Student Coaches' Knowledge, Attitudes, Skills, and Behaviors Regarding the Female Athlete Triad

Jill W. Lassiter and Celia A. Watt

Abstract

The female athlete triad can cause acute and chronic health problems for physically active females. This study describes student coaches preparedness to participate in primary prevention and intervention of the triad; specifically, (n=61) senior Physical Education and Sport majors' knowledge, attitudes, skills, and behaviors related to the triad are surveyed. The majority of subjects lack knowledge, appropriate attitudes and skills, and are not likely to participate in indicated behaviors (females scored more favorably than males, however previous training specific to the triad did not impact scores). These findings indicate the need for initial and continuing education of all coaches of female athletes.

The female athlete triad, a syndrome composed of disordered eating, amenorrhea, and osteoporosis, can cause significant acute and chronic health problems for physically active females (Burney & Brehm, 1998; Clairmont, 2000; Hobart & Smucker, 2000). Among athletes, both internal and external pressures to perform well in competition and to maintain a particular body type and size contribute to the likelihood that athletes will develop the triad (Otis, Drinkwater, Johnson, Loucks, & Wilmore, 1997). Participants in high-risk sports such as gymnastics, dancing, figure skating, running, swimming, and diving are at even greater risk due to the especially small physique and low body weight emphasized to excel in these activities (Clairmont; Otis et al.).

Although the exact prevalence of the female athlete triad is unknown, it has been estimated that up to 62% of female athletes engage in some sort of disordered eating patterns and as many as 66% report having amenorrhea (VanDeLoo & Johnson, 1995; Yeager, Agostini, Nattiv, & Drinkwater, 1993). The number of girls and women potentially at-risk of developing the triad is extremely high when considering that nearly half of all adolescent (grades 9-12) females participate in sports or vigorous physical activity (Kann et al., 2000), approximately 148,800 female students participate in college athletics (National College Athletic Association, 2001), and numerous others participate in non-varsity sports. Each component of the triad is related to costly health problems, and when presenting together the physical, emotional, and financial costs escalate.

All three of the components of the female athlete triad are difficult to treat once they have progressed into advanced stages. Therefore, primary prevention and early intervention are the most promising ways to decrease the prevalence of the triad and the negative health effects associated with it (Beals, Brey, & Gonyou, 1999; Nattiv, Agostini, Drinkwater, & Yeager, 1994). Coaches can have tremendous influence on the athletes that they coach; they have continuous and meaningful contact with their athletes therefore are well-positioned to participate in prevention and early intervention activities. Widespread recommendations from researchers call for increased education of coaches about the female athlete triad (Beals, 2000; Beals et al.; Burney & Brehm, 1998; Nattiv et al.; Otis et al., 1997; Sanborn, Horea, Siemers, & Dieringer, 2000; VanDeLoo & Johnson, 1995).

Professionals who are equipped with appropriate knowledge, attitudes, and skills are more likely to participate in educational and preventative behaviors that help decrease negative health behaviors in their target population (Blakeley & Robeiro, 1997; Clark, Haverty, & Kendall, 1990; Clark, Kendall, & Haverty, 1987; Intrieri, Kelly, Brown, & Castilla, 1993). Among those behaviors, educating athletes is frequently cited as necessary for preventing the female athlete triad (Otis et al., 1997; VanDeLoo & Johnson, 1995; Williams, 1998), however it is contingent on possessing knowledge, appropriate attitudes, and skills which findings of this study indicate to be lacking. Because the triad is a relatively newly defined health condition (Yeager, et al., 1993) it is likely that more experienced coaches did not receive formal education to address this issue. Therefore, this survey of newly educated coaches provides a benchmark for the level of preparedness to address the triad in a subset of coaches who are most likely to have been educated on the topic.

Currently, there is no published literature in which researchers describe seasoned or newly educated coaches' preparedness to address the female athlete triad nor whether or not they are involved in prevention and intervention activities. Therefore, this survey research examining the current state of student coaches' knowledge, attitudes, skills, and behaviors related to the female athlete triad is an initial step in developing an empirical database describing coaches' preparedness to address the female athlete triad.

Method

Sample

Subjects were seniors and graduate students majoring in Physical Education and Sport (PES) who had successfully completed their course work and student teaching requirements necessary for preliminary certification at a college in Western New York favorably known for its PES department. This sample represents the target population of college-educated coaches, and more specifically, newly educated coaches.

Instrument

A 34 item questionnaire based on current literature was designed to assess four constructs related to coaches' roles in preventing the female athlete triad: knowledge, attitudes, skills, and behaviors (Beals, 2000; Beals et al., 1999, Burney & Brehm, 1998; Hobart & Smucker, 2000; Nattiv et al., 1994; Nattiv & Lynch, 1994; Otis et al., 1997; Putukian, 1994; Sanborn et al., 2000; Smith, 1996; Sundgot-Borgen, 1994; VanDeLoo & Johnson, 1995). Items examining knowledge queried students' ability to name the components of the female athlete triad, recognize signs and symptoms of the triad, identify at-risk populations and potential resources for intervention and assistance. Attitudes, skills, and behaviors related to the female athlete triad were assessed using a Likert-type scale and are further described in the following results section. Basic demographics and mediating variables that might influence these constructs (gender of the coach, gender of the athletes coached, length of coaching experience, personal history of an eating disorder, specialized training about the triad) were also examined using appropriate inferential statistics (i.e. t-test, chi-square, MANOVA).

Results

A total of 64 student coaches participated in this study. Surveys from three subjects not providing demographic or coaching experience data were eliminated from analyses resulting in a final sample of 61 student coaches. (Note that some subtotals do not add up to 61 due to missing data.) At the time of the survey, 95% (n=57) were seniors and 5% (n=3) were graduate students.

Demographics and Mediating Variables

The sample consisted of slightly more males than females; 56% (n=34) and 44% (n=22) respectively. Differences across gender of coach will be reported in each of the following sections

(describing knowledge, attitudes, skills, and behaviors) when they are significant.

Students reported experience coaching a total of 18 different sports. Across these sports, 39% of students (n=24) indicated that they coached only male athletes, 33% (n=20) coached only female athletes, and 26% (n=16) coached both male and female athletes. Significant differences across gender of athlete coached will be described in subsequent sections.

All students reported some coaching experience; 46% (n=28) had 1-3 months experience of coaching experience, 25% (n=15) had 4-11 months experience, 20% (n=12) had 1-4 years of experience, and 10% (n=6) had 5 or more years of experience. No significant differences were found across knowledge, attitudes, skills, and behaviors based on length of coaching experience.

Few students indicated a history of the triad (n=2; 3%) or an eating disorder (n=5; 8%). Analyses examining differences based on these variables were not conducted because of low prevalence and inconsistent self-reporting (e.g. one subject who indicated a pervious history of the female athlete triad was male, some self-identified as having the triad but not as having an eating disorder).

Finally, 11% (n=7) of the student coaches said that they had received previous specialized training (e.g. professional conferences, video presentations, in-service trainings provided by their school districts) about the female athlete triad. No significant differences were found between students who had or had not received specialized training across knowledge, attitudes, skills, and behaviors.

Knowledge

Student coaches' responses to items assessing overall knowledge of the female athlete triad indicated deficits. Students were generally unable to name the components of the triad or to discriminate among a list of correct and incorrect signs and symptoms. Specifically, student coaches were asked to list three of the components; 31% were able to correctly identify disordered eating, 26% amenorrhea, and 8% osteoporosis. Only four students (7%) correctly identified all three components of the female athlete triad; an additional six (10%) correctly identified two of the three components. Almost one-fourth (23%, n=14) of the students wrote in the spaces provided that they *did not know* the components, 7% (n=4) left the question blank, and 21% (n=13) gave three incorrect answers. A further examination of these responses revealed that female student coaches were able to name significantly more components (m=1.00, s=1.07) than male student coaches (m=.38, s=.65; $t(58.911)=2.402$, $p<.05$).

Presented with a list of 16 signs and symptoms (12 correct and 4 incorrect), subjects were asked to identify which were possible signs and symptoms of the female athlete triad. Only 5% identified all 12 correct signs and symptoms, 49% identified at least 8 (8-12), and 67% identified at least half (6-12) of the correct signs and symptoms. Of the four incorrect signs and symptoms presented, almost half (46%) of the student coaches accurately left all four blank and an additional 31% accurately left 3 blank.

When student coaches were asked which population is most at risk for developing the female athlete triad, 46% correctly answered "all females who are physically active." The most common misperception held was that only "young girls who play sports" are at risk (31%). Other misperceptions included "all people who play sports" (13%) and "only mature women who are physically active" (8%).

Four true/false items also queried student coaches' knowledge of the female athlete triad. The first item asked if "women over the age of 25 are at greater risk of developing the female athlete triad than women under the age of 25" and was accurately answered as false by the majority (84%) of students. When asked if "the female athlete triad can be fatal", 89% correctly answered true. The statement "the female athlete triad only

affects athletes' health while they are playing sports" was correctly identified as false by 82% of student coaches. The item stating "signs and symptoms of eating disorders are also risk factors for developing the female athlete triad" was accurately identified as true by 92% of the students.

Female coaches correctly identified that the female athlete triad *does not* only affect athletes health while they are playing sports more often than male coaches (96% and 76% respectively; $X^2(1,n=59)=4.680$, $p<.05$). However, these results must be interpreted with caution as the number of cells with a small N exceeded 20%.

The final item surveying student coaches' knowledge of the female athlete triad asked them to specify three possible resources that coaches can access for intervention assistance with athletes who may have the triad. Only 18% (n=11) of student coaches could list three resources, 26% (n=16) could list two resources, and 23% (n=14) could list one resource. The most common resources specified were the internet (40%), parents (21%), physician (15%), and a counselor (11%). The remaining 33% (n=20) of student coaches either wrote "I don't know" in the space provided, left this item blank, or named inappropriate resources (e.g. call 9-1-1, television).

Attitudes

When examining students' attitudes related to the female athlete triad using a 5-point Likert-type scale (1 = strongly agree, 5 = strongly disagree), most responses reflected moderate agreement with attitudes indicated by literature and moderate disagreement with contraindicated attitudes; see Table 1 for examples of indicated and contraindicated attitudes. However, two items were an exception; student coaches moderately disagreed with the statements "my personal beliefs about body image affect the athletes that I coach" (m=3.33, s=1.30) and "I don't feel distressed when my ideal body weight fluctuates by 5 to 10 pounds" (m=2.70, s=1.31). See Table 1 for a complete listing of attitudes, their associated means, and significant differences across gender of student coach.

Skills

Overall, the majority of student coaches indicated uncertainty in their comfort initiating conversations necessary for prevention and intervention of the female athlete triad. Few students strongly agreed with any of the statements endorsing communication self-efficacy, with the exception of the statement that they would be comfortable talking to athletes about the female athlete triad *if* they had more knowledge about it (m=1.84); significantly more than their current level of comfort talking to athletes about the triad (m=2.67, t=5.32 (60), $p<.001$). Table 2 provides a detailed listing of items assessing communication skills, their related total means, and the means across coaches' gender. Although scores were not significantly different across coaches' gender, the direction of responses across these items consistently indicated that female coaches were more comfortable discussing issues related to the triad than males therefore are included.

Behaviors

Prevention and intervention behaviors. Although student coaches' responses did not indicate that they would be opposed to participating in prevention and intervention behaviors, they did not strongly endorse the likelihood of this behavior either. As illustrated in Table 3, most students said that they were somewhat likely or unsure if they would participate in indicated behaviors and were somewhat unlikely or unsure if they would participate in contraindicated behaviors. Table 3 provides a detailed listing of all behaviors, their associated means, and indicates significant differences across male and female student coaches and gender of athletes coached.

Table 1
Student Coaches' Attitudes

Attitudes	Total	Gender	
	M (SD)	Male (SD)	Female (SD)
†The female athlete triad is a severe disease.	1.95 (1.05)	2.03 (1.09)	1.85 (1.01)
†It is the responsibility of coaches to help prevent the athletes that they coach from developing the female athlete triad.	2.22 (.87)	2.30 (1.05)	2.11 (.58)
††It is extremely important for me to maintain what I consider an ideal body weight.	2.22 (.99)	2.12 (1.07)	2.35 (.89)
††Extreme weight loss measures are appropriate for an individual who is not at what they consider their ideal body weight.	3.77 (1.23)	3.74 (1.21)	3.81 (1.42)
†I don't feel distressed when my ideal body weight fluctuates by 5 to 10 pounds.	2.70 (1.31)	2.44 (1.28)	3.04 (1.29)
†My personal beliefs about body image affect the athletes that I coach.	3.33 (1.30)	2.97 (1.27)	3.78* (1.22)
††It is my responsibility as a coach to do anything necessary to win.	4.13 (1.16)	3.70 (1.33)	4.67*** (.55)

Note. Agreement was indicated on a 5-point scale (1 = strongly agree, 5 = strongly disagree).
†Indicated attitudes. ††Contraindicated attitudes.
* p< .050. ** p< .010. *** p< .001.

Table 2
Student Coaches' Skills

Skill	Total	Gender	
	M (SD)	Male (SD)	Female (SD)
I feel comfortable talking to the athletes that I coach about sensitive/personal issues.	2.28 (1.19)	2.61 (1.37)	1.89 (.80)
I feel comfortable talking to the athletes that I coach about controversial health topics.	2.00 (1.00)	2.24 (1.16)	1.70 (.67)
I feel comfortable initiating private conversations about health issues.	2.25 (.94)	2.35 (.92)	2.11 (.97)
I feel comfortable initiating group conversations about health issues.	2.23 (1.06)	2.38 (1.10)	2.04 (.98)
I feel comfortable talking to the athletes that I coach about the female athlete triad.	2.67 (1.12)	2.94 (1.28)	2.33 (.78)
I would be comfortable talking to the athletes that I coach about the female athlete triad if I had more knowledge about it.	1.84 (1.10)	2.12 (1.17)	1.48 (.89)

Note. Agreement was indicated on a 5-point scale (1 = strongly agree, 5 = strongly disagree).

Table 3
Student Coaches' Prevention and Intervention Behaviors

Behavior	Total	Gender		Athlete Gender		
	M (SD)	Male (SD)	Female (SD)	Male (SD)	Female (SD)	M & F (SD)
†I require athletes that I coach to have a pre-participation physical examination by a physician that I am sure screens for the female athlete triad.	2.17 (.98)	2.15 (.93)	2.19 (1.01)	2.13 (.99)	2.16 (1.07)	2.25 (.93)
†I monitor athletes that I coach for signs and symptoms of the female athlete triad.	2.44 (1.07)	2.60 (1.12)	2.23 (.99)	2.61 (.99)	2.11 (1.05)	2.63 (1.20)
†I talk to any athletes that I believe is exhibiting signs and symptoms of the female athlete triad.	2.24 (1.10)	2.63 (1.13)	1.77** (.86)	2.45 (1.14)	1.74_a (.87)	2.63_a (1.09)
†I refer any athlete that I believe is exhibiting signs or symptoms of the female athlete triad to an appropriate health professional.	2.07 (1.01)	2.38 (1.07)	1.69** (.79)	2.32 (.99)	1.68 (.82)	2.19 (1.17)
††I request that athletes that I coach participate in team weigh-ins.	3.73 (1.32)	3.21 (1.29)	4.38*** (1.06)	3.09_b (1.20)	4.32_b (1.00)	3.88 (1.50)
††I give athletes that I coach advice/recommendations about their weight.	2.98 (1.24)	2.79 (1.25)	3.24 (1.20)	2.58_a (1.21)	3.05 (1.18)	3.60_a (1.18)
††I discuss body size and weight with the athletes that I coach.	3.08 (1.12)	2.91 (1.16)	3.31 (1.05)	2.71 (1.04)	3.37 (1.07)	3.38 (1.20)
††I require athletes that I coach to meet team weight requirements.	3.88 (1.42)	3.35 (1.47)	4.58*** (.99)	3.25_b (1.39)	4.58_b (1.02)	3.94 (1.53)
†When I recommend that athletes lose weight, I help them to develop a diet plan and monitor their weight loss process.	2.69 (1.26)	2.61 (1.22)	2.81 (1.33)	2.43 (1.16)	2.84 (1.46)	2.88 (1.20)

Note. Likelihood was indicated on a 5-point scale (1 = very likely, 5 = very unlikely).
†Indicated behaviors. ††Contraindicated behaviors.
* p< .050. ** p< .010. *** p< .001.
m_a differ at p< .05. m_b differ at p<.01.

Behaviors related to education.

Student coaches were asked about their likelihood to provide educational programming for their athletes in two areas: 1) the female athlete triad and 2) weight and nutrition. Less than a quarter (22%) stated that they would personally educate their athletes about the female athlete triad, 19% would provide educational opportunities about the triad, 19% would encourage their athletes to become educated about the triad, and 40% would *not* discuss the triad with their athletes. Those student coaches who stated that they *would* personally educate or provide educational programming about the triad

were asked *how often* they would incorporate components of the triad, risks involved with the triad, and how to recognize the triad. The means of their responses to those items, along with differences across male and female coaches are listed in Table 4.

Table 4

Student Coaches' Behaviors Related to Education

Element of Educational Program	Total	Gender	
	M (SD)	Male (SD)	Female (SD)
Elements related to the female athlete triad (n=26)			
Components of the female athlete triad.	1.78 (.85)	2.08 (.90)	1.45 (.69)
Risks involved with the female athlete triad.	1.73 (.88)	2.17 (.94)	1.20** (.42)
How to recognize the female athlete triad.	1.82 (.96)	2.25 (1.06)	1.30* (.48)
Elements related to weight and nutrition (n=42)			
Facts about good nutrition	1.28 (.51)	1.43 (.59)	1.06* (.25)
Recommendations for appropriate caloric intake, food selection and preparation.	1.57 (.69)	1.64 (.66)	1.47 (.74)
Dispelling myths about weight and nutrition.	1.59 (.86)	1.82 (.96)	1.27 (.59)
The effect of nutrition on athletic performance and health.	1.27 (.51)	1.41 (.59)	1.07* (.26)

Note. Frequency was indicated on a 5-point scale (1 = always, 5 = never).
* p< .050, ** p< .010, *** p< .001

When asked about their likelihood to provide educational programming *about weight and nutrition*, 35% of student coaches indicated that they would personally educate the athletes whom they coach, 35% would provide educational opportunities, 16% would encourage their athletes to become educated about proper weight and nutrition, and 16% would not discuss weight and nutrition. Again, those students who indicated that they would personally educate or provide educational programming about weight and nutrition were asked how often they would incorporate facts about good nutrition, recommendations for appropriate caloric intake, food selection and preparation, dispelling myths about weight and nutrition, and the effect of nutrition on athletic performance and health. Elements describing the female athlete triad and weight and nutrition education, their associated means, and significant differences between gender of coach are shown on Table 4. While the magnitude of scores did not find significant results, the direction of responses across these items according to gender consistently indicated that female coaches were more likely to incorporate these elements than male coaches and therefore are included.

Discussion

This study provides an initial examination of student coaches' knowledge, attitudes, behaviors,

and skills related to the female athlete triad and is a first step to determine whether or not newly prepared coaches might participate in prevention and intervention behaviors related to the triad. Although numerous researchers have asserted that knowledge about the female athlete triad will enable coaches to educate their athletes about the triad and take part in prevention and early intervention efforts (Beals et al., 1999; Rosen, McKeag, Houghm & Curley, 1986; VanDeLoo & Johnson, 1995), the newly prepared coaches surveyed in this study lacked the basic knowledge necessary.

When student coaches were given a range of behavioral options for educating athletes about the triad (including personally educating them, providing educational opportunities, encouraging athletes to pursue education through their own efforts, or not discussing the triad at all) 40% chose the least proactive option (not discussing the triad with their athletes). Minimally, coaches need to encourage athletes to seek out their own education. Ideally, coaches would have sufficient knowledge, motivating attitudes, and communication self-efficacy such that they personally provide education to their athletes; a behavior frequently cited as necessary for preventing athletes from developing the triad (Otis et al., 1997; VanDeLoo & Johnson, 1995; Williams, 1998).

Strikingly, only 7% of student coaches were able to name all three components of the triad and 57% could not name a *single* component of the triad. Interestingly, while students were unsure whether or not they would feel comfortable talking to their athletes about the female athlete triad, they indicated that they would feel comfortable *if they had more knowledge* of the syndrome. These responses highlight the important relationship between knowledge and communication self-efficacy. Inadequate knowledge of the triad is a major deficiency in preparedness that can be a serious barrier to coaches taking an active role in prevention and intervention activities (Beals et al., 1999; Rosen et al., 1986; VanDeLoo & Johnson, 1995).

Student coaches' attitudes, skills, and behaviors, for the most part, aligned with the recommendations from current literature (e.g. student coaches moderately agreed that it is the responsibility of coaches to help prevent athletes from developing the triad, were somewhat likely to monitor athletes for signs and symptoms of the triad, and were somewhat unlikely to request athletes to participate in team weigh-ins). However, the weakness of magnitude across the majority of responses indicates that there is room to strengthen their attitudes, skills, and behaviors. Without exception, responses were never strong in the direction indicated by literature and most students were only neutral or unsure in their convictions.

There were several cases where student coaches' attitudes were counter to recommendations in the literature. Most notably, student coaches tended to be unsure about whether their personal beliefs about body image affect the athletes that they coach. Literature emphasizes that coaches' personal beliefs do affect the athletes they coach, and that it is an important reality for coaches to be aware of (Burney & Brehm, 1998; VanDeLoo & Johnson, 1995).

One encouraging attitude reflected by student coaches is their moderately strong belief that it is not their responsibility as a coach to do *anything* necessary to win. This response implies that student coaches see the detriment of a "win-at-all costs" attitude, one often associated with damaging misperceptions about "competitive body weights" (Nattiv et al., 1994; Sanborn et al., 2000; Smith, 1996). The attitude of these student coaches reflects a willingness to participate in behaviors that will benefit their athletes' health and suggests that curricular foci are not solely on winning, but integrate concern for athletes' health as well. Assimilation of other health issues for athletes, including the female athlete triad, into future curricula is a next step in complementing this healthy focus.

Comparisons of responses across gender of student coaches revealed the greatest number of significant differences. For the most part, females

were more knowledgeable, had more appropriate attitudes, and were more likely to participate in prevention and intervention behaviors than male student coaches. Although all of the female coaches in this sample coached female or co-ed sports, it is not unusual for male coaches to also coach female athletes (29% of the male student coaches in our sample coached female or co-ed sports), therefore educational programs about the triad need to address both female *and* male coaches.

There are many suggestions throughout literature that coaches should play a primary defensive role against athletes developing the female athlete triad (Beals, 2000; Burney & Brehm, 1998; Otis et al., 1997; Sanborn et al., 2000), however the findings from this study demonstrate that newly educated coaches are still deficient in necessary knowledge, and lack strength in the recommended attitudes, behaviors, and skills to optimally participate in prevention and intervention activities. These deficiencies, the finding that only 11% of students have participated in any type of specialized training related to the female athlete triad, and evidence supporting the detrimental physical and psychological effects of the triad indicate that there is an immediate and pressing need for increasing the prevalence and depth of initial and continuing educational opportunities that focus on this issue. As noted, student coaches' attitudes appear to show concern for the health of their athletes and receptiveness to continued education. Based on the results of this study, training for coaches should focus on knowledge, attitudes, and communication skills necessary to participate in prevention and intervention of the triad. Once these curricula are in place, future research may want to evaluate their content to ensure that it aligns with research suggestions and whether or not the developed programs translate into effective application.

This study is limited in that only a small sample of student coaches' from a single university were examined. Coaches graduating from other universities may be more or less educated than those who participated in this study, therefore caution must be made in generalizing to the population of all college educated coaches. Additional research examining the knowledge, attitudes, behaviors, and skills of a larger sample and of *current* coaches would be an appropriate next step. While a larger sample would provide more stability of analyses, it would also allow targeting at-risk sports (i.e. gymnastics, swimming, diving, cross country running) to see if coaches are more prepared in these domains.

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Ms. Jill Lassiter and Dr. Celia Watt are faculty members in Health Science at the State University of New York, Brockport.