Scoring Vax-to-Flax: A new method for fairer results

Anonymous et al.[1]*

Abstract

Model-derived age/speed corrections were formulated to return fairness and justice to VAX-to-FLAX race scoring procedures. Corrections were successfully applied to annual race results spanning the period 2001-2005, and appear to provide a reasonable method for comparison across all relevant age ranges. The corrected results indicate that the Faculty/Staff team has in fact dominated the competition, although the Student team has been victorious on at least one occasion.

Background

"Vax-to-Flax," a historic 8000m battle between Faculty/Staff and Student contingents at the Marine Sciences Research Center, has been conducted annually "longer than anyone cares to remember" (D. Conover, *pers. comm. non veritas*). The Student team has often disputed the method of determining victory, which is thought to have been devised by members of the Faculty/Staff team. This method uses disproportional averaging to supposedly account for age differences between members of each team. The final Faculty/Staff time is an average of the top five finishing times of that team, including at least 1 member of each sex. The Student time is an average of the finish times of the top 10 Student finishers, and must include at least 2 members of each sex. Because this method, in attempting to remove the effect of age disparity between teams, does not account for annual fluctuations in team composition (i.e. the gain or loss of young, and presumably fast, team members), it has been oft-accused of unfairly aiding the Faculty/Staff team. We present here an alternate, perhaps more just, method for removing age variability in Vax-to-Flax finish times.

Methods

A recent model has been reported to describe the relationship between age and running speed (*we are not making this up*; Moore, 1975). Running speed records plotted versus runner age are fit by a curve following Equation 1 (see also Figure 1; Moore, 1975):

$$Y = A_1[1-\exp(A_2X)] + A_3[1-\exp(A_4)], \qquad \textit{Eq. 1}$$

where coefficients A_1-A_4 are determined by a least-squares fitting of the empirical data, and vary depending on race length. Although the data used to derive Equation 1 are those collected from elite ("super") runners, Moore (1975) writes that "the speed curve for the ordinary runner may have the same shape as that of the super runner and the rates of change of speed with age would be the same" (p.265).

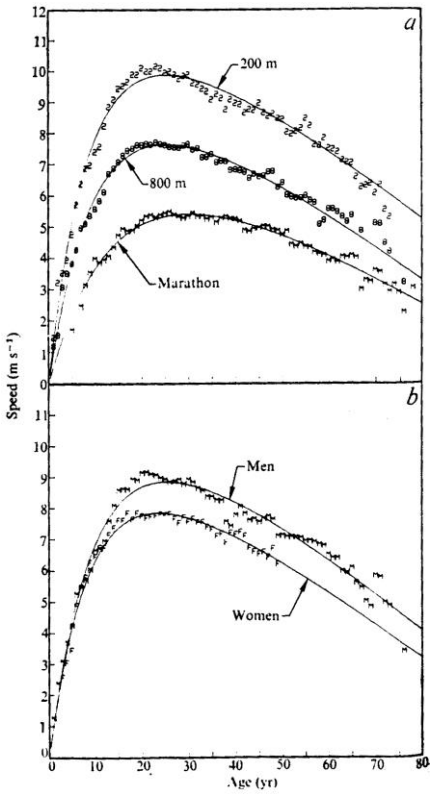

Figure 1. Running speed records by age and sex. Reprinted without modification or permission, from Moore (1975).

For the purpose of this report, the "800m" curve was approximated using constants of -0.11, 9.5, 0.08, and 6.7 for A_1, A_2, A_3, and A_4, respectively. The "Marathon" curve was approximated with coefficients of -0.08, 7, 0.08, and 5.2 for A_1-A_4. Because the age-speed relationship tends to decay more slowly with increasing race distance, a new curve must be defined for application to the Vax-to-Flax race (~8000m). As a first approximation, coefficient variation was assumed to be directly proportional to race distance. A "Vax-to-Flax" curve

[1] Stony Brook University, Stony Brook NY 11794-5000
*Author to whom correspondence should be addressed.

was constructed using constants determined by Equation 2:

$$A_{Vax} = (\beta_{Vax}/\beta_{Marathon}) * (A_{800m} - A_{Marathon}) + \beta_{Marathon}, \quad Eq.\ 2$$

where A_{Vax} is the adjusted coefficient for the Vax-to-Flax distance, β_x is the distance for Vax-to-Flax (8000m) and Marathon (42195m), and A_x is each coefficient described by the 800m and Marathon curves. We find that Vax-to-Flax coefficients A_1-A_4 are -0.104, 9.02, 0.008, and 6.41. The resulting graph is shown in Figure 2.

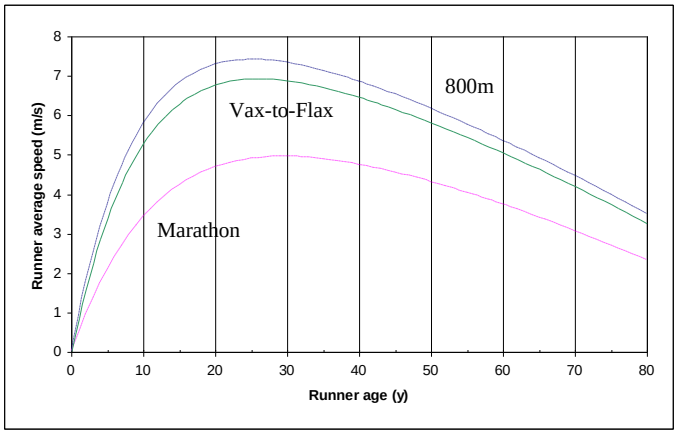

Figure 2. Vax-to-Flax (~8000m) age-speed curve compared to marathon (42195m) and 800m race distances (Modified from Moore, 1975).

The age-speed correction we will use is simply the ratio of the "super" runner time at age *t* to that at age 26 (when the model predicts that speed will be greatest). Thus, race times from Vax-to-Flax can be adjusted for age variation between runners by simply taking the product of the runner's actual time and the appropriate correction at runner's age *t*.

To apply this correction to past race results, it is necessary to make a few assumptions. The results reported below follow these guidelines:

1. The finish times of the top five runners from each category ("Student" and "Faculty/Staff") have been averaged. For each year, the five finishers considered must include at least one member of each sex.
2. Exact ages for individual runners are not known, so runners have been bracketed into age groups. The correction applied for each decadal group is the median value.
3. All "Student" runners are classed as 20-30 years of age, and for example, the correction factor used is that for age 25.
4. "Faculty/Staff" are classed as 30-40 years of age, except for tenured faculty, which are classed as 40-50 years of age.

Results

Actual and adjusted average finish times for 2001-2005 are shown in Table 1. For 2001 and 2002, the Student team had the fastest uncorrected average time by ~1 min. However, adjusted values show that if the age effect is removed, the Faculty/Staff team is faster by an average of ~1 min. The 2001 results only record three finishing members of the Faculty/Staff team (all male), so the apparent victory should be interpreted cautiously.

The Faculty/Staff team dominated clearly in 2003 and 2004, with faster average times even in the unadjusted category. During these particular years there were either an unusual number of newly acquired, fast faculty, or former-student post-docs/staff (*Benedictus arnoldii*). We would not go so far as to suggest a conspiracy that extends to faculty search committees, but the data do cast a suspicious light in that direction.

In 2005, the Student team had faster average times in both raw and adjusted categories. The correction, however, does place the Faculty/Staff team only 0.02 min (1.2 s) behind.

Fac/Staff	**2001**	**2002**	**2003**	**2004**	**2005**
Avg uncorr	39.21	35.17	37.60	34.31	38.20
Avg corr	36.96	33.45	35.80	32.62	35.69
Students					
Avg uncorr	38.30	34.93	38.29	35.34	35.67
Avg corr	38.29	34.93	38.29	35.34	35.67
Winner					
Avg uncorr	Stu	Stu	F/S	F/S	Stu
Avg corr	F/S	F/S	F/S	F/S	Stu

Table 1. Average uncorrected and corrected team times (min.) for each year, and winning team (Stu = Students, F/S = Faculty/Staff) based on each set of averages.

Conclusions

Application of a model-derived correction factor to a half-decade of Vax-to-Flax finish times has allowed team averages to be normalized by age. Adjusted times confirm Faculty/Staff victories during the years 2001-2004. However, the data suggest that the Student team won in 2005, contrary to the official verdict.

The closeness in average adjusted times between the teams indicates that the correction is probably valid, and may be accounting well for the

effect of age on deterioration of running speed. This comparison further suggests that the former method of determining race winners may be flawed, and needs revision.

References

Moore, D.H. 1975. A study of age group track and field records to relate age and running speed. Nature 253, 264-265.