12-2021

Survey of NCAA Athletic Trainers' Administration of the National Wrestling Coaches Association Weight Certification Program

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Abstract

Context: The National Collegiate Athletic Association (NCAA) implemented a minimum weight certification program in 1997 to help protect wrestlers from dangerous weight loss practices. Despite nearly a quarter of a century of this program, there is no published research detailing the implementation of it.

Objective: Determine how the NCAA minimum weight certification is being implemented across Division I programs.

Design: Cross-sectional study

Setting: Survey

Patients or Other Participants: A total of 35 (45.5%) of 77 NCAA division I wrestling athletic trainers responded to the survey.

Main Outcome Measure(s): Survey data on how the NCAA minimum weight certification program was implemented at the division I level was collected.

Results: Nearly all respondents used athletic trainers to take their measurements. Most staff (74.3%) had five or more years of experience taking the measurements, and only one (2.9%) had less than a year of experience. The time prior to competition that the measurement was taken ranged widely from 2 to 110 days. Nearly all (97.1%) used skinfold calipers, and just one program (2.9%) specified a different method, iDXA scan. Of those using the skinfold calipers, 52.9% used Lange calipers and 32.4% did not know the caliper type. Everyone used the same three measurement locations. Body density was converted to %BF with the Brozek formula at

13% of the institutions, the Siri formula at 4.3% of programs, “other” (defined by respondents as the optimal performance calculator provided by the NWCA) at 13% of schools, and 69.6% did not know.

Conclusion: Overall, there appears to be great consistency in the administration of the minimal wrestling weight standards across NCAA Division I wrestling programs.

Key Words: athletes; body composition; minimal weight

Abstract word count: 268

Manuscript word count: 2,253

Key Points

- Athletic trainers are responsible for taking the measurements used to calculate minimal weight classification in the vast majority (94%) of NCAA Division I programs.
- Nearly all programs (97%) use skinfold calipers and the same formula to estimate body fat percentage.
- Overall, the administration of the weight management program appears to be consistent across NCAA Division I wrestling programs.

In 1997, over the course of one month, three college wrestlers died because of "cutting weight" to wrestle at their desired weight class. These wrestlers used tactics such as sweat suits, withholding from water and food, and exercising in a hot room.[18] All three of these wrestlers died due to heat-related cardiac arrest.[5] Shortly afterwards, the National Collegiate Athletic Association (NCAA) created a minimum weight certification for their wrestling athletes. This minimum weight certification was implemented to help prevent these drastic weight cuts and protect the health of the athletes.[2,7]

As far back as 1976, the American College of Sports Medicine (ACSM) recognized the danger of wrestlers losing large amounts of weight rapidly, and the organization published a brief position paper on the topic.[1] Subsequently, in 1996, only a year before the deaths of these three wrestlers, the ACSM updated their position statement regarding weight loss practices.[17] In this position statement, the ACSM addressed the dangerous practice of rapid weight loss and the detrimental effect that it has on the athletes. The ACSM gave recommendations for wrestlers on how to safely manage their weight, such as maintain a balanced diet and avoid prolonged fasting and dehydration. At the time when this position statement was released, some states were starting to implement stricter guidelines regarding weigh-in procedures and creating new educational resources for wrestlers.[19] However, none of this was adopted universally by the NCAA until 1997 after the deaths of the three wrestlers.[7]

A minimum weight is determined for a wrestler by first taking a body density assessment of the athlete. This can be determined from a variety of methods. The NCAA allows the use of skinfold measurement, hydrostatic weighing, and air displacement plethysmography to determine the body density of the athletes.[16] This measurement is then put into an equation to determine the body fat percentage of the athlete (BF%). All these measurements must be done

with the athlete in a euhydrated state, which is verified with urine analysis using a refractometer or urinometer.[2,16] The BF% is used to determine the athlete's fat-free mass then 5% is added to the fat-free mass estimation to determine the minimum weight for that athlete. The athlete must wrestle in a weight class that is above his minimum weight.[16,17]

These measurements are important to the safety of the athlete throughout their season, and therefore the collection of these measurements is entrusted only to certain staff members that work with the team. The NCAA allows these measurements to be taken by only a physician, an athletic trainer, or a registered dietician.[16]

Although there is an established protocol for determining a wrestler's minimum weight, some variation exists across teams on how that measurement is acquired. Whether it be the method of body density measurement, which type of skinfold caliper is used, such as Harpenden or Lange, or who takes the measurement, the differences between teams could be substantial. Considerable research exists on the validity of the methods used to estimate a minimum weight for a wrestler.[6,13] There is also research documenting the efficacy of the NCAA's weight management program.[6,16,19] An entire generation of wrestlers have now grown up with minimal weight standards, as this system has been in place for over 20 years. However, there has yet to be a study examining the administration of the NCAA's weight management program. There may be substantial and meaningful differences in the administration of the weight management program across universities, which could disadvantage some athletes. Consequently, the goal of this study was to survey those involved in the collection of body composition data for the calculation of minimal wrestling weight in NCAA Division I wrestling and identify small differences or inconsistencies in the procedures that could potentially disadvantage some athletes.

Methods

The target population of this survey were the athletic trainers who oversee the wrestling team at their respective institution. According to the NCAA guidelines, athletic trainers may be responsible for taking the measurements; at least they are likely to know the details of how the measurements are taken. Specifically, the study was limited to NCAA Division I wrestling programs of which there are 77 current programs. The programs were selected through the NCAA list of Division I wrestling programs. The emails for the athletic trainers who oversee wrestling within each program were found through each university's website. The Institutional Review Board of the authors approved the survey, and a letter of information informed the participants of the intent to publish the data.

The authors developed the survey questions in consultation with an NCAA athletic trainer and a statistician with expertise in REDCap (Research Electronic Data Capture) survey research. The survey is available as supplemental content. REDCap was the survey tool used for data collection and analysis of descriptive statistics such as frequencies. The survey was available for one month, and an email reminder to complete the survey was sent to those who had not yet completed it after two weeks. We hypothesized that universities in the "Power 5" conferences would use laboratory methods of body composition assessment such as hydrostatic weighing and air displacement plethysmography more frequently than those from other conferences. Additionally, we anticipated that most athletic trainers responsible for determining the minimum weight would have substantial experience (> 5 yr).

Data were analyzed with REDCap. Responses were calculated as percentages.

Results

Of the 77 Division I wrestling programs invited to participate in the study, 35 responded to the survey, for a response rate of 45.5%. Respondents were from all seven conferences with NCAA Division I wrestling programs (Figure 1). Of the respondents, 42.9% finished their season in the top 25 of the National Wrestling Coaches Association (NWCA) coaches' poll.

Nearly all of the programs (94.3%) used the athletic training staff to take the wrestlers' body composition measurements and calculate the minimum weight, while the remainder (5.7%) had exercise science staff take the measurements. Of the 35 respondents, 74.3% had a staff member with five or more years of experience taking the measurements, and only one program (2.9%) had someone with less than a year of experience taking the measurements. The amount of time before competition that these minimum weight measurements were taken varied greatly between programs and individual athletes. The range of days prior to competition that the measurement was taken was 2 to 110 days, but most programs took the measurements 21 to 60 days before the first match (Figure 2). Pretesting hydration status was defined the same by nearly all with 91.4% of programs using a urine specific gravity (USG) criteria of < 1.020, while 5.7% selected "other" in the survey and defined this as a USG < 1.018.

The method for determining body composition was nearly unanimous with 97.1% using skinfold calipers, and just one program (2.9%) specifying a different method, iDXA scan. Of those using the skinfold calipers, 52.9% used Lange calipers, 32.4% did not know which caliper they used, 8.8% used Harpenden calipers, and 5.9% used some other type of caliper. All respondents used the same three measurement locations (and presumably the same skinfold formula) for their skinfold caliper measurements: triceps, subscapular, and abdomen. One respondent also reported a thigh measurement. Body density was converted to %BF with the

Brozek formula at 13% of the institutions, the Siri formula at 4.3% of programs, “other” (defined by respondents as the optimal performance calculator provided by the NWCA) at 13% of schools, and 69.6% did not know what formula was used. Lastly, 20% of the programs believed the athletes perceived the minimal weight measurement and NCAA’s weight management program as positive, 11.4% considered it as negative or an unnecessary burden and 68.6% rated it neutrally.

Discussion

Based on these survey results, there appears to be a great deal of consistency in the administration of the weight management program across NCAA Division I wrestling programs. Nearly all programs were consistent in how they verified pretest hydration status, the method used to assess body composition, and the formulas used to estimate %BF and determine minimal wrestling weight. While the validity of procedures and individual body composition assessments cannot be assessed through a survey, consistency across survey respondents suggests fairness or equality in the administration and application of determining a wrestler’s minimal wrestling weight.

One major inconsistency gleaned from this survey was the wide variability in the span of time between the calculation of minimal wrestling weight and the first match. This ranged from 2-110 days. Such a large difference in time could drastically affect a wrestler’s ability to achieve a higher or lower minimal weight class, and consequently negate the other consistencies observed across programs. Allowing an athlete more or less preseason-training time, likely resulting in some body composition change, poses an unfair advantage in setting a minimal weight classification, and this variable should be standardized (e.g., 30 days prior to the first match). However, the distribution of this survey during the Covid-19 pandemic is a likely

explanation for the large inconsistency in this variable. Some respondents noted that their seasons were either modified or simply did not exist. Therefore, the timespan between the measurements to determine minimal weight and the first match was vastly different than what it would have normally been. Consequently, it is assumed that there would be more consistency for this important variable during a "normal" season.

It was somewhat surprising that more programs were not using laboratory methods such as hydrostatic weighing or the Bod Pod to measure body composition. The skinfold technique requires considerable skill and practice to obtain an accurate measurement,[4] particularly when compared to the user-friendly Bod Pod. However, the skinfold method is certainly more practical and cost effective.[10] Further, the skinfold equation developed by Lohman[15] and validated specifically for use in wrestlers by Thorland et al.[21], has been widely used for estimating minimal wrestling weight for many years.[14] The measurement sites for this skinfold equation were illustrated and example calculations were provided in a 1996 *Journal of Athletic Training* article.[23] Skinfold calipers, in the hands of a trained technician, can be a reliable and valid method for measuring the body composition of lean athletes.[12] While the actual training of the personnel taking the measurements was unknown, from the survey most of the professionals taking the measurements had 5 or more years of experience. The training of the person taking the measurements can greatly influence body composition results.[11] Some programs reported using Harpenden calipers while others reported using Lange calipers. These two calipers exert a similar pressure; however, research suggests that Harpenden calipers produce slightly smaller folds than Lange calipers.[9,20] Nevertheless, the difference due to caliper type should be minor if the measurements are taken correctly.[9] However, technician training should be a priority if programs continue to use the skinfold method to estimate minimal wrestling weight.

Many survey respondents did not know which equation was used to convert the skinfold measurements to body density. This may seem concerning, but there is likely an obvious explanation. The National Wrestling Coaches Association (NWCA) provides staff associated with the wrestling programs some resources to promote safety and help their wrestlers perform at their best. One useful resource is the online optimum performance calculator, which is something that the survey respondents noted in their responses. This online resource automatically calculates minimum weights based on the skinfold and descriptive data entered and provides some nutritional tools for the athletes. Consequently, many athletic trainers likely use the calculator without knowing, or needing to know, the specifics of the conversion from individual skinfold values to determination of minimal weight.

The athletic trainer's perception of what the wrestlers think about the minimum weight requirements are interesting. Most of the response was neutral, with four programs (11.4%) thinking that the athletes view this requirement negatively. This rule was put into place to help protect the athletes from the dangerous effects of drastic weight cutting practices that were common in wrestling prior to this rule being created.[7] Given that the NCAA weight management program has been in place over 20 years now, it is understandable that most respondents said the athletes had a neutral attitude to it. Today's athletes have no other frame of reference; the minimal wrestling weight rule has always been in existence for them. The negative perception, while only 11.4%, is something that may merit some investigation. What aspects of the rule create this negative perception? Perhaps changes could be made to how data are collected or the determination of the minimal weight classification that can change some of these negative and neutral perceptions to more positive ones.

As with any survey, the study is limited to the respondents, and one must assume that nonresponders would answer similarly. The response rate of this survey was just under 50% at 45.5%. However, research shows the average response rate of athletic trainers taking part in electronically delivered surveys is 34.2%[3]; thus, the present study exceeded the typical response rate. Another limitation is that many collegiate wrestling programs had altered seasons last year due to the Covid-19 pandemic. This likely influenced or altered how some of the respondents answered some of the survey questions. Specifically, respondents noted that Covid-19 had affected the time schedule for taking the measurements while the other variables were mostly unaffected.

Overall, there appears to be great consistency in the administration of the minimal wrestling weight standards across NCAA Division I wrestling programs. Nearly all programs surveyed use skinfold calipers as their method of choice to assess body composition, and they also report measuring the same skinfold sites and using the same formula to determine minimal weight.

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Figure Legends

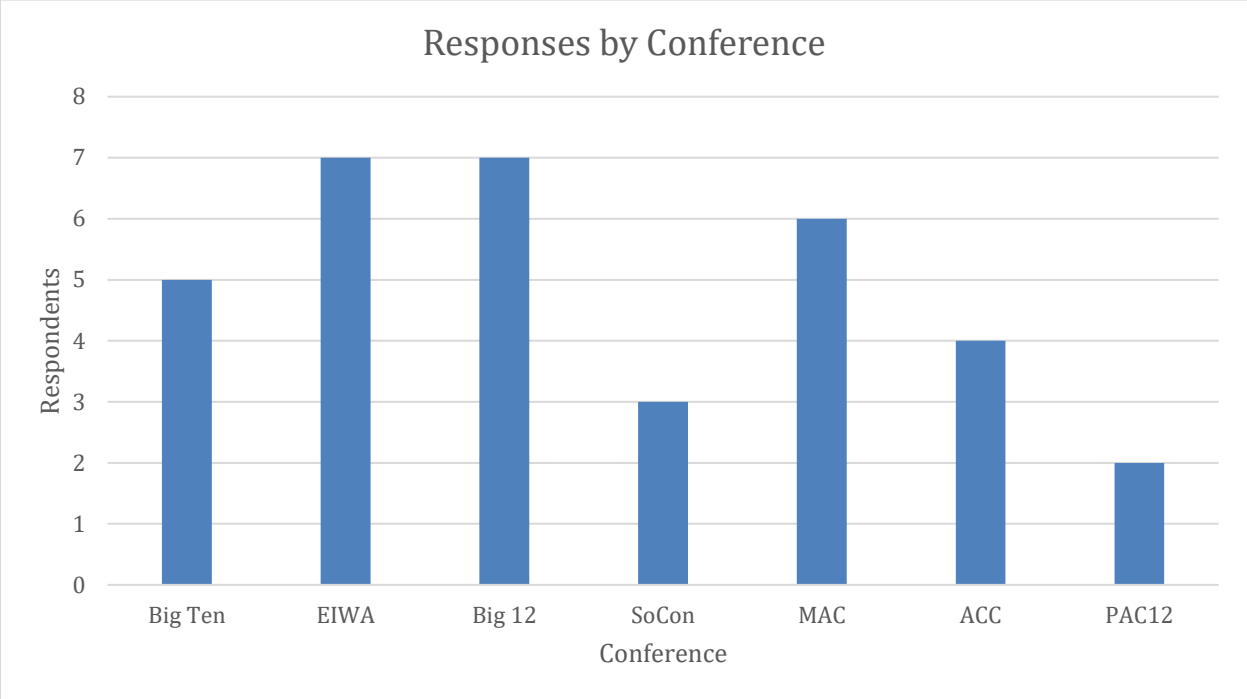

Figure 1. Responses by conference. EIWA (Eastern Intercollegiate Wrestling Association), SoCon (Southern Conference), MAC (Mid-American Conference), ACC (Atlantic Coast Conference), PAC-12 (Pacific-12 Conference)

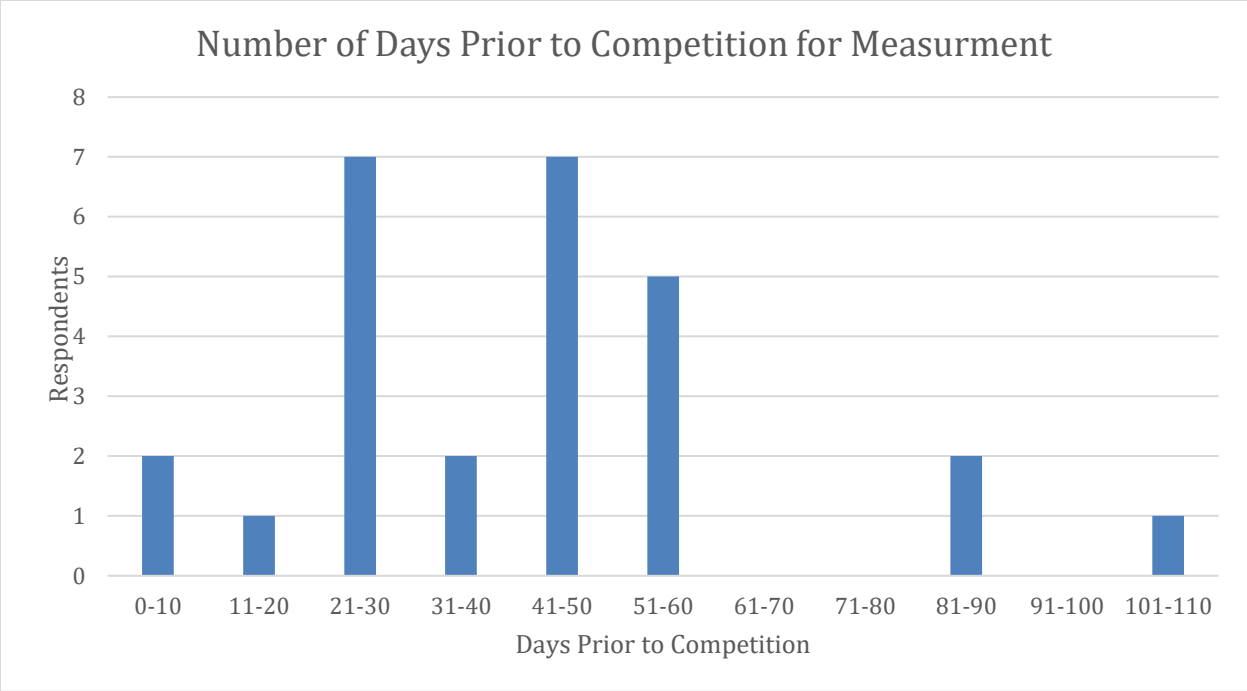

Figure 2. Chart displaying the days prior to competition the minimum weight certification was taken