

## MALE - FEMALE STRENGTH COMPARISONS AND RATE OF STRENGTH DECLINE WITH AGE IN WEIGHTLIFTING AND POWERLIFTING

Ralph Rozenek and John Garhammer, California State University, Long Beach, CA, USA.

**INTRODUCTION:** Physical strength and strength changes with age have long been of interest in the occupational setting. More recently, strength comparisons between males and females have become important relative to physical qualifications and equal opportunities in the work place. Much of the available data associated with the above issues was obtained without consideration for physical variables, such as age, height and weight, nor experience or training related to the strength tests utilized. The current popularity of age group competitions in most sports, including the highly strength dependent sports of weightlifting (WL) and powerlifting (PL), and the common practice of maintaining world and national records for each age group, permitted an objective evaluation of how strength levels change with age for people in given body weight categories who train regularly with the competition lifts. The purpose of this study was to compare male and female performances in the lifts contested in WL (snatch and clean & jerk) and PL (squat, bench press and deadlift), and to determine the rate of performance decline based on published age group world records for both sports.

**METHODS:** International Weightlifting Federation (IWF) world record lists as of December 31, 1997 were obtained for men and women, and for age group categories #1: 40-44, #2: 45-49, #3: 50-54, #4: 55-59, #5: 60-64, #6: 65-69, #7: 70-74, and #8: 75+ years of age. These records included 10 body weight categories for men and nine for women. In order to avoid using extremes in size, so as to draw conclusions applicable to the general population, and to make direct comparisons between men and women, data from only the five weight categories common to both genders were analyzed (59, 64, 70, 76 and 83 Kg categories). For PL, International Powerlifting Federation (IPF) world records were used. The IPF maintains age group records for only 40-49 and 50+ years. United States PL Federation (USPF) maintains national records for the same age groups as the IWF, so these records were used to determine rate of decline in performance with age for PL. The 56, 60, 67.5, 75 and 82.5 Kg body weight categories in PL were used for the reasons stated above, and to make comparisons between the two WL and three PL competition lifts possible for similarly sized male and female athletes. Each lift analyzed was expressed as a percent of the current men's or women's world record in that particular lifting movement. Male - female comparisons were made for each of the five types of lifts considered and also relative to age group. Rate of decline in performance for men and women was determined, for each type of lift, by a linear regression performed on the average percent of the world record lift performed by each age group across the five body weight categories. Rate of strength decline with age was assumed to be directly related to the rate of decline of performance in each type of lift.

**RESULTS:** For WL, the women's world records, over the five weight categories analyzed, averaged 67.3% and 68.9% of the men's records in the snatch and clean & jerk lifts, respectively. For age group categories #1, 2 and 3 the female to male performance ratios for both the snatch and clean & jerk were about 50%, but dropped to near 30% for age group categories #4 and 5. Women's data for older age groups were not available for some or all of the weight categories analyzed. The decrease in WL performance with age found for men was linear and almost identical for the two lifts as shown in Figure 1. A linear decrease in WL performance for women was not found. For age group categories #1, 2 and 3 average performance was near 50% of world record lifts, and dropped to less than 30% for age categories #4 and 5. For PL, the women's world records, over the five weight categories analyzed, averaged 69.0%, 69.1% and 74.0% of the men's records in the squat, bench press and deadlift, respectively. The decrease in PL performance with age found for men was nearly linear and similar for the three lifts, as shown in Figure 2. For the IPF women's age group 40-49, the average performances across the five weight categories were 81.6%, 87.4% and 68.2% of the women's world records in the squat, bench press, and deadlift, respectively. The female to male ratios for the three lifts in this age group were 67.5%, 59.4% and 54.9%. Data for older women's age groups were not available.

Figure 1: Five Weight Category Average % of WR vs. Age

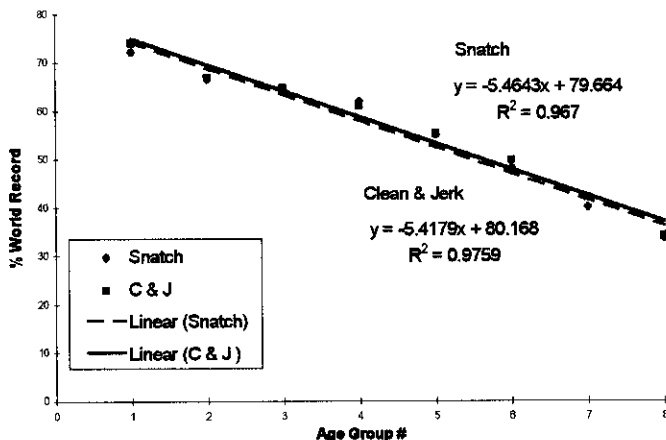
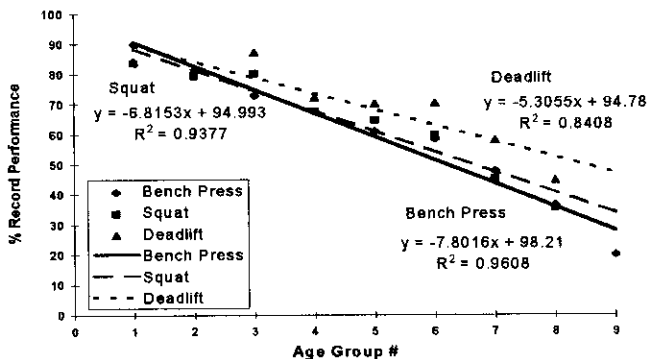


Figure 2: Five Weight Category Average % of Record vs. Age



**DISCUSSION:** Female to male strength performance ratios averaged about 70% for the five lifts analyzed. This result is similar to that of earlier studies (1). The advantage with the current values, however, is that men and women were compared in equal body weight categories and with similar training backgrounds. In addition, it is evident from observation that lifters in each of the weight categories analyzed tend to be very similar in body height. Body fat levels also tend to be similar in these weight categories. Female to male ratios for power output in WL were previously determined to be 63% for complete pulling motions, but about 74% for the faster second pulls (2).

Several studies investigating the effects of aging on performance have focused on track & field and swimming events. For endurance athletes, results indicated a 5-15% decrease per decade (3, 4, 5). Isometric and concentric knee extension strengths have been found to decrease at about 9% per decade for both men and women (6). The current results for men show about a 5.4% per

five year age group decline for WL and an average decline of 6.6% per age group for the three lifts in PL. These data indicate that men can maintain a strength level of about 60% of maximum at the retirement age of 65. Women's age group data for both WL and PL is very limited. This is likely due to the fact that women's participation in official national and international competitions is much more recent than for men. World championships for women in WL and PL have been contested for little more than a decade. As women mature in these sports, more will participate in age group competitions and a clearer picture of their strength decline with age will emerge.

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