Characteristics of the Adult Female Endurance Runner: A survey

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CHARACTERISTICS OF THE ADULT FEMALE ENDURANCE RUNNER: A SURVEY

by

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A thesis submitted in partial fulfillment of the requirements for the Honors in the Major Health Sciences Pre-Clinical in the College of Health and Public Affairs and in the Burnett Honors College at the University of Central Florida
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ABSTRACT

Objective: This study investigated the behaviors and characteristics of the adult female endurance runner and potential components of the female athlete triad (FAT). The FAT consists of three components that are interrelated: low energy availability, menstrual dysfunction, and low bone mineral density. Low energy availability may occur with or without disordered eating. Reproduction becomes non-essential leading to irregular menstrual cycles. A reduction in estrogen levels may contribute to low bone mineral density which may lead to stress fractures. Research investigating the FAT has primarily focused on adolescent and young adult females. Adult females training for endurance events may also be at risk for the FAT. *Method:* A survey was constructed and distributed to females in a local half-marathon and marathon training group in Central Florida. The data was collected at one point in time and no additional follow-up was required. The survey aimed to identify specific behaviors and characteristics related to components of the FAT and determine the potential prevalence in a small sample of female endurance athletes aged 18 and older. *Results:* 72 females with a mean age of 40.92(± 9.61) years completed the survey. Subjects had an average height of 163.60(±6.41) cm, weighed an average of 62.24(±10.05) kg and had 10 years of running experience. *Conclusion:* Adult female endurance runners demonstrate behaviors and characteristics that may be indicative of the FAT. Participants demonstrated signs of inadvertent or intentional low energy availability. These characteristics can be due to either body dissatisfaction or wanting to increase performance.

Keywords: Female athlete triad, menstrual dysfunction, energy availability, bone mineral density, adult female endurance athletes

DEDICATION

For my thesis committee Dr. Kristen Schellhase and Dr. Sandra Neer, for becoming a part of my committee. For my thesis chair, Dr. Carey Rothschild for giving me all the resources necessary to complete this project even with her insanely busy schedule. For my family, thank you for your love and support. For my boyfriend, Adrian Rodriguez, thank you for being my dedicated supporter and best friend. And especially, for my mother, Nancy Gabriel, thank you for your guidance and for pushing me to achieve my goals.

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INTRODUCTION

Female sports participation has dramatically increased in the past four decades as a result of Title IX, a federal law executed in 1972 designed to eradicate discrimination based on sex. The Title IX states that "…No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving federal financial assistance…".[1] Title IX applies to any institution that receives federal funds, including the majority of schools and universities in the United States.

According to the National Federation of State High School Associations in 1972, females constituted 7% of the total number of athletes. In contrast, 41% of athletes were females in 2008-2009.[1] Countless benefits have been associated with female sports participation, including improved self-esteem, positive body image, and an increase in high school graduation rate. However, the increase in female participation in sports has also been associated with an increase in sports-related injuries and other issues.[2] In 1992, the American College of Sports Medicine (ACSM) conducted a review of frequently observed medical conditions including disordered eating, amenorrhea, and osteoporosis in female athletes. Collectively, these factors were included in a term called the "female athlete triad" (FAT).[1]

FEMALE ATHLETE TRIAD

The FAT is a syndrome that typically begins when an athlete fails to consume an adequate number of kilocalories to support the level of exercise. It can happen unintentionally or

due to the pressure of having a small body size or participating in a weight category/ weight sensitive sport. [2, 3, 4] The FAT is comprised of three components: low energy availability, menstrual dysfunction, and low bone mineral density (BMD). Menstrual dysfunction and low BMD may result from low energy availability with or without an eating disorder. Amenorrhea (also known as "hypothalamic amenorrhea"), the absence of menstruation, and osteoporosis, solely or in combination, present significant health risks to physically active females.[5] According to researchers, the components of the FAT are interconnected. Energy deficiency associated with disordered eating contributes to the development of menstrual dysfunction, and a low estrogenic environment is associated with amenorrhea presenting a contingent role in low bone mineral density.[6] Therefore, low energy availability may increase the risk of developing the remaining components of the Triad.[5]

Serious health and performance complications may occur due to energy deficiency.[6] The hormonal and functional homeostatic balance of the body may become disrupted as a result of the body adjusting to reduced energy expenditure.[3,7] Medical complications may affect the following systems of the body: cardiovascular, endocrine, reproductive (infertility), skeletal (decreased BMD), gastrointestinal, immune, renal, and central nervous.[5,7] The body responds to low energy availability by proceeding into an energy conservation mode leading to the cessation of processes that are non-essential for survival with one of the them being reproduction.[8]

As a result, there is decreased production of estrogen, progesterone and other gonad releasing hormones eventually leading to amenorrhea. There are two types of amenorrhea: 1) primary amenorrhea, a delay in the age of menarche, and 2) secondary amenorrhea, the cessation of menses.[2] The body enters a state analogous to menopause with symptoms such as vaginal

dryness and atrophy. Oligomenorrhea is another type of menstrual dysfunction which is characterized by menstruation every 35 days or less than nine menstrual cycles in one year. [5,8] Depending on sport type, approximately 21% to 40% of female athletes in certain sports have reported oligomenorrhea, which is considerably higher than the general population [7].

Estrogen plays a significant role in the physiology of bone formation and bone mineral density by protecting the bone from resorption.[2,8] As a result of low estrogen, bones become thin and brittle leading to increased susceptibility to stress. [8] The body becomes incapable of replacing old bone cells with new robust bone cells, making athletes at risk for poor bone health. The peak bone-building years ranges from puberty to the age of 20. According to the Female Athlete Coalition, 90% of peak bone mineral density is reached by the age of 18 years.[6] For female athletes with irregular periods, the peak bone mineral density is not achieved. [9]

Despite the positive bone-building effects of exercise, some of these female athletes fail to develop all the bone mineral density that is anticipated. Low bone mineral density sets the foundation not only for stress fractures but also for early onset of osteoporosis. [9] In a study of 311 high school female athletes, 65.6% of the athletes were affected by musculoskeletal injury.[2] Compared to 13% to 20% in the general pubescent female population, estrogen deficiency is predominant among high school and collegiate athlete's ranging from 15% to 62%. [7] The occurrence of amenorrhea in specific sports is: ballet 35%, cycling 38%, running 45%, lightweight rowing 48%, and gymnastics 70%.[4]

Health and athletic professionals are another group of individuals who lack enough education on the FAT. In a survey of physicians, physical therapists, coaches and athletic trainers, less than half were able to name and identify the three components of the triad.[2] In a

study of 240 female athletes in a variety of sports and their 10 coaches, only three coaches had heard of the Triad, and only one could identify all three components. Three coaches thought that menstrual dysfunction was a normal result of sports participation.[10, 2] The condition may be underreported and left untreated due to coaches assuming that menstrual irregularity is a normal symptom of a female endurance athlete and physicians not being able to identify symptoms of the FAT and prescribing female athletes with oral contraceptives.[2] In addition, oral contraception may obscure the symptoms of low energy availability (menstrual dysfunction and decreased BMD) and further minimize the prevalence rate of the FAT. [3]

ADULT FEMALE ENDURANCE ATHLETES

Endurance sports may include distance running (half-marathon, marathon, ultra-marathon). Adult female participation (older than 18 years of age) in these endurance sports has been continuously increasing over the years and is at an all-time high. In half-marathons, 61% of participants were female, while in marathons 43% were female. The estimated total of triathlon participants rose up to 59% from 2008 to 2011.[11] While these female participation numbers increase, so does the training load and potential risk for musculoskeletal injury, including stress fractures.

Training for these type of endurance sports requires a lot of time and determination. For half-marathons, 3-6 days and 15-50 miles per week are recommended depending on experience level.[12] Training for an ultra-marathon requires more miles but at a slower speed and decreased intensity. The most concentrated training is for the triathlon runners, demanding 7-20 hours of training and 6-11 workouts per week.[12]

Existing literature of the prevalence of the FAT is mostly exclusive to the high school and collegiate population. Endurance female athletes over the age of 18 participate in various types of endurance events and vigorously train just as much as their high school/collegiate counterparts and may also be at risk for developing the FAT. With increasing miles, runners in the general population have an increasing prevalence of amenorrhea.[4] Fifty percent of women who run greater than 80 miles per week will be amenorrheic putting them at an increased risk of acquiring osteoporosis.[4]

Running in a marathon requires an enormous amount of time and effort which can take a toll on an athlete's personal life. Learning how to juggle relationships with the athlete's spouse, children, family, friends, career and community may lead to psychological effects.[13] Balancing these components of life may be challenging and can lead to compulsive behaviors such as overtraining. Psychological signs and symptoms of overtraining are constant mental fatigue, sleep disturbances, depression, reduced appetite, emotional instability, difficulty concentrating, and giving up on goals.[14] Overtraining can lead to the components of the FAT such as low energy availability, menstrual dysfunction, and low bone mineral density. These components directly correlate with each other and can be detrimental to a female athlete's health.[5]

DIAGNOSIS/ SCREENING OF FAT

Low energy availability, menstrual dysfunction, and low bone mineral density (BMD) are the three interrelated components of the FAT. The FAT begins with low energy availability leading to decreased production of estrogen causing menstrual dysfunction. This decrease in estrogen (a vital hormone in bone health) may lead to low BMD.[6] If diagnosed with one

component, it is recommended to test the female athlete for all three FAT components due to the relationship among them.[7]

Low energy availability is often caused by high energy expenditure with low kilocalorie intake. Low energy availability can be evaluated by calculating the energy availability. To calculate the energy availability, the energy intake is subtracted by the energy cost of exercise relative to fat-free mass (FFM). If the solution to the equation equals the value of 45 kcal/kg FFM/day then energy balance has been achieved; but if it falls below, energy availability is considered low.[15] After energy availability is calculated the body mass index (BMI) should be considered. The female athlete has decreased energy stored if the BMI is less than 17.5 kg/m^8. Assessment of low energy availability is difficult and imprecise but detailed history of the female athletes' diet and energy expenditure must be documented, in addition to the calculated BMI, to get an accurate depiction of its prevalence.[2] Low energy availability is initiated by disordered eating or an eating disorder.[7]

Disordered eating is characterized by healthy dieting but sporadic use of short-term restricted diets.[7] An eating disorder (anorexia nervosa or bulimia nervosa) is categorized by distorted body image, unusual eating behaviors, and weight fluctuations.[7] Both of these eating conditions are contingent of low energy availability is should be screened by making the previously stated calculations and documentations. But, if eating disorder is suspected, the female athlete should be referred to a psychiatrist or a primary care physician for signs of self-inflicted vomiting such as swollen parotid glands, callus in the back of a finger, and poor dentition. Low energy availability with or without an eating disorder often leads to menstrual dysfunction.[2]

Menstrual dysfunction is any menstrual irregularity including amenorrhea, oligomenorrhea, or cessation of menses, it is caused by low hormones necessary for female reproduction especially estrogen. Assessment for menstrual dysfunction includes documented levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), thyroid stimulating hormone (TSH), prolactin measurement, and a pregnancy test. [7] Decreased BMD results in a low estrogenic environment leading to susceptibility to fractures. [2]

Bone mineral density testing should be evaluated by dual-energy x-ray absorptiometry (DEXA), a diagnostic for evaluating BMD .[2, 6-7] The criteria to interpret a low BMD from a DEXA is similar for a premenopausal female athlete and a postmenopausal female athlete. For both pre/postmenopausal athletes, the Z-score of the hip and posterior-anterior view of the lumbar should be evaluated and compared to subjects with normal controls of the same sex and age. But, a Z-score of < -2.0 standard deviation is considered low for postmenopausal women while a Z-score o> -1.0 standard deviation is considered low for premenopausal women. History of stress fractures should also be accounted for and continuously documented. [2]

MANAGEMENT OF FAT

After being evaluated, essential recommendations are given to the female athlete to properly manage the FAT or certain components of the FAT. Low energy availability is managed by assessing a baseline of energy needs that includes extensive body weight history and also questions to determine menstrual status. A meal plan should be developed that targets the appropriate amount of energy needed for the amount of energy expended. [6] The objective should include achieving an equal balance of macronutrients and micronutrients especially iron, zinc, calcium, vitamin K and D. The female athletes' diet should include energy and nutrient-dense

foods such as essential fatty acids and fortified milk drinks. A successful treatment plan requires standardized periodic monitoring of body weight.[6] For female athletes with an eating disorder, cognitive behavioral therapy has been proven to be effective. In addition to therapy, antidepressant medication can be helpful. The aim of treatment with a female athlete with an eating disorder would be to reduce dieting attempts, alter negative emotions, and normalize pathological eating behaviors. Disordered eating can also be treated with cognitive behavioral therapy by assisting the female athlete with body dysmorphia and disordered eating behaviors. Increase in energy availability assist with menstrual dysfunction by restoring the normal homeostatic balance of the body and removing it from survival mode. [6]

Medication targeting menstrual dysfunction is mostly experimental and used to increase BMD, but oral or non-oral contraceptives (including hormone therapy) are typically ineffective at restoring menses. It creates an ovarian steroid environment that gives false sense of normalcy in the menstrual cycle. For that reason other strategies without medication incorporated are preferred such as increasing energy availability. Since all of the components of the FAT are interrelated and caused by low energy availability, increasing BMD correlates with weight gain and restoration of menses.[6] Weight gain and resumption of menses are crucial to avoid further loss of BMD.[6] In addition calcium-rich foods should also be recommended with optimal calcium intake between 1,000 and 1,300 mg/d while vitamin D intake should be 600 IU.[6]

The athletes also should be educated about the short and long term risks associated with the components of the FAT.[4]

CONSEQUENCES OF FAT

Menstrual disorders vary according to the patient but most patients with FAT experience functional hypothalamic amenorrhea due to reduced production of the gonadotropin-releasing hormone in accordance with the luteinizing hormone levels. Usually, blood tests done on these individuals show low amounts of follicle stimulating hormone, luteinizing hormone, and estrogen levels. Chronically low estrogen in women may lead to increased risk for cardiovascular disease and reduced bone mineral density. Estrogen is a fundamental hormone that protects the skeleton from bone resorption by assisting with replacing old bone cells with new healthy bone cells.[9, 16] Due to changes in hormones that are associated with decreased energy availability or energy deficiency, the body is not able to complete the process of resorption. Without this process bones become less dense which leads to stress fractures and osteoporosis. Low bone mineral density is worsened by energy deficiency and under-fueling and retrieving insufficient amounts of important nutrients such as calcium and vitamin D.[5] Loss of bone mineral density is usually irreversible if the amenorrhea episodes are prolonged. The consequences of estrogen deficiency also include infertility and/or vagina and breast atrophy.[4]

PURPOSE

The intention of this research was to identify the characteristics and behaviors of adult female endurance runners. Adult females training for endurance events such as the half-marathons and marathons typically have similar or greater training volumes as adolescent and collegiate runners. Hence, these runners may be at a similar risk for the FAT. Knowledge and research surrounding the components of FAT is still evolving. Medical health professionals and coaches still do not have enough knowledge on the syndrome. The lack of knowledge can lead to

an extensive amount of female athletes left untreated or mistreated with medication that will only obscure the underlining cause of the problem.

METHODS

SURVEY DESIGN

A survey was designed and developed to assess the characteristics of adult female endurance runners. The survey included a demographic section that asked participants about their general background, and training habits, as well as injury history. Questions pertaining to menstrual function and use of contraceptives were taken from the Low Energy Availability in Females Questionnaire (LEAF-Q). The LEAF-Q is a screening tool designed to identify female athletes at risk for the FAT. Select questions from the Eating Disorders Examination-Questionnaire (EDE-Q 6.0) were used to examine eating behaviors and disordered eating. The EDE-Q 6.0 is a self-report questionnaire that is comprised of food-related questions that pertain to a specific attitude, feeling, or behavior.

The first question of the survey pertained to the inclusion criteria that the participants had to meet. Questions 2-4 contained demographic questions such as weight, height, and age. Questions 5-12 examined running experience and training patterns. Questions 13-28 in the survey were taken from the LEAF-Q to assess physiological and menstrual issues in participants.[17] Questions 29-34 pertained to pregnancy, number of children birthed and any complications that may be associated with giving birth. Questions 35-41 were taken from the EDE-Q 6.0 to assess the prevalence of an eating disorder.[1, 18] The survey can be found in the appendix.

RECRUITMENT AND DATA COLLECTION

A Central Florida running specialty store offering a half-marathon and marathon training group assisted with recruitment of potential participants. The inclusion criteria were: female gender, age 18 and older, and currently training for an endurance event of greater than or equal to a half-marathon to be completed within the next 12 months. Participants who were not female, younger than the age of 18, and were not currently training for at least a half-marathon within the next 12 months were automatically excluded from participation. The survey was distributed by email to running group participants through a weekly newsletter. The newsletter contained a formal letter explaining the purpose of the research and a direct link to the survey for potential participants.

Survey responses were collected via Qualtrics (a survey software platform) from March 2016 through November 2016. The data were collected at one point in time and no additional follow-ups were required. All raw data were imported from Qualtrics into Statistical Package for Social Sciences (SPSS, version 22) for analysis to determine frequencies and descriptive statistics with standard deviations and means. Statistical analysis were assessed to identify the presence of psychological and physical characteristics associated with the FAT in adult female endurance athletes. All research procedures were reviewed and approved by the Institutional Review Board (IRB) at the University of Central Florida.

RESULTS

BACKGROUND AND TRAINING

Eighty subjects responded to the survey link (n=80), however, eight were excluded due to failure to complete the entire survey. Seventy-two females with a mean age of 40.92(± 9.61), ranging from 23-72 years completed the survey. Subjects were an average height of 163.60(±6.41) cm, had an average weight of 62.24 (±10.05) kg, and had an average mean of 10 (±8.37) years of running experience. Participants identified their primary reason for distance running as follows: 44.44% (n=32) said they run for general fitness, 15.28% (n=11) said for athletic performance, 1.39% (n=1) said they run for physical appearance, and 38.89% (n=28) said they run for personal achievement.

The mean running weekly mileage was 27.62 (±11.69) mi/wk. The average pace per mile question was omitted due to low response rate of 33 participants. The mean sessions per week typically run by participants was 3.71(±1.50). Fifty five percent (n=40) of participants targeted race distance for the present training session was a marathon. The majority of participants (n= 49) indicated the longest running distance completed was a marathon. Participants were asked if in addition to running, if they currently participated in any other physical activity and 84.7% (n= 61) responded "yes". Of the 66.7% (n=48) who indicated they had previously sustained a running- related injury (RRI), 67% (n=32) had 1-3 RRIs, 27% (n=13) had 4-6 RRIs, 4% (n=2) had 7-9 RRIs, and 2% (n=1) had 10-12 RRIs while training for a marathon.

USE OF CONTRACEPTIVES

Only 30.6% (n=22) of participants reported that they were currently using contraception. Participants were asked why they were using contraception and they were allowed to select more than one answer. 23.6% (n=17) said contraception, 8.3% (n=6) desired to decrease menstrual pain, 5.6% (n=4) for decreasing menstrual bleeding, 6.9% (n=5) to regulate menstruation, 1.4% (n=1) was to promote menses, and 1.4% (n=1) was due to acne/ skin management. Participants were asked if oral contraception were used in the past; 91.7% (n=66) responded "yes". Other kinds of hormonal contraception were used by 19.4% (n=14) of participants. Those 14 who answered "yes" provided the type of contraception used: 28.6% (n=4) used a hormonal implant, 21.4% (n=3) used a hormonal ring, 7.14% (n=1) used hormonal patches while 42.86% (n=6) responded "other".

MENSTRUAL FUNCTION

Participants (n=72) mean age for the first menarche was 12.86 (±1.386) years of age. Ten participants were post-menopausal and therefore did not receive additional questions. Of the participants who were pre-menopausal, 69% (n=43) had a regular (every 28th to 34th day) menstrual cycle whereas 30.6% (n=19) had an irregular menstrual cycle. Participants were asked the approximate number of periods in the last year, the mean was 7.04(±5.26) periods/year. Twenty six percent had their menarche stop for 3 consecutive months or longer (not due to menopause/ pregnancy/ breastfeeding). Participants were asked if their menstruation changed when they increased the intensity, frequency or duration of their exercise, 29.2% (n=21) said "yes". Participants were asked what menstruation change occurs when increasing exercise and were allowed to pick more than one answer. Of the 23 participants, 16.7% (n=12) bled less, 4.2%

(n=3) bled more, 13.9% (n=10) bled fewer days, 1.4% (n=1) bled more days while 6.9% (n=5) menstruation stopped.

None of the participants were pregnant at the time of the survey. Forty seven percent (n=34) were pregnant in the past. Of the 34 participants who were pregnant in the past 11.8 % (n=4) had one pregnancy, 47.1% (n=16) had two pregnancies, 29.3% (n=10) had three pregnancies, and 11.8% (n=4) had four pregnancies. Of the population that responded "yes" to having past pregnancies 3.0% (n=1) birthed zero children, 8.8% (n= 3) birthed one child, 61.7% (n=21) birthed two children, and 26.5% (n=9) birthed three children. Participants were asked if they experienced pelvic pain during running, 1.4% (n=1) responded "yes" while 98.6% (n=71) responded "no". Eighty six percent (n=62) of participants did not experience urinary incontinence whereas 14.0% (n=10) experienced urinary incontinence.

EATING HABITS

When asked "have you been preoccupied with the desire to be thinner?" 12.5% (n= 9) responded always, 20.8% (n=15) usually, and 31.9% (n=23) responded often. Participants were asked "have you felt your stomach is too big?" 16.7% (n=12) responded always, 29.2% (n=21) usually, and 26.4% (n=19) often. Fifty one percent (n= 37) of participants were rarely satisfied with the shape of their body. Seventy two percent (n=52) were in the process of trying to lose weight. Eighty percent (n= 58) of participants have tried to lose weight. Of the 58 participants who have tried to lose weight, 58.6% (n=34) have tried greater than five times. When participants were asked "have you felt extremely guilty after overeating?" 63.9% answered yes.

DISCUSSION

The American College of Sports Medicine Position Stand on The Female Athlete Triad indicates that low energy availability (intake minus expended) can be inadvertent, intentional or psychopathological.[5] Those who have inadvertent low energy availability just are unaware; they exercise but do not eat enough to compensate. These athletes do not realize how much energy they expend during training and unknowingly eat an insufficient number of kilocalories. Those who have intentional low energy availability are actively and purposefully trying to lose weight by restricting their calorie intake or overtraining. They may under eat, skip meals, and/or avoid foods that contain fat. [9] Sixty-five percent of the participants answered "yes" to being preoccupied with the desire to be thinner. The two additional questions revealed that over fifty percent of female adult endurance runners were dissatisfied with the shape of their bodies and felt their stomach was too big. Although, they ran a range of 12-85 miles (40.92±) weekly, 84.7% of participants also participated in other physical activities. Compared to the average female who is not training greater than 12 miles/week, these participants would be considered healthy/fit, but somehow they are discontent with their bodies. Research indicates that women frequently make appearance-related social comparisons to women in their natural environment. [19] The participants in this study may be benchmarking their bodies against other endurance runners and not against other "typical" women (even healthy/athletic women). Female endurance runners may feel the need to fit their mental picture of an endurance runner which is lean/thin and extremely athletic. The clothing worn during endurance running may further exacerbate these comparisons, resulting in body dissatisfaction.

Low energy availability occurs more frequently amongst weight sensitive sports in which leanness and/or weight are vital due to their role in performance, appearance or requirement.[3] Seventy-two percent of participants were also trying to lose weight while training for their race. They may be dieting in an attempt to improve performance rather than due to body dissatisfaction. Runners are incentivized to be thinner because they feel it will lead to increases in performance. Lightness is an advantage because there is less mass to move. Endurance running may encourage athletes to lose weight in order to amplify performance, this can lead to unfortunate outcomes when athletes go about it in an unhealthy way . [20] Extremely low energy availability may lead to harmful consequences such as menstrual dysfunction.

The occurrence of secondary amenorrhea in endurance runners is 65% compared to 2-5% in the overall population. [1] If the 10 participants who were in menopause are not considered, thirty percent (n=19) of participants did not have a regular menstrual cycle. It is important to consider that the mean age of the average participant was 40. Therefore, participants may have been experiencing irregular periods because they were in the premenopausal state. Conversely, the data could indicate that some participants are affected by the FAT due to insufficient caloric intake; especially since 31.9% (n=20) reported changes in menstruation when they increased their exercise. It is important for healthcare providers to recognize that female endurance runners in this age may report menstrual dysfunction, but it may or may not be concerning. Different age groups may need to be asked different questions and/or have further testing in order to determine the difference between regular pre-menopausal symptoms and symptoms of the FAT.

Physicians often prescribe contraception to treat irregular periods although research has shown that contraceptives only mask the real issue which is low energy availability. In this

study, 30.6 % (n=22) of participants used oral contraceptives and 8.3% reported that they were using contraception in order to regulate menstruation. Those who take oral contraceptives will not demonstrate irregular menstruation and therefore they may perceive their menstruation as naturally occurring and therefore not a concern. The use of contraception may obscure the signs and symptoms of the preliminary effects of low energy availability. Without the distinction of menstrual irregularity issues, the female endurance runner will likely continue with the improper eating habits and this may lead to low bone mineral density. [16] Physicians should ask more questions, and perhaps conduct more testing, rather than simply prescribing oral contraceptives.

Although, bone mineral density was not assessed in this study. The injuries section of the survey did address the number of participants who acquired a stress fracture. In this study, participants had a mean of 10 (±8.37) years of running experience with 66.7% (n=48) participants sustaining a RRI. The majority of the participants had 1-3 RRIs in their lifetime while nine participants had 4-6 RRIs and about three had 7-12 RRIs in their lifetime. When taking into account the range of 2-39 years of running experience these numbers are not significant and could simply be due to the stress on bones with running.[21]

LIMITATIONS

The data collection method used allowed the researcher to gather information from the specific targeted population. Because the survey was created specifically for this study, misclassification bias can be eliminated. The research was limited to the local area and is not representative of female endurance runners on a national or global scale. Only 72 participants participated and completed the whole survey which is not a large number but enough to acquire enough knowledge of the characteristics of adult female endurance runners.

CONCLUSION

This survey investigated the behaviors and characteristics of the adult female endurance runner population in the Central Florida area. Participants demonstrated signs of inadvertent or intentional low energy availability. Inadvertent low energy availability participants unintentionally over-trained and did not intake sufficient amounts of kilocalories. However, intentional low energy availability participants deliberately decreased their kilocalorie intake by dieting while training. These characteristics can be due to either body dissatisfaction or wanting to increase performance. In conclusion, health care professionals should address adult female endurance runners in a different manner than adolescent endurance runners because adult female endurance runners are susceptible to pre-menopausal symptoms which are similar to FAT symptoms.

APPENDIX: SURVEY

EXPLANATION OF RESEARCH

Title of Project: Characteristics of the Adult Female Endurance Runner: A survey

Principal Investigator: Carey E. Rothschild, PT, DPT, OCS, SCS, CSCS

Co-investigator: Stephanie Gabriel, Honors in the Major student, Pre-Clinical Health Science Major

The purpose of this study is to learn more about the characteristics of adult female endurance runners. Information to be collected will include demographics, running history, training patterns, medication usage, eating behaviors, and menstrual history.

The survey is being administered through the electronic surveying website www.qualtrics.com, an anonymous online survey platform with a secure link to access available below. The survey will be available from March 2016 to June 2016.

The survey consists of 42 questions and will take approximately 20-25 minutes to complete. This includes beginning the survey and submitting it.

The survey is anonymous and will not ask for your name or identification of any kind. Results can be obtained by contacting the principal investigator at Carey.Rothschild@ucf.edu.

You must be female, age 18 or older, and currently training for an endurance running event of greater than or equal to a half-marathon that will be completed within the next 12 months.

Study contact for questions about the study or to report a problem

If you have questions, concerns, or complaints send them to Carey Rothschild, PT, DPT, OCS, SCS, CSCS, Lecturer, University of Central Florida, Department of Health Professions, Doctor of Physical Therapy Program, 4000 Central Florida Blvd HPA - I Room 256 Orlando, FL 32816-2205, PH: (407) 823-1439, FAX: (407) 823-3464 IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

University

1. **Please confirm that you are a female, age 18 or older, and currently training an endurance event greater than or equal to a half-marathon that will be completed in the next 12 months.**
   a. Yes
   b. No

2. **What is your age?**
   _____ Years

3. **What is your height?**
   _____ Feet
   _____ Inches

4. **What is your weight?**
   _____ Pounds

5. **What is your PRIMARY reason for participating in a running training program?**
   a. General fitness
   b. Athletic performance
   c. Physical appearance
   d. Personal achievement

6. **How long have you been running?**
   _____ Years
   _____ Months

7. **What is your average weekly running mileage?**
   _____ Miles/week

8. **What is your average pace per mile?**
   _____ Minutes/mile

9. **How many total sessions per week do you typically run?**
   _____ Sessions/week

10. **What is your TARGET race distance for this training session? (Mark the closest distance)**
    a. I do not plan to race any distance at all
    b. 5 Kilometers
    c. 10 Kilometers
    d. Half Marathon
    e. Marathon
    f. Ultramarathon

11. What is the LONGEST race distance you have completed to date? (Mark the closest distance)

a. I have not completed a running race of any distance
b. 5K
c. 10K
d. 15K
e. Half-Marathon
f. Marathon
g. Ultramarathon

12. In addition to running, do you currently participate in any other physical activity?

a. Yes
b. No

13. If **yes, which activities do you currently participate in? (Mark all that apply)**

a. Cycling/biking/spinning
b. Walking
c. Strength training
d. Yoga/Pilates/Barre
e. Swimming
f. Tennis
g. Golf
h. Basketball
i. Soccer
j. Softball
k. Other

14. Have you ever sustained a running-related injury while training for the half-marathon or marathon distance? The definition of a running-related injury in this study is any running-related musculoskeletal pain of the lower extremity or back requiring you to change your normal running routine (time, distance, pace) for greater than one week.

a. Yes
b. No

15. If yes, how long were you unable to run due to the most recent injury?

_____ Days

16. How many running-related injuries have you had in your lifetime?

a. 1-3
b. 4-6
c. 7-9
d. 10-12
e. more than 12

17. Do you CURRENTLY use oral contraceptives? (e.g. birth control pill)

a. Yes
b. No

18. If yes, WHY do you use oral contraceptives? (Mark all that apply)

a. Contraception
b. Reduction of menstruation pains
c. Reduction of bleeding
d. To regulate the menstruation cycle in relation to performances etc.
e. Otherwise menstruation stops
f. Other _____

19. Have you used oral contraceptives in the past?

a. Yes
b. No

20. How long did you use oral contraceptives?

_____ Years

21. Have you used any other kind of hormonal contraceptives?

a. Yes
b. No

22. If yes, what kind?

a. Hormonal patches
b. Hormonal ring
c. Hormonal coil
d. Hormonal implant
e. Other

23. How old were you when you had your first period?

_____ Years

24. Do you have a regular menstrual cycle (every 28th to 34th day)?

a. Yes
b. No

25. Approximately how many periods have you had in the last year?

_____ Periods/ year

26. Have your periods ever stopped for 3 consecutive months or longer?

a. Yes
b. Yes, due to pregnancy/breastfeeding
c. Yes, due to menopause
d. No

27. Do you experience that your menstruation changes when you increase your exercise intensity, frequency, or duration?

a. Yes
b. No

28. If yes, how? (Mark all that apply)

a. Bleed less
b. Bleed more
c. Bleed fewer days
d. Bleed more days
e. Menstruation stops

29. Are you currently pregnant?

a. Yes
b. No

30. Have you been pregnant in the past?

a. Yes
b. No

31. How many times have you been pregnant?

_____ Pregnancies

32. How many children have you birthed?

_____ Children birthed

33. Do you experience any pelvic pain during running?

a. Yes
b. No

34. Do you experience any urinary incontinence or leaking of urine while running?

a. Yes
b. No

35. Do you feel extremely guilty after overeating?

a. Always
b. Usually
c. Often
d. Rarely
e. Never

36. Have you been preoccupied with the desire to be thinner?

a. Always
b. Usually
c. Often
d. Rarely
e. Never

37. Have you felt that your stomach is too big?

a. Always
b. Usually
c. Often
d. Rarely
e. Never

38. Do you feel satisfied with the shape of your body?

a. Always
b. Usually
c. Often
d. Rarely
e. Never

39. Are you trying to lose weight now?

a. Always
b. Usually
c. Often
d. Rarely
e. Never

40. Have you tried to lose weight?

a. Always
b. Usually
c. Often
d. Rarely
e. Never

41. If yes, how many times have you tried to lose weight?

a. 1-2
b. 3-5
c. 5

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