PERCEPTIONS OF MEDICAL PROFESSIONALS REGARDING THE ROLE OF CERTIFIED ATHLETIC TRAINERS ON THE FEMALE ATHLETE TRIAD TREATMENT TEAM

Karen Sue Hostetter
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PERCEPTIONS OF MEDICAL PROFESSIONALS REGARDING THE ROLE OF CERTIFIED ATHLETIC TRAINERS ON THE FEMALE ATHLETE TRIAD TREATMENT TEAM

by

Karen Sue Hostetter

A Dissertation Submitted to the Graduate Studies Office of The University of Southern Mississippi in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

Approved:

August 2007
ABSTRACT

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PERCEPTIONS OF MEDICAL PROFESSIONALS REGARDING THE ROLE OF CERTIFIED ATHLETIC TRAINERS ON THE FEMALE ATHLETE TRIAD TREATMENT TEAM

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The purpose of this study was to investigate the perceptions of physicians, registered dietitians, counselors, and certified athletic trainers (ATC) regarding the role of the ATC in recognizing, referring, and treating the female athlete triad (Triad) patient. The researcher developed the Medical Professional Perception Inventory (MPPI) which included four constructs (role, recognize, refer, and treat) and was used to assess the perceptions of medical professionals regarding the role of the ATC in recognizing, referring, and treating the female athlete triad patient.

This was a causal comparative study for which one hundred seventy-five out of nine hundred participants returned the MPPI questionnaire. Participants were randomly selected from medical specialty member lists, and represented states within Districts 8 and 10 of the National Athletic Trainers’ Association. MANOVA results indicated that medical profession significantly influenced the combined DV of (a) the role of the ATC on the Triad treatment team, (b) the ATC ability to recognize the Triad patient, (c) the ATC ability to refer the Triad patient, and (d) the ATC ability to treat the Triad patient (Pillai’s Trace=.211, $F(12, 510)=3.213, p<.001$, partial $\eta^2 = .07$). The dependent variables were intercorrelated, therefore a discriminant analysis was conducted as a follow-up to the significant MANOVA.
The results of this study indicated that RDs have significantly favorable perceptions of ATCs in their ability to refer Triad patients, but have significantly lower perceptions than MDs, MHPs, and ATCs regarding the ability of the ATC to treat Triad patients. These different perceptions may warrant further research and collaboration with representatives from the four medical professions identified in this study to understand the extent to which these perceptions are held.
ACKNOWLEDGMENTS

The author gratefully recognizes the following people who played an integral part in the pursuit and completion of the doctorate degree. This dream would not have become a reality without the dedication and support that was provided throughout the entire process.

- The University of Southern Mississippi Human Performance and Recreation, and Education Leadership and Research graduate faculty for their commitment to demonstrating, developing and maintaining professionalism in higher education.
- Dr. Susan Hubble Burchell for her ability to separate professional responsibilities and recreational activities, and to find time to enjoy both in the midst of a busy schedule.
- Ms. Jewel Adams for her support, encouragement, and friendship.
- The George Fox University administration and Health and Human Performance department members for financial support and encouragement to grow in my professional development through the pursuit of a terminal degree in human performance.
- My parents, friends and other family members who supported, encouraged, and prayed for me as I pursued the goal of completing the Ph.D.
# TABLE OF CONTENTS

ABSTRACT .............................................................................................................................. ii

ACKNOWLEDGMENTS .......................................................................................................... iv

LIST OF TABLES ................................................................................................................ vii

LIST OF ABBREVIATIONS ................................................................................................... ix

CHAPTER

I. INTRODUCTION ............................................................................................................. 1
   Problem Statement
   Definition of Terms
   Delimitations
   Assumptions
   Significance of the Study

II. REVIEW OF RELATED LITERATURE ........................................................................ 7
   Aspects of the Female Athlete Triad
   Role of the Certified Athletic Trainer
   Elements of a Strategic Treatment Plan
   Conclusions from the Literature

III. METHODS .................................................................................................................. 23
   Preliminary Procedures: Pilot Study
   Operational Procedures: Final Study

IV. RESULTS ...................................................................................................................... 32
   Introduction
   Descriptives
   Statistical Analysis
   Ancillary Findings

V. DISCUSSION ................................................................................................................. 49
   Summary
   Discussion
   Limitations
   Recommendations for Future Research
Conclusion

APPENDICES ............................................................................................................................57

Appendix A: Human Subjects Review Form .............................................................57
Appendix B: American Dietetic Association Permission Letter ..............................59
Appendix C: Medical Professional Perception Instrument (MPPI) ..........................60
Appendix D: MPPI with revised cover letter .............................................................64

REFERENCES ...........................................................................................................................68
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CAATE Content Areas</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>Common Symptoms and Clinical Signs of the Female Athlete Triad</td>
<td>17</td>
</tr>
<tr>
<td>3.</td>
<td>Cronbach’s Alpha Analysis of Pilot and Final Instrument</td>
<td>24</td>
</tr>
<tr>
<td>4.</td>
<td>Frequencies and Percentages of Medical Profession by Gender and Total</td>
<td>34</td>
</tr>
<tr>
<td>5.</td>
<td>Frequencies and Percentages of Medical Profession by Setting</td>
<td>35</td>
</tr>
<tr>
<td>6.</td>
<td>Frequencies and Percentages of Medical Profession by Years of Experience.</td>
<td>36</td>
</tr>
<tr>
<td>7.</td>
<td>Frequencies and Percentages of Medical Profession by Number of Previous Triad Patients</td>
<td>37</td>
</tr>
<tr>
<td>8.</td>
<td>Means and Standard Deviations for Medical Profession by Role, Recognize, Refer, and Treat the Female Athlete Triad</td>
<td>38</td>
</tr>
<tr>
<td>9.</td>
<td>Means and Standard Deviations for Gender by Role, Recognize, Refer, and Treat the Female Athlete Triad</td>
<td>39</td>
</tr>
<tr>
<td>10.</td>
<td>Means and Standard Deviations for Setting by Role, Recognize, Refer, and Treat the Female Athlete Triad</td>
<td>40</td>
</tr>
<tr>
<td>11.</td>
<td>Means and Standard Deviations for Years of Experience by Role, Recognize, Refer, and Treat the Female Athlete Triad</td>
<td>41</td>
</tr>
<tr>
<td>12.</td>
<td>Means and Standard Deviations for Number of Previous Triad Patients by Role, Recognize, Refer, and Treat the Female Athlete Triad</td>
<td>42</td>
</tr>
<tr>
<td>13.</td>
<td>Structure Matrix for Significant Discriminant Function</td>
<td>43</td>
</tr>
</tbody>
</table>
14. Means and Standard Deviations of Discriminant Scores from Function 1 for Analysis one .......................................................... 44

15. Post Hoc Tukey Mean Differences in Discriminant Scores .................. 44
LIST OF ABBREVIATIONS

ATC: Certified Athletic Training
ATEP: Athletic Training Education Program
BOC: Board of Certification
CAATE: Commission on Accreditation of Athletic Training Education
MD: Medical Doctor
MHP: Mental Health Professional
MP: Medical Professional
MPPI: Medical Professional Perception Inventory
NATA: National Athletic Trainers’ Association
NATA-EC: National Athletic Trainers’ Association Education Council
OARS: Oregon Administrative Rules
RD: Registered Dietitian
SCAN: Sports and Cardiovascular Nutrition Practice Group
Triad: Female Athlete Triad
CHAPTER I

INTRODUCTION

The female athlete triad (Triad) is a serious condition that may affect athletic young women involved in physical activities where leanness or endurance is emphasized. The elements of the Triad include disordered eating, amenorrhea, and early-onset osteoporosis. According to the American College of Sports Medicine Position Stand on the female athlete triad, “All individuals working with physically active girls and women should be educated about the female athlete triad and develop plans to prevent, recognize, treat, and reduce its risks” (Otis, Drinkwater, Johnson, Loucks, & Wilmore, 1997, p i). The prevalence of girls and young women who are affected by the Triad is unknown, although estimates are high because of the high incidence of eating disorders in this age group (Sherman & Thompson, 2006).

The traditional setting for a certified athletic trainer (ATC) is the collegiate or high school athletic training room. Certified athletic trainers are educated in twelve content areas, eight of which relate to the elements of the Triad. Content areas related to the Triad are: (a) risk management and injury prevention, (b) pathology of injuries and illness, (c) orthopedic clinical examination and diagnosis, (d) medical conditions and disabilities, (e) acute care of injuries and illnesses, (f) psychosocial intervention and referral, (g) nutritional aspects of injuries and illness, and (h) health care administration. These content areas contain specific athletic training proficiencies related to the female athlete triad condition (NATA Education Council, 2006). Often times the ATC is the first one to identify drastic changes in an athlete’s weight or body image. More likely than physicians (MDs), registered dietitians (RDs) or mental health professionals (MHPs), the ATC will have daily contact with a student athlete who may display signs or describe symptoms that are related to the Triad (DeSouza, 2006). The daily contact...
between the ATC and athletes makes a strong argument for the inclusion of the ATC on the female athlete triad treatment team.

Statement of Problem

The athletic training literature is consistent in the description of the medical professionals who should be included in the female athlete triad treatment team, and supports the inclusion of MDs, RDs, MHPs, and ATCs on the female athlete triad treatment team (J. E. Hornak, N. J. Hornak, & Cappaert, 2004; Reinking & Alexander, 2005). In contrast to articles specific to ATCs, the literature directed to MDs, RDs, and MHPs indicates the importance of a multi-disciplinary treatment team that includes MDs, RDs and MHPs, but inconsistently describes the importance of including an ATC on the female athlete triad treatment team (Sherman & Thompson, 2004; Smith, 1996). The purpose of this study was to investigate the perceptions of MDs, RDs, MHPs and ATCs regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad.

Hypotheses

Hypothesis 1: There are no significant differences between medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

Hypothesis 2: There are no significant differences between gender of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

Hypothesis 3: There are no significant differences between work setting of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad
treatment team in recognizing, referring, and treating the female athlete triad patient when considering work setting.

Hypothesis 4: There are no significant differences between years of experience of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

Hypothesis 5: There are no significant differences between the number of previously treated Triad patients by medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

Definition of Terms

Amenorrhea – Lack of menses.

Anorexia Nervosa – Condition where an intense fear of obesity, accompanied by an aversion to eating, results in severe weight loss (Dirckx, 2001).

Athletic Training Education Program (ATEP) – An undergraduate or graduate athletic training curriculum program accredited by the Commission on Accreditation of Athletic Training Education (CAATE).

Board of Certification (BOC) – The national organization responsible for developing and administering the certification exam for athletic trainers.

Bulimia Nervosa – Condition where large amounts of food are ingested over a short amount of time (binge eating), followed by a method of removing the food, such as vomiting or using laxatives (purging) (Dirckx, 2001).

Certified Athletic Trainer (ATC) – An individual who has met the certification requirements of the Board of Certification. Requirements include, but are not
limited to, graduating from a CAATE accredited athletic training education
program, passing the Board of Certification exam, and earning a minimum of 80
continuing education units every 3 years.
Commission on Accreditation for Athletic Training Education (CAATE) – The national
accrediting body for undergraduate and entry-level graduate athletic training education
programs.
Disordered eating – Sub-clinical restrictive caloric intake.
Early-onset osteoporosis – Diagnosis of osteoporosis prior to menopause or
perimenopause.
Eating Disorder Not Otherwise Specified – Person who does not meet all the criteria for
Anorexia Nervosa, Bulimia Nervosa, or Binge-Eating Disorder but displays the
need for treatment.
Female Athlete Triad (Triad) – A condition where disordered eating, amenorrhea, and
early-onset osteoporosis affect active young women (Dirckx, 2001).
Medical Doctor (MD) – For the purposes of this study MD is used to describe physicians
who specialize in family practice or obstetrics and gynecology.
Medical Professional (MP) – For the purposes of this study MP is used to describe MDs,
RDs, MHPs and ATCs, collectively.
Mental Health Professional (MHP) – For the purposes of this study MHP is used to
describe psychologists who are employed in a variety of settings, such as private
practice, collegiate or hospital settings.
National Athletic Trainers’ Association (NATA) – The professional organization for
National Athletic Trainers’ Association is to enhance the quality of health care for athletes and those engaged in physical activity, and to advance the profession of athletic training through education and research in the prevention, evaluation, management and rehabilitation of injuries” (p 18).

Osteopenia – Less than normal amount of bone mineral density, which may result in osteoporosis if not treated. Usually diagnosed when bone mineral density is between 1.0 and 2.5 standard deviations below normal for age-range comparisons.

Osteoporosis – The state of osteopenia in which bone mineral density is reduced to less than 2.5 standard deviations below normal. The skeleton loses its integrity and is unable to support the body weight.

Registered Dietitian (RD) – For the purposes of this study RD is used to describe specialists from the American Dietetic Association’s specialty group of sports, cardiovascular, and wellness nutrition (SCAN) who are employed in a variety of settings, such as private practice, collegiate settings, or hospitals.

Delimitations

This study was delimited by the following:

1. Local specialists were included in the pilot study participant pool.

2. Participants were randomly selected from states representing only Districts 8 and 10 of the NATA.

3. Physicians specializing in family practice or obstetrics and gynecology were randomly selected from Physician List Line (available at http://www.physicianlistline.com).
4. Registered dieticians from the American Dietetic Association dietetic practice group, Sport and Cardiovascular Nutrition (SCAN), were randomly selected from Aggressive List (available at http://www.aggressivelist.com).

5. Mental health professionals were randomly selected from Physician List Line (available at http://www.physicianlistline.com).

6. Certified athletic trainers were randomly selected from the NATA Membership Directory.

Assumptions

The validity and reliability scores on the instrument were dependent upon the honest responses of the medical professionals selected for the pilot study. The results were dependent upon honest self-reported responses that were returned in a timely fashion.

Significance of the Study

The athletic training literature consistently includes the ATC on the female athlete triad treatment team; however, the literature for other disciplines (MD, RD, MHP) is inconsistent in the description of the role of the ATC on the female athlete triad treatment team. The results of this study will help determine the need to educate medical professionals (MDs, RDs, MHPs, and ATCs) on the role of the ATC in recognizing, referring, and treating the female athlete triad, as well as participating on the female athlete triad treatment team.
CHAPTER II
REVIEW OF LITERATURE

The female athlete triad has recently received attention as a serious health condition affecting female athletes, especially those who perform in sports or activities where leanness or endurance is emphasized (American Academy of Pediatrics, 2002a). The three aspects of the female athlete triad are disordered eating, menstrual dysfunction (e.g., amenorrhea) and early-onset osteopenia or osteoporosis (Beals, Brey, & Gonyou, 1999; Otis, Drinkwater, Johnson, Loucks, & Wilmore, 1997). Although there are three components of the Triad, all three components need not be present in order to justify assessment or referral (Sherman & Thompson, 2006). In order to understand the potential risks and devastating results of the female athlete triad, it is important to look at the three aspects of the condition as they relate to each other.

Aspects of the Female Athlete Triad

**Disordered eating**

The two most familiar conditions related to disordered eating are Anorexia Nervosa and Bulimia Nervosa. The female athlete may, or may not, present with signs or symptoms of these extreme eating disorders, such as severe caloric restrictions or binging and purging, but may exhibit excessive concern and behaviors to control weight (Kirchner & Cohen, 2002). Disordered eating that does not meet the criteria for clinical diagnosis is referred to as an eating disorder not otherwise specified (EDNOS) (Vaughan, King, & Cottrell, 2004). Disordered eating not otherwise specified may manifest itself in a known or unknown energy deficit when the female athlete consistently fails to replenish the calories she burns throughout the day. The body adapts to energy deficits by transforming energy from other sources, such as muscle and...
fat tissue (Stevens, Brey, Harris & Fowkes-Godek, 1997). These adaptations may hide potential problems from health care personnel (American Academy of Pediatrics, 2002b). The athlete who consistently restricts caloric intake to less than she burns causes her digestive system and endocrine system to look to other sources of energy (e.g. muscle and fat tissue), which in turn diminishes the protein and fat sources used to repair the body following trauma (including micro-trauma of sport participation); hinders vitamin absorption; and affects other physiological functions, such as bone formation (DeSouza, 2006). If the practice of caloric restriction is continued the athlete may face serious health consequences, such as heart disease or failure (Stevens et al., 1997).

*Menstrual dysfunction*

Menstrual irregularities associated with the female athlete triad are commonly divided into three categories: primary amenorrhea, secondary amenorrhea, and oligomenorrhea. Primary amenorrhea is described as delayed development of secondary sexual characteristics, including absence of menarche by 15 years of age (Clairmont, 2000; Desouza, 2006; Khan et al. 2002; Woolsey-Hales & Schilz, 2002). In contrast, secondary amenorrhea is defined by the absence of menses for 3–6 months or more, after normal menarche (Clairmont, 2000; Woolsey-Hales & Schilz, 2002). Oligomenorrhea is characterized by gaps between menses longer than 35 days (Emori, 2003). A fourth, less-known, category of menstrual irregularity is hypothalamic amenorrhea, where restricted energy intake affects the ability of the hypothalamus to regulate hormonal distribution, including gonadotropic hormones, throughout the body (DeSouza, 2006).

According to the American Academy of Pediatrics (AAP) female athlete triad policy statement (2000b), athletes experience menstrual dysfunction more often than non-athletic
women in the general population. The percent of amenorrheic young women ranges from 3.4% to 66% in athletes (depending on the sport), compared to 2% to 5% in the general population (AAP, 2000b). These menstrual irregularities may be caused by low levels of gonadotropin hormones, such as luteinizing hormone (LH) and follicle-stimulating hormone (FSH) (Warren, Ramos & Bronson, 2002). Blood tests of individuals with low body mass and low body fat percentages often reveal low levels of LH and FSH, as well as insulin and thyroid hormones (DeSouza, 2006). Diminished levels of LH and FSH in active young women are most likely due to low nutritional intake which affects the release of gonadotropin releasing hormone from the hypothalamus (Warren et al., 2002; Warren & Perlroth, 2001).

Experts do not agree on the use of pharmaceuticals (e.g. hormone replacement therapy) to assist with female athlete triad related amenorrhea (Warren et al., 2002; Woolsey-Hales & Schilz, 2002). One side of the debate focuses on attaining normal menses regardless of the cause of the amenorrhea (AAP, 2000b). In contrast, others indicate a holistic approach that includes attaining and maintaining normal body weight, modified workouts, and a healthy diet will produce more beneficial results of regular menses, bone health, and acceptable proportions of body composition (DeSouza, 2006; Warren et al., 2002; Woolsey-Hales & Schilz, 2002).

Recently, some specialists have focused their attention to blood levels of a hormone called leptin, which may provide valuable clues for diagnosing the female athlete triad. Warren & Perlroth (2001) focused on the role leptin plays in the regulation of the menstrual cycle and in the reproductive system. Leptin, a hormone synthesized by adipose tissue, may indicate the nutritional status of athletes with exercise-induced amenorrhea. Restricted diets decrease adipose tissue, thus limiting leptin synthesis. A major role of leptin is to monitor
energy levels and to adjust to low energy levels that lead to amenorrhea by metabolizing more fat stores (Warren et al. 2002).

While most experts agree that menstrual dysfunction related to exercise levels is common in athletes engaged in activities where endurance or appearance is stressed (3.4% - 66% in athletes; 2%-5% in non-athletes), menstrual dysfunction is not normal (American Academy of Pediatrics, 2002a). Bullen, et al. (1985) demonstrated this by combining strenuous exercise with weight loss which caused disturbances in reproductive function (e.g., menstrual irregularities); however, the irregularities were remedied with proper nutritional intake in the presence of continued strenuous exercise. Athletes who report amenorrhea (primary or secondary) or oligomenorrhea should be referred to their physician in order to determine the cause of the dysfunction (DeSouza, 2006; Harmon, 2002). Even short-term amenorrhea (e.g., 3-6 months) is a warning sign that warrants an evaluative screening for eating disorders and osteopenia (bone loss) by a physician who is familiar with signs and symptoms of the female athlete triad (Warren et al., 2002; Woolsey-Hales & Schilz, 2002).

**Bone mineral density**

The third aspect of the female athlete triad is early-onset osteopenia or osteoporosis. Osteopenia is defined as bone mineral density (BMD) from 1.0 to 2.5 standard deviations less than mean values, and osteoporosis is characterized by BMD at least 2.5 standard deviations less than mean values (Khan, et al., 2002; Woolsey-Hales & Schilz, 2002). Restricted caloric intake leads to low body weight, which affects hormone levels (e.g. LH, Leptin and estrogen). Low levels of these hormones can lead to menstrual dysfunction and poor bone formation (DeSouza, 2006). When estrogen levels are within normal limits BMD is better-maintained, but when estrogen levels are low, BMD is sacrificed (AAP, 2000b; Harmon, 2002). While
load-bearing activity in some sports increases BMD, an overload of activity in the absence of sufficient caloric intake may have a detrimental effect on bone density (Klossner, 2000; Petterson, Stalnacke, Ahlenius, Henriksson-Larsen, & Lorentzon, 1999). The prevalence of osteoporosis and/or osteopenia in adolescent women is not known; however, Petterson et al. (1999) noted the link between low energy availability, hypothalamic amenorrhea, and low BMD when they assessed BMD (using dual energy x-ray absorptiometry) of ten amenorrheic distance runners. Of those assessed, ten percent were diagnosed with osteoporosis, and fifty percent with osteopenia of the lumbar spine. The likelihood of stress fractures caused by osteopenia or osteoporosis, increases with low body weight and low hormone levels (American Academy of Pediatrics, 2002b). Dual X-Ray Absorptiometry (DEXA) measures bone density at numerous skeletal sites, such as the lumbar spine and femoral neck. Evidence suggests that low BMD levels can be reversed; however, several experts fear that women diagnosed with the female athlete triad will have significantly lower BMD than their non-female athlete triad counterparts (American Academy of Pediatrics, 2002a; DeSouza, 2006; Harmon, 2002). Some investigators report irreversible bone loss in athletes with amenorrhea for longer than 3 years (Woolsey-Hales & Schilz, 2002).

Role of the Certified Athletic Trainer

Athletic Training Certification (ATC) is the certification awarded to individuals who have met the qualifications set forth by the Board of Certification (BOC) (NATA Education Overview, n.d.). Individuals who are given permission to sit for the certification exam must graduate from a CAATE-accredited athletic training education program (ATEP). The ATEP curriculum is guided by the NATA Education Council (NATA-EC). There are twelve content
areas by which the NATA-EC guides each ATEP (NATA Education Council, 2006.). Eight of
the twelve content areas include information specific to the female athlete triad (See Table 1).

Table 1

CAATE Content Areas

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Related to Female Athlete Triad</th>
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<tbody>
<tr>
<td>Risk Management and Injury Prevention</td>
<td>X</td>
</tr>
<tr>
<td>Pathology of Injuries and Illness</td>
<td>X</td>
</tr>
<tr>
<td>Orthopedic Clinical Examination and Diagnosis</td>
<td>X</td>
</tr>
<tr>
<td>Medical Conditions and Disabilities</td>
<td>X</td>
</tr>
<tr>
<td>Acute Care of Injuries and Illness</td>
<td>X</td>
</tr>
<tr>
<td>Therapeutic Modalities</td>
<td></td>
</tr>
<tr>
<td>Conditioning and Rehabilitative Exercises</td>
<td></td>
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<tr>
<td>Pharmacology</td>
<td></td>
</tr>
<tr>
<td>Psychosocial Intervention and Referral</td>
<td>X</td>
</tr>
<tr>
<td>Nutritional Aspects of Injuries and Illness</td>
<td>X</td>
</tr>
<tr>
<td>Health Care Administration</td>
<td>X</td>
</tr>
<tr>
<td>Professional Development and Responsibilities</td>
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</tbody>
</table>

Note. NATA Education Council – Content Areas. Retrieved January 16, 2007 from

By virtue of graduating from an accredited ATEP, entry-level ATCs have been
educated in recognizing early warning signs of the female athlete triad. Entry-level and
experienced ATCs can be found working in venues from the traditional high school, collegiate and professional settings, to hospital, physician and clinical or industrial settings (NATA Athletic Training Education Overview, n.d.). The most likely venues where an ATC will deal with a young, athletic woman at risk for the female athlete triad are the high school and collegiate athletic training rooms (Gutgesell, Moreau, & Thompson, 2003). The ATC in these settings is often times a liaison between the athlete and coach, or the athlete and other members of the Triad treatment team (e.g. MDs, RDs, MHPs) (Hobart & Smucker, 2000).

According to Vaughan, King, & Cottrell (2004), “A collegiate athletic trainer’s primary responsibility is to assist athletes in maintaining optimal health.” (p 71). Appropriate and timely communication between treatment team members and the ATC regarding the health and progress of the Triad patient is imperative for effective prevention, identification, and intervention of the female athlete triad.

Elements of a strategic treatment plan

Several experts have described three key elements of a strategic treatment plan for dealing with the female athlete who is at risk for the female athlete triad (Girard-Eberle, 2004; Gregory, 2004; Nattiv & Lynch, 1994). The plan includes (a) prevention, (b) identification of warning signs, and (c) a team approach to intervention. Prevention, early identification, and treatment of the female triad are keys to avoiding the critical psychological and medical conditions that may develop in the young female athlete (Nattiv & Lynch, 1994).

Prevention

Prevention is the first key to avoiding the devastating effects of the female athlete triad. According to Zawila, Steib, & Hoogenboom (2003), “The athletic trainer has the opportunity to serve as the first line of defense in preventing and identifying nutrition-related health
problems” (p 69). Prevention begins with education. Several authors agree that education is a key factor in reducing the risk of an athlete encountering any of the three elements of the female athlete triad (Beals & Manore, 2002; Clairmont, 2000; DeSouza, 2006; Kirchner & Cohen, 2002).

Various medical professionals must be included on the Triad treatment team in order to educate the individuals involved in the young athlete’s life. Mees (2003) emphasized the importance of the physician maintaining a high level of suspicion when treating young women for amenorrhea, stress fractures, or other conditions that could be indicators of the female athlete triad. Others emphasized the importance of physicians screening patients for the female athlete triad during preparticipation sports physicals (Hobart & Smucker, 2000; Williams, 2006). By acknowledging the relationship between caloric intake, amenorrhea and osteoporosis, physicians can assist athletic young women to safely participate in physical activity and sports (Nattiv & Lynch, 1994).

Education of non-clinical personnel was also emphasized in the literature. For example, N. J. Hornak & J. E. Hornak (1997) recommended that coaches should schedule educational team meetings where health care professionals present various topics of interest (e.g. sports nutrition, or bone health). Hobart & Smucker (2000) emphasized the importance of educating coaches, parents, and teachers about the health risks of the female athlete triad. According to Nattiv & Lynch (1994), physicians must not only be aware of the risks, they should also “educate athletes, coaches, parents, [athletic] trainers, administrators, and society” (p 62). The Female Athlete Triad patient statement of the American Academy of Pediatrics (2000a) informs parents, athletes and coaches on the relationship between disordered eating, menstrual dysfunction, decreased bone mineral density, and adequate energy and nutrient intake.
The most appropriate liaison between the physician and the athlete is the ATC (Gutgesell, Moreau, & Thompson, 2003; Williams, 2006). The ATC has the educational background, and the opportunity to be in daily contact with the athlete; both of which are necessary to observe warning signs that may be indicative of an athlete suffering from the female athlete triad (DeSouza, 2006; Williams, 2006). The well-educated ATC is in the best position to inform coaches and athletes, and to implement changes to decrease the risk of an athlete experiencing the female athlete triad (Thompson & Sherman, 1999).

Identification of warning signs

The relationship between the ATC and the athlete is critical to identifying athletes who are at risk for the female athlete triad. The ATC has access, responsibility, and the ability to recognize early warning signs of the female athlete triad (DeSouza, 2006). In states where licensure or registration is required, the responsibility is identified in state administrative rules, such as the Oregon Administrative Rules (OARs), which in Chapter 331-120-010, defines the expectations of the ATC as being able to recognize, evaluate, and provide immediate care of injuries during athletic events, or in practicing for athletic events (Oregon Health Licensing Agency, 2006). Early referral to the appropriate member of the treatment team (e.g. MD, RD, MHP) is imperative to prevention and/or successful treatment and recovery (Joy & Clark, 2004; Williams, 2006). It is crucial that the ATC have a high level of suspicion about sub-clinical warning signs, such as cold hands and feet, a decline in performance, sleep disturbances, menstrual irregularities, fatigue, stress fractures, or weight loss during puberty in order to identify at-risk athletes before irreversible clinical conditions (e.g., osteopenia and osteoporosis) occur (DeSouza, 2006). The opportunity for daily contact with the athlete makes the ATC and coach key personnel in the attempt to identify common warning signs of the
female athlete triad. Smith (1996) indicated that recognition is important, but only included friends, coaches or parents who know what to look for are likely to notice behaviors that are characteristic of the female athlete triad. However, earlier literature identifying warning signs of the female athlete triad included ATCs, parents, coaches, friends, teachers/professors, and athletic administrators (Nattiv & Lynch, 1994). In addition to parents, friends and teachers, Hobart & Smucker (2000) indicated the physician is responsible for recognizing early warning signs, such as disordered eating patterns and weight changes over time, during routine exams or during office visits for fractures (especially stress fractures) or other health conditions.

The typical female athlete triad patient is an adolescent or young adult who is driven to excel in sports. In their study of forty-four ballet dancers (mean age 17y) with menstrual disturbances, Young, Formica, Szmukler, & Seeman (1994) found twenty-two percent of the participants had osteopenia. The ballet group was significantly different (p<.001) from participants with normal menstrual functions. In contrast, in a study of active military women, Lauder, Williams, Campbell, Davis, Sherman & Pulos (1999) found that no participants met all three criteria of the Triad; however, 1.4 percent of the 423 participants were osteopenic.

The Triad patient may be obsessed with her appearance and her performance, and may make comments regarding the need to lose weight to succeed in her sport (Nattiv & Lynch, 1994, Williams, 2006). The most opportune time to screen high school and collegiate athletes for the female athlete triad is during a preparticipation exam (DeSouza, 2006). During such an exam, the physician can ask questions regarding the athlete’s nutrition, menstrual patterns, and body image. In addition, the physician can review the athlete’s previous records, looking for patterns of stress fractures which may indicate a decrease in bone mineral density (Hobart & Smucker, 2000; Mees, 2003; Smith, 1996).
Unlike the sporadic physician contact (e.g. yearly physical exam), the daily contact that the ATC has with the athlete allows the ATC to monitor the athlete for common Triad warning signs. According to the National Collegiate Athletic Association [NCAA] (2006), “the team physician has the final responsibility to determine...participation. In addition, clearance is...the responsibility of the team physician or that physician’s designated representative” (p 24). As the physician’s designated representative, the ATC has the authority to restrict activity of any athlete who demonstrates warning signs of the female athlete triad until she is cleared by the appropriate treatment team member (NCAA, 2006). Sub-clinical signs and symptoms of the female athlete triad are listed in Table 2. When these or other warning signs are present, the ATC should refer the athlete to the appropriate medical professionals for intervention (DeSouza, 2006; Williams, 2006). Menstrual irregularities, such as amenorrhea and oligomenorrhea, were once thought to be common among athletes, but are now considered early warning signs for disordered eating. Athletes who present with such conditions should be referred to a physician for diagnosis and treatment (DeSouza, 2006).

**Table 2**

*Common Symptoms and Clinical Signs of the Female Athlete Triad*

<table>
<thead>
<tr>
<th>Sub-clinical signs &amp; symptoms</th>
<th>Clinical symptoms</th>
<th>Clinical signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieving low body weight</td>
<td>Amenorrhea</td>
<td>Alopecia</td>
</tr>
<tr>
<td>Baggy clothes</td>
<td>Cold intolerance</td>
<td>Bradycardia</td>
</tr>
<tr>
<td>Competitive</td>
<td>Constipation</td>
<td>Cachexia</td>
</tr>
<tr>
<td>Compulsive exercise behaviors</td>
<td>Decreased concentration</td>
<td>Dry skin</td>
</tr>
<tr>
<td>Depressive tendencies</td>
<td>Depression</td>
<td>Hypotension</td>
</tr>
</tbody>
</table>
Table 2 (Continued).

<table>
<thead>
<tr>
<th>Sub-clinical signs &amp; symptoms</th>
<th>Clinical symptoms</th>
<th>Clinical signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent restroom visits</td>
<td>Fatigue</td>
<td>Lanugo Hair</td>
</tr>
<tr>
<td>Low BMI</td>
<td>Hair Loss</td>
<td>Large parotid gland</td>
</tr>
<tr>
<td>Low self-esteem</td>
<td>Lightheaded/dizzy</td>
<td>Peripheral edema</td>
</tr>
<tr>
<td>Maintaining low body weight</td>
<td></td>
<td>Stress fracture</td>
</tr>
<tr>
<td>Perfectionist / High expectations</td>
<td></td>
<td>Tooth enamel erosion</td>
</tr>
<tr>
<td>Preoccupation with food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor coping skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretive behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-critical of body and performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-imposed pressure to succeed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress fractures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Team approach to intervention

Safe and healthy sports participation for athletic young women is the concern for not only parents and coaches, but also healthcare professionals. Most authors agree that the female athlete triad is a serious condition that requires a multidisciplinary approach to diagnosis and treatment (American Academy of Pediatrics, 2000b; DeSouza, 2006; E. A. Joy, June 17, 2004; Sanborn, Horea, Siemers & Dieringer, 2000; Williams, 2006). The three primary specialists
that comprise the multidisciplinary treatment team are: (a) physicians (MD), (b) registered dietitians (RD), and (c) mental health professionals (MHP); however, the ATC plays an important role in treatment, as well (Thompson & Sherman, 1999). According to the 2006 OARs, the ATC is responsible to develop and implement an appropriate plan of rehabilitation and/or reconditioning, as well as provide educational guidance to injured athletes in order to facilitate recovery (Oregon Health Licensing Agency). In addition, Chapter 331-120-0010 of the OARs (2006) define the scope of practice for the ATC as recognizing, evaluating, and providing immediate care of injuries sustained during athletic events, or in the practice of athletic events. Within the scope of practice of the ATC is the responsibility to determine the level of functional ability of an injured athlete in order to determine the extent of an injury. These responsibilities are similar to the recommendations provided by the American Academy of Family Physicians (2006), who in their consensus statement for team physicians provide several recommendations for the team physician, such as establish a chain of command concerning return to play decisions, coordinate the rehabilitation plan, and confirm restoration of sport-specific skills.

It seems reasonable for the MD to develop the chain of command regarding the treatment of athletic conditions, but the concern is that there is a lack of understanding of the level of care that is considered the standard of practice for the ATC. In addition to a recommendation to assess psychosocial concerns, and to consider referrals, the American Academy of Family Physicians (2006) return-to-play statement includes a recommendation to communicate the process with the ATC and family members. These recommendations are in line with the standards of practice of ATCs. For example, Chapter 331-120-0020 of the OARs...
lists physician collaboration, documentation, confidentiality, and consultation as expected protocol with an injured or ill athlete (Oregon Health Licensing Agency, 2006).

While the MD, RD and MHP have the in-depth training and experience necessary to successfully treat the female athlete triad patient, the ATC has access to daily contact with the athlete (Williams, 2006). Many authors agree on the inclusion of the three primary members of the female athlete treatment team (American Academy of Pediatrics, 2000b; Thompson & Sherman, 1999; Williams, 2006); however, the literature is inconsistent about the role of the ATC on the Triad treatment team (Gutgesell, Moreau, & Thompson, 2003; Zawila, Steib & Hoogenboom, 2003). A number of authors included the ATC as a part of the primary treatment team (DeSouza, 2006; J. E. Hornak, N. J. Hornak & Cappaert, 2004; Williams, 2006). Other literature (e.g., Smith, 1996) omitted the ATC when describing the treatment team members, yet included the ATC as a well-informed professional who is in a prime position to recognize the warning signs and provide early intervention in the form of referral and limited participation. According to Chapter 331-120-0020 of the OARs, the standards of practice of an ATC include physician collaboration, consultation, and documentation—all of which allow for early intervention by a health care professional who has daily access to athletic young women (Oregon Health Licensing Agency, 2006). When warning signs are recognized and reported early, intervention is possible before the devastating effects of the female athlete triad develop into irreversible conditions (Hobart & Smucker, 2000).

Regardless of who is included in the treatment team, it is clear that when assessing an athletic young woman for a variety of conditions, a high index of suspicion for the female athlete triad must be present (Brubaker & Leddy, 2003; Couture & Karlson, 2002; Nattiv & Lynch, 1994). If intervention is delayed due to missed warning signs or misdiagnosis, the
effects may have long-term consequences, some of which may be irreversible (e.g. decreased bone mineral density) (DeSouza, 2006; Woolsey-Hales & Schilz, 2002).

Conclusions from the literature review

A review of the literature regarding the members of the female athlete triad treatment team revealed an interesting trend. The periodicals that addressed physician concerns contained articles and studies that related to the roles of MDs, RDs, and MHPs in recognizing and treating the female athlete triad; however, specific reference to the role of ATC and others who are in contact with the athlete was inconsistent. Smith (1996) indicated that parents of minors and coaches need to be involved in the treatment of the female athlete triad. Nattiv & Lynch (1994) used the term “other healthcare professionals” in describing the need for increased awareness of Triad warning signs (p 60). Additionally, Nattiv & Lynch (1994) pointed out the importance of physicians working with a consultation team (e.g. psychologists and nutritionists) who is familiar with the emotional and nutritional needs of the athlete with the female athlete triad.

In contrast, Hobart & Smucker (2000) pointed out that it is often the ATC or coach who is closest to the athlete, and in a position to monitor and enforce the intervention plan. N. J. Hornak & J. E. Hornak (1997) indicated that the coach should be the one who enforces the recommendations of the MHP and other medical professionals. By 2004, however, N. J. Hornak, J. E. Hornak and Cappaert were encouraging the ATC to take an active role in the female athlete triad treatment team, including recognition, referral and treatment. In another example of vague inclusion, the International Olympic Committee’s Medical Commission included “trainers and other healthcare providers” in the Female Athlete Triad Position Stand which describes the importance of education about the female athlete triad (Sangenis et al.,

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indicated the school nurse is in the best position to recognize middle and high school-age girls who are at risk for the female athlete triad. Contrary to this indication, the ATC may be in the best position to recognize and refer middle and high school-age girls who are at risk for the Triad because of the lower ratio of the ATC to student athletes. The school nurse is responsible for keeping medical records of all students, regardless of their athletic involvement; however, the ATC is responsible for keeping medical records of just the athletic population. The lower ratio increases the likelihood of identifying those young women at risk for the Triad.

Finally, several authors describe a multidisciplinary team approach to treatment and communication that consistently includes the primary care physician, a mental health professional, and a registered dietitian, yet only sporadically includes the ATC (J. E. Hornak, N. J. Hornak, & Cappaert, 2004; Joy & Clark, 2004; Walsh, Wheat, & Freund, 2000). It is this ambiguity that led this study to focus on the perceptions of MDs, RDs and MHPs regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring and treating the Triad patient. Athletic training literature supports active ATC involvement in recognizing, referring and treating the female athlete triad; however, the literature from the disciplines of MDs, RDs and MHPs inconsistently describes the role of the ATC in the female athlete triad treatment plan.
CHAPTER III

METHODS

This chapter includes a description of the development and implementation of the pilot study and the final study of the perceptions of MDs, RDs, MHPs, and ATCs regarding the role of the ATC in recognizing, referring, and treating the female athlete triad patient.

Preliminary Procedures

The participants for the pilot study were selected out of a sample of convenience from the local medical community. Face validity was determined by experts in the field (i.e., 2 MDs, 1 RDs, 1 MHPs, and 3 ATCs). The specialty professions of MDs, RDs, MHPs, and ATCs were selected for this study because of their inclusion in the literature regarding the female athlete triad. The researcher was interested in learning about the perceptions of these four groups of specialists regarding the role of the certified athletic trainer on the female athlete triad treatment team in recognizing, referring, and treating Triad patients.

A sample of convenience with specialists from four medical professions (MDs, RDs, MHPs, and ATCs) was employed to perform the pilot study. The 28-item questionnaire was distributed to thirty-eight participants (25 females and 13 males) from the four specialty groups (14 MDs, 6 MHPs, 8 RDs, and 10 ATCs) in order to determine internal consistency. The participants for the pilot study were mailed a packet which included a cover letter describing (a) the components of the female athlete triad, (b) the general role of the ATC, (c) the purpose of the study, and (d) a statement of implied consent for participating in the pilot study by returning the completed questionnaire and the instrument, in a pre-paid return envelope. Internal consistency of the pilot instrument was
assessed by a Cronbach’s alpha analysis for each of the four constructs (e.g., role, recognize, refer, and treat). The response rate for the pilot study was seventy-one percent, with an equal number of responses from MDs and ATCs (9 MDs, 5 MHPs, 4 RDs, and 9 ATCs). Reliability for each of the four constructs was addressed by including similar items from which to draw a composite score. Table 3 reflects the results for the pilot instrument.

The ceiling effect (Cronbach’s alpha = .12) demonstrated in items 11-15 (ATC role on the Triad treatment team) was due to each of the four specialty groups responding favorably to each item.

Table 3

*Cronbach’s Alpha Analyses of Pilot and Final Instrument*

<table>
<thead>
<tr>
<th></th>
<th>Pilot</th>
<th>Pilot w/o RD</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n = 27$</td>
<td>$n = 23$</td>
<td>$N = 175$</td>
</tr>
<tr>
<td>Role of ATC on Triad team: Items 11-15</td>
<td>.12$^a$</td>
<td></td>
<td>.72</td>
</tr>
<tr>
<td>Ability of ATC to recognize Triad: Items 16-20</td>
<td>.59</td>
<td>.70</td>
<td>.89</td>
</tr>
<tr>
<td>Ability of ATC to refer Triad patient: Items 21-24</td>
<td>.76</td>
<td></td>
<td>.90</td>
</tr>
<tr>
<td>Ability of ATC to treat Triad patient: Items 25-28</td>
<td>.69</td>
<td>.84</td>
<td>.79</td>
</tr>
</tbody>
</table>

$^a$Reflects ceiling effect

Cronbach’s alpha results for items 16-20 (ATC ability to recognize the Triad) and items 25-28 (ATC ability to treat Triad patients) demonstrated consistency when the RDs were removed (.70 and .84, respectively). The RDs were removed from this assessment because of the negative impact on internal consistency. The RDs included in the pilot study were obtained by a sample of convenience, and did not reflect the specialists included in the actual study (sport and cardiovascular nutrition-SCAN) from the American Dietetics...
Association. Cronbach’s alpha results for items 21-24 (ATC ability to refer the Triad patient) demonstrated consistency between the four specialty groups (.76).

Operational Procedures

The research was conducted with the permission of the advisory committee of the doctoral candidate from The University of Southern Mississippi. Permission to perform the study was obtained from The University of Southern Mississippi Human Subjects Review Board (Appendix A).

Design

This study was a regional causal comparative study, with participants randomly selected from NATA Districts Eight and Ten (Far West Athletic Trainers’ Association and Northwest Athletic Trainers’ Association).

This study included five independent variables:

Medical profession (MD – family practice or obstetrician/gynecologist, RD, MHP, and ATC).

Gender.

Work Setting (private practice, hospital/sports medicine clinic, traditional athletic training room, and other). The “other” category included such settings as HMO or hospice.

Years experience (0-10 years, 11-20 years, and more than 20 years).

Previous patients in the last two years with Triad risk factors (no patients, 1-5 patients, more than 5 patients).

This study included four dependent variables, each of which was grouped as a construct of either four or five questionnaire items.
The perception of the role of the ATC on the female athlete triad treatment team (items 11-15).

The perception of the ability of the ATC to recognize the female athlete triad (items 16-20).

The perceptions of the ability of the ATC to refer the female athlete triad patient (items 21-24).

The perceptions of the ability of the ATC to treat the female athlete triad patient (items 25-28).

Participants

The participant pool for the final study included approximately 200 members from each group of medical professionals in the study except physicians, which included approximately 300 members. The reason for the difference in number of participants was the perceived risk of low return rate from physicians. While this perception is generally accepted, recent studies suggest this may not be a true reflection. A brief review of recent studies with physicians as subjects demonstrated return rates of 60% (Ygge, Lindholm, & Arnetz, 2006), 72% (vanRyn, Burgess, Malat, & Griffin (2006), and 51% (Lipner et al., 2006).

The participant pool for this regional study included MDs, RDs, MHPs, and ATCs from randomly selected states (Alaska, Hawaii, Idaho, Montana, Nevada, Oregon, and Washington) within Districts Eight and Ten of the NATA. A list of 2000 MDs and 400 MHPs was purchased from Physician List Line (available at http://www.physicianlistline.com). Using this list and a random numbers table, 300 MDs and 200 MHPs were randomly selected for the final study. After receiving permission from
the American Dietetic Association to contact RDs (Appendix B), a list of 300 RDs specializing in sports and cardiovascular nutrition (SCAN) was purchased from the American Dietetic Association (available at http://www.aggressivelist.com). Using this list and a random numbers table, 200 RDs were randomly selected for the final study. A list of 450 ATCs was retrieved from the NATA Membership Directory. Using the NATA Membership Directory and a random numbers table, 200 ATCs were randomly selected for the final study.

Instrument

One of the most appropriate methods of collecting the opinions of medical professionals regarding the research questions was to survey the participants. For this reason, the Medical Professional Perception Inventory (MPPI) (Appendix C), containing statements regarding the female athlete triad, was developed and used to investigate the hypotheses and answer the research questions. The questionnaire included ten demographic questions and eighteen perception statements. The perception statements were written so as to be pooled into the four constructs of a) the role of the ATC on the female athlete triad treatment team, b) the ability of the ATC to recognize the female athlete triad, c) the ability of the ATC to refer the female athlete triad patient, and d) the ability of the ATC to treat the female athlete triad. The nature of this perception study was such that the research was dependent upon the honest opinions of the participants.

The statements included in the MPPI were developed using the NATA Education Council clinical proficiencies, and from a collection of journal articles that provided information about, and questions to ask, an athlete who is suspected of suffering from the female athlete triad. The MPPI instrument contained a cover letter, ten demographic
questions, and eighteen statements specific to the four constructs of role, recognize, refer, and treat. The ten demographic questions were used to separate the subjects into the subgroups of specific medical professions, and to determine gender, work setting, years of experience, and number of previous Triad patients. A 5-point Likert scale anchored by “1-strongly disagree” and “5-strongly agree” was used to assess eighteen statements related to the perceptions of medical professionals regarding the role of the ATC on the Triad treatment team (5 items), and the ATC’s ability to recognize (5 items), refer (4 items), and treat (4 items) the Triad patient.

Procedures

The questionnaire was mailed to a participant pool of stratified, randomly selected MDs, RDs, MHPs, and ATCs from Alaska, Hawaii, Idaho, Montana, Nevada, Oregon, and Washington. Nine hundred participants were mailed a final study packet which included a cover letter describing (a) the components of the female athlete triad, (b) the general role of the ATC, (c) the purpose of the study, and (d) a statement of informed consent for participating by returning the completed questionnaire, the MPPI, and a business reply envelope. Approximately 3 weeks after the initial mailing, a second questionnaire packet was sent to the participants requesting completion and return of the MPPI (Appendix D).

Limitations

In addition to the known limitations of this study, such as only including participants from the states found in Districts 8 and 10 of the NATA, which limited the ability to generalize the findings to other NATA districts, the following limitations may have threatened the internal validity of this study:

1. The return rate was acceptable, but low at 19.44% (175/900).
2. Some of the addresses provided by Physician List Line were incorrect. Had these addresses been removed from the original list of MDs and MHPs, random selection may have produced participants who were willing to return the questionnaire.

Statistical analysis

Cronbach’s alpha analysis was performed on returned questionnaires in order to verify internal consistency. Table 3 reports Cronbach’s alpha results for the final instrument, which demonstrated acceptable levels of consistency for each of the four constructs (role, ability to recognize, ability to refer, and ability to treat).

The independent variable of the first hypothesis (There are no statistically significant differences between medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient) was the medical profession (e.g., MD, RD, MHP, ATC). The four dependent variables of the first hypothesis were the perceptions of medical professionals regarding (a) the role of the ATC in (b) recognizing, (c) referring, and (d) treating the Triad patient. A MANOVA was conducted to analyze the differences in perceptions of the medical specialists. The dependent variables were intercorrelated, therefore a follow-up discriminant analysis was conducted to determine which structures were significant for the discriminant function.

The independent variable of the second hypothesis (There are no statistically significant differences between gender of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient) was gender. The four dependent variables of the second hypothesis were the perceptions of medical professionals regarding
(a) the role of the ATC in (b) recognizing, (c) referring, and (d) treating the Triad patient. A MANOVA analysis was used to analyze the perceptions of the medical specialists (alpha = .05).

The independent variable of the third hypothesis (There are no statistically significant differences between work setting of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient when considering work setting) was work setting. The four dependent variables of the third hypothesis were the perceptions of medical professionals regarding (a) the role of the ATC in (b) recognizing, (c) referring, and (d) treating the Triad patient. A MANOVA analysis was used to analyze the perceptions of the medical specialists (alpha = .05).

The independent variable of the fourth hypothesis (There are no statistically significant differences between years of experience of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient) was years of experience in the profession. The four dependent variables of the fourth hypothesis were the perceptions of medical professionals regarding (a) the role of the ATC in (b) recognizing, (c) referring, and (d) treating the Triad patient. A MANOVA analysis was used to analyze the perceptions of the medical specialists (alpha = .05).

The independent variable of the fifth hypothesis (There are no statistically significant differences between the number of previously treated Triad patients by medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient) was
number of previous Triad patients. The four dependent variables of the fifth hypothesis were the perceptions of medical professionals regarding (a) the role of the ATC in (b) recognizing, (c) referring, and (d) treating the Triad patient. A MANOVA analysis was used to analyze the perceptions of the medical specialists.
CHAPTER IV

RESULTS

This chapter includes a description of the statistical analyses of the final study of the perceptions of MDs, RDs, MHPs, and ATCs regarding the role of the ATC in recognizing, referring, and treating the female athlete triad patient.

Introduction

One hundred twenty-eight out of nine hundred questionnaires (14.22%) were returned after the initial mailing. A second mailing was sent to 747 participants who did not respond to the first request. Twenty-five participants were removed from the original list because of questionnaires that were returned with incorrect addresses. Forty-seven questionnaires were returned following the second mailing, which increased the return rate to 19.44% (175/900).

The five independent variables of this study were medical profession, gender, setting, years of experience, and number of previous Triad patients. The four dependent variables of this study were the perceptions of the (a) role of the ATC on the female athlete triad treatment team, (b) ability of the ATC to recognize the female athlete triad patient, (c) ability of the ATC to refer the female athlete triad patient, and (d) ability of the ATC to treat the female athlete triad patient. The medical professional perception inventory (MPPI) contained multiple statements that were combined to form one mean and standard deviation value for each construct (role = 5 items, recognize = 5 items, refer = 4 items, treat = 4 items). Each statement was anchored by a 5-point Likert scale of “1-strongly disagree, 2-disagree, 3 neutral, 4-agree, and 5-strongly agree.”
Cronbach alpha analyses were performed in order to determine internal consistency of the final instrument. Table 3 reflects the Cronbach alpha results for the final study. Assumptions regarding the negative impact of the RDs used in the pilot study were validated by the acceptable Cronbach alpha levels for each of the four constructs in the final study. The sample of registered dietitians used in the final study were randomly selected from the Sport and Cardiovascular Nutrition dietetic practice group (SCAN) of the American Dietetic Association.

Descriptives

Overall, the female respondents in this study outnumbered males by a ratio of approximately 2:1. Data obtained from the American Academy of Family Physicians (2007) indicated a 2:1 male-to-female ratio; however, the female MDs respondents in this study outnumbered male MDs by fifteen percent. Additionally, data obtained from the NATA News (2005) demonstrated 58% of salary survey respondents were male; yet, ATC respondents in this study included 28 females out of 48 respondents (58%). Of the 41 MHPs who responded to this study, 24 were men and 17 were women (59 and 41 percent, respectively). This breakdown is similar to information gathered from Division 43 (family psychology) of the American Psychological Association (2005) (59 percent males and 41 percent females). Data on female RDs outnumbered male RDs by a ratio of 9:1, which is consistent with the overall membership of the SCAN dietetic practice group of the American Dietetic Association. Table 4 presents the frequencies and percentages of medical profession by gender, and total number of respondents.
Table 4

Frequencies and Percentages of Medical Profession by Gender and Total Participants

<table>
<thead>
<tr>
<th>Medical profession</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>MD</td>
<td>15</td>
<td>42.9</td>
<td>20</td>
<td>57.1</td>
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<td>46</td>
<td>90.2</td>
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<tr>
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<td>17</td>
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<tr>
<td>ATC</td>
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<td>41.7</td>
<td>28</td>
<td>58.3</td>
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<tr>
<td>Total</td>
<td>64</td>
<td>36.6</td>
<td>111</td>
<td>63.4</td>
<td>175</td>
<td>100.0</td>
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</tbody>
</table>

The original questionnaire (Appendix C) included six categories for setting; however, sample sizes were too small in each category, therefore, the settings were collapsed into four groups (private practice, hospital/clinic, traditional, other). Overall, the participants working in private practice settings outnumbered each of the other settings. Fewer than ten ATCs were employed in each of the setting categories of private practice, hospital/sports medicine clinic, and other (e.g., mental health clinic or community health). Not surprisingly, the greatest number of ATCs were employed in the traditional setting of a high school or collegiate athletic training room. Generally, there was an unbalanced distribution of participants across each of the four employment settings, with the category of “private practice” comprising approximately twice as many participants as “traditional” or “other” participants, and approximately three times as many participants as “hospital/clinic” participants. With most MDs, RDs, and MHPs employed in private practice, this observation was expected. Table 5 presents the frequencies and percentages.
of medical profession by employment setting.

Table 5

*Frequencies and Percentages of Medical Profession by Setting*

<table>
<thead>
<tr>
<th>Setting</th>
<th>Private prac.</th>
<th>Hosp./clinic</th>
<th>Traditional</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=74</td>
<td>n=24</td>
<td>n=40</td>
<td>n=37</td>
<td>N=175</td>
</tr>
<tr>
<td>Medical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>26 74.3</td>
<td>2 5.7</td>
<td>2 5.7</td>
<td>5 14.3</td>
<td>35 20.0</td>
</tr>
<tr>
<td>RD</td>
<td>14 27.5</td>
<td>14 27.5</td>
<td>5 9.8</td>
<td>18 35.3</td>
<td>51 29.1</td>
</tr>
<tr>
<td>MHP</td>
<td>28 68.3</td>
<td>2 4.9</td>
<td>2 4.9</td>
<td>9 22.0</td>
<td>41 23.4</td>
</tr>
<tr>
<td>ATC</td>
<td>6 12.5</td>
<td>6 12.5</td>
<td>31 64.6</td>
<td>5 10.4</td>
<td>48 27.5</td>
</tr>
<tr>
<td>Total</td>
<td>74 42.3</td>
<td>24 13.7</td>
<td>40 22.9</td>
<td>37 21.1</td>
<td>175 100.0</td>
</tr>
</tbody>
</table>

The original questionnaire (Appendix C) included six categories for years of experience; however, sample sizes were too small for statistical analysis. The years of experience were collapsed into three groups (0-10 years, 11-20 years, more than 20 years). When separated by years of experience, the participants were generally evenly distributed; however, RDs outnumbered the other medical professionals with less than 10 years experience. Medical doctors were the most evenly distributed profession, yet overall had the fewest number of participants (n=35) in the study. Table 6 presents the frequencies and percentages of medical profession by years of experience.
Table 6

*Frequencies and Percentages of Medical Profession by Years of Experience*

<table>
<thead>
<tr>
<th>Years experience</th>
<th>0-10 years</th>
<th>11-20 years</th>
<th>&gt; 20 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical profession</td>
<td>n=64</td>
<td>n=58</td>
<td>n=53</td>
<td>N=175</td>
</tr>
<tr>
<td>MD</td>
<td>13</td>
<td>37.1</td>
<td>11</td>
<td>31.4</td>
</tr>
<tr>
<td>RD</td>
<td>22</td>
<td>43.1</td>
<td>15</td>
<td>29.4</td>
</tr>
<tr>
<td>MHP</td>
<td>11</td>
<td>26.8</td>
<td>14</td>
<td>34.1</td>
</tr>
<tr>
<td>ATC</td>
<td>18</td>
<td>37.5</td>
<td>18</td>
<td>37.5</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>36.6</td>
<td>58</td>
<td>33.1</td>
</tr>
</tbody>
</table>

The original questionnaire (Appendix C) included six categories for number of previous Triad patients; however, sample sizes were too small for statistical analysis. The previous Triad patient categories were collapsed into three groups (0 patients, 1-5 patients, more than 5 patients). When considering the number of previous Triad patients as an independent variable the participants were generally evenly distributed with 1-5 previous Triad patients being the most common response category. It was interesting to note that more MDs (n=17) reported seeing greater than 5 patients in the past two years who were at risk for the Triad, while more RDs and ATCs (n=20 each) reported seeing zero Triad patients in the past two years. Table 7 presents the frequencies and percentages of medical professions by number of previous Triad patients.
Table 7

*Frequencies and Percentages of Medical Profession by Number of Previous Triad Patients*

<table>
<thead>
<tr>
<th>Previous triad patients in past 2 years</th>
<th>0 patients</th>
<th>1-5 patients</th>
<th>&gt; 5 patients</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=59</td>
<td>n=64</td>
<td>n=52</td>
<td>N=175</td>
<td></td>
</tr>
<tr>
<td><strong>Medical profession</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>7</td>
<td>11</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>RD</td>
<td>20</td>
<td>17</td>
<td>14</td>
<td>51</td>
</tr>
<tr>
<td>MHP</td>
<td>12</td>
<td>21</td>
<td>8</td>
<td>41</td>
</tr>
<tr>
<td>ATC</td>
<td>20</td>
<td>15</td>
<td>13</td>
<td>48</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59</td>
<td>64</td>
<td>52</td>
<td>175</td>
</tr>
</tbody>
</table>

When considering medical profession, ATCs were more likely than other medical professionals to strongly agree with the statements related to the role and the ability of the ATC to treat the Triad patient. Interestingly, MDs had the lowest perceptions regarding the role of the ATC, as well as the ability of the ATC to recognize and refer the female athlete triad patient. Additionally, RDs were both less inclined to agree that the ATC plays a role on the treatment team, and that the ATC has the ability to treat the Triad patient; yet, RDs were most agreeable that the ATC is able to recognize and refer the female athlete triad. Similarly, across most professions, the perceptions of the ATCs’ ability to recognize and refer Triad patients were higher than the perceptions of the ATCs’ role and ability to treat Triad patients. Table 8 presents the group means and standard deviations for the category differences of medical professions by the four dependent variables of role, recognize, refer,
and treat. The mean value represents the composite score of the collapsed statements for each construct.

Table 8

*Means and Standard Deviations for Medical Profession by Role, Recognize, Refer, and Treat the Female Athlete Triad*

<table>
<thead>
<tr>
<th>Medical profession</th>
<th>Role</th>
<th>Recognize</th>
<th>Refer</th>
<th>Treat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$sd$</td>
<td>$M$</td>
<td>$sd$</td>
</tr>
<tr>
<td>MD</td>
<td>4.03</td>
<td>.75</td>
<td>4.32</td>
<td>.74</td>
</tr>
<tr>
<td>RD</td>
<td>4.23</td>
<td>.49</td>
<td>4.51</td>
<td>.58</td>
</tr>
<tr>
<td>MHP</td>
<td>4.08</td>
<td>.53</td>
<td>4.37</td>
<td>.55</td>
</tr>
<tr>
<td>ATC</td>
<td>4.36</td>
<td>.63</td>
<td>4.44</td>
<td>.67</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4.20</td>
<td>.61</td>
<td>4.42</td>
<td>.64</td>
</tr>
</tbody>
</table>

Note. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

When considering gender as a factor on the perceptions of the role of the ATC in recognizing, referring, and treating the female athlete triad, women were generally more likely than men to strongly agree with the statements related to each of the four constructs. Additionally, similar to other independent variables, the perceptions of the ATCs’ ability to recognize and refer Triad patients were higher than the perceptions of the ATCs’ role and ability to treat Triad patients. Table 9 presents the group means and standard deviations for the category differences of gender by the four dependent variables.
Table 9

*Means and Standard Deviations for Gender by Role, Recognize, Refer, and Treat the Female Athlete Triad*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Role</th>
<th>M</th>
<th>sd</th>
<th>Recognize</th>
<th>M</th>
<th>sd</th>
<th>Refer</th>
<th>M</th>
<th>sd</th>
<th>Treat</th>
<th>M</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4.14</td>
<td>.57</td>
<td></td>
<td>4.33</td>
<td>.53</td>
<td></td>
<td>4.33</td>
<td>.54</td>
<td></td>
<td>4.25</td>
<td>.63</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4.23</td>
<td>.63</td>
<td></td>
<td>4.47</td>
<td>.69</td>
<td></td>
<td>4.48</td>
<td>.63</td>
<td></td>
<td>4.31</td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.20</td>
<td>.61</td>
<td></td>
<td>4.42</td>
<td>.64</td>
<td></td>
<td>4.43</td>
<td>.60</td>
<td></td>
<td>4.29</td>
<td>.65</td>
<td></td>
</tr>
</tbody>
</table>

Note. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

When considering the work setting as a factor on the perceptions of the role of the ATC in recognizing, referring, and treating the female athlete triad, most medical professionals in non-traditional settings had favorable perceptions regarding the ATCs’ ability to recognize and refer the Triad patient; yet, they were not as amiable to the ATCs’ role on the treatment team or ability to treat the Triad patient. The responses from the traditional setting, which was comprised of 31 ATCs out of 40 participants, demonstrated more agreement than other settings for the role of the ATC, and the ATCs’ ability to treat the female athlete triad; yet, participants in traditional settings were less likely than participants in all other settings to agree that the ATC has the ability to recognize and refer the female athlete triad. Table 10 presents the group means and standard deviations for the category differences of setting by the four dependent variables.
Table 10

Means and Standard Deviations for Setting by Role, Recognize, Refer, and Treat the Female Athlete Triad

<table>
<thead>
<tr>
<th>Setting</th>
<th>Role</th>
<th>Recognize</th>
<th>Refer</th>
<th>Treat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>sd</td>
<td>M</td>
<td>sd</td>
</tr>
<tr>
<td>Priv. pract.</td>
<td>4.13</td>
<td>.507</td>
<td>4.44</td>
<td>.51</td>
</tr>
<tr>
<td>Hosp/clinic</td>
<td>4.08</td>
<td>.77</td>
<td>4.44</td>
<td>.80</td>
</tr>
<tr>
<td>Traditional</td>
<td>4.35</td>
<td>.74</td>
<td>4.38</td>
<td>.73</td>
</tr>
<tr>
<td>Other</td>
<td>4.24</td>
<td>.55</td>
<td>4.42</td>
<td>.65</td>
</tr>
<tr>
<td>Total</td>
<td>4.20</td>
<td>.61</td>
<td>4.42</td>
<td>.64</td>
</tr>
</tbody>
</table>

Note. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

When considering years of experience as a factor on the perceptions of the role of the ATC in recognizing, referring and treating the female athlete triad, those medical professionals with 11-20 years of experience held higher perceptions in all constructs than those with fewer than 11 or greater than 20 years of experience. Similar to other categories, regardless of the years of experience, the perceptions of the ability of the ATC to recognize and refer the female athlete triad patient were higher than the perceptions of the role of the ATC and the ability of the ATC to treat the Triad patient. Table 11 presents the group means and standard deviations for years of experience by the four dependent variables.
Table 11

Means and Standard Deviations for Years of Experience by Role, Recognize, Refer, and Treat the Female Athlete Triad

<table>
<thead>
<tr>
<th>Years experience</th>
<th>Role</th>
<th>Recognize</th>
<th>Refer</th>
<th>Treat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>sd</td>
<td>M</td>
<td>sd</td>
</tr>
<tr>
<td>0-10 years</td>
<td>4.20</td>
<td>.65</td>
<td>4.44</td>
<td>.71</td>
</tr>
<tr>
<td>11-20 years</td>
<td>4.29</td>
<td>.45</td>
<td>4.50</td>
<td>.50</td>
</tr>
<tr>
<td>&gt;20 years</td>
<td>4.09</td>
<td>.69</td>
<td>4.31</td>
<td>.67</td>
</tr>
<tr>
<td>Total</td>
<td>4.20</td>
<td>.61</td>
<td>4.42</td>
<td>.64</td>
</tr>
</tbody>
</table>

Note. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

When considering the number of previous Triad patients as a factor influencing the perceptions of the role of the ATC in recognizing, referring, and treating the female athlete triad patient, those medical professionals who, in the past two years, had seen more than five patients responded more favorably than those who had seen zero or 1-5 Triad patients. As with the other independent variable categories, the responses to the constructs of the ATCs’ ability to recognize and refer the female athlete triad were more favorable than the responses to the constructs of the role of the ATC and the perceptions of the ATCs’ ability to treat the female athlete triad. Table 12 presents the group means and standard deviations for the category differences for the number of previous Triad patients by the four dependent variables.
Table 12

Mean and Standard Deviations for Number of Previous Triad Patients by Role, Recognize, Refer, and Treat the Female Athlete Triad

<table>
<thead>
<tr>
<th>Previous triad patients</th>
<th>Role</th>
<th>Recognize</th>
<th>Refer</th>
<th>Treat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>sd</td>
<td>M</td>
<td>sd</td>
</tr>
<tr>
<td>0 patients</td>
<td>4.14</td>
<td>.78</td>
<td>4.27</td>
<td>.84</td>
</tr>
<tr>
<td>1-5 patients</td>
<td>4.22</td>
<td>.55</td>
<td>4.48</td>
<td>.53</td>
</tr>
<tr>
<td>&gt;5 patients</td>
<td>4.24</td>
<td>.42</td>
<td>4.52</td>
<td>.44</td>
</tr>
<tr>
<td>Total</td>
<td>4.20</td>
<td>.61</td>
<td>4.42</td>
<td>.64</td>
</tr>
</tbody>
</table>

Note. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Statistical Analysis

Hypothesis 1: There are no significant differences between medical professions in the perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

A one-way MANOVA was performed in order to determine the influence of medical profession on the four dependent variables (DV) of the perceptions of the (a) role of the ATC on the Triad treatment team, (b) ATC ability to recognize the Triad patient, (c) ATC ability to refer the Triad patient, and (d) ATC ability to treat the Triad patient. Table 4 presents the frequencies and percentages of medical profession of the participants in this study. Table 8 reports the group means and standard deviations for the category responses of medical profession, by ATC role on the female athlete triad treatment team, ability to recognize, refer, and treat the Triad patient.
Multivariate analysis of variance results indicated that medical profession significantly influenced the combined DV of (a) the role of the ATC on the Triad treatment team, (b) the ATC ability to recognize the Triad patient, (c) the ATC ability to refer the Triad patient, and (d) the ATC ability to treat the Triad patient (Pillai’s Trace=.211, $F(12, 510)=3.21$, $p<.001$, partial $\eta^2=.07$). The dependent variables were intercorrelated, therefore a discriminant analysis was conducted as a follow-up to the significant MANOVA. This analysis yielded a significant function for role [Wilk’s Lambda=.80 chi-square (N=175, df=12)=38.16, $p<.001$]. This function consisted primarily of a negative relationship to the variable “treat,” and a positive relationship for the variable “refer.” The structure matrix for this function is given in Table 13.

### Table 13

**Structure Matrix for Significant Discriminant Function**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat</td>
<td>-.38*</td>
</tr>
<tr>
<td>Role</td>
<td>.17</td>
</tr>
<tr>
<td>Refer</td>
<td>.35</td>
</tr>
<tr>
<td>Recognize</td>
<td>.25</td>
</tr>
</tbody>
</table>

*Largest absolute correlation between each variable and any discriminant function*

A univariate ANOVA was conducted to determine which of the medical specialty groups was significantly different from the others. Table 14 presents the means and standard deviations for the discriminant scores from function one for analysis one. The ANOVA for the discriminant scores from function one for analysis one produced significant results [$F(3, 171)=9.51$, $p<.001$].
Table 14

Means and Standard Deviations of Discriminant Scores from Function 1 for Analysis 1

<table>
<thead>
<tr>
<th>Medical profession</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD</td>
<td>-.36</td>
<td>1.17</td>
</tr>
<tr>
<td>RD</td>
<td>.62</td>
<td>1.09</td>
</tr>
<tr>
<td>MHP</td>
<td>-.21</td>
<td>.94</td>
</tr>
<tr>
<td>ATC</td>
<td>-.22</td>
<td>.80</td>
</tr>
<tr>
<td>Total</td>
<td>.00</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Post hoc tests for the discriminant scores from function one for analysis one demonstrated that the perceptions of RDs were significantly different ($p<.001$) from MDs, MHPs and ATCs regarding the ATC’s ability to treat the Triad patient, and the ATC’s ability to refer the Triad patient. This follow-up analysis indicated that more than other medical specialists, RDs had negative perceptions regarding the ATC’s ability to treat the Triad patient, but had positive perceptions regarding the ATC’s ability to refer the Triad patient. Table 15 presents the post hoc Tukey mean differences in discriminant scores.

Table 15

Post Hoc Tukey Mean Differences in Discriminant Scores

<table>
<thead>
<tr>
<th>Medical profession</th>
<th>Medical profession</th>
<th>Mean difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD</td>
<td>RD</td>
<td>-.98*</td>
</tr>
<tr>
<td></td>
<td>MHP</td>
<td>-.14</td>
</tr>
<tr>
<td></td>
<td>ATC</td>
<td>-.14</td>
</tr>
<tr>
<td></td>
<td>MD</td>
<td>.98*</td>
</tr>
</tbody>
</table>
Hypothesis 2: There are no significant differences between gender of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

A one-way MANOVA was performed in order to answer the second hypothesis. This analysis was conducted to determine the effect of gender on the four DVs of the perceptions of the (a) role of the ATC on the Triad treatment team, (b) ATC ability to recognize the Triad, (c) ATC ability to refer the Triad patient, and (d) ATC ability to treat the Triad patient. Table 4 presents the frequencies and percentages of medical profession by gender of the participants in this study. Table 9 reports the group means and standard deviations for the category responses of gender, by ATC role on the female athlete triad treatment team, ability to recognize, refer, and treat the Triad patient. Multivariate analysis of variance results indicated that gender did not significantly affect the combined DV

<table>
<thead>
<tr>
<th>Medical profession</th>
<th>Medical profession</th>
<th>Mean difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD</td>
<td>MHP</td>
<td>.84*</td>
</tr>
<tr>
<td></td>
<td>ATC</td>
<td>.84*</td>
</tr>
<tr>
<td>MHP</td>
<td>MD</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>RD</td>
<td>-.84*</td>
</tr>
<tr>
<td></td>
<td>ATC</td>
<td>-.85*</td>
</tr>
<tr>
<td>ATC</td>
<td>MD</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>RD</td>
<td>-.85*</td>
</tr>
<tr>
<td></td>
<td>MHP</td>
<td>-.01</td>
</tr>
</tbody>
</table>

*p<.001
Hypothesis 2: There are no significant differences between setting of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

A one-way MANOVA was performed in order to answer the second hypothesis. This analysis was conducted to determine the effect of setting on the four dependent variables (DV) of the perceptions of the (a) role of the ATC on the Triad treatment team, (b) ATC ability to recognize the Triad, (c) ATC ability to refer the Triad patient, and (d) ATC ability to treat the Triad patient. Table 5 presents the frequencies and percentages of medical profession by setting. Table 10 reports the group means and standard deviations for the category responses of setting by ATC role on the female athlete triad treatment team, ability to recognize, refer, and treat the Triad patient. Multivariate analysis of variance results indicated that setting did not significantly affect the combined DV (Pillai’s Trace=.116, F(12, 510)=1.71, p=.06, $\eta^2 = .04$); therefore, follow-up discriminant analysis was not necessary for the second hypothesis.

Hypothesis 3: There are no significant differences between setting of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

A one-way MANOVA was performed in order to answer the third hypothesis. This analysis was conducted to determine the effect of setting on the four dependent variables (DV) of the perceptions of the (a) role of the ATC on the Triad treatment team, (b) ATC ability to recognize the Triad, (c) ATC ability to refer the Triad patient, and (d) ATC ability to treat the Triad patient. Table 5 presents the frequencies and percentages of medical profession by setting. Table 10 reports the group means and standard deviations for the category responses of setting by ATC role on the female athlete triad treatment team, ability to recognize, refer, and treat the Triad patient. Multivariate analysis of variance results indicated that setting did not significantly affect the combined DV (Pillai’s Trace=.116, F(12, 510)=1.71, p=.06, $\eta^2 = .04$); therefore, follow-up discriminant analysis was not necessary for the third hypothesis.

Hypothesis 4: There are no significant differences between years of experience of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

A one-way MANOVA was performed in order to answer the fourth hypothesis. This analysis was conducted to determine the effect of years of experience on the four DV of the perceptions of the (a) role of the ATC on the Triad treatment team, (b) ATC ability to
to recognize the Triad, (c) ATC ability to refer the Triad patient, and (d) ATC ability to treat the Triad patient. Table 6 presents the frequencies and percentages of medical profession by years of experience. Table 11 reports the group means and standard deviations for the category responses of years of experience by ATC role on the female athlete triad treatment team, ability to recognize, refer, and treat the Triad patient. Multivariate analysis of variance results indicated that years of experience did not significantly affect the combined DV (Pillai’s Trace=.02, $F(8, 340)=.49, p<.865, \eta^2 = .01$); therefore, follow-up discriminant analysis was not necessary for the fourth hypothesis.

Hypothesis 5: There are no significant differences in perceptions of medical professionals regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient when comparing the number of previous Triad patients.

A one-way MANOVA was performed in order to answer the fifth hypothesis. This analysis was conducted to determine the effect of treating previous Triad patients on the four DV of the perceptions of the (a) role of the ATC on the Triad treatment team, (b) ATC ability to recognize the Triad, (c) ATC ability to refer the Triad patient, and (d) ATC ability to treat the Triad patient. Table 7 presents the frequencies and percentages of medical profession by number of previous Triad patients. Table 12 reports the group means and standard deviations for the category responses of number of previous Triad patients by ATC role on the female athlete triad treatment team, ability to recognize, refer, and treat the Triad patient. Multivariate analysis of variance results indicated that the number of previous Triad patients did not significantly affect the combined DV (Pillai’s Trace=.05,
$F(8, 340)=1.15, p<.33, \eta^2 = .03$; therefore, follow-up discriminant analysis was not necessary for the fifth hypothesis.

Ancillary Findings

During the course of statistical analysis, several items of interest were noted for further discussion. The first ancillary finding was that across most of the independent variables of medical profession, gender, setting, years of experience, and number of previous Triad patients, the perceptions of the ATCs’ ability to recognize and refer the female athlete triad patient were more favorable than the perceptions of the role of the ATC on the female athlete triad treatment team, and the perceptions of the ATCs’ ability to treat the female athlete triad patient.

The second ancillary finding was identified in the independent variable of setting, where participants from the traditional setting (31 ATCs out of 40 participants) demonstrated less agreement than participants from the private practice, hospital/clinic, and other settings in the constructs of the ability to recognize and refer the female athlete triad patient. Interestingly, while participants in the traditional setting, who were mostly ATCs, provided the weakest agreement for the constructs of recognize and refer, they provided the strongest agreement for the constructs of role and ability to treat.
CHAPTER V
DISCUSSION

This chapter includes a summary of the results of the data collection according to the five hypotheses. In addition, conclusions, discussion, and limitations of this study are addressed, as are recommendations for future practices and research on the role of the ATC in recognizing, referring and treating the female athlete triad patient.

Summary

The purpose of this study was to investigate the perceptions of MDs, RDs, MHPs and ATCs regarding the role of the ATC in recognizing, referring, and treating the female athlete triad patient. The final analyses were performed using responses from 175 participants from the states of Alaska, Hawaii, Idaho, Montana, Nevada, Oregon, and Washington. Of the 175 participants, there were 35 MDs, 51 RDs, 41 MHPs, and 48 ATCs.

The instrument used in this study was the Medical Professional Perceptions Instrument (MPPI). The 28-item instrument, which included ten demographic questions and eighteen statements measured by a 5-point Likert scale, was used to measure perceptions of medical professionals regarding the role of the ATC in recognizing, referring, and treating the female athlete triad patient. The Likert scale was anchored by 1 “strongly disagree” and 5 “strongly agree.”

This was a causal comparative research project which compared the perceptions of four groups of medical professionals (MDs, RDs, MHPs, and ATCs). The statistical procedures used to analyze the data included multivariate analysis of variance (MANOVA)
to test the five hypotheses. Follow-up discriminant analysis was performed to find specific areas of significant differences.

Statistical analyses of the data generated the following results for each hypothesis:

Hypothesis 1: There are no significant differences between medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

1. There was a statistically significant difference in scores on the MPPI between medical professions regarding the role of the ATC on the female athlete triad treatment team. Discriminant analysis demonstrated that perceptions of RDs were statistically significantly different from MDs, MHPs, and ATCs regarding the ATCs ability to refer and treat the Triad patient.

Hypothesis 2: There are no significant differences between gender of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

1. There were no statistically significant differences in scores on the MPPI between genders regarding the role of the ATC in recognizing, referring, or treating the female athlete triad patient.

Hypothesis 3: There are no significant differences between work setting of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient when considering work setting.
1. There were no statistically significant differences in scores on the MPPI between professional settings regarding the role of the ATC in recognizing, referring, or treating the female athlete triad patient.

Hypothesis 4: There are no significant differences between years of experience of medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

1. There were no statistically significant differences in scores on the MPPI between years of experience regarding the role of the ATC in recognizing, referring, or treating the female athlete triad patient.

Hypothesis 5: There are no significant differences between the number of previously treated Triad patients by medical professionals in their perceptions regarding the role of the ATC on the female athlete triad treatment team in recognizing, referring, and treating the female athlete triad patient.

1. There were no statistically significant differences in scores on the MPPI between the number of previous Triad patients regarding the role of the ATC in recognizing, referring, or treating the female athlete triad patient.

Discussion

Previous experiences of working with other medical professionals in treating female athlete triad patients provided a foundation from which to predict significant differences for profession, gender, setting, years of experience, and number of previous Triad patients. These experiences were balanced by the literature that referred to the ATC as the “first line of defense” in working with Triad-prone athletes (Zawila, Steib, &
Hoogenboom, 2003). Based on the statistical analyses and the limitations of this study, the following conclusions were made:

One independent variable (medical profession) had a statistically significant influence on one of the dependent variables (role of the ATC on the female athlete triad treatment team). Follow-up analysis indicated that RDs had statistically significantly different perceptions than MDs, MHPs, and ATCs regarding the ability of the ATC to refer and treat the Triad patient. A discriminant analysis indicated that RDs were significantly less likely than MDs, MHPs, and ATCs to strongly agree that the ATC has the ability to treat the Triad patient. In addition, the discriminant analysis indicated that RDs were significantly more likely than MDs, MHPs, and ATCs to strongly agree that the ATC has the ability to refer the Triad patient. This finding supports the idea that the ATC can serve as the first line of defense (Zawila, Steib, & Hoogenboom, 2003), or the concept that the ATC serves as a liaison between other medical specialists and the athlete, as Gutgesell, Moreau, & Thompson (2003) and Williams (2006) indicated. The NCAA (2005) allows a “designated representative” to make participation decisions (p 24). If an ATC suspects an athlete has a stress fracture—a possible indicator of the Triad—but the athlete cannot be seen by a physician before the next practice, the ATC should have authority to withhold the athlete from participation.

The literature suggests a strong link between the educational background of the ATC and his or her ability to play an important role on the Triad treatment team. As DeSouza (2006) and Williams (2006) appropriately observed, the ATC is educated regarding the warning signs of the Triad, and has access to daily contact with the athlete.
According to Thompson & Sherman (1999), the ATC plays an important role in treatment of the Triad and other conditions.

While not significant for all medical professions, the trend of more favorable perceptions regarding the ability of the ATC to recognize and refer the Triad patient was an interesting observation. The inference is that the ATC is well-qualified to recognize and refer the Triad patient, but that traditional Triad treatment team members are less agreeable as to the role of the ATC on the Triad treatment team. If treatment information is not shared with the ATC, who has daily contact with the Triad patient, the role of liaison between the athlete and other Triad treatment team members described by Hobart & Smucker (2000) and Gutgesell, Moreau, & Thompson (2003) may be non-existent. As Mees (2003) emphasized a high level of suspicion when treating stress fractures and other conditions associated with the Triad, physicians would do well to understand the opportunity for daily contact with the Triad patient by the high school or collegiate ATC. Additionally, in many cases, the preparticipation screening of athletes, suggested by Hobart & Smucker (2000) and Williams (2006) is often performed by an ATC. The NCAA (2006) recommends just one MD screening in four years of collegiate athletic performance (p 8).

Regarding the findings, the significant differences in the perceptions of RDs compared to the other medical professionals regarding the role of the ATC in referring and treating the Triad patient may have been a matter of education and credentialing. While the twelve CAATE content areas include nutritional aspects of injuries and illness (NATA Education Council, 2006), this only provides a basic education in nutrition that can be used to support the information provided by a RD who has graduated from an accredited program in dietary education. While it is appropriate for the ATC to refer the Triad patient
to a RD for nutritional counseling, the ATC should be able to identify and provide basic concepts regarding disordered eating and the relationship between a caloric deficit, amenorrhea, and stress fractures (DeSouza, 2006).

The contrast in perceptions of the medical professionals, when separated by setting, was interesting in that the traditional high school and university setting responses to the items regarding the ATCs’ ability to recognize and refer the Triad patient were lower than responses from the other three settings. The traditional category included thirty-one ATCs, but five or fewer MDs, RDs, and MHPs. An additional surprise to this trend was the more agreeable responses to the constructs of the ATCs’ role and ability to treat the Triad patient. If ATCs and others in the traditional setting expect ATCs to have a role on the Triad treatment team and be able to actually treat the Triad patient, confidence in the ability of the ATC to recognize and refer the Triad patient is imperative. If this ambiguity exists among medical professionals in the traditional setting, where ATCs make up a majority of the medical professionals, the discipline-specific literature will continue to withhold the ATC from consistent inclusion as a qualified member of the Triad treatment team.

Limitations

The findings of the study may have been affected by the following:

1. The low response rate (19.44%) may not provide adequate data in order to generalize the results to Districts 8 and 10 of the NATA.

Recommendations for Policy or Practice

Considering the statistically significant differences with the independent variable of medical professional perceptions regarding the dependent variable of the role of the ATC on the Triad treatment team, the following are recommendations for improving the
perceptions of medical professionals regarding the ATC are made:

1. Encourage collaboration between ATCs, team physicians and organizations, such as the NCAA and American Academy of Family Physicians, to develop consensus statements that more clearly define the Triad team members and the role of each medical professional on the team.

2. Focus educational and public relations efforts to MD, RD, and MHP groups, such as family practice physicians, SCAN dietitians, and exercise and sport psychologists in order to expand the understanding of the ATCs’ access to, and experience with the Triad patient. When ATCs present information to other ATCs, the message does not reach other medical professional groups. Intentional efforts to increase awareness of the benefits of having an ATC on the Triad treatment team will potentially increase the number of ATCs who are consulted regarding the Triad patient.

3. Focus educational and public relations efforts to the NATA at the national, district, and state levels in order to provide training and support for the implementation of collaborative efforts with other medical professionals on the Triad treatment team.

Recommendations for Future Research

Future research regarding the female athlete triad can move forward in several directions. First, the MPPI could be revised to separate the dependent variables into four distinct instruments in order to focus more construct items on specific characteristics. Within the construct of the ATCs’ ability to treat the Triad patient, for example, there was only one item specific to each of the four medical professionals. Confining a study to one
construct would allow for more items within the construct, which may have an effect on the outcome.

A second thought on future research is to investigate the perceptions of other “significant players” in the female athlete triad. The literature identified parents, athlete, coaches and administrators as groups to whom intervention and education should be provided (N.J. Hornak & J. E. Hornak, 1997; Hobart & Smucker, 2000). Knowing the perceptions of these groups may provide valuable information to the medical team regarding aspects of the Triad treatment plan that need increased attention.

Conclusion

The potentially devastating affects of the female athlete triad should not be ignored by medical professionals who treat athletic young women. The responsibility to recognize, refer, and treat the female athlete triad is most commonly expected of physicians, dietitians, and mental health practitioners, but the medical professional who has daily access to the Triad patient, and is able to recognize, refer, and treat her in collaboration with other qualified individuals is the certified athletic trainer. The results of this study indicated that MDs and MHPs do not consider the ATC to have a role on the Triad treatment team, even though they, along with RDs, perceived ATCs to be able to recognize and refer Triad patients to the appropriate medical professional. Further research and collaboration with representatives from the four medical professions identified in this study is necessary to understand the extent to which these perceptions are held.
Appendix A

Human Subjects Review Form

The University of Southern Mississippi
Institutional Review Board

TO: Karen Hostetter
3205 Hillside Drive
Hattiesburg, MS 39401

FROM: Lawrence A. Hosman, Ph.D.
HSPRC Chair

PROTOCOL NUMBER: 26062703
PROJECT TITLE: Perceptions of Medical Professionals Regarding the Role of the Certified Athletic Trainer in Recognizing, Referring, and Treating the female Athlete Triad

Enclosed is The University of Southern Mississippi Human Subjects Protection Review Committee Notice of Committee Action taken on the above referenced project proposal. If I can be of further assistance, contact me at (601) 266-4279, FAX at (601) 266-4275, or you can e-mail me at Lawrence.Hosman@usm.edu. Good luck with your research.
The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 26062703
PROJECT TITLE: Perceptions of Medical Professionals Regarding the Role of the Certified Athletic Trainer in Recognizing, Referring, and Treating the Female Athlete Triad
PROPOSED PROJECT DATES: 11/01/04 to 03/31/07
PROJECT TYPE: Dissertation or Thesis
PRINCIPAL INVESTIGATORS: Karen Hostetter
COLLEGE/DIVISION: College of Health
DEPARTMENT: Human Performance & Recreation
FUNDING AGENCY: N/A
HSPRC COMMITTEE ACTION: Exempt Approval
PERIOD OF APPROVAL: 06/27/06 to 06/26/07

Lawrence A. Hosman, Ph.D.
HSPRC Chair

G-24-06
August 18, 2006

VIA FACSIMILE
503.554.3864

Karen Hostetter, MS, ATC
Doctoral Candidate
The University of Southern Mississippi
1326 Cramner St.
Lafayette, OR 97127

Dear Karen,

As requested, here is the information regarding approval of your use of the American Dietetic Association mailing list.

The ADA advised of the approval on your mail piece! Please reference CL 10811 when you submit check. Once we receive the check we can proceed with the order.

Also, on the pricing, we would charge you for the STATE/DPG on the actual number of names received which is the 273. You'll reuse a portion of the list to get to the 350 quantity correct?

$300.00 Base
$4.09 DPG
$2.05 State
$50 email
For a total $356.14

Best of luck,

-Cici

Cecilia G. Rosseljong
Vice President-Client Services
847-304-4030 x205
F: 847-304-4032

♦ Your list manager should be AGGRESSIVE! ♦
Appendix C

Medical Professional Perception Instrument

August 14, 2006

Dear Participant,

My name is Karen Hostetter and I am a doctoral student at The University of Southern Mississippi. I am also an assistant professor and the athletic training education program director at George Fox University. The purpose of this letter is to request your input on a survey instrument I will use for my dissertation.

The female athlete triad is a serious medical condition that may affect athletic young women involved in sports or activities where leanness or endurance is emphasized. The three aspects of the female athlete triad are disordered eating, menstrual dysfunction, and below normal bone mineral density (early onset osteopenia or osteoporosis).

Most of the literature regarding the treatment of the female athlete triad describes four key elements: (a) identification of warning signs, (b) a team approach, (c) intervention, and (d) prevention. Of particular interest to me in this study is the team approach to treatment. The members of the treatment team usually include a physician, registered dietitian, and mental health professional.

The purpose of this study is to determine the perceptions of physicians, dietitians, mental health professionals, and certified athletic trainers regarding the role of the certified athletic trainer in recognizing, referring, and treating the female athlete triad. The Medical Professionals' Perception Instrument (MPPI) includes ten demographic questions and eighteen perceptual questions. The time to complete the MPPI should be no more than 15 minutes.

Participation in this study is voluntary and you may choose to discontinue your involvement at any time without penalty. Return of the MPPI implies your consent to participate in this study. The instrument has been numbered only to keep track of respondents. Your responses will be kept confidential, and will only be used for the purpose of answering the research questions. All documents will be destroyed when the information is no longer needed. A self-addressed, stamped envelope has been included for you to return the instrument to me within 10 days. Thank you for taking the time to participate in this study.

Sincerely,

Karen Hostetter, MS, ATC
George Fox University
Assistant Professor, ATEP Director
503-554-2922 (o)
503-970-4996 (c)
khostetter@georgefox.edu

This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.
MEDICAL PROFESSIONALS’ PERCEPTION INSTRUMENT (MPPI)

DEMOGRAPHICS

1. What is your occupation?
   - Physician: Specialty _____________  Psychologist/Counselor
   - Registered Dietitian: Specialty _____________  ATC

2. What is your gender?  Male ___ Female

3. With which gender do you practice the majority of your work?
   - Male _________________ Female _________________ Evenly distributed

4. In what setting do you practice the majority of your work?
   - Private Practice  College / University  Sports Medicine Clinic
   - Hospital  High School  Other _________________

5. How many years have you been a credentialed professional in your specialty?
   - Less than 1 year  6-10  16-20
   - 1-5  11-15  more than 20

6. In the past 2 years, approximately how many patients have you treated who demonstrated RISK FACTORS for the female athlete triad?
   - 0  6-10  16-20
   - 1-5  11-15  more than 20

7. In the past 2 years, approximately how many patients from question 6 were DIAGNOSED with the female athlete triad?
   - 0  6-10  16-20
   - 1-5  11-15  more than 20

8. In the past 2 years, approximately how many times have you CONSULTED with a certified athletic trainer regarding a female athlete triad case?
   - 0  6-10  16-20
   - 1-5  11-15  more than 20

9. In the past 2 years, approximately how many female athlete triad REFERRALS have you received from certified athletic trainers?
   - 0  6-10  16-20
   - 1-5  11-15  more than 20

10. In the past 2 years, approximately how many female athlete triad patients have been SELF-REFERRALS?
    - 0  6-10  16-20
    - 1-5  11-15  more than 20
MEDICAL PROFESSIONALS’ PERCEPTION INSTRUMENT (MPPI)

Please consider your position as a **medical professional** as you respond to each item by circling the number that most closely describes your **perception** regarding the **ROLE** of the Certified Athletic Trainer (ATC) on the Female Athlete Triad Treatment Team; and your **perceptions** of the Certified Athletic Trainer’s ability to **RECOGNIZE**, **REFER** and **TREAT** the Female Athlete Triad.

### PERCEPTIONS

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. The ATC has daily access to the female athlete triad patient.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>12. The ATC should have the authority to withhold a Triad patient from participating in interscholastic or intercollegiate athletics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. The ATC should be familiar with the three components of the Triad (e.g., amenorrhea, disordered eating, early-onset osteoporosis).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>14. The ATC should be able to maintain HIPAA-compliant confidentiality regarding the Triad patient.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>15. The ATC is qualified to be a member of the Triad treatment team.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. The ATC should be able to recognize social behaviors characteristic of people with eating disorders (e.g. perfectionist, introvert, high achiever).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>17. The ATC should be able to recognize disordered eating in female athletes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. The ATC should be able to recognize inappropriate exercise behaviors in female athletes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. The ATC should be able to screen female athletes for low body fat and low body weight.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. The ATC should be able to recognize an athlete who has a history of physician-diagnosed lower extremity stress fractures as being at risk for the Triad.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Please continue to next page
### MEDICAL PROFESSIONALS’ PERCEPTION INSTRUMENT (MPPI)

#### PERCEPTIONS (continued)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. The ATC should know when to refer an athlete with a history of lower extremity stress fractures.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. The ATC should know when to refer an athlete with irregular menstrual patterns.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. The ATC should know when to refer an athlete who demonstrates patterns of disordered eating.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. The ATC should know when to refer an athlete who demonstrates abnormal exercise patterns.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. The ATC should be able to reinforce the recommendations of each member of the Triad treatment team.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. The ATC should be able to provide information on proper nutrition practices to female athletes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. The ATC should be included in the Triad treatment team.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. The ATC should be able to keep records of the Triad patient’s compliance with treatment team recommendations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**THANK YOU!**

PLEASE RETURN SURVEY IN THE PRE-PAID ENVELOPE

---

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
September 20, 2006

Dear Medical Professional,

As you are aware from my earlier request, I am conducting a study related to the perceptions of medical professionals regarding the role of the certified athletic trainer (ATC) on the Female Athlete Triad treatment team. This investigation has value for physicians, dietitians, counselors and ATCs because it will indicate areas where further collaboration between treatment team members is needed. This study was approved by the American Dietetic Association (authorization CL 10811).

I realize that your time for such requests is limited, but your input will be a great asset to this study. Your responses will be kept confidential and used only for this research project.

The instrument should take less than 10 minutes to complete. I hope that you will take a few minutes to complete the survey and return it to me in the prepaid business reply envelope by October 4, 2006. Thank you for your thoughtful consideration and your participation in this study. Please let me know if you have any questions regarding this survey or the final results.

Sincerely,

Karen Hostetter, ABD, ATC
George Fox University
Assistant Professor, ATEP Director
503-554-2922 (o)
503-970-4996 (c)
khostetter@georgefox.edu

This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820

If you have returned the initial questionnaire, please disregard this request and accept my thanks for your participation.
MEDICAL PROFESSIONALS' PERCEPTION INSTRUMENT (MPPI)

DEMOGRAPHICS

1. What is your occupation?
   ___ Physician: Specialty? ____________________  ___ Psychologist/Counselor
   ___ Registered Dietitian: Specialty ____________  ___ ATC

2. What is your gender?  ___ Male  ___ Female

3. With which gender do you practice the majority of your work?
   ___ Male  ___ Female  ___ Evenly distributed

4. In what setting do you practice the majority of your work?
   ___ Private Practice  ___ College / University  ___ Sports Medicine Clinic
   ___ Hospital  ___ High School  ___ Other __________

5. How many years have you been a credentialed professional in your medical specialty?
   ___ Less than 1 year  ___ 6-10  ___ 16-20
   ___ 1-5  ___ 11-15  ___ more than 20

6. In the past 2 years, approximately how many patients have you treated who demonstrated RISK FACTORS for the female athlete triad?
   ___ 0  ___ 6-10  ___ 16-20
   ___ 1-5  ___ 11-15  ___ more than 20

7. In the past 2 years, approximately how many patients from question 6 were DIAGNOSED with the female athlete triad?
   ___ 0  ___ 6-10  ___ 16-20
   ___ 1-5  ___ 11-15  ___ more than 20

8. In the past 2 years, approximately how many times have you CONSULTED with a certified athletic trainer regarding a female athlete triad case?
   ___ 0  ___ 6-10  ___ 16-20
   ___ 1-5  ___ 11-15  ___ more than 20

9. In the past 2 years, approximately how many female athlete triad REFERRALS have you received from certified athletic trainers?
   ___ 0  ___ 6-10  ___ 16-20
   ___ 1-5  ___ 11-15  ___ more than 20

10. In the past 2 years, approximately how many female athlete triad patients have been SELF-REFERRALS?
    ___ 0  ___ 6-10  ___ 16-20
     ___ 1-5  ___ 11-15  ___ more than 20
MEDICAL PROFESSIONALS’ PERCEPTION INSTRUMENT (MPPI)

Please consider your position as a medical professional as you respond to each item by circling the number that most closely describes your perception regarding the role of the Certified Athletic Trainer (ATC) on the Female Athlete Triad Treatment Team, and to your perceptions of the Certified Athletic Trainer’s ability to recognize, refer and treat the Female Athlete Triad.

<table>
<thead>
<tr>
<th>PERCEPTIONS</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. The ATC has daily access to the female athlete triad patient.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>12. The ATC should have the authority to withhold a Triad patient from participating in interscholastic or intercollegiate athletics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>13. The ATC should be familiar with the three components of the Triad (e.g., amenorrhea, disordered eating, early-onset osteoporosis).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>14. The ATC should be able to maintain HIPAA-compliant confidentiality regarding the Triad patient.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>15. The ATC is qualified to be a member of the Triad treatment team.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>16. The ATC should be able to recognize social behaviors characteristic of people with eating disorders (e.g. perfectionist, introvert, high achiever).</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>17. The ATC should be able to recognize disordered eating in female athletes.</td>
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<td>2</td>
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</tr>
<tr>
<td>18. The ATC should be able to recognize inappropriate exercise behaviors in female athletes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>19. The ATC should be able to screen female athletes for low body fat and low body weight.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
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<tr>
<td>20. The ATC should be able to recognize an athlete who has a history of physician-diagnosed lower extremity stress fractures as being at risk for the Triad.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tbody>
</table>

Please continue to next page
<table>
<thead>
<tr>
<th>PERCEPTIONS (continued)</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. The ATC should know when to refer an athlete with a history of lower extremity stress fractures.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
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<tr>
<td>22. The ATC should know when to refer an athlete with irregular menstrual patterns.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>23. The ATC should know when to refer an athlete who demonstrates patterns of disordered eating.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>24. The ATC should know when to refer an athlete who demonstrates abnormal exercise patterns.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>25. The ATC should be able to reinforce the recommendations of each member of the Triad treatment team.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>26. The ATC should be able to provide information on proper nutrition practices to female athletes.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>27. The ATC should be included in the Triad treatment team.</td>
<td>1</td>
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<td>5</td>
</tr>
<tr>
<td>28. The ATC should be able to keep records of the Triad patient’s compliance with treatment team recommendations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

THANK YOU!

PLEASE RETURN SURVEY IN THE PRE-PAID ENVELOPE
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