writes that in the USA, four rowers drowned in 2021 and an additional three rowers drowned in 2022. The website states that "more than four dozen near-fatal accidents and twenty fatal rowing accidents…have occurred in the US and Europe since 1976."

To date, there has been one recorded death, occurring in the USA in 2005, due to heat stress which has been associated with lightweight rowing (Parillo and Fitzgerald 2005). The Working Group was unable to find any further documented reports of acute injury or death in rowing attributed to weight-making practices. Even so, it is clear from the academic literature that there are health risks related to 'making weight' for the purposes of competition in various sports. How great those risks are in rowing is difficult to quantify accurately, as the research specific to rowing is limited.

The American College of Sports Medicine (ACSM), in their 2021 Expert Consensus Statement on Weight Loss in Weight-Category Sports (Burke, 2021), concur with the findings above that weight categories exist to create an even playing field and safer competition by matching competitors with similar physical characteristics. In describing common weight-making practices, they distinguish between rapid weight loss (RWL), which involves "the intentional manipulation of total body water, glycogen stores and gastrointestinal tract contents over a period of hours or days", and chronic body mass management, which involves longer term strategies, such as gradual dieting and the manipulation of training load to reduce body fat. In 1996, the ACMS recommended a focus on chronic management over rapid weight loss and noted "evidence of favorable outcomes when such an approach is implemented." However, in their 2021 statement, they note a growing concern over the effects of low energy availability that may arise with this approach. Low energy availability may be simply described as having less energy intake than energy expended over a chronic period of time. While this approach does lower fat mass, it also can also involve some adverse health outcomes. (More on this later.)

Rapid weight loss strategies can be safe, or they can be deadly.

Rapid weight loss of up to 3 percent of body mass caused by short term fluid restriction and/or exercise – an amount analogous to that experienced in routine training – has been shown to be relatively safe, with minimal impact on performance, especially if accompanied by rehydration strategies after weigh-in (Burke, 2021). Martinez-Aranda et al (2023) suggest the acceptable range in combat sports "should not exceed 3% to ≤5% of body weight together with ≥24 h for adequate (or at least partial) recovery and rehydration processes." In rowers, a RWL of up to 4 percent, with aggressive rehydration, was shown to have minimal impact on performance (Slater, 2006). However, higher levels of weight loss have the potential to cause serious illness or injury including muscle cramps, electrolyte imbalances,

cardiovascular strain, impaired thermoregulation, heat stroke and even death (Burke, 2021). Berkovich et al. cite reports suggesting that up to 80 percent of judokas and wrestlers use RWL techniques. They reference a 22-year old judo Olympic-medal contender who was found dead in a sauna in 1996 while engaging in RWL. Also cited were the deaths of three high-school wrestlers in 1997, caused by dehydration and hyperthermia while losing weight for competition (Berkovich et al. 2016).

Longer-term weight-loss strategies can also be safe or deadly.

Losing small amounts of weight over longer periods of time is generally considered safer than RWL, and is often recommended for those who are overweight, however long-term body weight management has its own risks for athletes. Athletes who engage in chronic weight-management practices put themselves at risk of experiencing Relative Energy Deficiency in Sport (REDs). REDs involves "an energy deficiency relative to the balance between dietary energy intake (EI) and the energy expenditure required to support homeostasis, health and the activities of daily living, growth and sporting activities" (Mountjoy et al. 2014). Researchers had previously focussed on the Female Athlete Triad, consisting of disordered eating (DE), irregular menstrual cycles and low bone mineral density. But more recently, evidence suggests that the problem is not a triad, but a syndrome of adverse health outcomes that also affect men.

The most recent (2023) International Olympic Committee (IOC) consensus statement on Relative Energy Deficiency in Sport describes the many detrimental outcomes that can be caused by REDs which "include, but are not limited to, decreases in energy metabolism, reproductive function, musculoskeletal health, immunity, glycogen synthesis and cardiovascular health, which can all individually and synergistically lead to impaired well-being, increased injury risk and decreased sports performance." (Mountjoy et al. 2023)

REDs and eating disorders are not the same thing. While all cases of the REDs syndrome involve some form of relative energy deficiency, not all cases of REDs are caused by a diagnosed eating disorder. There is a continuum of disordered eating that may be involved in the syndrome. "The disordered eating (DE) continuum starts with appropriate eating and exercise behaviours, including healthy dieting and the occasional use of more extreme weight loss methods such as short-term restrictive diets…The continuum ends with clinical eating disorders (EDs), abnormal eating behaviours, distorted body image, weight fluctuations, medical complications and variable athletic performance." (Mountjoy et al. 2014) Medically diagnosed eating disorders include anorexia nervosa and bulimia nervosa but sub-clinical or combination forms of these disorders are common (Currie, 2010). Eating disorders have one of the highest mortality rates of any mental illness. Deaths are most often caused by cardiac arrhythmia or suicide (Joy et al. 2016).

Many factors play a role in increasing the risk of disordered eating and eating disorders.

Giesbrecht writes, "Dieting and eating disorders are not unique to lightweight rowing, nor are they causally a result of being in a lightweight category." (Giesbrecht, 2022). It is important to understand that factors increasing the risk of developing an eating disorder are many, varied and not all sport related. "EDs have many features in common, and athletes move among them. The pathogenesis of EDs is multifactorial with cultural, familial, individual and genetic/biochemical factors playing roles." (Mountjoy et al. 2014). Mountjoy et al. also note that factors specific to sport such as dieting for performance, personality factors, overtraining and pressure to lose weight from coaches have been suggested as playing a role.

In a review study of sport and eating disorders, Currie writes, “Sportsmen and women develop eating disorders for the same reasons that others do. There may be individual genetic and/or psychological vulnerability, socio-cultural pressures relating to diet, food and body image and non-specific psychological stressors which can act as trigger events. The sports environment can add to these risks in several ways especially in endurance, weight category and aesthetic sports.” (Currie, 2010)

More than one source observes that some of the personality traits that are common in elite athletes, traits which may contribute to their competitive success, are the very traits that might increase their risk of developing an eating disorder: tendencies towards perfectionism, goal orientation, obsessive compulsive tendencies, and compliant behaviors (Bratland-Sanda and Sundgot-Borgen, 2013; Katz, 2022; Smolak et al. 2000; UK Sport – Eating Disorders in Sport). In a review article on eating disorders in sport, the authors note that perfectionism, a construct of unrealistic personal standards, is a trait found in the general population, but it is more common among athletes (Ismailova and Gazdowska, 2016).

The competitive sporting environment may pose additional risk factors. Ismailova and Gazdowska (2016) observe that in most athletes who dieted, it was recommended by coaches or relatives, and they conclude that “very often the athletes want to satisfy others.” Coaching comments and behaviour, pressure to diet, sport specialization at a young age, and the trauma of injuries can all contribute to the development of eating disorders (Bratland-Sanda and Sundgot-Borgen, 2013).

The prevalence of eating disorders varies widely across sports and levels of competition, however there is consensus that in the **adult** population:

- Elite athletes are at greater risk than less competitive athletes and non-athletes.
- Elite athletes in sports that encourage weight control are at greater risk than athletes in non-lean sports.
- Women are at greater risk than men.

Whether caused by individual genetic factors, sport-related pressures or some combination of both, there is an increased prevalence of disordered eating and eating disorders among adult, elite athletes. In a review study regarding eating disorders in athletes, Bratland-Sanda and Sundgot-Borgen reviewed 20 studies and confirmed what many have found: female athletes have a higher prevalence of eating disorders than male athletes, and elite athletes (male and female) have a higher prevalence of eating disorders than non-athlete controls (Bratland-Sanda and Sundgot-Borgen, 2013). In a more recent review article, elite athletes were found to be at greater risk than less competitive athletes and female athletes had more than twice the risk of male athletes (Ismailova and Gazdowska, 2016).

A frequently cited study by Sundgot-Borgen and Torstveit showed the same pattern: females at greater risk than males in both elite athletes and non-athletes, and elite athletes (male and female) at greater risk than non-athletes. They also found that elite athletes in sports where weight is an issue had a greater risk of eating disorders than other elite athletes, in both male and female categories. This included aesthetic athletes (where athletes are judged on appearance and performance), endurance athletes, anti-gravity athletes and athletes with weight categories. The group demonstrating the greatest prevalence of eating disorders was elite female athletes in aesthetic sports (Sundgot-Borgen and Torstveit, 2004).

These articles demonstrate that there is great variation in ED prevalence rates from sport to sport, between men and women, and between elite and less competitive athletes. It is therefore very difficult to base decisions about a specific sports group (for example under-19 lightweight rowers) upon generalized information. In a systematic review of eating disorders in athletes, Mancine et al. (2020) conclude by saying, "Currently, there is not enough information to define specific sport populations based on risk for DE. If we are to properly address this problem, then further research needs to be completed with the aim of better identification of DE in athletes."

The body of work specific to disordered eating in rowers is small, but the Working Group did find some useful rowing-specific studies.

At the elite level, rowers in both lightweight and open categories are equally at risk for eating disorders.

In a German study, national and international level lightweight rowers (LWR) and heavyweight rowers (HWR) were compared for symptoms of eating disorders and mental-health-related issues (Kraus and Holtmann, 2018). Kraus and Holtmann found that "Competitive LWR and HWR reported a similar number of ED symptoms. This finding shows that despite direct weight restrictions for LWR, both LWR and HWR are affected likewise by ED symptoms." Importantly, the athlete scores in both groups were not high enough to indicate the presence of clinically diagnosed eating disorders.

The findings supported the work of previous studies. Kraus and Holtmann wrote, "The findings are in line with Sykora et al. (1993), Terry and Waite (1996) and Terry et al. (1999), which show no differences in eating attitudes between LWR and HWR. Thus, the findings indicate that competitive rowers show the same risky ED related pattern of thoughts and behaviour independent of formal weight restrictions." (Kraus and Holtmann, 2018). These findings helped the Working Group better understand the risks to elite rowers, both lightweight and open, but more information was needed regarding younger, less competitive athletes.

Collegiate-level lightweight women rowers were found to be at no greater risk for eating disorders than non-athlete controls.

Karlson et al., in a study involving collegiate lightweight women rowers, observe that there is a "perception among coaches and administrators that adding lightweight rowing programs for women [to intercollegiate programming] and having women 'make weight' could increase the prevalence of eating disorders" (Karlson et al. 2001). The authors observed that, unlike sports that emphasize appearance, rowers have no incentive to lose any more weight than is absolutely necessary to make their limit. "Additional weight loss is actively discouraged as rowing is also a strength-dependent sport, and athletes weakened by dehydration or excessive weight loss will not perform well." They hypothesized that, while lightweight rowers would display weight-loss behaviours, they would not significantly differ from controls in the presence of probable eating disorders.

The participants in the study were 122 collegiate lightweight women rowers at two east-coast USA championship regattas, constituting 91% of female lightweight competitors at those regattas, along with 95 college-student controls. In what the authors describe as "the largest examination to date [in 2001] of potential eating disordered behavior in lightweight women rowers", they found three interesting results. First, the lightweight women rowers showed significantly less concern about their body shape than controls. The authors suggest this was because any dieting behaviour was due to the demands of their

sport but not out of concern for their body image. Secondly, they found no significant difference between lightweight rowers and controls in any of the eating disorder diagnostic categories. But thirdly, they found an increased use of laxatives and diuretics by lightweight rowers that they described as concerning and problematic.

They summarize their findings as such. “The prevalence of eating disordered behavior that was found in this study does not appear to be different from the general college population. These results do not seem to validate the concerns that lightweight rowing for women at the collegiate level is associated with an increased prevalence of eating disorders, but do highlight the necessity to examine and address unhealthy weight management behaviors independently of eating disorder status.” (Karlson et al. 2001)

In the adolescent population, chronic and rapid dieting may involve additional risks.

In addition to Karlson et al. above, other authors reported the use of concerning RWL techniques in the younger population. Berkovich et al. described RWL among adolescents participating in competitive judo in Israel. They found that children in their study sample started competing at roughly 7 years of age and started ‘cutting weight’ around the age of 12. By the age of 13, 74 percent of them were engaging in RWL. They also note that coaches have the greatest influence in these decisions (Berkovich et al. 2016).

Martinsen et at. conducted a study of dieting and disordered eating in adolescent elite athletes and non-athlete controls. In the younger population, they found that athletes have a *lower* prevalence of eating disorders than controls (more on this later) but an alarming 11 percent of athletes were using unhealthy RWL techniques such as vomiting, laxatives and diuretics (Martinsen et al. 2010)

The potential impact of chronic dieting and RWL are different in the adolescent population compared to adults. Adolescents are still growing, developing bone density and going through puberty. Lakicevic et al., in a systematic review, studied youth in Olympic combat sports who engaged in RWL and rapid weight gain. Their systematic review found that “intentional energy deficit and dehydration during physical training and competition in childhood or during adolescence could disturb metabolic and hormonal regulations affecting growth, maturation, body composition, menstrual cycle and reproductive capacity, and may increase the risk of injuries and stress fractures” (Lakicevic et al. 2022). They concluded that RWL in youth should ideally be banned.

Another safety recommendation for adolescents is described in the 2023 IOC consensus statement on REDs. The paper states that to minimize the risk of disordered eating behaviours, developing athletes should not undergo body composition testing, where “using skinfolds, DXA [dual-energy x-ray absorptiometry], and B-mode ultrasound are the proposed body composition assessment methods available at the time of publication.” Specifically they write that “body composition assessment is recommended only for medical purposes under 18 years of age” (Mountjoy et al. 2023).

Earlier, Mountjoy et al. observed that, in girls, the chronic inadequacy of energy intake, which is the underlying problem in REDs, can contribute to primary amenorrhoea (no periods by age 15) or secondary amenorrhoea (the absence of three consecutive cycles). They also explain that REDs in adolescents can have adverse effects on the acquisition of bone density which peaks at 19 years for women and at 20.5 years for men. They note that bone loss in athletes can be irreversible and may lead to increased risk of stress fractures in both sexes (Mountjoy et al. 2014). In Canada, there are few lightweight rowers under that age of 15, which may reduce the chance of primary amenorrhoea,

however secondary amenorrhoea for girls and reduced bone density for boys and girls are serious concerns.

Georgopoulos et al. examined the effects of negative energy balance on artistic gymnasts and rhythmic gymnasts and compared them to athletes in other sports. The gymnasts they studied started their training at 6.4 to 7.7 years of age and trained more than 30 hours a week. They observed that the intensive physical training and negative energy balance in these athletes delayed the onset of puberty. However, they also note that girls and adolescents in sports, who train less than 15 hours a week, do not show menstrual disturbances or have delayed puberty.

Additionally, Georgopoulos et al. observed that intense athletic training of 18 hours per week, particularly in sports that strictly control energy input, can restrict growth. In a group of artistic gymnasts, both male and female, they found evidence that final height failed to measure up to their genetic predisposition. But they argued that the extent to which this happens depends upon the age of initiation, the type and intensity of training, and whether energy intake has been restricted. Interestingly, they found that rhythmic gymnasts did not experience any restrictions to growth. In fact, their final height was found to be higher than expected by genetic predisposition. Looking at other sports, they wrote that "no deterioration of growth has been reported…Girls training for approximately 12 hours per week in sports including rowing, track and swimming for an average of 4 years during puberty, revealed no difference in height velocity compared to population means" (Georgopoulos et al. 2010).

A study by Roemmich et al. compared wrestlers to gymnasts and also observed that not all adolescent athletes who experience energy restriction are affected the same way. Wrestlers experienced a mild maturational delay, but they also observed a 'catch up' growth period following the competitive season. "For wrestlers, the 3- to 4-month period of under-nutrition is followed by long periods of adequate nutrition such that the period of under-nourishment may not be long enough to slow growth or maturation or reduce the height of wrestlers. Female gymnasts who are chronically training and limiting their dietary intake may be at greater risk for limiting their growth" (Roemmich et al. 2001)

While the Working Group did not find any research specific to adolescent lightweight rowers, we did observe that training patterns for adolescent rowers is more like wrestlers than gymnasts, with several months of the year off. Highschool rowers are also unlikely to engage in intense training of more than 12 or 15 hours per week which may limit their risk of impaired growth or delayed puberty.

In the adolescent population, participation in sports decreases the risk of eating disorders.

Adolescents who participate in sports may experience a protective effect against eating disorders that is not seen in more competitive adult populations. This potential benefit has been noted in many peer-reviewed research papers (Fulkerson et al., 2000; Smolak et al., 2000; Rosendahl et al., 2009; Martinsen et al., 2010; Bratland-Sanda and Sundgot-Borgen, 2013).

Smolak et al. undertook a meta-analysis of research, the highest level of scientific evidence, relating to eating problems (including anorexia nervosa, bulimia nervosa and 'eating disorders not otherwise specified') and female athletes. In analyzing 34 studies they found that "non-elite athletes, especially in high school, had reduced risk of eating problems compared to controls." In the high-school results, this included lean and non-lean sports. Dancers were the only high-school athletes that did not demonstrate this protective benefit. Smolak et al. hypothesized that "being an athlete might give a girl a sense of

pride that is separate from appearance and may help her to invest in what her body can *do* rather than how it looks." The authors conclude, "these findings suggest that participation for fun, fitness and perhaps social interaction might indeed be valuable, especially in developing girls." (Smolak et al. 2000)

The 34 studies included in the Smolak meta-analysis were all dated 1999 or earlier, however similar studies carried out since 2000 support their findings. Fulkerson et al. compared high school athletes to non-athletes for the prevalence of eating disorders and also made a comparison of personality characteristics. They found that the athletes at greatest risk were those who were highly perfectionistic in their approach to sports. But overall, they found that "high school athletes are not at greater risk for the development of an eating disorder than other students. Athlete's [sic] positive outlook on life and high self-efficacy may serve as protective factors" (Fulkerson et al. 2000).

Rosendahl et al. looked for the risk of disordered eating behaviours in high school athletes and non-athletes. The athletes participated in a range of lean and non-lean sports at both elite and less competitive levels. They found that 16.3 percent of athletes and 26.1 percent of non-athletes exhibited signs of disordered eating behaviour. When this was refined to look at girls only, non-athletes exhibited almost three times the risk of athletes for the most serious forms of disordered eating. As in the adult population, elite athletes appeared to be at greater risk than less competitive athletes. Overall, the study concluded that "participation in sports seems to be protective for developing serious eating problems, especially in girls." In particular "[female] non-elite athletes evinced a lower frequency of disordered eating compared with both elite athletes and non-athletes." (Rosendahl et al. 2009)

In 2010, Martinsen et al. compared adolescent elite athletes with non-athlete controls. The athletes came from a wide variety of lean sports, including rowing, and non-lean sports. Their main findings were that there was a higher prevalence of symptoms of disordered eating among adolescent non-athlete controls compared with athletes and that there was no difference in prevalence among athletes competing in leanness sports versus those in non-lean sports. They concluded that their findings supported previous studies suggesting that disordered eating is less of a problem among adolescent athletes than it is in the community at large. (Martinsen et al. 2010).

The consistent and well documented finding that adolescents participating in organized sport show a decreased prevalence of disordered eating, even in 'lean' sports, is highly relevant to the decision facing Rowing Canada Aviron regarding lightweight rowing. But a decreased risk of disordered eating is not the only benefit adolescents may experience while participating in organized sport.

In the adolescent population, participation in sport is associated with many positive physical, social and mental health outcomes.

There is extensive research examining the health benefits of physical activity for children. These include improved muscular fitness, bone strength, blood sugar levels, brain, heart and lung health, the maintenance of healthy weight and the reduction of risk for chronic diseases such as type 2 diabetes (Centre for Disease Control, 2012).

Eime et al., in 2013, completed a systematic review of 30 studies considering the social and mental health effects of participation in sport (ie. physical activity which is organized, usually competitive and played in a team or as an individual). Their paper should be recommended reading for all sports administrators. The evidence of many different psychological and social health benefits associated with adolescents' participation in sport is substantive and clear. The list of associated benefits is long. Four

studies demonstrated fewer suicidal tendencies in young athletes. Another three showed fewer depressive symptoms. Twelve studies demonstrated, variously, better social skills, self esteem and/or relationships. Another nine demonstrated outcomes such as better mental health, reduced anxiety or more happiness.

The results are impressive. The authors highlighted team sports as being particularly beneficial. They found that team sport participants had reductions in anxiety, experienced protective effects against depressed mood, had lower suicide ideation and had positive associations with self-esteem. Some positive results were over and above those experienced by individual athletes and some effects lasted for years. For example, one "longitudinal study spanning 12 years found that participation in team sport (specifically school teams) was associated with lower social isolation later in life, compared with [participation in] other activities" (Eime et al. 2013).

In a New Zealand study, Williams et al. note a difference in the motives of adolescents who participate in organized sport compared to those who engaged in more solitary exercise. They found evidence that youths who participated in sport had intrinsic motives associated with enjoyment and challenge, while individual exercisers had motives that were more 'extrinsic' like appearance and weight (Williams et al. 2022).

Eime et al. conclude their systematic review by writing, "There is substantive evidence of many different psychological and social health benefits of participation in sport by children and adolescents…above and beyond other forms of leisure time [physical activity]. More specifically…participation in team sports rather than individual activities is associated with better health. It is conjectured that this is due to the social nature of team sport".

Summary of findings from the literature

We have learned from the literature review that all sports involve some level of risk which must be weighed against the many benefits received from participation. The health risks to athletes depend upon the age of the athlete, the sport, the level of competition and sex. We did not find any studies that specifically examined the health risks associated with the under-19 lightweight rowing population, so care should be taken before relating findings to our target group. Nevertheless, the Working Group did find many closely related studies which may shed light on the health risks to under-19 lightweight rowers.

The few studies specific to rowing indicate that, at the *elite* level, lightweight rowers do not appear to be at any greater risk for eating disorders than rowers in open events. At the *collegiate* level, lightweight rowers were found to be at no greater risk for eating disorders than the non-athlete population.

The balance of the research on high school athletes, from a broad range of lean and non-lean sports, shows no increased risk of eating disorders to participants. In fact, many studies demonstrated a protective effect associated with participation in sports at a high school non-elite level, lowering the incidence of eating disorders. There is evidence to show that for seasonal weight-restricted sports such as wrestling (and similar to rowing) athletes reach their genetically anticipated height. Prolonged negative energy balance and intensive training may cause primary or secondary amenorrhoea, however there is evidence that at a high-school level of less than 15 hours per week of training, athletes do not show menstrual disturbances or have delayed puberty.

Still, there were concerning behaviours identified in some populations of adolescent athletes in weight restricted sports. Even though there is no evidence to support an increase in eating disorders in this group, some young athletes have been observed to utilize concerning rapid weight loss behaviours such as dehydration, or the use of laxatives or diuretics to 'cut weight'. There are serious health risks associated with extreme and rapid weight loss, up to and including death, and engaging in these behaviours while the body is still growing carries additional risk. Limited amounts of rapid weight loss in the adult, elite-athlete population has been shown to be relatively low risk, but at least one researcher recommended that rapid weight loss in adolescence should be banned. Further to this, the body of research regarding relative energy deficiency in sport (REDs) is growing as we write this. The most recent IOC consensus statement on REDs recommends that no one under the age of 18 should undergo body composition assessment, such as skinfold testing or DXA, unless for medical reasons. Ongoing research in this area may, in future, further elucidate the risks to youth engaged in any type of weight loss practices for the purposes of sport while they are still growing.

Other studies support the importance and extreme value to children and adolescents of participating in sport, particularly team sport, to foster physical health, to build meaningful and lasting social relationships and benefit from improved mental health and happiness. The consensus in this area is clear and compelling and suggests that increasing the participation and inclusion of children and adolescents of all sizes and abilities should be an important objective for all sports organizations. In this regard, the research supports the creation and use of categories based on age, sex, ability and size to avoid gross mismatches and promote fairness, inclusion, safety and positive developmental experiences.

Part 3 – What we learned from our stakeholders

Over a two-month period, members of the Working Group interviewed 21 stakeholders. Some interviews were held in small groups, others as individuals. Please see Appendix 4 for a list of participants. The Canadian Secondary School Rowing Association declined to be interviewed but provided a brief written communication expressing their position. Several others were invited to participate but declined or did not respond.

Interviews were recorded, then summarized in writing to share with the full Working Group. Findings were grouped into themes and presented below. To encourage full candour, identities are not being indicated. Where it is necessary to provide some identifying information, for example, where the specific profession of the stakeholder speaks to the credibility of the information, this has been done with the consent of the stakeholder.

The central observation that can be made from the stakeholder interviews is that there is a vast diversity of opinions in the rowing community regarding the fate of the under-19 lightweight rowing category. There were only two areas where there was general agreement across the board.

Objective health and safety data, which could inform recommendations, is not available.

In the health and safety sector, decisions regarding where to direct resources aimed at illness/injury prevention or safety improvement are usually informed by objective data. How many incidents of harm are occurring? What types of harm? Who is most affected? How many near misses? Where, and under what circumstances? Having data allows health and safety professionals to identify areas of greatest risk and devise plans to mitigate those risks.

The Working Group heard that, in the rowing community, little to no data is available to inform athlete health-and-safety-related quality improvement or prevention initiatives. Every stakeholder we asked – coaches, race organizers, rowing associations, umpires, athletes – was consistent in their reply: We do not have any documented incidents of harm to under-19 lightweights in Canada, we do not have data and we are not aware of a collection system that might provide such data. Several referred to research, to anecdotes, to anonymous surveys or to personal observations, but no one was aware of a health and safety incident reporting system that could provide objective data regarding the types of harm occurring to rowing athletes and where, how and to whom harm was occurring.

This is not to say that there is no harm occurring. Undoubtedly, injuries and illnesses have occurred, and are still occurring in the rowing community. But without firm data, stakeholder positions may be overly influenced by personal experience or anecdote, leading to a diversity of opinions, which is what the Working Group experienced. One coach/administrator was aware of poignant stories of suffering among lightweights with eating disorders; two race organizers could not think of a single instance of harm to a lightweight; one former athlete observed that both lightweight and open athletes had similar eating issues; one administrator felt that all rowers are under-fueled; one former lightweight athlete knew open-weight athletes with eating disorders but no lightweights with eating disorders; one coach described several athletes who came from other sports and struggled with body weight and image issues, but found rowing to be body positive, less appearance focussed, with more emphasis on strength and athleticism. There were many observations, too many to list here, but there was no data. Nevertheless, one health professional made very clear that just because no data is being collected, does not mean that no harm is being done.

The absence of data is a clear gap, and it impedes our ability to clearly understand the health risks to rowing athletes.

Coaches are key, and they need more education and support.

There was a consensus among stakeholders that there was a lack of education and resources in the rowing community (and in other sports) relating to nutrition, REDs and disordered eating prevention, recognition and management in all athletes, as well as the healthy management of lightweights and safer weight loss practices. While everyone in the rowing community could benefit – athletes, parents, event organizers, sport administrators – it was coaches that were singled out as the group most in need of further education and support. Coaches were identified in the literature, in stakeholder interviews, and in the athlete survey (next section) as having the most influence over athletes' health decisions, but more than one stakeholder felt there were gaps in current coaching education programs relating to the above noted issues, especially about safe and healthy lightweight rowing.

Some expressed concerns regarding behaviours from coaches: overly competitive attitudes; misguided 'weight-cutting' advice and expectations; public weigh-ins and other privacy concerns. One health practitioner noted that inappropriate coaching can undo all the potential benefits that normally come from participating in sport. They recommended that all coaches, not just lightweight coaches, get more education about athlete health and wellness. One athlete development professional indicated that whether participation in a given sport increases or decreases the risk of eating disorders depends on many factors. Prolonged workload or a spike in training, a focus on winning, or training in a constant state of weight loss can all increase risk. However, if the focus is on health, fun, social skills and emotional well-being, the same sport can be protective against eating disorders. Coaches need the education and resources to make the right choices and foster a healthy environment.

This is where broad consensus among stakeholders ends.

When asked to consider the under-19 lightweight rowing category, its risks, its benefits and what should happen going forward, the stakeholders interviewed held a diversity of opinions. The coaches were split; former athletes were split; staff, officials, and committee members associated with Rowing Canada were split; and race organizers were split. In total, eight stakeholders supported the continuation of under-19 lightweight rowing; seven stakeholders recommended the discontinuation of the category; three more stakeholders did not support lightweight categories for adolescents but would support an alternative size category to maintain full inclusion; four stakeholders demurred from providing a firm recommendation. The concerns and suggestions from these various groups are summarized below.

A diverse group supports the continuation of an under-19 lightweight rowing category.

One coach summed up the concerns of this group succinctly, saying, "I think the numbers would go down without lightweight events…I wouldn't row if I had to go heavy and get pounded." In this group, there was a consensus that the discontinuation of under-19 lightweight events would lead to many athletes having negative experiences and dropping out, or not joining at all. This would be detrimental to both the health of adolescents and to the rowing community. One former athlete observed that athletes want a competitive experience that is fair and meaningful for a diverse population. They were not sure they would have continued rowing if there hadn't have been a category within which they could be competitive. Another noted that body image issues go beyond the sport of rowing, and it would be unfair to penalize lightweights by getting rid of their category. Yet another felt that discontinuing the category would remove opportunities for kids to participate, and it's important to keep kids in sport. "If

you're small, what's the point of rowing [without an appropriate weight category]?" This stakeholder, who works across diverse sports, singled out volleyball as a sport that has no size categories, to the detriment of late maturing boys, who miss the window of opportunity to participate in high school, but later grow to a height at which they might have excelled in the sport. Some of these stakeholders noted that age categories, which have been proposed as a solution, do not account for experience, ability or size and that 'late bloomers' who are small for their age – kids who currently can find success in lightweight categories – would drop out.

In this group of stakeholders, some felt the reported health risks were being overblown. Where was the data? Was this, some wondered, part of a larger trend to get rid of lightweight rowing altogether? Others, acknowledging some risk, felt it could be mitigated. Overall, this group felt the benefits to adolescents outweighed the risks.

Suggestions to improve safety and lower risk included:

- Education to all stakeholders – athletes, parents, all coaches (not just lightweight coaches) and officials – regarding lightweight health, mental health, nutrition and safe sport. One stakeholder cited an educational program created by Figure Skating Canada.
- Only natural lightweights should be racing in the under-19 lightweight category. To this end, create a policy stating that no junior/under-19 rowers should engage in any kind of dieting or weight loss activities. Use this policy as the basis for a widely distributed position statement. Require all athletes and coaches to sign off that they have read and understand the policy. Set up a process to manage coaches found to have contravened the policy.
- An educational campaign, targeted at all athletes, male and female, open and lightweight, with positive messaging: food is fuel; your strongest weight is your natural weight; promotion of positive body images.
- Have access to expert advice (nutrition, mental health) for all athletes, coaches and parents.
- No one appeared to be a fan of having a medical clearance letter, as this creates a barrier for some. In the USA, when this was implemented, 50 percent of lightweight athletes did not return, and for those that did, it was difficult to determine if clearance letters were legitimate.

It was acknowledged that, despite the positive suggestions above, it is difficult to control the competitive nature of some athletes or coaches, and dieting, thought not recommended, might still occur if lightweight categories are continued.

Another group recommends the discontinuation of under-19 lightweight rowing.

This group, also diverse in background, felt that there was no practical way to prevent dieting and that a growing athlete should never be restricting calories. The dangers of rapid weight loss and dieting are too high and may impact normal growth and development. A health practitioner in this group noted that 12- to 19-year-olds are at the highest risk for developing anorexia nervosa (AN). If a person is genetically predisposed, having a negative energy balance (dieting) can be a trigger for AN. They stated that individuals who have suffered from AN for 3 years have the following outcomes: 50 percent recover, 30 percent improve, and 20 percent will continue to have a chronic illness. Of this last group, one in five will die. Because of this, it is important to do whatever is needed to prevent AN. No one in this group provided evidence that the prevalence of eating disorders was higher for under-19 lightweights than for

athletes in open events or the general population, but they preferred to err on the side of caution. Less dieting, they hoped, would result in fewer eating disorders or body image issues.

Alternatives to weight categories and other suggestions included the following:

- This group also supported education for all, positive messaging about fueling and body image and better access to expert advice.
- Some recommended that under-19 lightweight categories be discontinued with no other inclusion-directed changes, adopting a survival-of-the-fittest approach. One stakeholder stated, "If it goes away, it doesn't affect me." Another, who was not sure why lightweight categories existed at any age, stated, "I don't need it because I don't use it. So, I'm happy to get rid of it." Others were more sympathetic to smaller athletes, acknowledging this would put them at a disadvantage, but felt that at the adolescent level, the risks of having a lightweight category outweighed the benefits. For them, lightweight categories should begin after the age of 18.
- Some supported categories based on ability (novice, intermediate, etc) based on points earned by years of experience or race history. This approach does go some way towards grouping athletes to have meaningful race experiences, however, they acknowledged that smaller athletes would remain at a disadvantage.
- Another described having one big pool of athletes and then seeding them in mixed boats based on sex, age and race experience. A criticism raised against this approach was that women rarely medal and smaller athletes remain disadvantaged, making it more difficult for these groups to have meaningful race experiences.
- Some suggested having different race distances to cater to lighter body types. However, others noted that open-weight races have faster times at all distances from sprints to head races, so it was difficult to envision how this might work.
- Some espoused the model used by USRowing, having novice and age categories of under-15, under-16, under-17 and under-19; or the model used in Australia based on school years. This is another system that goes some way towards grouping athletes to have meaningful race experiences, however, children develop at different rates and in these systems, larger athletes would still be advantaged. This is especially so in the Australian model, where students who skip grades or who are held back, continue to race within their school year level which can cause both age and size disparities.

Health practitioners also recommend the discontinuation of under-19 lightweight rowing, but most supported height categories as an inclusive alternative.

The Working Group interviewed four health practitioners (HPs): a registered clinical counsellor, specializing in eating disorders; a registered dietitian who works primarily with elite athletes and athletes with eating disorders; a sports-medicine physician who is the Chief Medical Officer for both Rowing Canada and for the Canadian Olympic Committee; and a second sports-medicine physician who holds a Canada Research Chair and is on the editorial board for the British Journal of Sports Medicine. Two of the HPs were former national team rowers, one racing in lightweight events and the other in open events.

The HPs were interviewed separately, but their positions were largely aligned. All four HPs stated that participation in organized sport is critical to healthy mental and physical development and should be

encouraged. Nevertheless, they felt that having lightweight categories for under-19 rowers was too risky to support. While the 2023 IOC statement on REDs states that body composition assessment (skinfold testing, DXA and B-mode ultrasound) is recommended only for medical purposes under 18 years of age, this group interpreted the ban on body composition assessment more broadly to include weigh-ins.

Research shows, stated one, that the younger one starts dieting, the greater the likelihood of disordered eating. Other reasons included: dieting through adolescence may impair bone development and cause amenorrhoea, and the longer the exposure to dieting, the greater the risk; dieting may impair normal growth and development, including brain development; the long-term effects of rapid weight loss on adolescents has not been sufficiently researched; early dieting increases long-term risk because if one is not a natural lightweight, an athlete needs to work harder each season they need to get down to weight, increasing the risk of unhealthy strategies in the older athlete; and lastly, adolescents are often not mature enough to understand the long-term health risks to dieting, and if so, they cannot provide informed consent.

In many ways, this group of HPs is much like the group described in the previous section: they too recommend the discontinuation of the under-19 lightweight category. The difference with the health practitioners was that they were very aware that discontinuing the lightweight category risked diminishing the participation of smaller athletes and considering the critical role that sport plays in healthy mental and physical growth and development, they were concerned about this. Three out of four of the HPs were interested in finding a way to keep 'like-sized' people together and to maintain inclusivity in a way that provided fair, meaningful competition to everyone without using weigh-ins.

Suggestions to improve safety and lower risk included the following:

- All health practitioners supported the discontinuation of lightweight events for athletes under 19 years of age. One physician stated that young athletes should not be rowing lightweight "until such a time that their bone health is established, and they can take responsibility for their health decisions."
- Three out of four HPs suggested using height categories to include athletes of all sizes, while avoiding all dieting and weigh-ins until over 18 years of age. They noted that this is a form of categorization by size that cannot be manipulated by unhealthy behaviours. Adolescents might grow in height slightly over the course of a race season, but it was suggested that at this age and stage of development, a 'close enough' size categorization could be a good compromise to avoid weight categories and encourage smaller athletes to participate.
- A few supported the use of additional age categories, but conceded this did not entirely address size disparities in competition.
- Like previous groups, they also recommended education for coaches, athletes and parents, access to experts in nutrition and mental health, and the adoption of a clear position statement.

We learned from an administrator with Canadian karate and boxing that height categories are being used in karate for younger athletes. In karate, we were told, weight is not measured or manipulated until the age of 18. Instead, the sport has tried combining skill and height categories (high skill + tall; low skill + tall; high skill + regular height; low skill + regular height) with positive results.

Summary of findings from the stakeholder interviews

Coaches, athletes, administrators, race organizers…the rowing community is split in their opinions about whether under-19 athletes should have a lightweight event. There was a vocal group – many of whom were involved with lightweight rowing in some capacity – who spoke with conviction about maintaining diversity in the sport of rowing. They were not convinced that the health risks to lightweight adolescents were any greater than those in the general population. Another group spoke with equal conviction about the potential harm to adolescents, who should be focussed on growing, not dieting at this time in their lives. Some did not seem to see the value in lightweight events in general, suggesting there were other sports that smaller athletes could participate in.

Health practitioners were more unified in their opinions. They understood that sport is overwhelmingly positive to the health and development of adolescents but did not support having lightweight events. REDs, rapid weight loss, and any form of dieting or weigh-ins all pose a risk to growing athletes. Young athletes should not be restricting their weight at all until bone health is established and they are mature enough to make informed decisions on the matter, suggesting the age of 19 as a minimum. Three out of four health practitioners suggested using height categories as an alternative to weight categories in order to maintain inclusion for smaller athletes.

There was consensus in two areas. First, that there is not much objective data specific to rowing regarding the health and safety of athletes – not in the form of standardized incident reporting, nor in the form of research specific to the sport. Secondly, many stakeholders identified gaps in the education of coaches and suggested more support should be provided to ensure they are knowledgeable in the areas of lightweight athletes' health, safety and performance needs, as well as the areas of nutrition, REDs, eating disorders and mental health for all athletes, lightweight or open.

Part 4 – What we learned from the athletes' survey

A survey was designed in the spring of 2023 with the intended target audience being adult Canadian former under-19 (U19) rowers. The survey was launched in early August 2023 on Rowing Canada Aviron's website, with advertisement via social media and email, and it remained open several weeks, garnering 334 responses.

83.2 percent of respondents self-identified as being white and 9.9 percent as First Nation, Metis or Inuk/Inuit. 98.7 percent self-identified as being without a disability. Non-Canadian residents were screened out, as were those who had not rowed in the U19 category. Not all participants answered all questions.

Most of the questions were directed to 245 Canadian residents, over the age of 18, who had in the past competed in U19 rowing. Of these:

- 74.3% were former U19 lightweights and
- 25.7% were former U19 open athletes

Results

When former U19 lightweights were asked:

If their mental health was negatively affected when managing weight in rowing:

- 54.4% strongly or somewhat disagreed
- 32.7% strongly or somewhat agreed
- 12.9% neither agreed nor disagreed

If their physical health was negatively affected when managing weight in rowing:

- 56.6% strongly or somewhat disagreed
- 31.9% strongly or somewhat agreed
- 11.6 % neither agreed nor disagreed

If their lifestyle was positively impacted by lightweight rowing:

- 69.4% strongly or somewhat agreed
- 16.9% strongly or somewhat disagreed
- 13.8% neither agreed nor disagreed

If the U19 lightweight category benefitted them:

- 82.6% strongly or somewhat agreed
- 9.6% strongly or somewhat disagreed
- 7.9% neither agreed nor disagreed

(Note: 100% of open category athletes strongly agreed with the statement "Participating in openweight rowing has been an overall benefit to me", however, there were only 12 responses to that question compared to 147 lightweight responses, so caution must be exercised in comparing these answers.)

If they think they should have been a lightweight:

- 76.4% strongly or somewhat agreed (66.3% strongly agreed)
- 12.9% strongly or somewhat disagreed (6.7% strongly disagreed)
- 10.7% neither agreed nor disagreed

When former U19 lightweights were asked, "Would you have competed in rowing if there was no lightweight category?", they responded:

- 28.0% would still row
- 39.0% would not have rowed
- 33.0% responded 'maybe' or 'other'

When former U19 athletes (lightweight and open) were asked, "Should lightweight rowing be an under-19 category?":

- 80% said yes
- 18% said no
- 2% were not sure

A few additional findings:
The survey mirrors the literature review and the stakeholder comments regarding where athletes go for advice on weight management. Coaches are the athletes' most frequent resource followed by family and health professionals.

When open category athletes were asked to respond to the statement, "I think there are issues with weight management in openweight rowing", responses were split:

- 30.8 % of respondents somewhat agreed
- 38.5 % strongly or somewhat disagreed
- 30.8 % neither agreed nor disagreed

(Note: This question had only 12 responses, so caution must be exercised in giving weight to this result.)

Limitations:
It should be noted that this group of survey participants was a sample of convenience. The survey was taken only by those with an interest, which may bring some bias into the results. The demographic results show that three-quarters of the respondents were former lightweights and one-quarter former open athletes, which is not representative of the rowing population at large. Some questions directed to open athletes had very few responses. While the results of this survey should not be considered representative of the entire Canadian rowing community, it is more reasonable to consider this a helpful indication of the opinions of lightweight rowers, a group that would be impacted by the changes under consideration.

Interpretation of the survey data collected

The results of the survey suggest that there are some lightweights who struggled in the U19 lightweight category. Almost one third of lightweight respondents felt that their physical or mental health was negatively impacted when managing their weight for rowing. The survey did not specify the severity or duration of these issues, but the rate is concerning. Narrative responses indicated that some were frustrated in trying to find good advice regarding safe weight management; some felt their coaches should be more educated in this regard. One person expressed that they were still struggling, years later. One in 15 strongly felt they should not have been lightweight. A few respondents indicated that they did not want to row lightweight but were pressured into doing so by their coaches or club.

While these responses are clearly concerning, it is also important to note that over 80 percent of lightweight respondents felt that the lightweight category benefitted them. A significant 39 percent said they would not have competed in rowing if there was not a lightweight category. Another 33 percent weren't sure and only 28 percent stated they would have rowed if the category had not existed. Narrative answers expressed a love for this category, that it gave smaller athletes a chance at fair competition based on competence, not size. They expressed that the category is "awesome" for those who are naturally lightweight, but caution that it can be "toxic" when mid- or open-weight rowers are pressured to compete in this category.

Overall, 80 percent of respondents, both open and lightweight, support the continued existence of an under-19 lightweight category. Nevertheless, the results suggest that the lightweight category is not for everyone, and care must be taken to ensure that athletes are competing in the correct size category where they can safely thrive and grow.

Part Five – Recommendations and Rationale

Considering the findings from the literature review, the stakeholder interviews and the athletes' survey, the Working Group has developed several recommendations. The first six recommendations are designed to benefit the entire athlete population: all ages, all levels of competition and both lightweight and open athletes. The Working Group feels strongly that these recommendations should be implemented regardless of which direction Rowing Canada takes with respect to the under-19 lightweight category.

Recommendation 1: Collect data to inform future health and safety initiatives based on risk.

The Working Group recommends a two-pronged approach:

a) Develop a centralized, nation-wide incident reporting system to collect standardized data on adverse events and near misses.
b) Participate in athlete health and safety research specific to the sport of rowing. Consider dedicating funds to support this.

Rationale:

Rowing lacks an incident reporting system with which to inform safety decisions and plans. Over the course of this project, the Working Group has learned that the risks associated with REDs, eating disorders, long-term or rapid weight loss are very specific to sport, athlete age, level of competition and gender. Without incident data and research specific to under-19 rowers, it is challenging to understand the risks faced by this group and to make well-informed decisions. The Working Group has done its best to make logical, well-informed recommendations, however, an incident reporting system would provide information about adverse events, and research would help elucidate longer term risks to athletes.

Potential risks and suggestions to mitigate:

1. Clubs or race organizers may be hesitant to participate in data collection due to privacy or liability concerns. Create a data-sharing agreement with partners. Work towards a system where Rowing Canada Aviron hosts a centralized database of anonymized data. The responsibility to follow up on incidents remains with the club or race organizers. RCA would collect centralized data to look for trends across the country and share the results with partners to identify risk and prioritize athlete safety initiatives based on evidence.
2. Establishing such an incident reporting system would require the investment of resources, both human and financial. Look for grants relating to athlete safety. Consider partnering with other national sport organizations on a shared data collection system.
3. Research projects can be costly and require academic expertise. Look for research grants relating to sport and athlete safety. Partner with universities, sport institutes and/or federal/provincial sport ministries.
4. To provide value, incident collection must use a standardized approach across the country. Consult and collaborate with clubs and race organizers across the country to create a system that is easy to use and provides meaningful, standardized data from all sources.

Recommendation 2: Develop, fund and require mandatory education for all coaches.

Education should cover:

a) Safe and healthy management of lightweight athletes;
b) Prevention and identification of eating disorders and relative energy deficiency in sport (REDs) for all athletes;
c) Nutrition for all athletes – for training, performance and in weight-restricted situations;
d) Athlete mental health.

Rationale:

The academic literature and the athlete survey both indicate that coaches have the most influence on athletes who are looking for health and weight loss advice, however, stakeholder interviews indicated that coaches have little to no education regarding the safe management of lightweight athletes: how to safely lose weight; limits to safe weight loss; how to prevent and identify disordered eating, eating disorders and REDs, and what to do once identified; nutrition and fluid management, for safety and performance; and athlete mental health. This is an obvious gap that needs to be filled. Based on the findings that in elite rowing, the risk of disordered eating is the same for both lightweight and open populations, it is recommended that all coaches complete this education.

Potential risks and suggestions to mitigate:

Volunteer rowing coaches are, arguably, the rowing community's most precious assets. They donate their time and expertise and without them, kids would not have the opportunity to participate in the sport.

1. Care must be taken in discussing this recommendation, that coaches do not feel blamed in any way for this gap in education. Be clear when discussing this educational initiative that the work is being done to address a systemic gap in coaching education, not a gap in any individual's knowledge. Coaches should feel supported and rewarded.
2. Requiring coaches to pay for this education may create a barrier to everyone participating. Considering how much time coaches donate, education should be free, and delivered in a format that is easily accessible to everyone, for example in a series of webinars on the RCA website.

Recommendation 3: Create an environment where Canadian lightweight athletes feel equitably supported, included, and valued.

Rationale:

Lightweight rowing events are being removed from the Olympics after 2024, and now the under-19 lightweight category is being considered for discontinuation. In speaking with stakeholders, interviewers worked to restrict the scope of the conversation to under-19 rowing, but this was sometimes difficult. Many former lightweights seemed worried that all lightweight events, from high school to the international level, were under threat. At a time when the rest of the world is working hard to increase diversity, equity and inclusion, the global rowing community appears to be going in the opposite direction. One could argue that this concern is beyond the scope of this project, however the anxiety experienced by some former lightweight stakeholders (as well as the indifference expressed by some others) came across loud and clear. In this context, it is not surprising that some members of the Canadian rowing community are passionate about blocking any changes to under-19 lightweight rowing.

It is recommended that RCA create a clear position statement in support of lightweight rowing, both nationally and internationally, and then take steps to support both lightweight and open rowing equitably. If the Canadian lightweight rowing community feels supported, in both words and actions, this will help build the trust needed to implement any changes directed at keeping under-19 lightweight athletes safe.

Risks:
None. Building a diverse, equitable and inclusive community benefits everyone. If the lightweights feel threatened, so will women, para-rowers and masters. As long as RCA is sincere, there is no downside to creating a more inclusive environment.

Recommendation 4: Create a guideline, specific to the sport of rowing, regarding the prevention, identification, and management of disordered eating, eating disorders and REDs.

Rationale:
UK Sport has created a very instructive guideline called Eating Disorders in Sport. It may be beneficial to make this available to the rowing community. However, the literature suggests that the prevalence and underlying issues relating to eating disorders are, in some aspects, sport specific. It would therefore be advisable to create a guideline specific to rowing. For example, one might assume that eating disorders are more prevalent in lightweight rowers, however the current research indicates that it is elite rowers, whether lightweight or open, who may be most at risk. A guideline specific to rowing should include a section on safe weight-making practices for lightweights, but it could also raise awareness of the dangers of disordered eating, eating disorders and REDs in the entire athlete population.

Potential risks and suggestions to mitigate:
The development of a guideline specific to rowing would require access to professionals with expertise in the areas of disordered eating and REDs, who also have knowledge of how these issues manifest in the sport of rowing. This might be a rare, and possibly expensive, skill set. Start by sharing the UK Sport document. Consider partnering with universities, sport institutes and/or Sport Canada. Look for grants in the area of athlete health and safety.

Recommendation 5: Develop and launch an educational, body-positive campaign, targeted at all athletes including:

a) Your strongest weight is your natural weight;
b) Food is fuel and other nutritional information;
c) Body-positive images and language;
d) What to do if you, or another athlete, are struggling.

Rationale:
An educational campaign targeting athletes can address gaps in knowledge, can prevent harm and it can provide support to those who may be struggling. Our survey found that almost 7 percent of former lightweights strongly felt, in retrospect, that they should not have rowed lightweight. The literature suggests that there is insufficient awareness of the dangers of REDs and rapid weight loss. It also

suggested that when athletes, particularly girls, focus on what their body can do, rather than on appearance or weight, positive outcomes ensue. These are all areas that can be addressed in a body-positive educational campaign focused on strength, performance, proper nutrition – and in the event something still goes wrong, what to do, or who you can reach out to.

On the topic of body-positive language, the Working Group suggests avoiding use of the term 'heavyweight' wherever possible. Athletes who row in open categories are tall and lean. To be called heavyweight may be vexing and, particularly for women, it may be harmful.

Potential risks and suggestions to mitigate:
Advertising or reinforcing the wrong messages may be harmful. Care must be taken to choose messaging carefully. Consult with sports psychologists, nutritionists and other professionals to find the right message and tone. Check for similar work in other sports. Skate Canada has a set of body-positive guidelines that focus on performance and fitness rather than appearance and weight.

Recommendation 6: Provide access to experts in nutrition, eating disorders, sport psychology and health practitioners.

Rationale:
This recommendation comes from the literature and from the health practitioners that were interviewed. It was supported by all stakeholders interviewed. Having access to timely advice based on sound evidence has the potential to prevent harm, improve health and wellness and improve performance among adolescent athletes.

Potential risks and suggestions to mitigate:
Having access to licensed professionals 24/7 is an expensive and logistically complex service to set up. Consider advertising already existing help lines. Also, recruit professionals who may be willing to provide advice via email or via an advice column on the RCA website.

Options to support full participation in the under-19 age group, while minimizing health risks.

Determining whether to continue an under-19 lightweight category is an extremely complex issue. The health risks to growing adolescents who potentially manipulate their weight for competition needed to be weighed against the health risks associated with a potential drop in participation in team sports and a loss of the clear benefits that result from participation. In addition, the positions held by various members and sectors of the sport were diverse and passionately argued. In coming to a final recommendation, the Working Group explored three options. They have been documented in the report to be transparent and allow the RCA Board to fully consider the issues.

Option 1: Continue the U19 lightweight category with a ban on dieting and rapid weight loss.

This Working Group project was launched out of concerns for the health of under-19 lightweight athletes, particularly with respect to eating disorders and the long-term effects of dieting on the growing adolescent athlete. The literature review suggested that adolescents who participate in high school sports may experience a protective effect against eating disorders. Even athletes in lean sports demonstrated a lower prevalence of eating disorders than their non-athlete control group. This was a significant finding that supports the importance of having as many adolescents as possible participating in organized sport, particularly team sports. For this reason, it is important to keep athletes of all sizes participating in rowing. Nevertheless, the literature also demonstrated that some adolescents engage in unhealthy rapid weight loss activities. Additionally, the growing body of evidence regarding REDs indicates that there are risks to health that we are still coming to understand. Therefore, a ban on any weight loss activities during adolescence is merited. Adolescents should be focused on growing stronger, not dieting.

However, considering the competitive nature of athletes and some coaches, it may be difficult to curb the desire to diet in order to fall into a lower size category. An educational campaign could be used to attempt to change this culture and educate athletes, parents and coaches about risk. A position statement from RCA stating that no athlete under the age of 19 should be engaged in dieting or other intentional weight loss strategies for the purposes of competition would be required to make this option safer. Unfortunately, there is the possibility that with a ban on dieting, the practice will simply go 'underground'. If athletes are officially not allowed to diet, they will have no one to consult should they still opt to do so.

Option 2: Create size categories based on height.

The literature makes very clear the extraordinary mental and physical health benefits of having adolescents participating in organized sports. A decreased risk of eating disorders was only one of the benefits. However, our athlete survey indicated that, without a size category for smaller athletes, only 28 percent of former lightweights feel they would have continued rowing. To maintain maximum participation in a way that is fair and meaningful to smaller athletes, some form of size categorization is needed. Height, while not a perfect indicator of potential power in rowing, is a physical attribute that cannot be manipulated like weight. Until the age of 19, using height to categorize athletes would provide a safe way to have size categories while athletes are still growing. Once the age of 19 has been achieved, it becomes safer to switch to the more accurate system of using weight categories.

Some considerations with this approach include:

1. Height categories for children and adolescents are beginning to be adopted in other sports, but so far, little is known about what risks might arise from this approach. There is little stigma to being in a lightweight category, but most people would rather not be in a 'short' category. Care will need to be taken in planning and rolling out this approach. Options for naming categories include using the terms 'regular' and 'tall'. Another option is to stick with 'lightweight' and 'open' categories, but while athletes are under 19 years, height can be used to determine eligibility for the lightweight category, rather than weight.
2. Care must be taken in picking a height cut off. If it is too high, athletes who turn 19 may find it difficult to get down to lightweight as an adult, and perhaps feel some shame or failure about this.

To avoid this scenario, err on the conservative side with the height limit. Consult with health professionals in setting a standard.

3. Adolescents grow. Over the course of a racing season, an athlete may get taller. It would be unfortunate to penalize a crew at the end of a season if one or more of their athletes have grown slightly over the height limit. One approach would be to have a cutoff date early in the season where heights are measured by a trained official (not an athlete's coach), then signed off for the season. If the athlete grows a bit, let it go.

Option 3: Have an increased number of age categories.

The USA uses a system with no size categories, but increased age categories: under-15, under-16, under-17 and under-19. While this does have the advantage of eliminating weigh-ins and dieting, there are a number of drawbacks. In many communities, there are not enough athletes to make these categories meaningful. Crews could need to mix ages simply to have enough members to form a crew, rendering the age categories meaningless. Additionally, age is not a direct proxy for size, so this approach does not prevent larger athletes from dominating their age class.

The risk of eating disorders is lowered in the high school population through participation in sports, particularly team sports. While having more age categories is an attempt to maintain inclusivity, the athlete survey indicated that, with no size category, a large proportion of athletes may drop out – losing the protective effect that comes from participation.

Analysis of options

To assist in decision-making, the Working Group created a risk/benefit matrix below to help weigh the pros and cons of each option (see Figure 2).

Figure 2: Under-19 Lightweight Rowing Risk/Benefit Matrix

	Supports inclusion, fairness for smaller athletes	Lowers risk of eating disorders	Lowers risk of dieting, RWL and REDs	Supported by majority of Health Practitioner stakeholders n=4	Supported by majority of other (non-HP) stakeholders n=18	Supported by majority of survey respondents n= 245	Supported by Working Group	Risk/Benefit Score
Maintain U19 LWT category	+1	+1	-1	-1	0	+1	+1	2
Create U19 height categories	+1	+1	+1	+1	0	0	+1	5
Create additional age categories	0	0	+1	+1	0	-1	-1	0

Risk/Benefit Score: Green = +1; Amber = 0; Red = -1 Higher scores express a more positive outcome.

For the Working Group, the age-category option was problematic for two reasons: the potentially large drop in participation and the fact that the approach does not provide a meaningful competitive experience for smaller athletes.

The Working Group agreed they could support either maintaining the lightweight category, or the creation of height categories as an alternative. Ultimately, height categories provide the safer option by removing weigh-ins and dieting from the sport until 19 years of age.

Recommendation 7: In the under-19 age group, adopt height categories to support inclusion, fairness, and health while providing a meaningful race experience for athletes.

Rationale:

The Working Group fully supports the use of size categories to promote full participation, and support a fair, meaningful competitive experience. For reasons of adolescent athlete health and safety, the Group recommends the use of height categories until the age of 19.

Potential Risks and Suggestions to Mitigate:

As discussed above, if RCA chooses to adopt this recommendation, care will need to be taken to choose safe height limits, use sensitive language in describing the categories and the athletes, and in looking for any unexpected adverse outcomes in this new approach.

Conclusion

The Working Group would like to thank Rowing Canada Aviron for the opportunity to undertake this project, and to provide recommendations regarding this very important issue. The Group has worked diligently for a full year and the journey of discovery has been elucidating. We have learned that categories in sport are necessary for reasons of fairness, inclusion, safety and to provide meaningful competition in sport. We were happy to learn that, at a high school level, participation in team sport can lower the prevalence of eating disorders. Nevertheless, we did discover some risk to adolescents associated with dieting while they are still growing. For this reason, using an abundance of caution, the Working Group has recommended the adoption of height categories for lightweights until the age of 19. Six further recommendations have been provided for the benefit of all athletes in the rowing community. We hope that these seven recommendations will give RCA a useful roadmap forward which fosters broad participation in the sport of rowing, and a full sense of inclusion and equity for all rowers in a safe and healthy environment.

Appendix One – Members of the U19 Lightweight Review Working Group

Diana Sinnige, (Chair) is a Registered Physiotherapist with experience in injury prevention, quality and risk management and executive leadership. Currently, she is the Policy & Governance Lead for the Canadian Alliance of Physiotherapy Regulators, the national forum working to harmonize physiotherapy regulatory policy across Canada. A 5-time national team member, her career was capped with a gold medal in the lightweight coxless four at the 1990 World Championships, where her crew set Canada's first world's best time.

Scott Anderson is a Niagara resident, a retired high school principal and an RCA Performance certified rowing coach, who serves as the open men's rowing coach at Brock University. With a diverse background in national and international rowing, spanning lightweight and open categories, he possesses coaching expertise across all levels, from high school to masters, and has recently been involved with Canada's U19 and U23 athletes in international competitions.

Jacob Giesbrecht is a PhD candidate at Charles University in Prague, Czechia. His academic focus revolves around the philosophy of sport, delving into areas such as the ethics and logic of categorization, eSports, virtuality, and freedom of expression. Beyond academia, Jacob has been rowing for 15 years and has dedicated 13 of them to coaching rowing, sharing his expertise and passion with aspiring athletes. His coaching experience adds a practical dimension to his academic pursuits, offering a holistic perspective on the world of sports.

Rebecca (Camplin) Kennedy is a health and fitness professional with a background in nutrition research and health policy. She has a B.Sc in Exercise Physiology and a Master's in Public Health. She was a five-time U19 lwt CSSRA champion, raced the varsity 8+ at the University of Miami, and competed at NCAAs for Oregon State in 2022.

Meghan Montgomery started rowing at the Winnipeg Rowing Club in 2000. She went on to compete in the para category and competed for Canada at multiple World Championships and Paralympic Games. She and her teammates won the first Para rowing medal for Canada at the 2016 Rio Paralympic Games. She is now a teacher and rowing coach, currently residing on Salt Spring Island.

Meredith Smith is a Registered Nurse working in a provincial clinical leadership role. Never a rower herself, Meredith has supported rowing for years. She married one, raised two and volunteered in many capacities. Currently she is an RCA Umpire and sits on RowOntario Board of Directors. Safety, fairness, inclusion and fun for rowers continues to drive Meredith's participation in supporting rowing.

Appendix Two –Workplan

The process to work up a policy issue often falls into five main stages:

1. Planning
2. Collecting and reading relevant documentation
3. Talking to subject matter experts and stakeholders affected
4. Analysis and report writing
5. Presentation of findings to client

Below is a more detailed list of activities common to such projects.

Activities	Deliverable	Our schedule?
• Project initialization		December 2022
• Confirm project objectives and deliverables	Clear objectives and deliverables	December 2022

• Plan environmental scan
  ○ Review of literature
  ○ Key informant interviews
  ○ Focus groups
	Workplan	December 2022, January, February 2023

• Determine literature review parameters		March 2023
• Screen literature search to find most relevant papers, best practices		March 2023
• Collect policy, internal documents		March 2023
• Complete review of literature, grey literature, current policy		April 2023
• Analyze findings of literature review		April 2023
• Develop interview guide	Interview guide	May 2023

• Confirm list of interview candidates
  ○ Subject matter experts
  ○ Analogous organizations (same sport, different country; same country, different sport)
  ○ Stakeholders who will be affected
	List of interview candidates	May 2023

• Explanatory email/invitation to invited participants	Introductory email	May 2023
• Scheduling of interviews/focus groups		May, June 2023
• Completion of interviews/focus groups		June 2023
• Analyze all findings		July 2023
• Consider options, risks and benefits		July, August 2023
• Draft recommendations/report	Draft report	September 2023
• Final report and presentation to Board	Final Report	September 2023

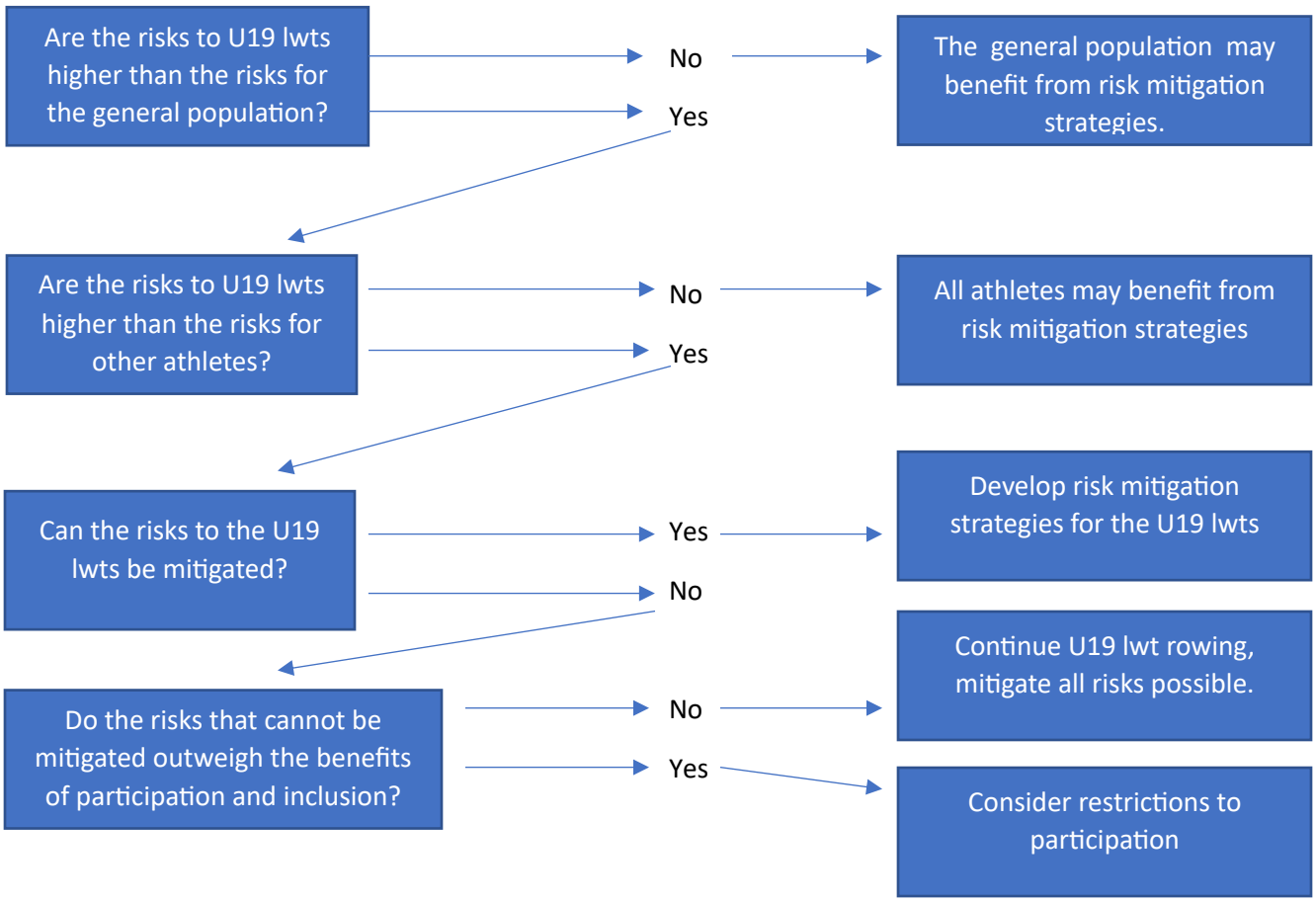
Appendix Three – What questions do we need to answer to understand the issue?

To guide our environmental scan (literature review an interviews), please consider what information we might need in order to create evidence-informed recommendations. The following questions are offered as a place to start our conversation. Please consider this also as a 'straw dog', to which we can add, subtract, edit, or we can discard and start from scratch.

Questions that may help the Working Group come to consensus on recommendations

- What are the health risks to the athlete associated with Under-19 lightweight rowing? Do the same risks exist for the general population? For all athletes? Can the risk be quantified?
- What are the risks, if any, to the athlete arising from the discontinuation of the Under-19 lightweight events?
- What are the benefits to participation in sports and inclusion through sport?
- What mitigation strategies exist that could decrease the identified risks?

In weighing the relative risk and the benefits, there are a number of considerations:



Appendix Four – Stakeholders Interviewed

Coaches (in a group)

- Alex Marchuk - Calgary
- Bradley Brennen - Kingston
- Tony Tremain - Toronto
- Janine Stephens - Winnipeg

Health and Wellness

- Patricia Obee – Registered Clinical Counsellor, focus in eating disorders
- Jane Thornton – Sport physician, Canada Research Chair, editorial board member at British Journal of Sports Medicine
- Susan Boegman – Registered Dietitian, focus in athletes and eating disorders
- Mike Wilkenson – Sport physician, Chief Medical Officer for Rowing Canada, Chief Medical Officer for Canadian Olympic Committee (all sports)

Sport Development

- Richard Sylvester, PhD – Sport 4 Life

National Sport Organization – with weight categories

- Kraig Devlin – Boxing Canada and Karate Canada

Rowing Canada Staff

- Colleen Miller – RCA Coaching Education and Development

International Rowing Federations (in a group)

- Chris Chase - USRowing
- Jamie Fernandez – Rowing Australia

RCA Committees and Working Groups (in a group)

- Bill Donegan
- Mike Bagshawe
- Derek Ventnor
- Volker Nolte

High School/Junior Organizers

- Rene Gonan – Greater Victoria Youth Rowing Society

Others Interested

- Wendy Wiebe
- Dave Derry
- Phil Marshal

Note: several others were invited to be interviewed but either declined or did not respond.
Mike Purcer, CSSRA President, provided a short, written statement via email.

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