Supplemental Digital Content 2.

Text. Estimated maximum heart rate after deleting tests that are presumably less than full effort

Methods

Supplemental Paragraph Number 1 Including tests that represent less than full effort may impede assessment of the association of age and observed MHR. We explored several strategies for forming restriction sets that eliminated tests that were less than full effort: 1) If RPE was low, the participant did not perceive working at full effort during the treadmill test; as an example of RPE-based restriction, we studied a restriction set that eliminated any test with RPE <15. 2) Tests of short duration may not represent full effort; we studied a duration-based restriction set that excluded those who did not finish stage 2 of the test, and for another excluding those who did not finish stage 3. 3) We formed restriction sets by excluding tests with low age-specific MHR, using a "trimline". One such "trimline" strategy excludes tests with MHR <85% of predicted MHR using the Tanaka formula 208- 0.7*age, as depicted in Supplemental Digital Content 4. This restriction eliminates tests in 18 year olds with MHR < 166 beats/minute. The cutpoint for exclusion declines to 147 at age 50 by 0.7 beats/minute per year of age. We designate this "trimline" by the cutpoints at age 18 and at age 50, that is trimline (166,147).

Supplemental Paragraph Number 2 Trimline (166,147) makes exclusion proportional to predicted MHR at each age. We explored 600 additional non-proportional "trimlines" in order to see whether a linear age-MHR association emerged in this CARDIA dataset similar to the equations reported by Tanaka and

Gellish (8, 22). This exploration consisted of examining the repeated measures regression of MHR on quadratic age for each trimline (X, Y), with X (the cutpoint at age 18) ranging from 160 to 189 and Y (the cutpoint at age 50) ranging from 120 to 139 (30 x 20 = 600 "trimlines" in total). We recorded size and statistical significance of the coefficient for age^2, with focus on a cutoff line that yielded a small and nonsignificant coefficient for age^2 (indicating a linear age-MHR relationship), then repeated the regression omitting the age^2 term to characterize the linear solution.

Interpretation

Supplemental Paragraph Number 3 We further studied the shape of the eMHR curve under several restriction strategies based on RPE, highest stage of the treadmill test attained, or trimming using a percent of the Tanaka age-predicted MHR (eg, trimline (166,147)) (see Table, Supplemental Digital Content 3, which demonstrates prediction of maximum heart rate (MHR) from age in all available data and in some restriction sets obtained by different trimming methods; see Figure, Supplemental Digital Content 4 which shows distribution of MHR by age after excluding those with values below the 85% TANAKA estimate of MHR (eMHR)). All shapes were quadratic. We explored a wide range of non-proportional "trimlines" and found that many yielded a linear slope similar to what was reported previously (8,22). For example, linearity of the MHR age relationship was maintained for the age 18 cutoff 180-186 combined with any age 50 cutoffs in the range 120-139; the age slope was close to (-0.7) for all these trimlines. Specifically, the trimline (182,130) yielded eMHR=203-0.70*age. However, further adjustment for baseline characteristics that may have been involved

in selection bias, including sex, race, BMI, physical activity, smoking status, lung function and treadmill test duration, restored a quadratic association with quadratic coefficient -0.003. We concluded that we never know what proportion of a true maximal test was performed; even a person achieving a relatively high MHR might have achieved a relatively low proportion of true MHR. Therefore we were not able to distinguish less than full effort from full effort tests, and we deemed restriction strategies for all but a very few low level tests not to be helpful in understanding MHR.