A Prospective Study of Type A Behavior and Running Injuries

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A prospective study was developed to examine whether personality factors predispose runners to injury. Forty runners who completed a type A behavior screening were followed for 1 year during which they documented their training mileage, injuries, and time lost from training because of injury. Runners with high scores on the type A behavior screening questionnaire experienced significantly more injuries, especially multiple injuries. Although not significant, high scorers lost nearly twice as much training time because of injury. No significant relationship was found between mileage and injury. The data suggest that a type A behavior score warrants consideration as a predictive risk factor when screening for potential running injuries.
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Beginning approximately 20 years ago, with the popularity of Kenneth Cooper's book *Aerobics*[1] and the Olympic marathon victory of Frank Shorter, many Americans turned to running as their primary means of fitness. Currently an estimated 20 million Americans run on a regular basis, and road races such as the San Francisco Bay to Breakers attract as many as 80,000 participants. Three factors that encourage many to become runners are the low cost of equipment, the convenience, and the high level of cardiovascular conditioning achieved during a short exercise period.

In spite of the health benefits attributed to running, injuries have been a persistent problem affecting as many as 50% of runners yearly.[2,3] A number of retrospective studies by McBryde et al,[4] Orava,[5] and James et al[6] reviewed injured runners. They concluded that most injuries derived from such training errors as too much mileage, excessive "speed work," and not enough rest. Extrinsic factors—for example, too many hills, hard running surfaces, or uneven shoe wear—also contributed. D'Ambrosia,[7] Drez,[8] and McBryde[9] have noted a number of anatomical variants commonly occurring among injured runners. These variants included Morton's feet, increased Q angles, excessive pronation, cavus feet, and "miserable malalignment syndrome." In a 1987 prospective study, Lysholm and Wiklander[10] examined a mix of sprinters and middle-distance and long-distance runners. Although their total number of participants was small, the marathon runners' injuries were found to correlate significantly with increased mileage in the month prior to injury. Of these observed injuries, 72% could be explained by a training error alone or in combination with other factors. Other researchers have felt that anatomical factors, training errors, and equipment problems sufficiently explain some injuries, but cannot completely account for the high injury rate.

In many sports coaches refer to injury-prone athletes. Jackson et al[11] examined injury-prone athletes in football players and found that two bipolar psychological traits—reserved vs outgoing and tough-minded vs tender-minded—differentiated the severity of injuries. McKelvie et al[12] and Valliant[13] also investigated these traits in addition to other psychological factors in runners, but found no support for a "personality hypothesis of injury." In spite of a lack of predictive studies, sports psychologists suggest that personality factors lead to self-destructive behavior in runners.[3] A survey by Shafer and McKenna[2] found a strong connection between stress and injuries but did not specifically relate this to personality factors.

A recent *Runner's World* article[14] featured interviews with leading sports psychologists, all of whom regard type A behavior as related to running injuries. The term *type A behavior* was first introduced by Friedman and

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Rosenman[15] to describe a personality type particularly prone to coronary artery disease. In a number of studies, type A behavior showed a positive correlation with coronary artery disease and to some extent with other illnesses. No documented prospective studies have associated type A behavior with running injury. Characteristics of type A behavior that may be associated with running injury include time urgency, hostility, aggressiveness, ambitiousness, and competitiveness. Such traits among runners could lead to overtraining or returning too quickly from injury. In extreme circumstances hostile runners become angry and fight the injury rather than submit to treatment. This prospective study sought to explore whether there is a link between type A behavior scores as measured by a self-reporting index and running injuries.

METHODS

Subjects for this study were drawn from members of a running club located in Greensboro, North Carolina. All persons in attendance at a regularly scheduled club meeting volunteered to take a two-part questionnaire. The first section contained information concerning running habits, previous injuries, and surgery as well as demographic information. The second section consisted of the Type A Self-Rating Inventory (TASRI) developed and validated by Blumenthal et al.[16] The TASRI is a brief screening alternative to the more lengthy structured interview. The TASRI consists of a 28-item adjective checklist that is rated on a 7-point Likert scale. A cutoff score of 120 was chosen based on the original validation of the TASRI by Blumenthal et al.[16] In their study, individuals who score 120 or above on the TASRI have a 78% chance of being classified as type A by structured interview.

A power analysis revealed that a minimum of 28 participants were needed for this research to detect a large effect (β=.20, α=.05). Fifty-one runners completed the questionnaire, with 11 being excluded from the study. Of the excluded runners, one had stopped training, five were injured at the time of the survey, and five preferred not to participate in the longitudinal study. The excluded group and study group had similar TASRI scores and demographic characteristics.

All participants kept daily training logs for the year. Because of the limitations of self-reported diaries, the logs were reviewed monthly by telephone with each participant. The specific information recorded included average weekly running mileage, number of injuries, and total number of training days missed because of injury.

For the purpose of this study, an injury was defined as any musculoskeletal problem occurring during running that interrupted training for 1 or more days. To qualify as a runner, all participants had to train an average of 3 days and run at least 10 miles per week. The statistical methods used to analyze the data were Pearson's correlation and chi-square.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS BY TYPE A SELF-REPORTING SCORE (TASRI)

Characteristic	TASRI ≥ 120	TASRI < 120
Number	14	26
Sex		
Male	10	21
Female	4	5
Age (years)		
20 to 40	9	16
41 to 60	5	10
Education		
High school or some college	6	4
College or postgraduate degree	8	22

RESULTS

Forty individuals made up the sample, and no dropouts occurred during the 12-month study period. The group was predominantly male (77.5%) and was highly educated, with 30 runners (75%) having completed an undergraduate or advanced college degree. Ages ranged from 20 to 60 years, with 25 runners (62.5%) between the ages of 20 and 39 years. The mean age was 37 years.

The distribution of TASRI scores for this sample fell into the same range as previously noted by Blumenthal and others.[16] For example, runners showed TASRI scores no higher than the general population. Participants with TASRI scores of 120 or greater and those with scores less than 120 both ran an average of 29 miles per week over the 1-year study period (range = 10 to 67 miles per week), indicating that weekly mileage was independent of the runner's TASRI score.

Demographic characteristics of the two groups are shown in Table 1. No significant association was found between running mileage and either injury or training time lost to injury. Injury patterns illustrate that weekly mileage was not a primary factor in injury, as 80% of the runners who averaged fewer than 20 miles per week were injured compared with only 50% of the runners who averaged more than 40 miles a week.

In contrast, type A scores were significantly associated with injury, suggesting that as TASRI scores increase, so do injuries. Specifically, injury patterns (ie, frequency of injury or multiple injuries) differed significantly between the 14 runners with TASRI scores greater than 120 and the

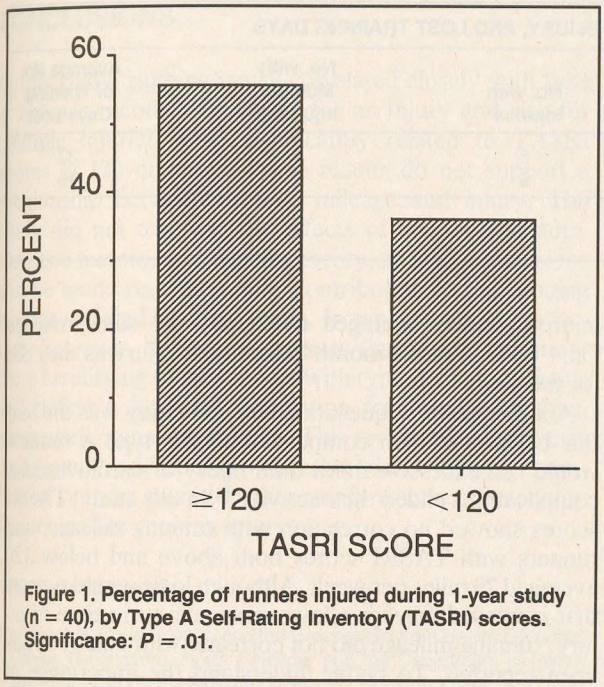

Figure 1. Percentage of runners injured during 1-year study (n = 40), by Type A Self-Rating Inventory (TASRI) scores. Significance: *P* = .01.

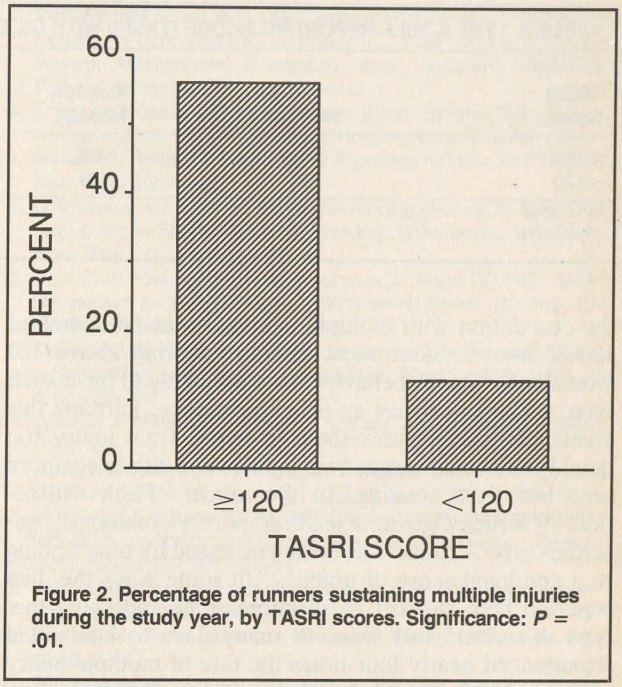

Figure 2. Percentage of runners sustaining multiple injuries during the study year, by TASRI scores. Significance: *P* = .01.

26 runners with TASRI scores less than 120 (χ^2=3.85, *P*=.049). Among the high scorers, 8 of 14 (57%) experienced injury compared with 9 of the 26 (34.6%) participants whose TASRI scores were less than 120 (Figure 1). More impressive is the fact that all 8 of the injured high scorers suffered multiple injuries (57% of group) while only 4 of the 26 low scorers (15%) sustained multiple injuries (χ^2=7.56, *P*=.006) (Figure 2). In other words, of the runners who sustained at least 1 injury, 100% of those scoring 120 or above (8 of 8) experienced a second injury compared with only 44% of those scoring below 120 (4 of 9).

In addition, the injured high scorers lost nearly twice as many training days per runner (average days lost = 33) as did the injured runners scoring less than 120 (average days lost = 19). This finding, however, was not statistically significant (Table 2). Time lost per injury was 11.4 days for the type A runners and 11.2 days for the other runners. It therefore appears that recurrent injuries accounted for the differences in the total days lost to training.

DISCUSSION

This study sought to examine whether psychological traits could be an independent risk factor in predicting running injury. To ensure that this information might have clinical utility, a self-administered type A behavior questionnaire that can be completed by the patient in 5 minutes was used rather than a lengthy structured interview. The scoring of the Blumenthal et al TASRI takes 2 minutes, which allows the clinician time to obtain necessary information and give appropriate proscriptive advice during a single office visit. A self-reporting index clearly does not identify all type A individuals. In this study, however, a score of 120 or above was accepted as a reasonable cutoff in the identification of type A behavior and was the critical cutoff between the groups at high risk for multiple injuries.

The results of this study indicate that running and type A behavior are associated with risk of running injury. In this study 42% of the participants were injured during the follow-up year. This finding is consistent with previously reported injury rates of 40% to 50% for similar populations. Retrospective studies have emphasized the importance of a good training history, a careful review of extrinsic factors such as shoe wear, and cautious screening for anatomical conditions that may predispose to injury.[4,7,9] These studies, however, did not include comparative data on uninjured runners; thus, differences in training history and anatomic factors between injured and noninjured runners are unknown. Because relevant information concerning these factors is unknown, none of these factors can currently be used as a predictor of injury risk.

The trend for higher scores to correlate with more frequent injuries begins above the mean score (112), but

TABLE 2. TYPE A SELF-REPORTING SCORE (TASRI) WITH MILEAGE, INJURY, AND LOST TRAINING DAYS

TASRI Score	Number	Average Mileage	No. with Injuries*	No. with Multiple Injuries†	Average No. of Training Days Lost
≥120	14	29	8	8	33
<120	26	29	9	4	19

*P < .049
†P < .006

the correlation with multiple injuries begins at scores of 120 or above. Since most of those scoring above 120 would have type A behavior, they are likely to have such type A characteristics as time impatience. Perhaps this characteristic pressures them to return from injury too quickly and leads to recurrent injuries and ultimately more time lost from training. In the article "Futile Attraction,"[14] Bruce Ogilvie, a leading sports psychologist, describes type A runners as being possessed by time leading to a continual sense of urgency. In some ways the data reported here support these impressions and show that type A runners lost twice as many days to injury and experienced nearly four times the rate of multiple injury (57% vs 15%). Time lost per injury did not differ, however, and it has not been clearly determined that runners return to training too early without further assessment of the severity of injury.

Other psychologists feel that time impatience is of secondary importance in regard to injury risk. Tutko, also quoted in the article "Futile Attraction,"[14] believes that a subset of type A runners who have a high hostility index drive themselves to a disproportionate number of injuries. According to Thomas Tutko, injuries result in anger, then runners try to run through pain. They embody the "jock mentality" expressed on the common locker room sign stating, "no pain, no gain." Still, most sports psychologists feel that no one factor in the type A personality complex leads to injury; rather, a combination of traits interact to prevent the runner from exerting full control over his or her training and competing.

In previous surveys and retrospective studies, running mileage showed a significant correlation to injury. One survey[3] reported that runners exceeding 50 miles per week showed a 73% incidence of injury compared with 34% for runners averaging fewer than 25 miles per week. Another survey[2] noted that only 10% who ran 7 to 10 miles per week compared with 35% who ran more than 50 miles per week sought medical attention in the previous year. A prospective study by Lysholm and Wiklander[10] supports this concept and found that running mileage in the previous month was significantly correlated with injuries in marathon runners. In contrast, this study questions the reliability of mileage as an injury predictor, since injured runners averaged essentially the same mileage (35.4 vs 33.4) in the month before their injury as they did for the year.

Another concept questioned by this study was the fear that because of their compulsive nature, type A runners would run excessive miles until injury or cardiovascular complications ended their activity.[14] In this study, TASRI scores showed no correlation with running mileage, and runners with TASRI scores both above and below 120 averaged 29 miles per week. Although logic would suggest that increased mileage allows more exposure time to injury, running mileage did not correlate with injury, as has been reported. To better understand the importance of total running miles, studies need to associate mileage with training patterns. For example, total mileage may be less important than the number of hard training sessions or the amount of speed work completed. Clearly, larger prospective trials are needed to confirm or refute the association of running mileage and injury, which is often cited in running surveys.

Other factors may explain the differences in the results of this study. More in-depth analysis of the runners from the Greensboro club may reveal differences from the US running population not evident from a comparison of simple demographic characteristics.[2] Similarly, anatomical and extrinsic factors such as training surface and shoe wear were not analyzed; therefore, it is possible that equipment problems or training errors could have occurred more often in high scorers.

Assuming that personality factors do contribute to injury frequency and duration, can these be changed by intervention? Recent studies indicate that type A behavioral characteristics may be changed even though the basic personality type remains the same. Some psychologists feel that given guidelines, type A individuals can function as type B individuals by using exercise, such as running, to modify type A characteristics.[17–19] Other strategies include involving a coach who could closely monitor the type A runner to guard against overtraining. Furthermore, physicians can modify recommendations about returning to training following injury if it is evident that a particular athlete is at high risk for recurrent injury.

CONCLUSIONS

In this study, running injury correlated closely with type A behavior scores. Tendency for an injury and risk for multiple injuries were significantly related to TASRI scores of 120 or more. These results do not support a relationship between running mileage and injury. The study did not examine the effects of anatomic factors, extrinsic factors, and training errors, and no conclusions can be made regarding their contribution to the running injuries suffered by this sample. Irrespective of these factors, however, this study suggests that a brief questionnaire identifying those runners with type A characteristics will define a high-risk population for running injuries, particularly recurrent injuries. This research may serve as a pilot study; additional prospective trials with larger numbers of runners should further clarify whether personality factors lead to running injury.

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