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BRIEF REPORT

Psychological Attributes of Ultramarathoners

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Introduction—As the popularity of ultramarathon participation increases, there still exists a lack of understanding of the unique psychological characteristics of ultramarathon runners. The current study sought to investigate some of the psychological and behavioral factors that are involved in ultramarathon running.

Methods—We obtained information from participants of the Bear Chase Trail Race via an online survey. This race is a single-day, multidistance race consisting of a 10 k, half marathon, 50 k, 50 mi, and 100 k run in Lakewood, Colorado, at a base altitude of 1680 m with total altitude in climbs ranging from 663 to 2591 m. We correlated information from the Exercise Addiction Inventory and the Patient Health Questionnaire-2 and demographic information with race finish times.

Results—Out of 200 runners who started the race, 98 (48%) completed the survey. Over half of the runners were men (61.2%), and the average age was 39.0 years (SD±8.9; range 21–64 years). A number of respondents (20%) screened positive for exercise addiction concerns. Approximately 20% of our sample screened positive for depressive symptoms (Patient Health Questionnaire-2 score >3). The majority of participants reported receiving strong social support from current partners with regard to their ultramarathon running training time and goals.

Conclusions—Although only a screening, the number of positive screens on the Exercise Addiction Inventory suggests use of screening measures with an ultramarathon running population. Athletes with positive screening tests should be fully evaluated for depression and exercise addiction because this would enable appropriate athlete support and treatment referral.

Keywords: ultramarathon, exercise addiction, screening, PHQ-2

Introduction

The fundamental principles of sport drive athletes to run faster, jump higher, and achieve bigger goals. As a result, there has recently been an emergence of "ultra-endurance" events, where participants exercise for extended periods of time, often in extreme conditions. Although exercise is generally considered to be a healthy activity, there is the notion that excessive exercise may have addictive potential. The term "exercise addiction" has been coined because it encompasses many qualities of classic addiction, such as dependence, compulsion, pleasure, or relief from psychologic discomfort (eg, anxiety, depression).[1] This issue has been examined in recent years using a validated screening tool developed by Griffiths et al, called the Exercise Addiction Inventory (EAI).[2] Exercise addiction appears to be relatively rare in habitual exercisers (3.2%) and in the general population (0.5%), although obsessive passion and dedication to athletic activity are strong predictors of exercise addiction.[3,4] Competing in ultraendurance events requires long training hours and large training volumes. As such, many of these athletes display signs of obsessive passion and dedication to the sport.

Endurance athletes dedicate a significant amount of time to their respective sports. There are many potential stressors for endurance athletes, including maintaining health, recovering from injury, coping with success, and managing performance expectations.[5] As a result of these stressors, some may assume that only emotionally and mentally strong athletes are able to compete at the highest level of endurance sports and as such are at a lower risk for psychological disorders.[6,7] However, recent research has suggested the prevalence of psychological disorders in endurance athletes may be

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higher than the 6.7% in the general population, with depression rates ranging from 68% in a sample of 50 collegiate varsity swimmers precompetition to 34% after competition.[6,8] Additional research with professional footballers found that up to 26% of current players reported symptoms of depression and anxiety.[9]

Ultraendurance athletes, including ultramarathoners, represent a unique population within athletics in that they must perform optimally in extreme environments.[10] Generally, these athletes tend to be well educated, of high socioeconomic status, and psychologically high functioning.[11] Little is known to date about the psychological functioning and incidence of exercise addiction in this group. The purpose of this study was to learn more about this population, including potential positive screens on depression, exercise addiction measures, and lifestyle factors associated with ultramarathon running (eg, social support).

Methods

An observational online survey study was conducted before the Bear Chase Race in Lakewood, Colorado, in August 2015. The Bear Chase Trail Race is a single-day, multidistance race consisting of a 10 k, half marathon, 50 k, 50 mi, and 100 k run at an altitude of 1680 m with total altitude in climbs ranging from 663 to 2591 m. The survey link was sent twice to all ultramarathon (50 k, 50 mi, and 100 k) runners within 2 weeks before the race. The aim of this survey was to capture a more chronic mood state, rather than mood immediately after race completion. Race results were matched with survey data. The Colorado multiple institutional review board and the Bear Chase Race approved the study.

SURVEY INSTRUMENT

A 30-item electronic survey including the Patient Health Questionnaire-2 (PHQ-2), the EAI, and demographic questions was used for this study.[1,12] The PHQ-2 is a validated screening tool for depressive symptoms.[12,13] PHQ-2 scores were considered positive if participants endorsed any current symptoms of depression, regardless of number of days of symptoms.[12] PHQ-2 scores were dichotomized into variables consisting of endorsement of any symptoms vs none. The EAI is a validated 6-item Likert-type scale based on behavioral components of addiction (salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse).[1,2] See Table 1[2,13] for additional information on PHQ-2 and EAI. The cutoff score for "at risk" individuals is 24 out of 30. The EAI intends to reflect the top 15% of respondents with regard to risk. The EAI reports excellent factor loadings and reliability.

STATISTICAL ANALYSIS

We conducted statistical analyses with IBM SPSS, version 22.0 (SPSS Inc, Chicago, IL). We used descriptive statistics to examine the frequency, mean, median, and range for all variables. Group comparisons were done using χ^2 and unpaired t tests. P values <0.05 were considered statistically significant.

Results

Our survey was completed by 98 out of 200 race starters (49% response rate). Participant demographics are summarized in Tables 2 and 3.

On the EAI, 18.2% of respondents reported scores in a range considered indicate risk for exercise addiction (scores $\geq$24).[1] First, dichotomous variables were created for both EAI total score (scoring at or above the at-risk cutoff) and answers to each EAI item (Likert-type items were grouped into "*strongly disagree, disagree*" vs "*agree, strongly agree*"). The relationship between overall exercise addiction risk and completion status, sex, and age was examined. No significant relationship between these variables existed. Additionally, each item of the EAI was examined with regard to its relationship to the total EAI score (scoring at or above the cutoff for exercise addiction). Of the 6 individual EAI questions only 4 were significantly related. Mood modification (χ^2 [1, n=81]=1.93; P=0.17) and tolerance (χ^2 [1, n=81]=3.13; P=0.07) were not significantly related to overall EAI score. Of note, mood modification and tolerance were both endorsed by a number of participants (84.5% and 72.2%, respectively), with the next highest item being withdrawal at 60.8%. Individual responses to EAI items were examined with respect to sex, with no significant differences present. Finally, no differences existed between entrants in the 3 events (50 k, 50 mi, and 100 k) with respect to EAI scores.

In our sample, 21.6% endorsed having little interest or pleasure in doing things and 18.6% endorsed feeling down, depressed, or hopeless over the last 2 weeks. We examined the relationship between endorsed depressive symptoms and age, sex, spirituality, relationship status, race completion status, and race completion time. No significant relationships were found.

The majority (89.7%) of participants reported that they are currently either married or "in a relationship." Of single participants, 9.3% reported being single and 1.0% reported being divorced. Before analysis, participants' views of their partners' supportiveness of their ultramarathon training time and goals was dichotomized (Likert-type items were grouped into "*strongly disagree, disagree, neutral*" vs "*agree, strongly agree*").

Table 1. Summary of measures

Survey instrument	*Question or statement*	*Response*	*Component*	*Component description*
PHQ-2[13]	Over the past 2 weeks, how often have you been bothered by any of the following problems?	Little interest or pleasure in doing things	Anhedonia	
		Feeling down, depressed, or hopeless	Depressed mood	
EAI[2]	Exercise is the most important thing in my life.		Salience	When an activity becomes the most important thing in a person's life
	Conflicts have arisen between me and my family and/or my partner about the amount of exercise I do.		Conflict	Conflict between a person and those around them related to an activity
	I use exercise as a way of changing my mood.		Mood modification	Subjective experience of "buzz" or "high" from engaging in an activity
	Over time, I have increased the amount of exercise I do in a day.		Tolerance	The process whereby increasing amounts of an activity are need to achieve the same effect
	If I have to miss an exercise session, I feel moody and irritable.		Withdrawal	Unpleasant feelings or states when an activity is stopped
	If I cut down the amount of exercise I do and then start again, I always end up exercising as often as I did before.		Relapse	The tendency for reversion to earlier patterns of an activity when it is resumed after absence

PHQ-2, Patient Health Questionnaire-2; EAI, Exercise Addiction Inventory.

With regard to partner support, 88.8% of our sample endorsed that they agreed or strongly agreed that their partner is supportive of their ultramarathon running goals. Additionally, 83.0% endorsed that they agreed or strongly agreed that their partner is supportive of their ultramarathon running time. A rating of partner supportiveness (of both goals and time) was also examined for its relationship with the importance of training with a partner (not necessarily one's relationship partner); both variables were dichotomized and tested for independence. When participants stated that they disagreed or felt neutral about their partner's support for their training goals, the proportion of participants who stated that they felt training with a partner was important or very important was significantly greater than those who did not (80.0 vs 20.0%; χ^2 [1, n=89]=4.53; P=0.03). Additionally, when participants stated that they disagreed or felt neutral about their partner's support for their training time, the proportion of participants who stated that they felt training with a partner was important or very important was significantly greater than those who did not (73.3 vs 26.7%; χ^2 [1, n=89]=4.33; P=0.04).

Discussion

An important finding of the current study involves the high rate of positive screenings on the exercise addiction inventory scores. When recommended cutoff scores of 24 are used, approximately 1 in 5 of our ultramarathon participants scored as "at risk" for exercise addiction. Our sample scored higher than expected, given that the "at risk" category is designed to catch the top 15% of responding individuals. Although not statistically significant, this finding is interesting. It is difficult to

Table 2. Demographic characteristics of race participants

Participants' characteristics	*Survey respondents (n=98)*	*All runners in the race (n=200)*
Age, years; mean±SD (range)	38.4±8.9 (21–64)	39.4±9.8 (21–77)
Male sex; n (%)	59 (60.2)	121 (60.5)
Race distance; n (%)		
50 k	57 (58.8)	123 (61.5)
50 mi	22 (22.7)	47 (23.5)
100 k	18 (18.6)	30 (15.0)
Race completion status; n (%)		
Finished	77 (87.5)	173 (86.5)
Did not finish	11 (12.5)	27 (13.5)

k, kilometers; mi, miles.

identify the key drivers of this scoring phenomenon; however, we suggest both a potentially high rate of exercise addiction in ultramarathon runners and a potential screening bias. It may be useful to examine the 2 questions not significantly related to the total EAI scores. Both mood modification (using exercise as a means to manage mood) and tolerance (increasing exercise over time) were unrelated to the total EAI cutoff. When viewed through the lens of addiction, both of these variables suggest an increasing dependence on exercise. However, when viewed in the context of ultramarathon running, a high degree of participant endorsement makes sense. As runners train for increasingly long distances, they naturally would have to increase distances, and many runners endorse running as a means to manage their mood (often positively). Indeed, for both of these questions, a high proportion of respondents (over 70%) endorsed "*agree or strongly agree*." Thus, these questions may simply be highly prevalent characteristics of ultramarathon runners, rather than harbingers of exercise addiction. As such, perhaps certain questions on the EAI need to be modified or disregarded for endurance athletes because responses may reflect training requirements for the sport rather than true addiction, as it might in recreational or nonendurance athletes.

Another important study finding involves the slightly higher than expected endorsement of depressive symptoms in our sample. The prevalence of depressive symptoms in this population is similar to the higher rates found in endurance athletes when compared with

Table 3. Characteristics of respondents (n=98) categorized by specific race

Participants' characteristics	*50 k (n=57)*	*50 mi (n=22)*	*100 k (n=18)*	*All respondents (n=98)*
Education; n (valid %)				
Associate/High school degrees or less	4 (7.0)	5 (22.7)	4 (22.2)	14 (14.3)
Bachelor's degree	24 (42.1)	10 (45.5)	7 (31.8)	41 (41.8)
Master's degree or higher	28 (49.1)	7 (31.8)	7 (31.8)	43 (43.9)
Household income; n (valid %)				
<$50,000	5 (8.8)	2 (9.1)	2 (11.1)	9 (9.9)
$50,000–99,999	16 (28.1)	11 (50.0)	2 (11.1)	29 (31.9)
$100,000–200,000	24 (42.1)	4 (18.2)	10 (55.6)	38 (38.8)
>$200,000	9 (15.8)	2 (9.1)	4 (22.2)	15 (16.5)
Relationship status; n (valid %)				
Single	3 (5.3)	4 (18.2)	2 (11.2)	9 (9.9)
In a relationship	10 (17.5)	3 (13.6)	4 (22.2)	17 (17.3)
Married	43 (75.4)	15 (68.2)	12 (66.7)	70 (71.4)
Child(ren); n (%)				
0	22 (38.6)	8 (36.4)	8 (44.4)	38 (38.8)
1	11 (19.3)	5 (22.7)	1 (5.6)	17 (17.3)
2	16 (28.1)	5 (22.7)	7 (38.9)	28 (28.6)
≥3	8 (14.0)	3 (13.6)	2 (11.2)	13 (13.3)

the general population prevalence rate of 6.7%.[6,8,9] These findings highlight the importance of considering the psychological functioning of ultramarathoners and the development of appropriate services for this population. Because these patients may appear physically healthy, the physician may overlook the fact that they may be at higher risk for not being mentally healthy. Perhaps a more thorough exercise history should be taken by all clinicians and, if it reveals that the patient is participating in significant endurance exercise, it should trigger the clinician to ensure that adequate depression screening has been completed.

High degrees of partner support for ultramarathon goals and training time were reported in our sample. Most support came from a relationship partner, but it also came in the form of a training partner. This is likely because long hours are required for training and competing in ultramarathon events. Without some form of partner support, the countless hours could be grueling to endure alone. However, one explanation may be that partner support may inadvertently enable the development of exercise addiction symptoms in these athletes. If this support were not present, then the athlete alone may not be capable of pushing his or her body and mind to the ultimate limit. Research has suggested that married adults who join a fitness program with a spouse had significantly higher attendance and lower dropout rates than married single attendees, which appeared to be influenced by spouse support rather than self-motivation. As such, our finding is consistent with previous research.[14]

LIMITATIONS

The current study has several limitations that should be acknowledged. First, this is a pilot study with a small sample size. Larger-scale studies should be undertaken. Second, our classification of symptoms (both depression and exercise addiction) relied on self-report and may be subject to self-report bias in responses (ie, positive self-presentation). However, given the higher than expected rates of endorsement for both depression and exercise addiction scores, it is possible a tendency to under-report symptoms did not significantly affect our data. Additional limitations exist with regard to use of measures. Because the PHQ-2 is a screening tool and does not represent diagnosis, further studies should focus on increased diagnostic clarity for depression. Although the PHQ-2 is traditionally used for ease of administration and scoring, other measures of depression such as the PHQ-9, Hamilton Depression Rating Scale, or Center for Epidemiologic Studies Depression Scale may be useful.[15] Additionally, the EAI should be interpreted with caution because positive scores may represent risk for disease or simply strong commitment to and engagement with sport as opposed to a diagnosis of addiction. Finally, more than half of our subjects were from the 50 k race which is shorter than many ultramarathon distances.

CLINICAL IMPLICATIONS

Several key clinical implications can be taken from our findings. Clinicians caring for ultramarathon runners should be aware of the potential for high rates of both depression and exercise addiction in their patients. This could be especially salient for sports medicine clinicians who treat athletes who are prevented from running because running was related to mood management for many of our runners. Given the high rate of positive screening on both the EAI and PHQ-2 and potential concerns about specificity, careful use of these measures in ultramarathon runners is warranted. However, both exercise addiction and depression are important clinical concepts and are prevalent in endurance athletes. As such, we suggest further research into both the prevalence rates of depression and exercise addiction in the ultramarathon-running populations as well as appropriate screening tools for these populations. Additionally, athletes with positive screening tests should be fully evaluated via diagnostic interview for depression and exercise addiction. We also encourage providers working with ultramarathon runners to consider screening for exercise addiction and eating disorders, given the correlation between the two.

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