

EVALUATION OF HYDRAULIC RESISTANCE EXERCISE EQUIPMENT

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Recently, exercise machines have been developed that incorporate hydraulic cylinders to provide both variable speed and variable resistance. To evaluate this form of equipment a comparative study with weight stacks (Universal), cam-machines (Nautilus), and the Hydra equipment plus a control group doing their normal recreational programme, involving 56 randomly chosen RAF Trainee personnel was organised. Each form of equipment involved 2 groups of eight personnel, the seventh group being the control group. The physiologic characteristics of all personnel, including % fat, weight, sub-maximal measurement of oxygen uptake (VO₂) and other factors, were recorded and evaluated by recognised procedures. Strength parameters were identified by the use of a Total-Power Omnitron, which utilises the same concept as the Hydra, the use of the hydra cylinder permits variable and accommodative resistance at a variable and accommodating speed of movement.

The results did identify the trends already remarked on in studies by the N American Forces. Strength parameters in the Hydra groups not only showed significant changes relative to the other 3 groups but also much quicker. Work and Force totals in the Hydra groups were maximised in 5-6 weeks, unlike the other groups where relative comparisons did not exhibit such totals, in many individuals, even at the conclusion of the 20 week study. In addition there was significant enhancement of cardiovascular response (CVR) using Hydra whereas the other two types did not exhibit a significant change in this area. It is concluded that both in concept and practice this new form of hydraulic resistance, where the hydraulic fluid is under positive pressure from the start of the movement, is an excellent addition to progressive resistance training surmounting the compromise of the cam-machines and the limited variable resistance facility applied on the various weight stack machines

BOOK REVIEW

Title: **GROWTH, HEALTH AND FITNESS OF TEENAGERS. LONGITUDINAL RESEARCH IN INTERNATIONAL PERSPECTIVE**
Editor: H. C. G. Kemper 1985 ISBN 3-8055-4042-6
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This volume in the series medicine and sports science is described as a report of a 'multiple longitudinal study' which was carried out at the University of Amsterdam by three collaborating departments. The study was designed primarily to describe the course of the physical and psychosocial development of teenagers in the Netherlands and to search for periods of deterioration in the health of these young people attending secondary school. The subjects were two groups ranging in age from twelve to seventeen who were measured and assessed annually between 1976 and 1979 according to a lengthy and detailed protocol. The multidisciplinary of the study provided for the inclusion of physical measures (anthropometric, physiological and motor performance); psychosocial measures (personality and sociometric); eating and smoking habits and habitual physical activity assessments.

It is fascinating to compare the scope, design and the findings of this elegant study with some of its eminent predecessors. One calls to mind for example, the Harpenden Growth Study conducted by Tanner in England between 1948 and 1971, the Medford Boys' Growth Study directed by Clarke at Oregon from 1956 to 1968 and the Canadian Trois Rivieres Regional Study led by Lavalee from 1969 to 1977. The present Netherlands Study though not so extended over time is most sophisticated in general design and particularly in the methods of data analysis based on variations of the SPSS and BMD-P computer programmes. There is little doubt that this volume will be a key reference for those working in the area of adolescent growth and health and will establish important pointers towards future studies.

The results of the study are reported with commendable clarity. Details of growth changes in height, weight and velocity are linked with indices of biological development and body build. Functional measures of motor performance, maximum aerobic power are discussed and compared with the findings from other studies. Cardiovascular risk indicators are identified and are considered in the context of our current lifestyle. Energy intake and output are considered and the developmental changes in personality and sociometric status are seriously pursued. This may appear to be rather a lot to pack into 200 pages but the well structured and carefully written chapter makes for relatively easy and certainly compelling reading.

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