Relative Energy Deficiency in Sport (RED-S) and Eating Disorders in Athletes

webinar transcript

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la-shell_johnson@med.unc.edu: Good afternoon, everyone we would like to welcome you to today's presentation titled, “Relative Energy Deficiency in Sport (RED-S) and Eating Disorders in Athletes.”

la-shell_johnson@med.unc.edu: Today's presentation will be given by Ms. Rachael Flatt. There are a few things to note before I introduce today's speaker. One, participants will be muted upon entry and videos turned off. For technical assistance, we ask that you please use the chat box located at the bottom of your screens. You will also receive an email approximately one month from today, request and feedback and impact on today's presentation.

la-shell_johnson@med.unc.edu: Then we ask that you visit our NCEED training center located at www.nceedus.org/training to view other training opportunities that we have.

la-shell_johnson@med.unc.edu: We will provide a copy of today's slides via email along with the evaluation at the end of the webinar.

la-shell_johnson@med.unc.edu: And we also ask that you tune into our training center one week from today for those of you that would like to view today's training on-demand. At the end of the training, we will also have a 10 minute question and answer segment available.

la-shell_johnson@med.unc.edu: I'll now go ahead and introduce today's speaker.

la-shell_johnson@med.unc.edu: Rachael Flatt is an Olympian and World Junior Champion in women's figure skating. She is currently a doctoral candidate in clinical psychology at the University of North Carolina at Chapel Hill.

la-shell_johnson@med.unc.edu: Her research primarily focuses on eating disorders in athletes and digital eating disorder interventions which she uses to inform her clinical work treating individuals with eating disorders and athletes experiencing a variety of mental health concerns. She also continues to play an active role in the sports community by serving on the US Olympic and Paralympic Committee’s
Rachael Flatt: Thanks, La-Shell. Hi, everyone that's so nice to see. Well, not to you all. But you know as we do in in the Zoom world, lots of webinars.

Rachael Flatt: So, like La-Shell mentioned, I will be presenting on the Relative Energy Deficiency in Sport and Eating Disorders and Athletes.

Rachael Flatt: This is an area that I am very passionate about, given my own personal background as an elite figure skater and now turning into a Clinical Psychology researcher and provider. So this is, hopefully, going to be some helpful information for you all, just in terms of some basic background information that you can provide and with that we will get rolling.

Rachael Flatt: So there we go. So these are my disclosures. I currently have a NSF graduate research scholarship program grant and that's the grant number. And in terms of the objectives, I really hope that this is a pretty straightforward presentation for you all in that. By the end you'll feel a lot more comfortable describing the relative energy deficiency in sport and the association with eating disorder psychopathology.

Rachael Flatt: I hope you'll have a better understanding of which athletes might be at greater risk for REDS, and what screening measures to consider using. And then, in addition to that, I hope you feel a little bit more comfortable, providing some psycho education to the folks that you might be seeing, especially around the potential consequences of REDS.

Rachael Flatt: Hopefully, you'll get a few more front tidbits out of this to. But those are the 3 core objectives that we have for today.

Rachael Flatt: In terms of our agenda. I will be introducing this topic with a little bit of history and background on REDS and large part because it is pretty new, and it actually shifted from the female athlete triad to REDS. So I'll get into that a little bit more in just a minute. But I want to provide a little bit of history on REDS, and then we'll spend some time talking about the links between REDS and eating disorders, what screening measures to consider using, and how to implement them.
Rachael Flatt: And then, finally, we'll talk a little bit about the treatment and consequences of REDS, and I'll follow that up with a little bit of time for Q&A. But if you have questions throughout, please feel free to put those in the chat, I'll do my best to answer those as we go. But if not, I'll be able to answer some of them after the presentation.

Rachael Flatt: Alright, so let's start with the history of relative energy deficiency in sport.

Rachael Flatt: So the history of REDS actually starts about 25-ish years ago with the female athlete triad. So this was something that was originally coined by the Woman's Issue Task Force of the American College of Sports Medicine back in 1992.

Rachael Flatt: As you can see on the right here, this is a great illustration of how the female athlete triad was originally conceptualized. It had 3 components, the first being disordered eating, the second being osteoporosis, and the third was amenorrhea, and all 3 components had to be present simultaneously in order to receive a diagnosis of the female athlete triad.

Rachael Flatt: But certainly this has some constraints, and obviously they ran into issues with certainly under reporting of injuries in athletes, which is a well-known issue in the athlete world. But unfortunately, because of the under reporting of injuries that would eventually trigger an osteoporosis diagnosis, many athletes would only endorse 2 of the components simultaneously. Thus, they did not meet criteria or full diagnostic criteria, for the female athlete triads. Since initially all 3 components had to be present simultaneously.

Rachael Flatt: So fast forward to 2007, and the ACSM actually updated the criteria so that the female athlete trial was considered more of a spectrum disorder and not a binary yes or no diagnosis. So, in each of these components they shifted to this idea that each exists on a spectrum. So, for instance on the eating concern side, we start with kind of the optimal energy availability on the right kind of moving down the spectrum to low energy availability, and that could be present with or without an eating disorder. On the amenorrhea side, certainly that ranges from you eumenorrhea to amenorrhea, and then on the skeletal side, we've got optimal bone health to osteoporosis.

Rachael Flatt: The model shifted to really account for the fact that these components may not always be present at the same time, which obviously led to a lot of under diagnosis initially. And certainly, this model was really a huge improvement in identifying female athletes who are experiencing various forms of pathology. It also encouraged a lot of providers to refer and assess athletes who demonstrated at least one component to then evaluate all 3 components.
Rachael Flatt: But again, to step this, despite these improvements, there were still some major drawbacks to this model, namely, that this model was only oriented to female athletes.

Rachael Flatt: In addition to that, there were several other components to the puzzle that came into the picture, really as more research was conducted. And so that leads us to the current model that we have today, and the shift away from the female athlete triad and now to REDS.

Rachael Flatt: So, after more research was conducted on the tried, it became evident that kind of the main underlying issue of the tribe was energy deficiency. So there was a negative energy balance between dietary intake and the energy expenditure that was really needed to support both homeostatic functioning of the body, general health and daily functioning growth, development, all that good stuff on top of the energy that was also needed to support a sport involvement.

Rachael Flatt: So essentially, what the quote that I have on the screen here is from the IOC or the International Olympic Committees, a consensus paper that was originally published on REDS in 2014, with a coined REDS. It's a syndrome that refers to impaired physiological functioning, including, but not limited to metabolic rate, menstrual function, bone health, immunity, protein synthesis, cardiovascular health, all caused by relative energy deficiency.

Rachael Flatt: And since this was originally published back in 2014. Certainly there's been quite a bit of research that has been done over the last couple of years, and there was an IOC consensus paper update that was published in 2018 that I would highly recommend you read both. But one of the things that has become even more clear as research has been conducted is that REDS is really a diagnosis made through exclusion, which means that a lot of other medical diagnoses need to be ruled out first.

Rachael Flatt: And it's also not a binary diagnosis. So just as the female athlete tried originally moved from kind of a yes-no, you have female athlete tried, or you don't. It's really should be considered as something that is more of a spectrum disorder. So instead of thinking about it as yes/no, you have REDS, think about it as there are mild, moderate, and severe cases, and as a result, treatment really needs to reflect that. In terms of diagnosing REDS, and I'll talk a little bit more about this in a in a bit. Really, the best practices are to have a combination of a physician and a mental health provider. But it's also can be really helpful to have an exercise physiologist and dieticians to have on board just to really help evaluate some of these markers, and I won't go through all of them, since I'm not a medical practitioner. I'm not going to step outside my area.

Rachael Flatt: But I want to just make that clear that it's really helpful to have a coordinated team to go over this. So, in terms of a little bit more background, and, as you can see right away on the prevalence estimates ranging from 22 to 58%. That is a very wide range.
Rachael Flatt: And this can at least be partially explained by the various methodologies that have been used to measure and examine low energy availability as well as some of the difficulties in recruiting athlete samples, as well as the discrepancies between the athlete samples that have been recruited. So, for example, there's a lot of differences in terms of the level of competition, the type of sport, the demographics of the athletes that have been recruited in terms of age, race, sex, and gender.

Rachael Flatt: Now, but the holding factor here that we're seeing is that female athletes do tend to have a higher prevalence than male athletes. And again, this is preliminary data that's suggesting this. But, we don't have great data as to why that's the case. So, we do need to be wary of that fact, simply because most folks in sport are aware of the female athlete tried, and a little bit more familiar with REDS in female athletes. And so, it may be possible that we do see similar rates between male and female athletes, it's just that the research hasn't caught up to that or this trend could stick that female athletes do actually have a higher prevalence estimate.

Rachael Flatt: So low energy availability again, this kind of core underlying factor of REDS, is really derived from one of 2 avenues, the first being not enough caloric intake, and this could be intentional or unintentional, could be intentionally done through restricting your caloric intake, or unintentionally done, simply you know, out of the out of the blue, because of some athletes just training so much. They just might not realize how much, how much caloric intake they actually need, especially if training demands are very high, and that could depend seasonally as well.

Rachael Flatt: The second piece that may occur here is excessive energy expenditure. So again, when you have athletes who are training quite a bit, I think back to the days when I was competing. And, you know, somehow training 7 to 8 hours a day on top of going to school full time that's a lot of training time, and I can imagine there were definitely sometimes where my energy expenditure far exceeded the amount that I was taking in, just in part, because maybe my training demands weren't well coordinated between my coaching staff and my strength conditioning team and all that good stuff. So, it's just something we have to really monitor closely.

Rachael Flatt: Now, energy availability is calculated by subtracting the energy consumed from the energy ingested and then dividing this by the fat free mass and fat free mass is for folks who aren't familiar with that. That's something that includes all the parts of your body that can or that do not contain mass, which includes inner organs, bones, tendons, ligaments, muscles, bloods, connective tissue, nerves, all that good stuff. So the quick version of that calculation is to take the inverse of your body fat percentage and multiply that percentage by your weight.
Rachael Flatt: One other thing that I'll mention here, too, is that ideal energy availability in athletes really supports homeostatic functioning and athletic performance. Sometimes there's this misconception that if you have enough energy to just support your training, it's fine, but that's definitely not the case and is becoming ever more clear as we gain research, and I'll talk a little bit more about this again on the next slide.

Rachael Flatt: So, another way to kind of think about these 2 ideas of insufficient energy intake and excessive training load. I really wanted to show this graphic from a paper from Keay and Francis in 2019. In the middle, this is representative of an athlete that's really fueled appropriately and has the energy intake to both support their daily functional needs. You know whether that's getting up and taking care of the laundry, or taking the dogs out and doing all the processes that their body needs in order to sleep and regulate the homeostatic functioning well. In addition to that, they have enough energy to support their training load as well.

Rachael Flatt: Each side of the spectrum is where either an athlete is not ingesting enough calories on the left, or training excessively on the right, and in both cases you'll see here. The energy intake is not enough to support both the training load and the daily life processes. So, as a result, not only does the performance suffer for this athlete. But the most important thing is that their overall health and physical health and mental health can really suffer negatively here.

Rachael Flatt: So and we'll talk a little bit about some of these consequences in just a minute. But if there's one thing that I hope you can take away from this presentation, it's that if you can talk to athletes that you're working with, this is a very clear picture of how important it is to ensure that the athletes are getting the fuel that they need on a daily basis and consistently across the duration of their sports career, because there could be a lot of detrimental consequences to both their performance and their health.

Rachael Flatt: So, in terms of all the systems that are affected by REDS, there's quite a few here, so buckle up, one of the things, and this is a great graphic from the IOC consensus paper. We'll start at the top and kind of work our way around clockwise. There are a number of systems that are affected by low energy availability, and we'll start with the immunological functioning. Oftentimes you'll see folks who are coming in, who are just getting sick more often. And it could be related to, you know, certainly their environment. But if you're in a low energy availability state, your increase...you're at a much greater increased risk of being sick more often and having compromised immunological functioning.

Rachael Flatt: You'll also see some negative effects on reproductive health for folks. So in females you'll often see menstrual dysfunction, amenorrhea, you'll also see decreased libido in males, skeletally, you'll also see an increased risk of osteopenia, early onset of osteoporosis, and various skeletal injuries from stress fractures to a full breaks; from an endocrine system perspective, there's a lot of different issues that can occur here, namely, though you'll see reduction in the production of various hormones
including those that are associated with the hypothalamic pituitary axis and appetite and insulin production; on the metabolic side, we’ve got some good research here that illustrates the athletes.

la-shell_johnson@med.unc.edu: Please bear with us. We're having a few technical difficulties. We're gonna have Ms. Flatt join us back. So please bear with us a few minutes. Thank you.

la-shell_johnson@med.unc.edu: Hello, everyone. Ms. Flatt apparently had an internet outage. She is joining from another device. So we're asking that you please be patient and give her a few minutes. Thank you so much. We apologize for this technical difficulty and inconvenience.

Rachael Flatt: Okay, I'm back. I'm so sorry all. Hotspot to the rescue

la-shell_johnson@med.unc.edu: All right. You should be able to re-share again. I think you remember what slide you were on.

la-shell_johnson@med.unc.edu: Yes, okay, no problem.

Rachael Flatt: Thank you all so much for sticking with me. I really apologize. Let me get this going. Okay, we're gonna have to track through these a bit.

Rachael Flatt: Okay. So, we were just wrapping up here.

Rachael Flatt: All right, let me get organized for just 2 seconds. So, I think, where my computer probably logged off was right around when I was finishing up this slide. So, we will start from there. So, the long story, the long story short here is that we really want to make sure that athletes and providers have a very clear understanding that REDS is not a simple issue.

Rachael Flatt: It is something that again, we're still understanding. But really negatively impacts a whole host of symptoms. And one of the best things that we can do is help the athletes understand that not only are there significant performance consequences which we'll talk about a little bit later, but from a physical health perspective, we need them to understand that this is something that we have to take very seriously and address quickly.

Rachael Flatt: All right. So let's talk about what REDS and eating disorders have to do with each other.
Rachael Flatt: I think there's still a pretty common assumption that relative energy deficiency in sport and eating disorders always show up together, and I think part of that comes from how REDS was initially developed or identified, and that it came from the female athlete triad, where one of the components was disordered eating behaviors or the presence of an eating disorder.

Rachael Flatt: Now we know that this is not actually always the case. They may go hand in hand often, but not a hundred percent of the time. An eating disorder doesn't necessarily always cause REDS. And this vice versa is also true. However, it is very important to recognize that if an athlete does have an eating disorder, or does display disordered eating behaviors, or has a history of either of those 2 things, it can really substantially increase their risk of relative energy deficiency in sport. Now disordered eating behaviors may still be present, even if they're at a sub threshold level, and don't meet criteria for a full eating disorder. But we'll talk about that on the next slide here.

Rachael Flatt: So, when we are thinking about these 2 buckets of low energy availability, right? We've got this, not enough caloric intake and excessive energy expenditure. I've divided some of the most common eating disorder behaviors up into each of these 2 buckets.

Rachael Flatt: The first is that we'll often see restriction. So again, this is where individuals and athletes are restricting their intake. They're actively, this is the intentional component, where they're actively not taking in enough calories. And this could be something as related to a specific food group or a dietary preferences that then skew into kind of this eating disorder psychopathology.

Rachael Flatt: And this can present in anorexia nervosa, both subtypes with restricting and binge and purge subtypes. And you may see restriction occurring in between these binge and purge sub cycles as well as with bulimia nervosa. Binge eating disorder is also very common to see folks restricting prior to a binge. It’s very common to see folks who kind of restrict at the beginning of their day, because they’re going to try and have a quote unquote, healthy day, right? And then at the end of the day they will often binge because their body simply cannot tolerate that.

Rachael Flatt: And then, in addition to that, you'll see it in, in ARFID – avoidant restrictive food intake disorder, OSFED, and Orthorexia, which again is not a DSM V Diagnosis for eating disorders, but is very common in athletes who are restricting their intake to only healthy foods or only specific safe food groups that are very health oriented.

Rachael Flatt: Secondly, we'll see fasting often come up in this not enough caloric intake bucket. And again, I've got the eating disorders listed that are commonly associated with fasting.
Rachael Flatt: So again, anorexia, bulimia, binge eating disorder and OSFED, those are, again, the key disorders that you’ll see this behavior kind of pop up in, and then finally with vomiting. When an athlete is eating and vomiting up their meals or their snacks, or any caloric intake, certainly makes sense that they’re not going to get the energy needs met for both their health and their performance. And again, you’ll see these in a variety of, of eating disorders as well.

Rachael Flatt: Now again, you might see some of these behaviors pop up, and other eating disorders, or in other illnesses, psychiatric illnesses, but in terms of the even disorders that you’ll commonly see associated with these behaviors, it’s helpful to understand how, how these presentations might present with REDS.

Rachael Flatt: Now on the flip side you may see this under your excessive energy expenditure.

Rachael Flatt: Where you know this, the primary behavior that shows up here is a form of maladaptive exercise, and this is typically described as excessive or compulsive exercise. Now, a side note here is that there is not a consensus in the field as to how to term this behavior, but you can check out one of the other NCEED webinars for a much longer discussion on that.

Rachael Flatt: But this can be present in both anorexia nervosa, and you'll see this in both subtypes, bulimia nervosa and OSFED as well.

Rachael Flatt: You’ll notice here that one of the key eating disorder behaviors that we often screen for which is misuse of diuretics and laxatives, is not on here. And now they. This behavior may not inherently lead to either of these 2 buckets, where we have excessive energy expenditure, or low caloric intake, but certainly could be paired with other behaviors where this comes up.

Rachael Flatt: One of the things that is becoming a lot more present in the literature and again, this is a very budding understanding here of what the differences are between REDS and eating disorders, but it's, in addition to that, we've got another syndrome to be very wary of that can all kind of join together, and the symptomatology is very similar across the board.

Rachael Flatt: It is not uncommon for athletes to have periods where they or what's called overloading and training. This is an extremely common practice, it's something I did as an athlete, and is very much a best practice at this point, for a lot of elite athletes where they are leading to kind of short term, decreases in performance, but long term gain. So they're going just above and beyond in their training for a brief period of time.
Rachael Flatt: Before they're able to fully recover, and then make sure that they have adequate energy and recovery to ensure these significant performance or significant performance gains. Now this is not excessive exercise or maladaptive exercise behavior. Rather, this is a very carefully and strategically planned training pattern that's really well coordinated between coaches and sports med staff and the athlete, so that it doesn't lead to long term performance consequences.

Rachael Flatt: Now, if this is not carefully balanced or monitored, or, for instance, if an athlete is engaging in excessive or compulsive exercise beyond typical training, this is where overtraining syndrome can kind of come into the picture.

Rachael Flatt: So the difference between kind of this problematic and low, low, energy availability and the short term kind of venting or reversible changes in their training, is something that needs to be very carefully calculated and well planned. So, the way that we think about overtraining syndrome is this persistent lack of recovery, and inadequate rest after very repetitive, intense training loads that lead to long term performance decrements.

Rachael Flatt: Some folks conceptualize overtraining syndrome as a part of the continuum of REDS. But it's not necessarily the case, since REDS is indicative of rapid physiological changes due to low energy availability rather than kind of this extended overloading and training that isn't accompanied by good recovery periods.

Rachael Flatt: And there's a lot of existing definitions out there for overtraining syndrome. But, generally speaking, these are kind of the core components where it's a lack of recovery and inadequate rest after training.

Rachael Flatt: Big picture here, there's not a lot of research out there that identifies kind of the crossover between overtraining syndrome, REDS, and eating disorders. And there's no standard diagnostic test either, but there are a number of questionnaires that out there that are out there, as well as a variety of medical tests that can be run and biomarkers that can be evaluated.

Rachael Flatt: I believe there's, it's the endocrine and metabolic responses in overtraining syndrome screening tool that can look at hormones and performance tests, psychological tests, all that good stuff. But one of the things that's really important to be aware of is that there are a significant number of shared syndromes or shared symptoms between REDS and eating disorders and overtraining syndrome.

Rachael Flatt: So, you'll see athletes who show up feeling very fatigued, they may experience weight loss as a result of overtraining syndrome, REDS, and eating disorders. There can also be associated sleep
issues like insomnia or awakening without feeling refreshed, loss of motivation, and kind of these psychological symptoms of poor concentration, and depressed mood and irritability. And it's like, ‘Oh, gosh! I see that all the time with almost any athlete.’ And yes, that may be true, but it's going to be really important to see this key differentiator that in order to identify overtraining syndrome. You first have to rule out disordered eating behaviors and eating disorders as well as low energy availability.

Rachael Flatt: So hopefully that gives you a little bit more understanding of some of the differences there. But it's very important to, to note that some of the early papers that were published on overtraining syndrome. This was several years ago before REDS was actually coined, were actually very likely evaluating REDS. So there's still a lot of research to be done here and hopefully, lots of room for if there are any researchers and clinicians on the call who want to participate in this this work. This is a great area to help us understand and tease out a little bit more.

Rachael Flatt: So let's jump into screening for REDS. So the short version here is that we need to screen every athlete for this, just like we do for pre-participation physical exams or PPEs.

Rachael Flatt: We want to make sure that athletes are screened for mental health and REDS concerns specifically, though when you have athletes that are presenting with some, again, some form of maladaptive exercise behavior, whether that's excessive or compulsive exercise.

Rachael Flatt: If they've got some eating disorder symptoms or meet criteria for an eating sort of currently particularly anorexia nervosa, those are folks who are going to especially be at risk for REDS.

Rachael Flatt: Athletes who are participating in leanness sports. So these are judged sports like skating, aesthetic sports like gymnastics and diving. You've got weight class sports like wrestling and boxing and weightlifting, and endurance sports like in running long distance running, cross country, all that good stuff these are sports that you really want to keep a careful eye on, especially given the increased risk of eating disorders in those sports as well.

Rachael Flatt: In addition to that, if you have an athlete who's coming in with some recent weight loss, that should be a very, very fast red flag to screen them for REDS given that in order to lose weight there has to be some sort of negative energy balance there. So that's going to be something to very quickly look at with those athletes.

Rachael Flatt: In addition to that, athletes who especially are kind of going through puberty if they're not gaining weight or not kind of going through these traditional and typical growth and development curves, like you're seeing some growth curve drop off, that's a great indicator to screen for REDS and
delayed or lack of normal growth and development. In addition to that, if athletes are presenting with lots of injuries, especially musculoskeletal injuries and illnesses, and decreased performance and endocrine dysfunction, these are all going to be good indicators of when to screen an athlete for REDS.

Rachael Flatt: Again, this is not a comprehensive list, but these should be some things that if you're taking, if you're right taking notes this is a great list to start with as a group of athletes to screen right off the bat.

Rachael Flatt: In order to screen for REDS and I again cannot recommend this enough, just like you do annual PPEs for athletes, we want to incorporate REDS screening tools into annual assessments, if not more so when any of those additional flags come up from the prior slide.

Rachael Flatt: So certainly we've got a number of REDS assessment tools, including the REDS clinical assessment tool or the REDS CAT. And a quick side note is that this will be updated in the fall. There's going to be a whole host of publications coming out in the British Journal of Sports Medicine, or BJSM in the fall. So keep your eyes open for that, and they will be providing an updated REDS clinical assessment tool in addition to that. And they'll also provide a new algorithm as well.

Rachael Flatt: In addition, some more brief screeners that can be used are the Low Energy Availability in Females (LEAF-Q). And these have been very recently validated in athletes, in athletes specifically with REDS, so those could be used as well in addition to the REDS specific screening tool; and a side note, there is that to my knowledge as of the time I put this presentation together a couple of weeks ago, there was not a validation study in males yet. But if that's changed, let me know.

Rachael Flatt: In addition to that, so when an athlete has an eating disorder, one of the things that we want to make sure does not happen is that the eating disorder just becomes the focal point and REDS kind of gets thrown out of the picture. So, it's really important to, to, you know, in addition to those screening tools, also use disordered eating behavior and eating disorder assessments in combination with that. So, for instance, the BEDA-Q, the EDE-Q, and the EDI are all great tools to use that have been validated in athlete samples. So just keep your eyes open for those as well.

Rachael Flatt: A couple of other things to do here that can be really helpful, are you using meal logs and training logs to get a pretty good sense? It's not going to be a perfect measurement of energy availability, but at least it'll give you some good self-reporting.
Rachael Flatt: One of the things that can be done, for example, is using a digital eating disorder intervention tool or self-monitoring tool, so that athletes can very readily track their meals and track their training just so that they have a better sense of where they are, and so that their intake can be adjusted appropriately and can be done so in real time so, you’re not having to wait until the next session a week later, or 2 weeks later, to go through and adjust their, their dietary needs. This can be something that they can connect with a clinician and adjust this day of if needed.

Rachael Flatt: In addition to those markers we want to use weight and BMI measurements to screen for REDS, but only in the case, especially in the BMI side, only in the case of just kind of getting these quick markers not to judge the athlete, not to tell them their weight, especially if they are in the early phases of eating disorder treatment.

Rachael Flatt: But these can also help track the progress through, through these illnesses and ensure that they are recovering kind of on, on, track. One of the recommendations is that with BMI measurements in particular, this is really only helpful for folks who have gotten through the majority of puberty. So typically 18 or older, can be a, a good place to start that.

Rachael Flatt: In addition to that, various medical history or various medical tests and a medical history can be done to help screen for REDS as well. And one of the important pieces here to remember is that for trans athletes or non-binary athletes, who especially those who are assigned female at birth, may have different markers, and, and should be assessed for menstrual irregularities.

Rachael Flatt: So one of the things that we do not have a lot of information on, though, is, is how trans athletes may have some differences physiologically then athletes, for instance, who are cisgender. So one of the things that we want to do here is ensure that they are getting gender affirming care while taking into to account their underlying physiology.

Rachael Flatt: In addition to that, with the Risk Assessment Model here, this is from the REDS clinical assessment tool. This is currently the traffic light model that we like to, to, term it so red, yellow, green, on the red light side. This is the high risk, and so this is athletes with anorexia or very serious medical conditions or extreme weight loss techniques that have been used. These are folks who are medically unstable. We do not want them participating in sport especially at a full training level or competing where they could get very seriously hurt and have long-term health consequences as a result. So that's kind of on one end of the spectrum.

Rachael Flatt: In the middle, we've got folks who are in this yellow light, a kind of moderate risk area for RES. And again, there's a whole slew of characteristics here. I won't go through all of them. But there are some key instances here that would indicate an athlete is at pretty high risk still of REDS, and that we
want to take immediate steps to ensure that we are preventing any further harm, and ensuring that they are getting the help that they need.

Rachael Flatt: On the far-right side, we've got the green light zone where athletes are generally, not at risk or very, very low risk for REDS. They've got an appropriate physique, and it's maintained without any additional stress or unhealthy kind of dieting or exercise strategies commonly associated with eating disorders. Medically, they're functioning well; BMI, and bone and mineral density, all that good stuff is looking okay.

Rachael Flatt: So again, there's a wide range of issues that can pop up between those two book ends, but this will also be expanded a little bit in the coming publications in the fall. So again, keep an eye out for that, there's going to be some more explanations now that we've got a little bit more research. But for now this this traffic light scenario helps, helps indicate which athletes should be seeking treatment.

Rachael Flatt: And speaking of treatment, we will very quickly go through some treatment considerations and consequences specifically for athletes. One of the things that is going to be very similar here, as eating disorder treatment is that it is very helpful to work with a multidisciplinary team. And hopefully, this is a team that works well together.

Rachael Flatt: So we've got a dietitian to really help re-establish balanced eating habits. We've got a mental health care professional to address underlying psychological issues, especially if there's an eating disorder present. And although it can be difficult to find someone who has a background and training in both working with athletes and those with eating disorders. That's the jackpot for both dietitians, mental health care professionals and positions and for physicians. They're going to be the folks who are primarily monitoring and treating the athletes uh, physical and medical health conditions.

Rachael Flatt: When we start, once you've got that team assembled, in addition to that, you know, there may be other professionals that you may want to include here. For example, an exercise physiologist just to help measure some of the energy output, and just to help get a better detailed picture of the energy availability. Once you've got that team assembled, that's when you want to get really high quality baseline data.

Rachael Flatt: This is again using all those metrics that I just put together on that prior slide. This is going to be your start line for this athlete, and will help them understand where they need to go in order to resume hopefully full training and address the underlying physical and health concerns.
Rachael Flatt: Then what we'll do is address some of the caloric energy deficiency. Again, an eating disorder or disordered eating behaviors are present. That's when you want to use evidence-based psychological treatments like a family based therapy and cognitive behavioral therapy for eating disorders and, if necessary, an additional step that can be taken is to use pharmacological and supplemental treatments, and that can also be done, for instance, if an athlete's got low iron or can also be used to reduce the risk of stress fractures.

Rachael Flatt: Second to last, we also very closely want to monitor mental irregularities for athletes who are signed female at birth (AFAB). And finally, we want to very, very intentionally be putting together maintenance strategies and relapse prevention strategies, so that this is not something that athletes have to deal with long term. One of the best things that we can do when we're treating REDS as well as eating disorders as well, is ensuring that these plans are flexible, so that when an athlete is training at a higher load earlier in the season, for instance, or is building, or is kind of coming into their off season. What are some of the strategies that they need to consider with those training loads that may change over time.

Rachael Flatt: Finally here, one of the things that can be most helpful with athletes given, how strong the athlete identity can be is talking a little bit about some of the performance consequences of REDS. And this is very helpful in treatment settings when you're trying to get them on board. Sometimes athletes are a little bit rather reticent to engage in some of these treatments, just in part because it's less time on the field.

Rachael Flatt: And, as we know, athletes love to, love to be playing. So we want to ensure that they have a very clear understanding of what some of the performance consequences are of REDS when they are getting treatment, and even from a psychoeducational perspective. Having this information upfront can help them prevent engaging in some behaviors that may lead to REDS and eating disorders. But also can help them make small changes over time, so that their health and their performance are optimized long term.

Rachael Flatt: And this is again, I won't go through all of these, but I think one of the things that we need to be careful of is that when some athletes and coaches think that REDS is present, they can still get away with some of these shorter types of workouts or you know, performance that is a little subpar and then an athlete can kind of dig, dig deep and push through, you know, just to get the job done for a minute or 2.

Rachael Flatt: But in reality, when you're looking at the health and performance consequences, it's really clear that an athlete will not be able to maintain their health and their performance long term, and when so many systems, and when so many performance aspects are negatively affected. So again,
hopefully, more, more fuel to, to motivate them, to get treatment and to prevent going down this road in the first place.

Rachael Flatt: So last thing before we wrap up, and I apologize for eating a few minutes into our Q & A time because of my Wi-fi issues. But here we are a couple of things to mention in terms of future research and practice.

Rachael Flatt: One of the things that it's very clear especially after a few conferences where some of this initial information on the updates for REDS have been presented, is that we really need a better understanding of shared and unique risk factors and presentations for athletes based on their demographics and sport characteristics.

Rachael Flatt: I think one of the things that is really lacking in the research, especially given that REDS used to be the female athlete triad, is that we really don't have great data on males or men athletes with these characteristics. So one of the things that we're going to need to do is start validating and doing a lot more research on athletes with a variety of demographics based off of their gender, their age as well as their, their sex, their sexuality, their SES. One of the things that we've often thought about is how folks who are food insecure, this may be especially persistent. So we and but we don't have good data on that yet.

Rachael Flatt: So again, if you're interested in participating in research, this is a great opportunity to, to get involved and, and help with this. In addition to that, we also need to understand if and how eating disorder treatment should differ in the presence of relative energy deficiency and sport.

Rachael Flatt: We do not have this at this point in time. But hopefully we should be able to get that in the next several years, so that we can make more informed decisions for these folks who are presenting with both eating disorders and REDS.

Rachael Flatt: Third, we want to ensure that there is a better understanding of both the shared and unique pathology and treatment recommendations for REDS, eating disorders, and overtraining syndrome, since, again, there's not much out there on that.

Rachael Flatt: And the last 2 things that I will mention here that, I hope these are the major takeaways for you all is that if there is a concern for an eating disorder screen for REDS, and the same goes if REDS is present, screen for an eating disorder or disordered eating behaviors. And I really hope that you can take some of this information and disseminate both REDS and eating disorder psychoeducation
simultaneously, since they often do go hand in hand, but not every time. So I hope that this has been helpful for you all.

Rachael Flatt: And with that I will put my key references up here for you all, and we'll also share the slides so you can take a peek at those after the presentation.

Rachael Flatt: But with that, I will look to the chat and the Q & A for some questions and I will do my best to get through as many of them as I can. So thank you all for listening, and thank you so much for bearing with me with the Wi-Fi interruption.

la-shell_johnson@med.unc.edu: Thank you so much, Ms. Flatt for the presentation. As a reminder, we will be sending the slides from today's presentation out along with our evaluation immediately after the call. And any unanswered questions from the Q&A, we will send those responses to you one week from today from Ms. Flatt.

la-shell_johnson@med.unc.edu: So, the first question reads, please provide the reference for the 2018 paper you mentioned. I know you shared references earlier Rachel, so I assume that is included in there?

Rachael Flatt: Yes. It's in the key references as well as one of the 3, I think it was one of the 3 or 4 papers that I had initially recommended as pre reads for this. So, we'll definitely send that information to you.

la-shell_johnson@med.unc.edu: The next question reads, “It seems like the coach or person working directly with the athlete, would be a critical person to add to the team. What are your suggestions for moving forward with treatment if the coach and team trainer are not on board with being part of the care team?”

Rachael Flatt: Yeah, this is a great question, and I think with REDS we take a very similar approach, as we would with eating disorders. So, one of the things to consider here, as you think about kind of the full picture of the treatment, treatment team for athletes, oftentimes a coach or trainer will be included. But first and foremost, that is, only with the athlete's consent, in part because we know that coaches in particular, and some training staff can really be a negative influence on maintaining the eating disorder, or maybe part of the risk at the get go.

Rachael Flatt: So, one of the things that can be helpful, especially if the coach is on board is to involve them as long as the athlete is on board with that as well. However, sometimes it is very helpful to maybe
meet with this coach separately, and give them some additional information as to how to adapt training, or how to provide more body positive or body neutral messaging to this athlete. That work may have to be done separately before they're kind of brought into the fold, and sometimes the coaches just are not, as you said, not on board with being part of that care team. And that's perfectly okay, too.

Rachael Flatt: In large part, because it's not necessarily something that they've been trained to do right. We don't necessarily have a lot of coaches out there who are, you know psych or who are therapists or dietitians, or you know that that's very few and far between, so totally understandable that may they may not want to be involved.

Rachael Flatt: So the important thing that you can do there is with the athlete, with their family. If, if, that's a part of the treatment team we want to make sure that they have a really good understanding of how to, you know, communicate with the coach, what information to pass along to them, and how to advocate for differences in training plans, for instance, or differences in communication styles around the athletes body, or their energy intake, or their training. So, there's again. It's hard to do, you know, therapy, or hard to do that kind of treatment with both parties not in the room, but one of the best things that you can do is just really empower and advocate for the athlete in those, in those sessions. So it's not ideal if they're not wanting to be involved, but sometimes that may be for the best, if especially if the athlete is not wanting them to be particularly involved.

la-shell_johnson@med.unc.edu: Thank you so much for that, Ms. Flatt. The next statements as question read, “are those citations included in the presentation, are they searchable citations? If not, could we include those at the end, once we send out the slides?”

Rachael Flatt: Yes, to both. I can compile them.

la-shell_johnson@med.unc.edu: Great. The next question reads, it seems that the coach trainer instructor that works closely with the apple would be an important person to add to the care team. Okay, we read that one already? “What are suggestions for currently this person to be a part of the health care team for the athlete?”

la-shell_johnson@med.unc.edu: So, we did that one. “Have you thought of including artistic aesthetic athletes, such as dancers cheerleaders, and circus performers to your research? Figure skaters and gymnasts would definitely be a part of this group. I know that with dancers, that loss of menstruation is considered a badge to be earned, and has been reinforced in the past as a positive achievement. Do you have any thoughts or considerations related to this?”
Rachael Flatt: Yeah, so there is a bit of information and a bit of research out there on skiers, cheerleaders, dancers. They are definitely and gymnasts as well, that kind of aesthetic group of athletes. This is definitely a group like I mentioned earlier, that is at much greater risk of developing REDS and eating disorders.

Rachael Flatt: I think one of the things as you mentioned, too, is that? And I can think back to my own competitive days. Where, truly amenorrhea was locker room talk for, hey? I’m doing the right things in my training. And obviously, we know now that that’s not the case. But unfortunately, that was very common and is still quite normalized. So, I think one of the things that we need to do is again provide a lot of psych education around these topics, not only to the athletes? But also to the folks who are around them, their coaches, their family, their peers, to ensure that these athletes really understand what is a good indicator of health. What is a good indicator of an eating disorder or sub-threshold eating disorders or just disordered eating behaviors.

Rachael Flatt: But I completely agree that we need more research on these, these athletes, and those groups in particular, since there is an elevated risk. Yeah, great question.

la-shell_johnson@med.unc.edu: Thank you so much, Ms. Flatt. The next question reads, “I'm still confused a bit. If an athlete has anorexia nervosa or bulimia nervosa, wouldn't they always have REDS, at least for anorexia nervosa, isn't it almost a hundred percent certain that they have REDS?”

Rachael Flatt: Yeah. So great question. Your last point, is it almost a hundred percent certain that they have REDS if they have anorexia. Most likely, yes.

Rachael Flatt: We do not have great research, though, on if there are instances where that wouldn’t be the case. But for bulimia they may or may not actually have REDS, especially if the binge or the consumption during a binge kind of outweighs some of the purge disorder, or the purging behaviors.

Rachael Flatt: So it's really important again to monitor that closely. But it is, it is really interesting to see the lack of research on that at this point, but is a great area for us to get a better understanding of how often both of those illnesses coincide, so great question.

la-shell_johnson@med.unc.edu: Thank you so much again, Ms. Flatt. And the last question reads, “How do you recommend coaches and others who work with athletes start the conversation about eating disorders with their athletes, especially if they are seeing concerning signs and symptoms?”
Rachael Flatt: Yeah, also another great question. One of the best things that you can do when you're talking with coaches and family members, etc., is to help them understand how to approach this athlete with an empathetic manner. We want to ensure, I think, first and foremost, that they approach this athlete in a you know a confidential and safe space that they're reaching out to them and saying, “Hey, I'm concerned about you. I've seen some of these things, or I've heard you know, you say some of these comments, and I'm worried about you.

Rachael Flatt: One of the most important things that you can do is be supportive and not quickly coming to conclusions. You want to be curious, and you want to be empathetic, and you want to ensure that when they are talking with this athlete that they have resources ready to go, and that they're willing to follow up with this athlete frequently. In large part, because we know folks who have eating disorders or REDS are very reticent to get treatment and let alone admit that something is going on.

Rachael Flatt: So, if and when they are ready, we want to make sure that they do have resources that they can get checked out by a medical professional and a therapist and dietitian, and that they're able to get treatment early. Because it can be really difficult for athletes to speak up about that. And so, when it coaches and the support team are willing to take that step and say, ‘hey, I'm worried. I just want to check in, see how you're doing. And here are some resources just in case,’ and then following up with them often shows that this isn't. This doesn't have to be a scary, or stigmatizing topic that we can, we can talk about, and that I'm here for you, and that even if I am not the professional to treat you, I'm still on your side, and I still want you to be your very best, not just as an athlete, but as a human.

la-shell_johnson@med.unc.edu: Thank you so much for that, Ms. Flatt, we truly appreciate it. That is the end of our question and answer segment. We have addressed all questions. I want to thank you all once again for joining today's webinar. We will be sending out slides at the end of the webinar along with our evaluation. Ms. Flatt, do you have anything that you'd like to share any final thoughts?

Rachael Flatt: No, just thank you all so much for joining. And yeah, feel free to reach out with any further questions.

la-shell_johnson@med.unc.edu: Alright. Thank you all once again for joining, and we appreciate you and look forward to seeing you again on next month's webinar. Thank you.

Rachael Flatt: Thanks.