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COMPETITIVE SELECTION AMONG AGE-CLASS ICE-HOCKEY PLAYERS

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INTRODUCTION

The "little-league" is an important feature of the North American scene, young boys vying vigorously with one another for places on age-categorized ice-hockey, "football", and baseball teams that compete in municipal, regional and even provincial leagues. The system has been criticized on a number of counts, including the possible psychological risks of premature exposure to intensive competition, the limited knowledge of many of the "coaches", and the too frequent insistence upon winning at all costs. The present note examines a further likely hazard of age-class sport – competition and even physical collision between small pre-pubertal children and young people of the same chronological age who have reached almost adults' proportions.

THE DIMENSIONAL PROBLEM

The nature of the dimensional problem can be illustrated by data obtained on a random sample of Canadian boys by Howell and MacNab in 1968. The children were grouped into one-year age categories. Thus, the average thirteen year old boy weighed 47.1 kg, but it could be inferred from the published standard deviation of the data that one 13 year old boy in 40 weighed only 26.4 kg, and one in 40 weighed as much as 67.7 kg. These estimates assume the authors were justified in calculating a standard deviation. The upper and lower limits may in fact have been influenced somewhat by "skewing" of the data.

In practice, some of this alarming disparity of sizes is eliminated by the force of competitive selection. Figure 1 illustrates some fairly recent height and weight curves for Southern Ontario school boys (Stennett & Cram, 1969). Randomly selected boys from the Trois Rivières region are smaller than these standards, but this is not true of the participants in age-class ice-hockey competitions. Information is available regarding the characteristics of four classes of ice-hockey players from the Trois Rivières region of French Canada (Larivière et al., 1976). Each category spans two years, the "Mosquitos" being aged 9-10, the "Pee-Wee" 11-12, the "Bantam" 13-14, and the "Midget" 15-16 years. The "Mosquito" and "Pee-Wee" categories have essentially the same height as the Ontario norms, while the "Bantams" are 5 cm taller than these standards. By the "Midget" category, the

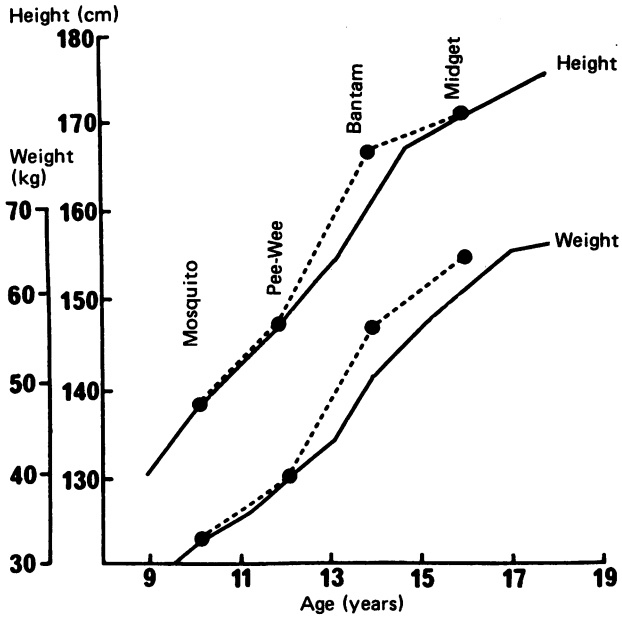

Figure 1: A comparison between height and weight curves of ice-hockey players in the Trois Rivières region, and normal curves for Southern Ontario (Stennett & Cram, 1969).

ice-hockey players have reverted to the normal curve. In terms of body weight, the two youngest categories also conform to Ontario norms, but the "Bantams" are 5.1 kg heavier and the "Midgets" 2.7 kg heavier than the standards.

PHYSIOLOGICAL CONSEQUENCES

The physiological test data are modified in the way that might be predicted from the anatomical characteristics. The PWC_{170} (the physical working capacity at a heart rate of 170 per minute) was measured on a Von Döbeln cycle ergometer, following a protocol established by the Canadian Association of Physical Health Education and Recreation (CAHPER) for the testing of a random sample of Canadian youth (Howell & MacNab, 1968). In all age categories (Table I), the PWC_{170} of the Trois Rivières ice-hockey players was higher than the

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CAHPER norms, peaking at 143% of the CAHPER results in the "Bantam" category. The dispersion of the data was measured as the coefficient of variation (S.D./mean, %). In the two younger categories, the coefficients were much as anticipated for a one year rather than a two year age spread, while in the two older age categories the coefficients were even smaller than for the one year groupings of the CAHPER population.

The relative power (PWC_{170} per kg of body weight) is illustrated in Table II. Results for the Trois Rivières ice-hockey teams again exceeded the CAHPER norms, although on this criterion the most powerful players were found in the oldest age category. Again, the scatter of the observations was reduced, particularly for the critical pubertal period ("Bantam" category).

A Stoelting handgrip dynamometer was used to provide an index of muscular strength (Table III). The recorded results are the best of three attempts with the right hand. Data for comparison are taken from a survey of Edmonton school children conducted by Howell et al. (1964). Again, the data for the Trois Rivières ice-hockey players increases progressively relative to these norms, and the coefficient of variation is less than for the one year age groupings of the Edmonton boys.

CONCLUSIONS

Size discrepancies are a problem in age-class sport. Nevertheless, data from ice-hockey players in the Trois Rivières region suggest that little-league competition has a progressive selective effect. Thus, the older age categories contain a preponderance of tall, heavy boys, with a large PWC_{170} and an above average muscular strength. Further, calculation of coefficients of variation shows that there has been a substantial attenuation of potential differences in size and physiological characteristics between competitors.

TABLE I

The physical working capacity at a heart rate of 170 beats per minute (PWC_{170}) — a comparison of data for the Trois Rivières ice-hockey players, and a random sample of Canadian boys (Howell & MacNab, 1968), the CAHPER norms

	PWC_{170}			
	Mosquito Aged 9-10 (N = 15)	**Pee-Wee 11-12 (N = 19)**	**Bantam 13-14 (N = 16)**	**Midget 15-16 (N = 18)**
	(10.0 ± 0.8 yrs)	**(12.0 ± 0.9 yrs)**	**(13.9 ± 0.8 yrs)**	**(16.1 ± 0.7 yrs)**
Trois Rivières Ice-Hockey	496 ± 116	666 ± 166	862 ± 184	1116 ± 202
CAHPER	406 ± 93	524 ± 140	605 ± 210	796 ± 185
Ice-Hockey (% CAHPER)	122	127	143	140
Ice-Hockey (coeff. of variation, %)	23.4	24.9	21.3	18.1
CAHPER (coeff. of variation, %)	22.9	26.7	34.7	23.2

TABLE II

The PWC_{170} per kg of body weight — a comparison of data between the Trois Rivières ice-hockey players and a random sample of Canadian boys (Howell & MacNab, 1968), the CAHPER norms

	PWC/kg			
Trois Rivières Ice-Hockey	15.7 ± 3.7	17.1 ± 3.7	15.3 ± 2.7	18.1 ± 4.0
CAHPER	12.75 ± 2.54	13.27 ± 3.13	13.92 ± 3.55	13.15 ± 2.88
Ice-Hockey (% CAHPER)	123	129	110	138
Ice-Hockey (coeff. of variation, %)	23.6	21.6	17.6	22.1
CAHPER (coeff. of variation, %)	19.9	23.6	25.5	21.9

TABLE III

The right hand grip force — comparison of data between the Trois Rivières ice-hockey players and a sample of Edmonton school boys (Howell et al., 1964)

	Right Hand Grip Force (kg)			
Trois Rivières Ice-Hockey	20.4 ± 2.9	26.7 ± 4.9	39.8 ± 6.7	52.9 ± 8.3
Edmonton (Howell et al.)	18.3 ± 4.1	21.6 ± 4.3	29.9 ± 5.1	39.6 ± 8.0
Ice-Hockey (% Edmonton)	112	124	133	134
Ice-Hockey (coeff. of variation, %)	14.2	18.4	16.8	15.7
Edmonton (coeff. of variation, %)	22.4	19.9	17.1	20.2

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