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Original Research

Training Habits and Injury Rate in Masters Female Runners

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Background

The number of masters females that choose long-distance running as a form of exercise is growing exponentially. As clinicians working with these athletes, it is important to understand their training habits and how these habits relate to running related injuries (RRI).

Purpose

The primary aim of this study was to identify the training behaviors and cross training engagement in masters female runners. A secondary aim was to determine RRI rates and their relationship to training behaviors.

Methods

A 31-question online survey was completed by 68 masters females aged 45 and older. Answers from 18 of the 31 questions were used to address the specific aims of the study. Descriptive variables and Chi Square analyses were used to synthesize the data.

Results

The majority of the cohort ran less than 30 miles week distributed over three days/week. Most participated in cross-training activity that included strength training, cycling, and swimming. Injury was prevalent in this group of runners with many experiencing more than one RRI over their running history. The area of the hip and gluteal region was the most common site of injury.

Conclusion

This cohort of runners trained in a relatively smart manner, with a moderate volume of running mileage, and utilization of cross-training. Many had experienced some form of injury that halted their running for a period of time.

Level of Evidence

Level 3 – Case Controlled, retrospective survey

INTRODUCTION

Running is one of the most popular types of physical activity and is becoming more common in the older athlete.[1,2] The benefits attributed to recreational running in the older individual include improvements in physical and mental health, all-cause mortality reduction, and social participation.[3–6] After starting to run on a regular basis, runners report changes in their lifestyles, including more energy, less stress, better eating habits, and better sleep.[7] Of the two sexes, participation by females has increased more than males in long distance running events and triathlons over the last decade.[8]

A masters female is operationally defined as one that is aged 40 years and older and therefore, this category spans several decades. Key research has demonstrated that as the female ages there is a tendency for a decline in aerobic capacity,[5] muscle mass,[3] bone density,[9] flexibility[10] and power.[11] Additionally, post-menopausal females may have

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more drastic physiological changes due to the loss of key hormones, such as estrogen.[12,13] Based on these findings, it can be speculated that masters females should train differently than their younger counterparts.[10,14,15]

Additionally, injury due to running is common in long-distance runners. It is estimated that up to 70% of endurance athletes sustain an injury which prevents them from continuing their running routine.[16] Research on RRI most commonly involves participants that are younger runners or male runners.[10,17] Modifiable risk factors associated with RRI may include reduced flexibility and muscular weakness.[2] It is currently unknown whether masters female runners that participate in cross-training activities to improve strength and flexibility have a reduction in RRI.

Little has been published on the training habits of endurance masters female athletes and the running related injuries (RRI) that may accompany their habits. The primary aim of this study was to identify the training behaviors and cross training engagement in masters female runners. A secondary aim was to determine RRI rates and their relationship to training behaviors.

METHODS

PARTICIPANTS

Females over the age of 45 years that participate in a consistent (> 2 x weekly) running program for the prior two years were solicited to complete a retrospective survey. Exclusion criteria included runners that: 1. could not read or interpret the survey; 2. stopped running for more than four weeks in the prior two years; and 3. had sustained an injury/disease that significantly altered their training program. The participants were recruited from area running clubs in a Midwest city through social media and word of mouth.

SURVEY

A 31-question Web-based survey was administered to a convenience sample of female distance runners in order to identify their typical running behavior, cross-training activity, and injury history. The readability of the survey was assessed before use and deemed appropriate for individuals at an 8th grade reading level by a sample of older female runners. The response options for each question were set as categorical in order to improve speed of survey completion and the survey took approximately 20 minutes to complete. The survey was available online for a period of six months (November, 2020 – April, 2021). To answer the specific aims of this study, 18 of the 31 question answers were used for data analysis. Of the 18 questions, two dealt with demographics, nine dealt with running habits, three dealt with cross-training habits, and four dealt with injury history. The remaining questions not used for this study were designed to assess more specifics about treatment for the runners RRI's.

PROCEDURE

Before the launch of the survey, institutional level ethical approval was granted by the IRB at Creighton University, Omaha, NE. Once the subject agreed to participate in the study, she received the link to the survey designed in MailChimp (Atlanta, GA). If the participant did not complete the survey within a two-week period, a reminder e-mail was sent. Once the survey was completed the data was housed in MailChimp and copied to a Microsoft Excel spreadsheet for analysis.

DATA AND STATISTICAL ANALYSES

Descriptive analyses of the subject characteristics, running habits, cross-training participation and injury history were presented as mean and frequencies (%). Running years, age, strength training, and running volume were individually cross-tabulated with injury using chi-square (X^2) tests of independence. Alpha level was $p \leqslant 0.05$. For running years dichotomy was set at < 15 years and ⩾ 15 years. For age, dichotomy was set at < 50 years and ⩾ 50 years. For running volume, dichotomy was set at < 30 miles/wk and ⩾ 30 miles/wk. These dichotomies were set by the authors based on their experience with running athletes.

RESULTS

A total of 68 surveys were completed. For the questions posed for this study, there was no missing data. Most of the participants were between the ages of 45 – 60 years (80.8%). With the remaining 8.8% between 61 – 65 and 10.3% 66 years or greater. Eighty-six percent of participants were white, 4.4% were African American, 1.5% Latino, 1.5% Asian, 1.5% American Indian and the remaining 5.9% in another category.

RUNNING HABITS

Most participants had been running for over 15 years (47.8%). This cohort of runners trained at a pace of a 9-minute mile pace or slower (96.5%) with the remainder training between 8:00 – 8:59 pace. Most ran at least partially on the road or pavement (94.1%). Close to half also incorporated treadmill running (48.5%) and off-road training (45.6%).

The weekly mileage was distributed from under 10 miles to over 40 miles per week. Figure 1 displays the range of mileage for the participants. Almost half the participants ran three times per week. Sixty-three of the 68 participants competed in some sort of racing from a 5k to IronMan triathlon distance.

When asked why they run, the majority (30.9%) picked mental health as a reason to run closely followed by personal challenge and competing. Figure 2 shows the distribution of reasons. Most of those surveyed did not train with a group or follow a training plan. Further, the majority incorporated one or more different running workouts such as hill repeats (61.8%), speed work (73.5%), long runs (79.4%), and tempo runs (70.6%).

Close to 80% of the runners participated in a warm-up routine. The majority (52.9%) used walking as at least one component followed by stretching (23.8%) and dynamic drills (16.2%).

CROSS TRAINING

In this cohort, 97.1% cross-trained and many participated in more than one mode of cross training. Strength training (77.9%) was the most common followed by cycling (64.7%), swimming (47.1%), and yoga (30.9%). The frequency of the cross-training averaged 2.6 days/week.

RUNNING INJURY

In this group of master females, only 11.8% had never sustained a running related injury, the majority (70.6%) had sustained more than one injury over their running history. Seventy-two percent had sustained an injury that was severe enough to modify training (decrease intensity, distance or frequency) or stop running. The location of the injuries was distributed as follows: hip/gluteal region (48.5%) followed by the foot (42.6%) then the knee (41.2%). All injury locations are shown in Figure 3.

INJURY VERSUS RUNNING HABITS

Years running and injury were not significant (X^2 = 1.65, p = 0.199). Age and injury were not significant (X^2 = .286, p = 0.592). Running volume and injury were significantly related (X^2 = 7.41, p = 0.007). Strength training and injury were not significant (X^2 = .659, p = 0.416).

DISCUSSION

This is the first published study to document the running habits and cross-training practices of recreational female master distance runners. The aims of the study were to document the training patterns and injury history of this cohort. The runners included in this study are classified as devoted recreational runners most of whom had been running for numerous years.[18]

RUNNING HABITS

The volume of running for the participants varied from less than 10 miles per week to over 40 miles. The majority ran between 10 and 20 miles a week. These miles were commonly dispersed between three days per week. Although this type of mileage may seem low to a younger runner, it is consistent with what is seen in male masters athletes[19] as well as what is recommended for good health. Further, the volume and consistency found in the runners is acceptable for significant mortality benefits as discovered by Lee et al.[20] The female subjects exercised well above the World Health Organization's recommendation of 75 minutes of vigorous intensity exercise per week.[21]

Their running speed is relatively slow with the majority running at a 10 – 11 minute/mile pace, but this pace is not unusual for recreational women. A study by Thuany et al. found that pace slowed almost linearly after the age of 19 up to age 65 in Brazilian female runners.[22] Although classified as recreational, most of the group participated in races and found that racing was a motivating factor for continuing to be active. Participation in mass running events fosters a sense of social togetherness and promotes social-psychological well-being.[23,24] Interestingly, in the present study most of the runners did not follow a formal training plan or run with a running group. This result is similar to what Krouse et al. found in female ultrarunners who chose not to use coaches due to cost or their ability to rely on past experience in the sport.[25]

The runners in this study utilized a variety of running terrains, but most preferred to train at least some of the time on the road. The treadmill was also a common mode for at least half the runners for some portion of their train-

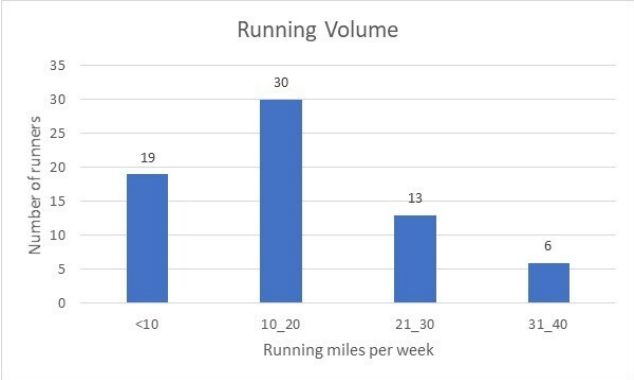

Figure 1. Mileage distribution for female runners

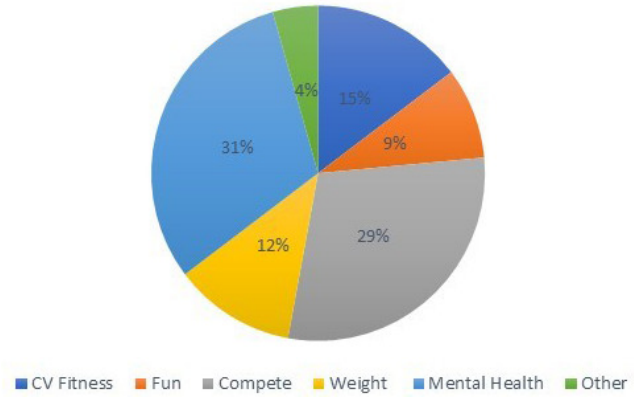

Figure 2. Reasons why runners run

Figure 3. Injury location

ing. Being that the survey was given to runners in the Midwest, it may have been impossible to run year-round on the roads due to the weather.

CROSS-TRAINING

The survey question that asked about cross-training included the following answer choices with the participant able to pick all that applied: resistance/strength training, cycling, swimming, yoga, other, and I don't cross-train. Almost all participants (97.1%) engaged in some form of cross-training activities besides their weekly running. Many participated in more than one form of cross-training. The most popular activity was strength training followed by cycling and swimming. Although it is questionable if the addition of cross-training improves performance,[26] it is still advised for this cohort of runners.[2] These cross-training activities are important in this population to diminish stress to joints, improve neuromuscular coordination, and to help prevent burn-out and staleness.[2]

Resistance or strength training was used in 77.9% of the participants. Study results are similar to a study by Blagrove et al. who found 76.9% of their surveyed competitive runners utilized resistance training.[17] Evidence suggests strength training or explosive training sessions twice a week is beneficial for improving running economy.[27,28] In older marathon runners, resistive training improved running economy.[29] The strength training performed by participants in the present study seems to be in line with this recommendation because most runners reported that they typically performed the training on average three times per week. Besides performance enhancement, resistance training in the older female will help with minimizing sarcopenia and improve bone mineral density.[30–32]

Another area of cross-training that is recommended by authorities is flexibility training.[2,19] Loss of tissue extensibility is inevitable in this group and may be associated with injury. Yoga, a form of flexibility exercise was utilized by close to 31% of the participants. Additionally, 23.5% of the participants used stretching as part of their warm-up. The authors recommend that a dedicated flexibility program be used five to seven times per week to maintain range of motion of critical joints such as the ankle, hip and low back.

INJURIES

It has been estimated that 89% of master athletes experience one sports-related injury since turning 50 years; of these injuries, 68% are due to repetitive overuse.[13,33] Similarly, in the present study, close to 88% reported a RRI that made them modify their training or stop running at some point in their running career. Many of the runners (70.8%) reported more than one injury and 45% reported a recurring injury. Injury rates tend to be higher in the masters runner compared to the younger runner.[1] Probable explanations include less resilient connective tissue, lack of joint flexibility and loss of stabilizing strength.[19] Within the masters cohort, there was no statistically significant association ($p = 0.592$) between age and injury. For the Chi square analysis the subjects were divided by age , those younger than 50 ($N = 20$) compared to those over 50 ($N = 48$). It can be concluded that within the masters runner category, an increase in age does not equate to increased injury risk. Ganse et al. suggest that experienced master athletes lesson their risk of injury by practicing injury prevention.[16]

From survey results, the most common location for injury was the hip/gluteal region (48.5%) followed by the foot (42.6%) and the knee (41.2%). Other authors have found somewhat different results, Matheson et al. found the knee as the most common injury site for both older and younger runners.[34] Knobloch et al. found Achilles tendinopathy to be the most common injury, but this was in elite runners and the majority of subjects were males.[35]

Within the studied runners, running training volume (> 30 miles/week) was statistically related ($p = 0.007$) to an increased number of injuries experienced by the runners. This result is similar to other studies.[36,37] McKean et al. found that of the masters runners that they surveyed, the runners who ran more volume experienced more injuries.[1] This result is a key finding and a recommendation for the master female would be to limit weekly mileage to less than 30 miles/week. We would also recommend that females over 50 focus on the quality and variety of their runs, getting away from runs greater than 8 miles, run at a slow distance. The overall weekly volume and number of run days per week may be less, but mixing running sessions up with hill repeats, intervals, and fartleks, as well as mixing strength with run segments helps boost performance, neuromuscular patterns, and efficiency while at the same time giving the body adequate recovery time. Also, not running two days in a row gives the body a better chance to recover from repetitive loading forces and possibly help prevent injury.[2,13]

Participation in cross-training does not seem to be associated with lower self-reported injury rates. In this study, most runners reported a RRI and the majority participated in cross training and strength training, so there appears to be no protective effect. However, the time between injury and cross training were not specified so conceivably the runner could have been injured prior to starting a cross training program. Further, although the survey asked about RRI, it cannot be ruled-out that an injury was a result of the additional cross-training activity. For example, activities such as intense cycling or cross fit could cause or compound an injury.

LIMITATIONS

A number of limitations are important to acknowledge. First, the survey was developed by the researchers and has not undergone validity or reliability testing. Some questions may have been misinterpreted, thus producing inaccurate data. Secondly, the survey was limited by participant's self-report (recall bias) of their training program and injury rates. Third, selection bias may be present, as those participants who chose to complete the survey may have different training programs than those who did not complete the survey. Fourth, the survey group was geographically from the Midwest USA, and generalizability of the results to other geographical regions must be performed with caution. A final limitation of the study was the categorical nature of the question responses which potentially lim-

ited specificity of the answers. Future research that includes longitudinal studies would be informative on determining cause and effect relationships between training habits and injury.

CONCLUSIONS

In this original research, female endurance athletes were surveyed about their training habits, cross-training activity, and injury history. The results indicate that this cohort of runners trained with a moderate volume of running mileage, and many utilized various methods of cross-training. Many had experienced some form of injury that halted their running for a period of time.

DISCLOSURES

No financial support was used in this investigation and the disclosure form is completed. There is no Conflict of Interest by the authors.

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