

CHANGES IN BODY SIZE OF ELITE HIGH SCHOOL FOOTBALL PLAYERS: 1963-1989

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Abstract:

An examination of the heights and weights of members of the *Parade Magazine's* High School All-American Football Teams from 1963-1971 indicates no significant changes in the Body Mass Index of these elite athletes whereas an increased pattern in Body Mass Index was noted within this group from 1972-1989. The large increases in Body Mass Index after 1971 among the All-American high school football players raise interesting research questions; in particular, what portion of these gains can be attributed to improved nutrition and training techniques and what portion is the result of use of performance enhancing drugs such as anabolic steroids?

Article:

Based on media accounts and anecdotal reports, the size of high school football players appears to have increased dramatically during the past two decades. Sixteen years ago an article in *Sports Illustrated* predicted that, based on gains to date, we would eventually see "360-pound, seven and a half foot tackles" (Johnson, 1974, p. 80). In 1988 Howard University's football coach, Willie Jeffries stated, "These days we're able to go out and get a 270-pounder [straight out of high school]" (Korn, 1988, pp. 30-31). The increase in the size of athletes who play football at the collegiate and professional levels is also apparent. In the past 30 years, the average weight of a college football All-American lineman has increased 48 pounds while the average weight of a National Football League All-Pro lineman has increased 21 pounds. During that same time, the average height of both groups has increased by 2 inches (*USA Today*, 1987). Although the increase in the size and weight of college football players has been systematically documented (Olsen & Hunter, 1985), this has not been done for younger players. The purpose of our paper was to examine the change in Body Mass Index of high school football players.

METHOD

Football is a strength and power sport in which almost one million adolescent high school boys on approximately 14,000 varsity teams participate (National Federation of State High School Associations, 1989). A summary of the size and weight of these players serves as a source of information for the growth trends in young athletes. Although data for all these players are not available, it is useful to isolate certain types of players to see these trends. For over two decades *Parade Magazine*, based on the votes of high school and collegiate scouts, has selected a yearly high school All-American football team. Along with the athlete's name and team affiliation, self-reported heights and weights were provided. Because changes have occurred over time in position designations and definitions, only interior linemen (five each year for a total of 115 athletes) were used in this study. The data for the football players span from 1963 to 1989 except for 1968, 1970, 1987, and 1988 (*Parade Magazine* was unable to provide the data for those years). A reference group is the nationwide 18- to 24-yr.-old males who participated in cross-sectional surveys conducted by the National Center for Health Statistics. Specifically, the data were collected during the Health Examination Survey, 1960-62 (National Center for Health Statistics, 1962), during the Health Examination and Nutrition Survey from 1972-74 (National Center for Health Statistics, 1973), and again from 1976-80 (National Center for Health Statistics, 1981), and during the Nationwide Food Consumption Survey (U.S. Department of Agriculture, 1990).

RESULTS

The mean height, weight, and Body Mass Index (BMI, weight in kilograms divided by height in meters²) of elite high school football linemen showed an increased pattern over the last twenty-six years (Table 1). The average weight in 1963 was 213 pounds, whereas in 1989 the average weight was 268 pounds. The average index for the linemen in 1963 was 27.7; in 1989 the average was 32.0. The rate of change in Body Mass Index of football players, however, varied over time.

TABLE 1
MEAN HEIGHT, WEIGHT, AND BODY MASS INDEX OF FOOTBALL PLAYERS BY YEAR (N = 115)

Year	Body Mass Index	Height	Weight
1963	27.7	6 ft., 1 in.	213
1964	29.3	6 ft., 0 in.	222
1965	27.9	6 ft., 2 in.	214
1966	27.4	6 ft., 0 in.	211
1967	29.3	6 ft., 0 in.	220
1969	27.9	6 ft., 3 in.	222
1971	29.8	6 ft., 5 in.	250
1972	30.4	6 ft., 4 in.	250
1973	29.9	6 ft., 4 in.	242
1974	28.8	6 ft., 3 in.	225
1975	30.0	6 ft., 4 in.	239
1976	29.3	6 ft., 4 in.	237
1977	30.9	6 ft., 4 in.	256
1978	29.9	6 ft., 5 in.	245
1979	30.2	6 ft., 4 in.	244
1980	30.7	6 ft., 6 in.	249
1981	30.8	6 ft., 5 in.	263
1982	31.5	6 ft., 4 in.	261

(continued on next page)

Note.—Yearly Body Mass Indexes were calculated by averaging the individual players' indexes.

TABLE 1 (CONT'D)
MEAN HEIGHT, WEIGHT, AND BODY MASS INDEX OF FOOTBALL PLAYERS BY YEAR (N = 115)

Year	Body Mass Index	Height	Weight
1983	32.6	6 ft., 5 in.	275
1984	31.8	6 ft., 5 in.	264
1985	30.6	6 ft., 4 in.	247
1986	31.8	6 ft., 5 in.	264
1989	32.0	6 ft., 5 in.	268

Note.—Yearly Body Mass Indexes were calculated by averaging the individual players' indexes.

In particular, there was little change in Body Mass Index from 1963 to the early 1970s and thereafter a significant increase appeared to take place. The slope of the regression line fitted through the data points from 1972-1989 was significantly different from the line for 1963-1971 ($p < .01$; Fig. 1). For the data from 1972-1989 there was a significant positive association between year and Body Mass Index ($F_{1,14} = 20.17$, $p < .001$). The explained variance of Body Mass Index for football players by the year (1972-1989) was almost 60 percent ($R^2 = .59$). The values for the years 1963-1971 were not significantly related to time ($p = .33$). The index for 18- to 24-yr.-old males in the general population showed no significant relationship with time ($p > .05$).

DISCUSSION

It is possible that the values from recent years for height and weight of elite high school football players may be inflated by the athletes or their coaches due to intense competition for scholarships to major football schools. Our findings, however, also parallel those of Olsen and Hunter (1985) which showed the Body Mass Index of collegiate football linemen rising from 29.11 to 31.42 during the ten-year period 1973 to 1983. While the general population of 18- to 24-yr.-old males in the USA does not experience significant gains in Body Mass Index over time (Fig. 1), the dramatic increases in the index among elite high school football players from 1972 to 1989 is both interesting and possibly cause for concern.

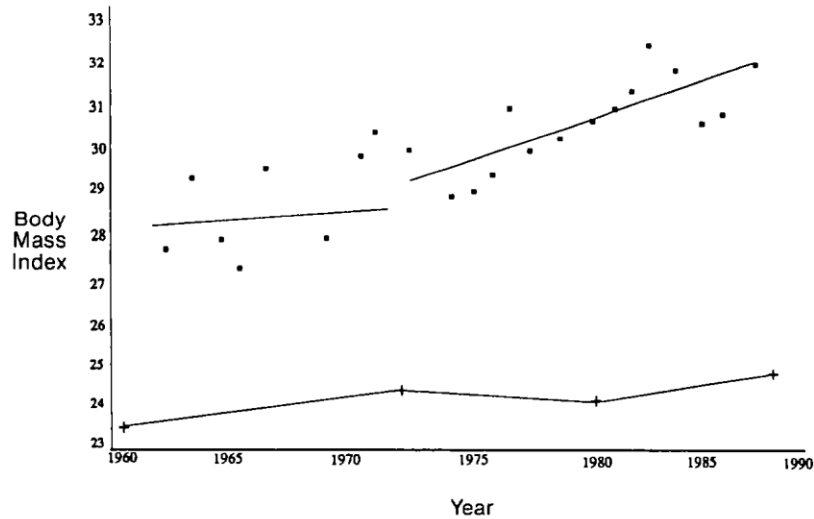


FIG. 1. Slope of Body Mass Indexes of 115 football players: 1963 to 1989 and of the nationwide 18- to 24-yr.-old males (* = Football players, + = Normal)

The data do raise questions as to what portion of these gains can be attributed to improved nutrition and training techniques and what portion may be the result of use of performance-enhancing drugs such as anabolic steroids (Yesalis, Wright, & Lombardo, 1989). Nonmedical use of anabolic steroids could have serious biophysical consequences for adolescents, such as premature skeletal maturation, decreased spermatogenesis, and increased risk of injury (Blether, Gaines, & Weldon, 1984; Rosenfeld, Northcraft, & Hentz, 1982; Wilson, Kei, Hentz, & Rosenfeld, 1988).

Although a causal relationship cannot be established here, there is evidence of anabolic steroid use among adolescents in high school and junior high school as well (Toohey & Cox, 1971). The use of 1971 as a "cut-off" date in the regression analysis is admittedly somewhat arbitrary. The decision to use 1971 was based on the fact that 1971 was the first year that anabolic steroid use was systematically documented among high school athletes (Toohey & Cox, 1971). Toohey and Cox reported an anabolic steroid use rate of 2.5% among a combined population of athletes in 10 Arizona high schools. Nevertheless, a 1988 nationwide study showed that almost 7 percent of male high school seniors reported previous anabolic steroid use, and it is estimated that approximately one-half million adolescents have used or currently use these drugs (Buckley, Yesalis, Friedl, Anderson, Streit, & Wright, 1988). Furthermore, the most frequent reasons given for using anabolic steroids were "to improve athletic performance and appearance." Of the self-reported anabolic steroid users, 44% played football (Buckley, *et al.*, 1988).

There are many possible explanations for the increase in average body mass of elite high school football players since 1972. It is likely that this increase is the result of several factors, particularly, widespread adoption of strength techniques, nutritional programs for weight gain (U.S. Department of Agriculture, 1990), and unfortunately, anabolic steroid use. Of these factors, the potential harm caused by steroid use in this population make the evaluation of such drug use and the underlying motivations a serious issue which should be further researched (Yesalis, *et al.*, 1989).

REFERENCES

- All-USA high school football team. (1987) *USA Today*, December 23, P. 6C.
- BLETHER, S. L., GAMES, S., & WELDON, V. (1984) Comparison of predicted and adult heights in short boys: effect of androgen therapy. *Pediatric Research*, 18, 467-469.
- BUCKLEY, W. E., YESALIS, C. E., FRIEDL, K. E., ANDERSON, W. A., STRETR, A. L. & WRIGHT, J. E. (1988) Estimated prevalence of anabolic steroid use among high school seniors. *Journal of the American Medical Association*, 12, 24-29.
- JOHNSON, W O (1974) From here to 2000. *Sports Illustrated*, 41, 80.

- KORN, P. (1988) How big is too big? *Sport*, 79, 30-31.
- NATIONAL CENTER FOR HEALTH STATISTICS. (1962) *Plan and initial program of the Health Examination Survey*. Washington, DC: U.S. Department of Health, Education, and Welfare, 1962. (Health statistics from the U.S. National Health Survey; Series A-No. 4) (DHEW No. 584-A4)
- NATIONAL CENTER FOR HEALTH STATISTICS. (1973) *Plan and operation of the Health and Nutrition Examination Survey, 1971-1973*. Rockville, MD: U.S. Department of Health, Education, and Welfare, February, 1973. (Vital and Health Statistics; Series 1-No. 10a) (DHEW No. (HSM) 73-1310)
- NATIONAL CENTER FOR HEALTH STATISTICS. (1981) *Plan and operation of the Second Health and Nutrition Examination Survey, 1976-1980*. Hyattsville, MD: U.S. Department of Health, Education, and Welfare, July, 1973. (Vital and Health Statistics; Series 1-No. 15) (DHEW No. (PHS) 81-1317)
- NATIONAL FEDERATION OF STATE HIGH SCHOOL ASSOCIATIONS. (1989) *National Federation News*, October, p. 10.
- OLSEN, J. R., & HUNTER, G. R. (1985) A comparison of 1974 and 1984 player sizes, and maximal strength and speed efforts for Division 1 NCAA universities. *National Strength and Conditioning Association*, 6, 26-28.
- ROSENFELD, R. G., NORTHGRAFT, G. B., & HENTZ, R. L. (1982) A prospective, randomized study of testosterone treatment of constitutional delay of growth and development on male adolescents. *Pediatrics*, 68, 681-687.
- TOOHEY, J. V., & Cox, B. A. (1971) Steroids and the athlete. *Arizona Journal of Health, Physical Education, Recreation & Dance*, 14, 15-17.
- U.S. DEPARTMENT OF AGRICULTURE. (1990) Report of the Dietary Guidelines Advisory Committee on the dietary guidelines for Americans. Washington, DC: U.S. Government Printing Office.
- WILSON, D. M., KEI, J., HENTZ, R. L., & ROSENFELD, R. G. (1988) Effects of testosterone therapy for pubertal delay. *American Journal of Diseases of Children*, 142, 96-99.
- YESALIS, C. E., WRIGHT, J. E., & LOMBARDO, J. A. (1989) Anabolic-androgenic steroids: a synthesis of existing data and recommendations for future research. *Clinical Sports Medicine*, 1, 109-134.
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