“Taking Their Measure”
in Play, Games, and Physical Training: The American Scene, 1870s to World War I

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“AMERICA’S LOVE AFFAIR WITH THE STANDARDIZED TESTS,” social critic Peter Sacks has stated, began in the 1840s when Massachusetts required examinations of school children.1 The testing of children and youth now has reached extensive proportions. In the United States nearly one million achievement tests were administered in elementary and secondary schools in 1986-1987.2 This number has increased since the No Child Left Behind Act was signed in 2002. The preoccupation with testing and standards, contributors to All Work and No Play . . . How Educational Reforms Are Harming Our Preschoolers (2003) contend, has resulted in scripted teaching, overwhelming desk work, and almost total neglect of what children might learn through play. Others have raised similar concerns. Among these, emeritus professor of education R. Murray Thomas faults the testing obsession with decreasing the time given to physical education, which has contributed to the rise of childhood obesity.3

Not only are children tested on their school work, they are the subjects of scores of growth, physical performance, psychological, and other investigations as reflected in the extensive number of articles that appear in the Annals of Human Biology, Journal of Pediatrics, [...]

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Journal of Child Psychology and Psychiatry, Journal of Sport and Exercise Psychology, and other scientific and clinical publications. An article in the October 2006 issue of the Journal of Physical Activity and Health reported that the number of published physical activity and measurement studies doubled between 1987 and 1992. Seventy percent of “all measurement or surveillance studies of PA [physical activity]” conducted during the last four decades have been published since 1996. However, as the authors note, “[e]ven in most areas with sound research, we lag behind in translating science into practice.”

Translating science into knowledgeable practice is essential in fields like engineering and medicine. Because appropriate amounts and types of physical activity are essential in securing and maintaining health, it is indispensable in physical education.

Interest in measuring the human body, as British growth and development authority James M. Tanner has observed, has a long history. Christian Friedrich Jampert’s 1754 publication of heights and weights taken at the Royal Orphanage of Berlin is thought to have been the first study involving children. Drawing upon records in Stuttgart’s Stadtarchive, the authors of “The Growth of Boys in the Stuttgart Carlschule, 1771-93” recently provided an interesting account of noble, middle-class, and artisan boys. (Because the school was organized along military lines, the heights of pupils were measured at least once a year.) Among other early studies, before the Civil War Samuel Henry Dickson of the Medical College of the State of South Carolina compared the heights of his students with data obtained from students attending the Citadel Academy. By 1900 studies of heights, weights, and other physical dimensions of childhood and youth were being conducted in a number of countries. Interest in measuring intelligence and other abilities also emerged. Although the idea of studying children was still considered by many individuals to be a novel and controversial enterprise, as Leila Zenderland, a professor of American Studies, has observed, the bases for the ubiquitous testing that exists today were rapidly being established.

This paper is concerned with late nineteenth- and early twentieth-century interests in the physical and psycho-social measuring of children and youth, the rise of the Child Study movement, and the role measuring performed in the emerging field of physical education. It begins with a brief account of broader contexts and influences.

Contexts and Influences

As the realities of poverty, disease, and social injustice challenged Enlightenment ideals regarding human perfectibility and progress, German physician Johann Peter Frank and others became convinced that governments must take a role in matters relating to public health. Population statistics were gathered in Sweden as early as 1748, and ministries elsewhere soon began to conduct censuses and other investigations. In the early 1830s Belgian mathematician Adolphe Quetelet surveyed heights, then heights and weights, of children. His interest soon turned to studying births, marriages, and deaths (population statistics) and a search for “ideal proportion.” In Sur l’homme et le développement de ses facultés. Essai sur physique social (A Treatise on Man and the Development of His Faculties) (1835), Quetelet wrote: “If the average man were completely determined, we might consider him as the type of perfection; and everything differing from his proportions would constitute deformity and disease.” His conception of “l’homme moyen”—“average
man”—would have considerable influence on early American physical educators who devoted a great deal of time to measuring students.

Quetelet also had made statistical analyses of convicts and men enrolled for the military draft. During the Civil War the United States Sanitary Commission (established in 1861) investigated race and other differences among Union Army soldiers, basing its anthropometric investigations upon his methodology. After the war the Commission distributed its apparatus (e.g., dynamometers, calipers) to colleges and other institutions in the hope that such research would continue. And continue it did! Among other contexts, anthropometry would become the major, and in many instances the only, research focus of American physical educators until World War I. The intended use of data collected was to develop body symmetry by means of exercise and postural realignment and bring an individual as close as possible to the “average” (or ideal) body type.

Interest in measuring younger populations was prompted by the appalling conditions in which children often worked. The 1833 Report of the Commissioners on the Employment of Children in Factories, the first of several such investigations in Britain, included mean heights and weights of boys and girls ages nine to eighteen. A similar investigation called for by a Parliamentary Commission in the early 1870s motivated Henry Pickering Bowditch to conduct the first survey of school children in the United States. Bowditch, who received a medical degree from Harvard in 1868, was one of a considerable number of Americans who went abroad during the nineteenth century for advanced study. He studied first in France and then in Bonn and Leipzig, where a complex of hospitals and institutes had been built during the 1850s and 1860s. The most noted was Carl Ludwig’s Physiologisches Institut. Upon returning to the United States, Bowditch joined the faculty of the Harvard Medical School, initiated important changes in medical education, and performed a significant role in professionalizing American physiology.

Among other Americans who pursued advanced work abroad were William James (M.D., Harvard, 1869), who studied in Berlin, and G. Stanley Hall, who first traveled to Germany in 1868. James developed an interest in the scientific study of the mind, and following his 1873 appointment as instructor at Harvard, he established what is believed to have been the first experimental psychology laboratory in the United States. Hall worked with James while serving as a tutor in English at Harvard and also investigated muscular perception in Bowditch’s laboratory. In 1878 he received a Ph.D. in psychology, the first such degree awarded in the United States. Upon returning to Germany he spent considerable time in Ludwig’s Leipzig physiology laboratory and in the new experimental psychology laboratory that Wilhelm Wundt had established.

The return of Bowditch, Hall, and others who had studied at European universities, clinics, and research laboratories coincided with extensive changes in American society brought about by industrialization, urbanization, and continuing waves of immigration. What Burton Bledstein has called a “culture of professionalism” was emerging wherein status came to be increasingly defined by a man’s career and what he could offer to society. Major changes in higher education also were under way. Formerly, the focus had been the undergraduate curriculum, but in the 1880s and 1890s graduate and professional programs began to appear. Johns Hopkins University, which drew upon the German university model, opened in 1876 with an emphasis on the research seminar and laboratory. Prestige as well as experience gained from studying at Europe’s finest
universities helped men advance their careers, found professional organizations, and establish academic journals. Bowditch, for example, created the American Physiological Society with Silas Weir Mitchell and H. Newell Martin in 1887. Hall is credited with founding the American Psychological Association (1892). He launched the *American Journal of Psychology* in 1887, and in 1891 he established *Pedagogical Seminary* (today the *Journal of Genetic Psychology*), which served as the major outlet for child study research conducted by his students at Clark University.19

Psychologist James McKeen Cattell, the first person in America to investigate individual differences in ability, also had studied under Wundt20 and had worked in Hall's laboratory at Johns Hopkins. While in England he came in contact with Francis Galton, who was engaged in comparing physical characteristics and searching for a way to investigate psychological differences.21 In his 1895 presidential address before the American Psychological Association, Cattell referred repeatedly to the importance of experiment, measurement, and quantitative data. The biologist, he declared, “should no longer rest content with describing the genesis [evolution] of species and of individuals, but should measure variations and changes, and determine causal relationships by methods of exact science.”22

Of the many developments that occurred in nineteenth-century biology, none had more power—or resulted in more controversies—than did evolution. The influence of English naturalist Charles Darwin’s ideas regarding natural selection (the existence of heritable variations within a species), set forth in his *On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life* (1859), was immediate and dramatic. The phrase “survival of the fittest,” which Herbert Spencer used is his *Principles of Biology* (1864), popularized the words that comprised the second half of Darwin’s title and was widely used in an array of contexts, one of which was a presumption that the mesomorphic male body, especially that of the athlete of Anglo-Saxon descent, represented the highest standard.23

Galton, Darwin’s cousin, had opened his *Hereditary Genius* (1869) with the words “I propose to show . . . that a man’s natural abilities are derived by inheritance, under exactly the same limitations as are the form and physical features of the whole organic world.”24 In it he compared such things as the reputations of eminent men over the age of fifty with those of a similar age from the British population as a whole and the performances of oarsmen (in this instance muscle was the focus). Reaction time as a measure of intelligence and anthropometry were among the many things for which Galton would gather data and make comparisons.25 He created the statistical concepts of regression and correlation and laid the foundations for biometry (the application of statistical analyses to biological data). The word eugenics (“hereditarily endowed with noble qualities”),26 which Galton coined, first appeared at the end of the section titled “Bodily Qualities” of his 1883 book, *Inquiries Into Human Faculty and Its Development*.27

Galton had urged the British Anthropological Institute to sponsor a program of bodily measurements in all classes of schools (elite public, grammar, and those for pauper children). Its Anthropometric Committee reported in 1883 that boys aged fourteen in industrial schools were nearly seven inches shorter than those of the professional classes.28 The *Boston Medical and Surgical Journal* (now *New England Journal of Medicine*) commented favorably about the Anthropometric Laboratory that Galton had established and agreed
that it would be “desirable to give more attention than has been customary hitherto to investigate and define the capacities of each individual.” Attributes that could be measured with reasonable precision, the writer noted, included height, weight, chest-girth, lung capacity, hair color, strength, and muscular coordination. He agreed with Galton that such measurements might be useful in determining a child’s career but doubted such an approach would find acceptance in the United States where “the great majority of moderately educated young people flatter themselves that there is almost nothing which a smart American cannot accomplish, if he wants to badly enough.” Moreover, he noted, some women could “outdo the most sanguine men.”

During the 1884 London International Health Exhibition, Galton's laboratory collected data on height, weight, arm span, breathing capacity, reaction time, and other measurements of nearly 10,000 individuals who were used in his investigations of human differences.

A growing number of such investigations were carried out on both sides of the Atlantic before World War I. In 1903, for example, J.H. Vines reported in the Westminster Review changes in height and weight of boys who had attended Rugby School and Marlborough College between 1874 and 1901; the lads were taller and heavier than their fathers had been at the same age. The article, titled “The Physique of the Public Schoolboy,” was reprinted in the June 1904 issue of American Physical Education Review, which also contained a companion piece by Paul C. Phillips, M.D., director of physical training at Amherst College, “Is the Physique of the American College Man and Woman Degenerating?” Having examined height and weight measurements collected from college men at

Amherst between 1861 and 1903 and from college women at Oberlin, Wellesley, Smith, Mt. Holyoke, and the University of Chicago between 1883 and 1903, he concluded that both sexes now were “taller and heavier” than their fathers and mothers had been. Although he acknowledged that the data could reveal nothing about “the integrity of the tissues” that had been measured, Phillips deemed contemporary arguments about a decreased size among this portion of the American population to be unfounded.31

Measuring Bodies: Developments in the United States

Edward Hitchcock, Jr. (M.D., Harvard, 1853), who usually is credited with establishing the first college program of physical education in the United States,32 had begun measuring students shortly after he became director of the gymnasium at Amherst College in 1861. During his youth he had helped his geologist father collect specimens. This experience may have contributed to his interest in anthropometry; he also was familiar with Quetelet’s writings. By 1878 he had collected height, weight, arm span, lung capacity, and other measures of 1,321 young men.33 In *An Anthropometric Manual* (1889), which he published with physician Hiram H. Seeyle, Hitchcock declared: “The idea of the Typical Man has been on the brain of Anthropologists for these many years.” Whereas previous efforts to identify an “average man” had drawn upon special populations like soldiers, now the New England college student “would furnish an average, or mean, that could be used in an Anthropometric study of the Anglo-Saxon race.”34

According to the *Index of Proceedings of the American Association for the Advancement of Physical Education* that John Pierce (secretary of the Boston Physical Education Society) compiled in 1895, anthropometry had been the topic of thirty-one presentations during the American Association for the Advancement of Physical Education’s (AAAPE) first ten annual meetings—nearly twice the number as the second most frequent topic, “hygiene.”35 It also was the subject of numerous articles and discussions in the *American Physical Education Review* following that journal’s creation in 1896. The enthusiasm for taking measurements did not go unquestioned, however. As early as 1887, Hitchcock had cautioned fellow AAAPE members: “[D]o not place too much dependence on what our measuring apparatus tells us of the individual. . . . Measurements are efficient but not sufficient, and danger lays in placing too much dependence on them.”36

Measuring children, which shared a number of things with anthropometry in college settings, placed particular attention upon comparing different populations. British physician Charles Roberts (who also had an interest in physical training) had been one of five medical doctors who participated in an 1872-1873 survey called for by a Parliamentary Commission to look into conditions of boys, girls, and women who worked in textile factories. Nearly 10,000 children were examined and found to be shorter at ages eight to eleven than those who lived in suburban or non-factory rural districts. After learning of this investigation, Bowditch convinced the Boston School Committee to let him undertake a survey of that city’s schoolchildren, which he published as “The Growth of Children” in the *Eighth Annual Report of the State Board of Health of Massachusetts* (1877). He subsequently extended such work, publishing “The Physique of Women in Massachusetts” (1890) and “The Growth of Children Studied by Galton’s Method of Percentile Grades” (1891).37 In the latter Bowditch declared: “[T]his branch of anthropometry stands in such close relation to physical training that it may be regarded as the test to which
systems of physical training must be subjected in order to judge of their comparative efficiency.” This was followed with the statement: “No teacher at the present day is satisfied to give instruction in any department of learning without testing its results by periodic examination of the pupils.”38 Commenting favorably in the *Boston Medical and Surgical Journal* about Bowditch’s 1877 study, Charles S. Minot, M.D. (who would later include a section on “Growth” in his 1886 *Reference Hand-book of the Medical Sciences*), cited a similar investigation that Professor Luigi Pagliani of the University of Turin had conducted, noting that his findings seemed to confirm that “sufficient and regular exercise does a great deal to assist growth.” Boys who had been selected for their “gymnastic aptitude” and given three extra gymnastic lessons a week had shown more improvement in muscular power and lung capacity than did the rest of those Pagliani had studied.39 Echoing Bowditch, physician Walter Channing stated in 1895: “[W]e must have more exact knowledge of the physical data of childhood and youth, and this can largely be accomplished by adopting a system of bodily measurements and observations.” The title of Channing’s article was “The Importance of Physical Training in Childhood.”40

In an 1893 summary of the most important “anthropological” studies in relation to “the child’s growth, health, and ability to work,” Clark University’s William H. Burnham cited those of Roberts, Bowditch, George Peckham, William Townsend Porter, Franz Boas, Sweden’s Alex Key, and several German researchers who had engaged in similar work.41 Best known to history for his work among indigenous populations, Boas (assisted by fellows and students of Clark University) collected height measurements of boys ages six through fifteen and girls ages six through fourteen in Worcester, Massachusetts, in 1891 and 1892 using as categories for his calculations: nationalities (American, Irish, mixed American and Irish, German, English) and parental occupations (professional, mercantile, skilled labor, unskilled labor).42

Speaking before the American Statistical Society in 1893, Luther Halsey Gulick, superintendent of the Department of Physical Training at the Springfield, Massachusetts Y.M.C.A. Training School and recent recipient of a medical degree from New York University, noted the “flood” of interest in anthropometrical investigations that was sweeping the country. He then set forth a number of criticisms regarding their conduct and use. These included the assumption that percentile grades can give “a set of numerical values that will represent the symmetrical man” and that there is only “one standard of symmetry.”43 Faulting the “generalizing method” (drawing generalizations from one-time measurements), Porter, at the same meeting, maintained that the “individualizing method,” which required measuring each individual yearly (or more frequently) during the growth period, calculating statistical probabilities, and treating each individual case on its merits, was the way to insure reliable information. Boas agreed and also called for a more thoughtful approach.44 Two years later, after reviewing naval surgeon Henry G. Beyer’s study of cadets ages fifteen to twenty-one at the United States Naval Academy, Boas credited Beyer with providing data that contradicted Bowditch and Porter’s presumption that “on the average individuals of a certain percentile rank retain this rank through life” but still found fault with a number of Beyer’s calculations.45

By 1895 a remarkable number of anthropometrical investigations of various populations had appeared. Drawing upon Bowditch’s protocol (but substituting offspring of German immigrants for those of Irish immigrants), biology teacher George Peckham in
1881 analyzed a survey of heights, weights, and sitting heights of 10,000 Milwaukee youngsters. Porter, a physiologist at St. Louis Medical College and later professor of physiology at Harvard Medical School, collected height, weight, chest girth, grip strength, and other data from more than 33,000 St. Louis school children and concluded that those who were taller and stronger possessed greater "mental power" than others of comparable age. He was by no means alone with that conclusion.

One of the most extensive turn-of-the-century publications was Arthur MacDonald's 315-page "Experimental Study of Children Including Anthropommetrical and Psycho-Physical Measurements of Washington School Children," which was included in the 1897-98 Report of the United States Commissioner of Education. MacDonald, a specialist in the Bureau of Education, had taken measurements (e.g., height, weight, sitting height, strength of hand grasp, shape of head, sensitivity to heat) of 1,000 boys and girls in the schools of Washington, D.C. From these data, he created over seventy tables and graphs that enabled him to compare his subjects according to race, sex, and social class and to relate physical measurements to mental ability, nervousness, and teachers' judgments of a pupil's ability. Also included were summaries (with accompanying tables) of investigations that had been conducted by Bowditch, Porter, Boas, A.F. Chamberlain in Toronto, Paul Hasse in Gohlis-Saxony, and Emil Schmidt in Leipzig. In the concluding section, MacDonald described ninety-one "instruments of precision" that could be used in taking psycho-physical as well as anthropommetrical measurements (e.g., the polygraph, sphygmograph,
ergograph, Marey’s myograph, dynamometer, anthropometer). Whereas it was relatively easy to measure large numbers of subjects with a tape measure or anthropometer, other instruments posed more difficult problems. Nevertheless, several individuals interested in the nervous system in relation to development carried out investigations of hand and body movements and other motor tasks.

**Motor Ability Tests Enter the Scene and More Questions are Raised about Anthropometry**

The belief that outer form is a reflection of inner function, which has a long tradition, was given new dimensions in the late 1800s when physiologists and psychologists brought the methods of science increasingly to questions they were asking. In the 1860s nerve physiologist Emil Du Bois-Reymond and pathologist Rudolph Virchow had been called upon to settle the Barrenstriet (a debate about which was the better form of gymnastics, the German or the Swedish). Berlin-born Du Bois-Reymond strongly supported German gymnastics, denouncing the so-called “physiological theories” upon which the Swedish system was based. His pronouncement regarding the important relation of muscle to nerve function would be invoked in more than one country to support physical training.

Eager to lay down scientific bases for understanding “mind”—hence, intelligence, morals, and social interactions—psychologists began to design experimental studies of children and youth. The most active source of such studies was Clark University, an entirely graduate institution that opened in 1889 at Worcester, Massachusetts, with Hall as its president. Concerned that little was known about their motor ability and of the opinion that school subjects could be better taught if “we knew just what movements children can make,” John Hancock (Fellow in Pedagogy at Clark University) published “Preliminary Study of Motor Ability” in 1894. Porter measured grip strength, tested with a dynamometer, in his study of St. Louis children. William Bryan, one of Hall’s most capable students, tested shoulder, elbow, wrist, and finger movements of more than 700 boys and girls ages five to sixteen in the Worcester public schools; the arms of subjects were immobilized to allow movement of only the specific muscle group being tested. Allen Gilbert conducted finger tapping experiments with boys and girls in New Haven, Connecticut, and in Iowa. These and other domestic and foreign studies of motor ability were included as part of the large (over 600 citations) “Bibliography of Child-Study” that Louis Wilson, librarian at Clark University, prepared for *Pedagogical Seminary* in 1898.

In 1898 Frederic Burk (Fellow in Psychology at Clark University) declared: “Any systematic study of genetic psychology at the present juncture begins with the phenomenon of physical growth. . . . [T]he dominant tendency of modern science has been to correlate more closely the mental and the physical.” Reviewing what he believed were the most important growth studies in relation to what little was known about mental development, Burk questioned the accuracy of those who were of the opinion that the “aim of training should be to make the child grow to specific dimensions.” This, he observed, was especially prevalent in physical education. Franz Boas, chair of the AAAPE’s Section on Anthropometry, agreed and pointed out that the usual approach did not take into account the effects of such things as malnutrition and the unsanitary conditions in which the poor
lived. “It would seem desirable,” he stated, “to subdivide the subjects measured in a number of classes according to their health records.” Also, because the American population included descendants of practically all European nationalities, it did not seem justifiable to assume that there was only one ideal type. Even among individuals “belonging to the same type,” he noted, none were absolutely alike. The whole matter had to be approached in a more thoughtful manner and more data needed to be collected that took into account a much wider range of variables.54

In his opening speech at the International Congress on Physical Education held in conjunction with Chicago’s 1893 World’s Columbian Exposition, Edward M. Hartwell, director of physical training for the Boston Public Schools, was pleased that the National Education Association (NEA) recently had added physical training as one of its several sections. In his address “Physical Exercises for School Purposes,” physician J. Gardner Smith, director of the physical department of the Harlem Y.M.C.A. and special instructor of physical training for New York City Public Schools, commented on measurements that he had taken on 8,000 pupils and followed with the statement that a rational system of physical training for grades one through six must include games as well as calisthenics, marching, and light gymnastics. However, with some exceptions it would be over a decade before games would begin to become part of the physical education curriculum. It was at this 1893 Chicago congress that physician Thomas Denison Wood, director of physical training at Stanford University and later professor of health education at Columbia University, called for a more scientific approach to the many “unsolved problems of physical education.”55 Although some early members of the physical education profession (most of whom held medical degrees) conducted research on such things as blood pressure in relation to exercise and reaction time, it would take more than six decades before substantial numbers of physical educators became engaged in scientific work.

Speaking at the Congress on Physical Education held during the 1900 Paris International Exposition, William Hastings (University of Nebraska) made an impassioned plea for the creation of a system of physical education that would find its “scientific” rationale in data collected from semi-annual tests. Parents, teachers, school boards, and the children themselves, he believed, would be motivated if given specific information about the physical status of each individual. However, because the public lacked an understanding of how “weakness, atrophy, and low vitality” might be avoided, each city would need to appoint a physical director to be in charge of “general hygienic work” in schools. It would be the responsibility of this individual to determine the type and quantity of exercises, train teachers, oversee the supervision of “all forms of recreative work,” and conduct (with the aid of teachers and medical assistants) semi-annual anthropometric and health examinations.56

Hastings was among those who faulted the approach that many directors of college gymnasia were following—recording heights and girths, comparing these to “fixed standards of excellence,” and then assigning those men deemed deficient to an exercise regimen aimed at achieving a desired standard. Rather than seeking to achieve “muscular symmetry,” exercise should be directed to “health and vitality.” He also thought that the AAAPE needed to become more involved in the types of work that Hall and his students were doing. The present “pedagogical scheme,” he maintained, neglected the child during
the extremely important developmental years. With the assistance of twenty-five University of Nebraska students, Hastings had taken measurements on 2,500 pupils in the Lincoln and 10,000 pupils in the Omaha public schools. He reported the findings at the Thirty-Eighth Annual Meeting (1899) of the National Education Association. These data, along with his belief that it was the responsibility of every city to insure the promotion of physical education, were more widely circulated in his *Manual for Physical Measurements for Use in Normal Schools, Public and Preparatory Schools, Boys' Clubs, and Young Men's Christian Associations* (1902). Although he acknowledged that gymnastics had value, Hastings believed that more attention should be given to recreational games and sports because these were "typically hygienic and natural" and more attractive to young people.

AAAPE President Edward M. Hartwell, speaking at the organization's 1895 annual meeting, had offered similar observations. The recipient of a Ph.D. in physiology from Johns Hopkins University in 1881, Hartwell had studied with the noted biology professor H. Newell Martin. After earning a medical degree from Cincinnati's Miami Medical College, he returned to Hopkins as associate in physical training and director of the gymnasium. With Hall (who was appointed a lecturer—later professor—in psychology and pedagogy at Johns Hopkins in 1882), he published "Bilateral Asymmetry of Function" in *Mind*. Although Hartwell chose not to pursue a research career, his interest in bringing science to the understanding and teaching of physical education (then often referred to as physical training) was evident in papers like "The Nature of Physical Training, and the Best Means of Securing Its Ends" and "On the Physiology of Exercise." Referring to
Henry H. Donaldson’s study, “Growth in Relation to Training,” he declared: “As students of neuromuscular physiology and its application to physical training we should be interested in knowing the latest teachings of science, with regard to the order and rate of development of the different parts of the brain, sensory and motor.”

Growing Concerns about School Hygiene and the Rise of “Child Study”

In his remarks at the 1895 AAAPE annual meeting, Hartwell acknowledged a “new movement” stating: “[T]he Illinois Society for Child Study . . . is well worth our consideration.” He then referred to George Johnson’s recently published work on the educational value of plays and games, calling it “the best of its kind that has appeared in English.” Johnson’s “Education by Plays and Games,” published in *Pedagogical Seminary*, categorized hundreds of games according to forty-six specifics, such as abdominal muscles, association, endurance, grammar, judgment, oral expression, and perseverance. Games, Johnson held, furnished “a zest and vigor in the exercise of the muscles, never equaled in gymnastics . . . [and] a physical and moral training for children fully equal to the mental.”

The educational potential of “natural” activities, which received attention in limited circles before the Civil War, had been given a new impetus during the 1870s by Pestalozzian ideas introduced by Superintendent of Schools Edward Sheldon in Oswego, New York, the importation of Frederich Froebel’s educational theories, and the creation of a growing number of kindergartens. As the United States became more urban and industrialized during the post-bellum years, concerns about public health intensified. The first effective municipal boards of health were formed, and advances in physiology, pathology, and other fields began to offer new understandings about the origins and spread of disease. The potential health hazards of schools and schooling became the subject of a growing number of articles in medical and sanitarian journals and of addresses at meetings of medical societies, civic reform associations, and the American Public Health Association.

Both school hygiene and physical education began to receive more attention. In 1875 the *New England Journal of Education* published an article titled “Physical Education” in which George B. Emerson urged teachers to pay more attention to training “all the senses and faculties of the body.” An accompanying contribution titled “Exercise” recommended two hours of activity a day. Shortly thereafter the journal published “The Nature of Play and Its Importance as a Means of Education,” which linked active games with the development of “intellectual and moral motives.” The following year Boston neurologist James J. Putnam delivered a paper on the merits of school gymnastics at the annual meeting of the American Social Science Association (ASSA). A graduate of Harvard Medical School, Putman had studied in London under nerve physiologist Hughlings Jackson as well as in Leipzig and Vienna. At the same 1876 meeting David F. Lincoln, secretary of the ASSA’s Department of Health, spoke on the importance of exercise for both health and proper motor development. Respected for his knowledge of nervous diseases, Lincoln (a Harvard Medical School graduate who had studied in Vienna and Berlin) became an active member of the AAUPE, delivering papers at annual meetings and engaging in discussions about the appropriateness of various interpretations of statistical data.

In 1877 the *Boston Medical and Surgical Journal* reported on an “animated debate” that occurred at a recent meeting of the Boston School Committee over the appointment of a medical inspector of schools. Among those who supported such a position was Dr.
E.H. Clark, who stated: “Physical and mental soundness and physical and mental un-
soundness go together.” Physician John Blake pointed to the deleterious influences on
pupils and teachers caused by lack of hygienic considerations in the selection of school
sites, poor school construction, absence of preventive measures against contagious dis-
eases, defects of heating and ventilation, and badly designed desks. Dr. Ezra Palmer coun-
tered with the assertion that because disease did not rise in school but in the home, there
was no need for such an inspector. Bowditch followed, stating that Palmer’s ideas were
“contrary to those of the vast majority of physicians”; abundant evidence now existed that
“complete education must combine both mental and bodily training.”69 In 1880 the
Boston School Committee appointed a special instructor in hygiene.70 By 1913 when the
second edition of Luther Gulick and Leonard Ayers’ Medical Inspection of Schools appeared,
more than 440 cities and towns were conducting school medical examinations.71

During the three decades beginning in the 1880s, a number of changes had occurred
regarding ways that Americans believed school-aged children should be educated. An
important influence for much of this was work done by Hall and his students.72 Hall’s
first, and many contend most famous, article titled “The Contents of Children’s Minds on
Entering School” was modeled upon a similar study that had been conducted in Ger-
many.73 Influenced by Darwin and German biologist Ernst Haeckel’s theory of recapitu-
lation, he rejected “faculty psychology” (the mind consists of distinct faculties, each of
which requires its own training) and believed that human beings passed through a series of
developmental stages. Therefore, it was imperative to gain a thorough knowledge of the
growth of the body and the “brain and soul of the young of the human species” and how
these entities are functionally related.74 Dorothy Ross, one of Hall’s biographer’s, states:
“Muscular function was emphasized by Hall more strongly than any other area of child
activity. In line with his general concern for physical health as the basis of mental well-
being, Hall argued that muscular training was the proper foundation of mental training.”
Nearly half of the chapter on “Growth of Motor Power and Function” in his book Adoles-
cence, Its Psychology and Its Relations to Physiology, Anthropometry, Sociology, Sex, Crime,
Religion, and Education (1904) is devoted to gymnastics, play, games, and sports. Al-
though he was concerned about the excessive competitiveness present in American college
sports, he believed that play and games were more beneficial for children than were formal
gymnastics.75 Not surprisingly, many of his students would study physical and motor
aspects of exercise as well as social and psychological dimensions of play and games.

Among those Hall had brought to the new university were Franz Boas to work in
anthropology and William Burnham, who was made a docent to work on education as it
related to psychology. The stated intent of Burnham’s 1893 Pedagogical Seminary article,
“A Scheme of Classification for Child-Study,” was to provide teachers with relevant infor-
mation. Possibly no less important was a desire to give support to “child-study as a depart-
ment of Pedagogy [that] includes every investigation or observation of children that has
any relation to education.” The article’s second section, “Psychological Studies,” was di-
vided into three parts: The Sensory Field (e.g., hearing, taste, vision); Cognitive, Intellec-
tual Processes (e.g., perception, imagination, reasoning); and The Motor Field, which
included children’s language, their manual labor, their plays, and the development of con-
tral over motor activity.76
John Hancock’s “Preliminary Study of Motor Ability,” published the following year, pointed out that “the enormous difference in ability between the child and the adult, both physically and mentally” had not received sufficient recognition. He then extracted from the few existing studies various tests for teachers to ascertain the motor ability of their pupils. These included but were not limited to tying a string; hopping on each foot; rolling a hoop; skating or turning a somersault; driving a nail. Referring to research conducted by Du Bois Reymond, Hancock declared: “[T]he close relation between muscle, nerve and mind makes it impossible for exercise to affect one alone.” Consequently schools should devote greater attention to physical training.77 “The prime object of measurement and testing children,” according to The Child Study Monthly (founded in 1895 by University of Illinois professor William Krohn, a former student of Hall) was to determine if bodies as well as minds are “in proper condition for school work [and] . . . whether the child has developed at the proper rate.”78

At the same NEA meeting where Hastings had presented his anthropometric studies of Nebraska school children, Will S. Monroe (State Normal School, Westfield, Massachusetts, who would author History of the Pestalozzian Movement in the United States, 1907) reported the results of a study he had made of favorite summer games of 2,000 children. He also commented favorably about a number of articles that had appeared in Pedagogical Seminary, the usefulness of Johnson’s “carefully worked out course of study of games,” and Gymnastic Stories and Plays for Primary Schools (1898) by Rebecca Stoneroad (director of physical training in the schools of Washington, D.C.).79 The 1897-98 Report of the [United States] Commissioner of Education in which Arthur MacDonald’s lengthy “Experimental Study of Children” appeared also contained a 110-page compilation (this, too, by MacDonald) on the subject of “Child Study in the United States.” Included were summaries (with a number of accompanying tables and graphs) of studies of physical growth; youthful degeneracy; hearing; motor ability; children’s drawings; dolls; children’s fears; moral education; the influence of companions, teachers, games; and more.80 J.F. Alleyne Adams’ article in the 1896 Educational Review is illustrative of the many commentaries regarding the value of physical education that appeared at this time. “The adoption of physical training as an essential feature of our public-school system,” Adams stated, “is the new departure which now seems destined to distinguish the educational methods of the twentieth century from those of the nineteenth.”81 Writing for the same publication on the relation of psychology to education, Mary Putnam Jacobi, arguably then the country’s most scientifically prepared female physician,82 observed that although science had demonstrated that “sensible facts are constantly being transformed into mental facts through the energy of human volition,” schools lacked any system for training the senses beyond what is “accorded by the study of music, or by the exercises of the gymnasium.”83 The two ends of exercise, Hartwell told the Boston Medical Improvement Society in 1896, were “the promotion of health” and “the formation of proper habits of action.” He deemed the motor element (“formation of habit”) to be so important that “the systematic study of movements [was] destined to play a much more prominent part than ha[d] been accorded to it hitherto in the professional training of all classes of teachers.”84 D.F. Lincoln in “The Motor Element in Education,” published in the 1897 American Physical Education Review, declared that both gymnastics (the “more pure kinetic” form of
motor activity) and manual training (the more applied form) were essential parts of the child’s education. Each in its own way developed perceptions of physical properties (e.g., weight, momentum, velocity) and were the bases for mental development. Invoking what was given as Du Bois Reymond’s statement that “such bodily exercises as gymnastics, fencing, swimming, riding, dancing, and skating are much more exercises of the central nervous system, of the brain and spinal cord than of the muscular system,” Lincoln maintained that motor activities “should be regarded as constituting a part of a liberal education in the broad sense, equally with the study of geometry or Latin.” Although he considered gymnastics to be valuable, Lincoln was somewhat troubled by their routine nature and joined with others who were beginning to advocate “the partial substitution of games.”

No early leader of American physical education was a more ardent proponent of play and games than Luther Halsey Gulick. In 1898 he described psychological aspects of physical exercise in Popular Science Monthly, dividing the play life of the child into five stages. Whereas the play of early childhood was “individualistic” and “non-competitive,” that of later childhood and adolescence was “competitive” and “socialistic.” Physical education, he maintained, needed to attend more to the types of issues that sociologists were beginning to study. As director of physical training for the public schools of New York City, Gulick would establish in 1903 an extensive after school program of games and sports for boys—the Public Schools Athletic League; two years later he created a similar, but by no means identical, program for girls. In 1906 he became president of the newly formed Playground Association of America. The following year he also became chairman of the Russell Sage Foundation’s Playground Extension Committee (which soon was made part of its Department of Child Hygiene).

Believing that the child’s perspective must be understood, T.R. Croswell and associates queried 2,000 boys and girls in the Worcester, Massachusetts schools about their favorite toys, games, and amusements. The lengthy report contained numerous charts and “curves of relative interest” for pupils ages six through eighteen. Percentiles were calculated and tables were produced for such items as the effects of sex, nationality, locality (e.g., Brooklyn; Westfield, Massachusetts), and number of companions. Of the 700 amusements that the children mentioned (272 were common to both sexes), 100 were sedentary (e.g., cards), 150 were with toys and other objects, and 225 (here boys predominated) were active games and sports. After age nine physical exercises were twice as popular as all other forms of amusement; among boys age sixteen they were four times as popular. Of the several “nationalities” included in the study (e.g., Irish, French, Jewish, American), Swedish children engaged most often in “active physical pursuits.” According to Croswell, the children’s preference for active physical exertion was so conspicuous that the most prominent characteristic of their amusements was “the desire for physical activity.” The development and exercise of skill (an important aspect of competitive games, walking on stilts, and games requiring manual dexterity like marbles) was especially associated with what children saw as “pleasure in physical exercise.”

In his 1893 “A Scheme of Classification for Child-Study” article, Burnham had reported that investigations were done “sometimes for the sake of children, sometimes for the sake of teachers, and sometimes for the sake of science.” However, leading
psychologists soon began to realize that much of the child study research lacked sufficient objectivity. The collection of quantities of data by untrained teachers and other observers was regarded not only as “bad science,” but performing this task tended to distract teachers from their intuitive approach to children and lead them to think that “the ideal ends of education were implicit in scientific findings.” In her summary of developments, Sara Wiltse (an assistant to Hall and one of his kindergarteners) noted criticisms that psychologist Hugo Münsterberg and others were enunciating. (Münsterberg would write in his *Psychology and Life* (1899) that “all this seductive but rude and untrained and untechnical gathering of . . . material means a caricature not an improvement of psychology.”)91 Professors who looked askance, she stated, were of two kinds: “those whose work has shut them within the four walls of a psycho-physical laboratory, and the teachers of the old fashioned philosophy.” Granted every great movement had its “faddists and dilettantes,” child study was so important that she hoped “the people” and “the scholars” might bring together “the university and the kindergarten as never before in their history.”92

In 1902 Earl Barnes (professor of pedagogy at Stanford University, where he had begun studies of children in 1891) reluctantly acknowledged that the number of books and articles had declined since 1897 and that child study societies existed in only New Jersey, Indiana, Pennsylvania, Wisconsin, and Illinois (the most prominent). According to Barnes, the best work had been done in the study of “physical conditions” because these involved more objective measures. He also was of the opinion that “trained physiologists and physicians were better prepared to do such work than were the psychologists and the sociologists.”93 When Hall published *Adolescence*, child study also had been criticized by James Baldwin, William James, and others. By 1911 the movement had come to an end.94 However, interest in measuring and studying the physical, psychological, and social dimensions of childhood continued in other contexts. One of these was physical education, but with few exceptions physical educators did not become involved in psychosocial testing until after World War I.95

**Tests of Motor Efficiency Begin to Replace Anthropometry**

When individuals who identified themselves with the emerging field of physical education spoke of psychological investigations, which they did increasingly beginning in the early 1900s, they usually meant things relating to the nervous system and motor development. George Fitz’s paper, “The Physical Examination of School Children,” given at the 1901 AAAPE annual convention, is representative of this trend. Having stated what he believed was a growing demand for psycho-physical examinations “owing to the fact that experts have reached a point where they can, by correlation of certain tests and measurements, determine the general physical status of the child,” he then set forth twenty-four items for which more data needed to be collected and analyzed (e.g., height, lung capacity, chest strength, endurance, diet, habitual postures).96 At the same meeting both Boas and Beyer spoke on anthropometry; Walter Truslow, M.D., president of the New York Physical Education Society, presented his methods for recording structural deformities of the trunk (scoliosis); James H. McCurdy, M.D., read his paper on “The Effect of Maximum Muscular Effort on Blood-Pressure”; and James A. Babbitt, M.D., reported on sphygmograph tests he had conducted at Haverford College regarding the influence of athletics and
gymnastics on blood corpuscle and hemoglobin count. Psychologist James McKeen Cattell, who also participated, summarized measurements that he, Boas, and Livinston Farrand had taken of freshmen and seniors at Columbia University—these had been augmented by contributions from Watson L. Savage, M.D. (director of the gymnasium) and records of the students’ academic and athletic performance. George Johnson (superintendent of public schools in Andover, Massachusetts) discussed games that his teachers had been using as a safeguard against “over-pressure” for children ages five to fourteen. The topic of Gulick’s paper was “Psychological Aspects of Muscular Exercise.”

Social, economic, and political forces have exerted, and continue to exert, powerful influences upon society and public education. They have affected what types of activities will comprise the curriculum and also what matters will be the focus of research endeavors. In his study of “energy, fatigue, and the origins of modernity,” aptly titled *The Human Motor* (1990), Anson Rabinbach has examined how—and why—nineteenth-century discoveries in science such as the second law of thermodynamics merged with social issues to transform the working body into a model or metaphor of the “universal process by which energy was converted into mechanical work.” In his presidential address titled “Physical Education Past and Present” at the 1903 meeting of the American Physical Education Association (the name the AAAPE had just adopted), Watson L. Savage, M.D., spoke enthusiastically about curricular improvements and the recent appointment of Gulick as the first director of physical training for New York City’s public schools. He was concerned, however, about the continuing shortage of teachers and believed that more efforts were needed to alert the public of the importance of making physical education a part of the curriculum. He also made several references to how industry, mechanization, and urbanization were altering America’s mode of living. Crowded cities were the sites of health and social hazards, and many forms of work required less muscular exertion. However, work as well as city life now placed greater strain upon the nervous system or so it was thought.

Babbitt expressed similar views in pointing out that Columbia University and other institutions of higher learning were adding swimming, fencing, wrestling, and other sports to the gymnastics-centered curriculum. Physical educators, he continued, had been taking far too many anatomical measurements and ignoring “vital examinations.” The Society of College Gymnasium Directors, he noted, recently suggested reducing the emphasis on anthropometric measurements and giving more attention to strength tests. He then referred to valuable experiments that Fitz, McCurdy, and others had conducted on such items as reaction time and vaso-motor responses.

In a 1903 *American Physical Education Review* article titled “Present Tendencies in Physical Examination,” William Hastings summarized changes that had occurred since 1885, when the AAAPE appointed its first committee (Statistics and Measurement). Between 1896 (when the *Review* replaced the *AAAPE Proceedings*) and 1902, the number of articles dealing with anthropometry had declined considerably. But those dealing with psychology had increased from seven to twenty-three, and those involving physiology had risen from seven to twenty. Moreover, sensory or motor tests now were beginning to receive more attention. Two years later, Hastings reported that a recently appointed Anthropometric Committee concluded that taking long lists of measurements “had little
practical bearing upon the estimation of individual vigor,” that examiners were becoming careless, and that anthropometric testing was falling into disrepute in many quarters. Therefore, the committee was working to simplify tests and focus on indicators of “organic vigor.”

Other changes were on the horizon. Concerns about abuses in college athletics, which already had been raised, filtered down to the public schools. Opening his paper on “Athletics,” Dr. George Meylan (director of physical training at Columbia University) observed that this matter had become a growing topic among principals and school officials as well as college presidents. Nearly one-third of the articles in the 1907 American Physical Education Review dealt with matters relating to athletics, while those dealing with anthropometry were conspicuously absent.

Calls for greater physical efficiency, which would benefit the individual and the nation, increased. Meylan underscored these matters in his 1909 American Physical Education Association (APEA) presidential address. No longer would education focus on just the “acquisition of knowledge or even the training of mental faculties,” he argued, “but rather it should seek the development of the efficient man and woman.” The theme chosen by the APEA National Council for the 1913 national convention was “Measurements of Efficiency in Physical Education.” Opening the meeting, Melyan referred to business and industry using “scientific management” to bring about greater efficiency and to educators “experimenting with various tests for measuring educational efficiency.” Arguments that physical education was essential to health and that motor training and mental development were closely allied, he continued, had to be brought into line with these new developments. Consequently, testing at Columbia University now involved such athletic skills and activities as the high jump, rope climb, straddle vault, running, swimming, and wrestling as well as examinations of posture and tests of cardiovascular efficiency. Joseph Raycroft, M.D. (director of the Department of Health and Physical Education at Princeton University), observed that the anatomical measurements and strength tests that had predominated in the 1890s had been “reduced to a working minimum.” Instead, the focus now was on tests of heart function, fatigue, and physical efficiency. What also was needed, he stated, were the contributions of psychologists who could design “workable sets of tests” to measure fundamental abilities such as reaction time, accuracy, and endurance.

“We are living in an age of measuring and testing,” proclaimed Carl Schrader of the Sargent College of Physical Education and later supervisor of physical education for the state of Massachusetts and subsequently president of the APEA. Physical efficiency tests, he asserted, were “the latest issue in public school physical education.” Unfortunately, teachers lacked the knowledge and ability to administer them, and physical education still was not an integral part of the public school curriculum. This predicament, he believed, was due largely to the shortsightedness and “inactivity” of the APEA, which had failed to garner the recognition and support that the Playground Association of America had gathered for the playground movement. The primary purpose of efficiency tests, he maintained, should be to serve as an incentive for further practice. Additionally, rather than adjust the curriculum to the tests, testing should be derived from the subject matter that comprises the curriculum, which should include a wide range of activities. Prevalent
conceptions about anatomical and structural differences between males and females, Schrader believed, were exaggerated; girls should have an equal chance to make the best of their “innate abilities.” The type of efficiency tests currently given to them was “entirely too tame and pedantic.”¹⁰⁷ A variety of means were used to make testing—and participation—more attractive to young people. The most prominent was the Public School Athletic League’s Athletic Badge Test for Boys, initiated by Gulick; climbing, jumping, running, and throwing activities were its four essential elements. The Athletic Badge Test for Girls emphasized balancing, running, and throwing. Attractive badges were awarded for each of three progressively difficult tests.¹⁰⁸

Aware of the growing interest in play and games that had been fostered by the Playground Association of America, more physical educators had begun to give these forms of physical activity attention before the United States entered World War I. The number of men rejected due to a lack of “fitness” intensified the emphasis on physical efficiency testing. During the 1920s these matters combined with a shift that was occurring in education, and placed greater emphasis on social development as well as efficiency testing. Clark Hetherington summarized such tendencies in School Program in Physical Education (1922), stating: “Physical education has come under the sway of social and educational movements that are creating a new conception of it.”¹⁰⁹

Thomas Denison Wood, M.D. (now at Teachers College, Columbia University), opened his aptly titled The New Physical Education: A Program of Naturalized Activities for Education Toward Citizenship (1927) with the observation that education had broadened its scope to embrace the physical and social as well as intellectual and moral needs of pupils. Physical educators, he believed, still had not kept pace with changing educational practice. They were “too narrowly trained” and still concentrated too much on formal exercises. It was time, Wood maintained, to develop a “new physical education” that would give more attention to such things as the child’s psycho-social development.¹¹⁰ That trend soon occurred; however, with some exceptions it was not until the 1940s and 1950s that physical educators would become involved with psycho-social testing.¹¹¹

12 Quoted in ibid., 128.


25As Nicholas Gillham has observed, Galton like Quetelet, with whose work he was familiar, was always "searching for the proper analytical tool to interpret his results." Nicholas Wright Gillham, A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics (Oxford: Oxford University Press, 2001), 158.

26These words appear in a footnote.

27Francis Galton, Inquiries into Human Faculty and Its Development (London: Macmillan and Co., 1883). It is interesting to note that several references are made to "athletic achievements."


29"The Anthropometrical Laboratory," Boston Medical and Surgical Journal 106 (1882): 76.


32Hitchcock replaced John D. Hooker, M.D., who had been appointed to the position in 1860 but resigned the following year because of poor health.

33A good account of Hitchcock’s work may be found in the introductory chapter of the fourth edition of William D. McArdel, Frank I. Katch, and Victor L. Katch, Exercise Physiology: Energy, Nutrition, and Human Performance (Baltimore, Md.: Williams and Wilkins, 1996).

34Edward Hitchcock and H.H. Seeyle, An Anthropometric Manual, Giving the Average and Mean Physical Measurements and Tests of Male College Students and Methods of Securing Them (Amherst, Mass.: J.E. Williams, 1889), 4. Because one of the stated goals of exercise was to develop body symmetry, it may be that this emphasis on anthropometry contributed to the early persistence of gymnastics (systematic movements designed to exercise each part of the body) as the major focus of the curriculum.


36Edward Hitchcock, “Physical Measurements, Fallacies and Errors,” Proceedings of the Third Annual Meeting of the American Association for the Advancement of Physical Education, 1887 (Brooklyn, N.Y.: Rome Brothers, 1887), 35-42. Mere numbers, Hitchcock maintained, could not take into account such human qualities as brightness of eye and quickness of speech.


38Bowditch, “Growth of Children Studied by Galton’s Percentile Grades,” 521. (Bowditch, Galton, Roberts, and Hall all were named early Honorary Members of the AAAPE.)


46William Townsend Porter, “The Growth of St. Louis Children,” Transactions of the Academy of Science of St. Louis 6 (1894): 263-380. Tanner has called this the most important of contemporary American studies.

47The career of MacDonald, (who had been a docent at Clark University) at the Bureau of Education ended in 1902 when he was “fired as a specialist.” Apparently his interest in determining a link between physical appearance and criminality, questionable use of methodologies and interpretation of data, and other matters had brought him into conflict with William Torrey Harris (United States Commissioner of Education) and others. See James B. Gilbert, “Anthropometrics in the U. S. Bureau of Education: The Case of Arthur MacDonald’s ‘Laboratory,’” History of Education Quarterly 17 (1977): 169-195.


51These and several other studies were summarized in Frederic Burk, “From Fundamental to Accessory in the Development of the Nervous System and of Movements,” Pedagogical Seminary 6 (1898): 5-64.

52Pedagogical Seminary 6 (1898): 541-589.


“Reports Presented Before the Section on Literature and Bibliography,” *Report of the Tenth Annual Meeting of the American Association for the Advancement of Physical Education* (Concord, N.H.: Republican Press Association), 41-49. (Hartwell is cited as the person giving the Report.) In 1897 Hartwell left his position as director of physical training for the Boston Public Schools to become secretary of that city’s new Department of Municipal Statistics. See Gerber, *Innovators and Institutions*, 319-324.

Cited in Ross, *G. Stanley Hall*, 154-155. Ross notes that Hartwell was one of four students who engaged in “psychological observation and experiment” in the laboratory that Hall created in 1883. (The others were James McKeen Cattell, Joseph Jastrow, and John Dewey.) What is meant by the term “student” is not entirely clear as Hartwell was a faculty colleague. G. Stanley Hall and Edward M. Hartwell, “Bilateral Asymmetry of Function” *Mind: A Quarterly Review of Psychology and Philosophy* 9 (1884): 93-109.


“Reports Presented Before the Section on Literature and Bibliography,” 42. Donaldson, who would become a noted neurologist, had collaborated with Hall on “Motor Sensations of the Skin,” published in *Mind* in 1885, while he was an advanced student of nerve physiology at Hopkins. See also Edward M. Hartwell, “Preliminary Report on Anthropometry in the United States,” *Publications of the American Statistical Association* 3 (1893): 554-568.

“Reports Presented Before the Section on Literature and Bibliography,” 43.


“Special Instructor in Hygiene in the Public Schools of Boston,” *Boston Medical and Surgical Journal* 102 (1880): 521.


Zenderland, Measuring Minds, 46.

Ibid., 28-30; Ross, G. Stanley Hall, chaps. 10, 12 and passim


Burnham, “A Scheme of Classification for Child Study.”

Hancock, “Preliminary Study of Motor Ability,” 21-22.


See, for example, Regina Markell Morantz-Sanchez, Sympathy and Science: Women Physicians in American Medicine (New York: Oxford University Press, 1985).


Ibid.

Luther H. Gulick, “Some Psychical Aspects of Physical Exercise,” Popular Science Monthly 52 (1898): 793-808. T.R. Croswell, who was conducting his own investigations, called this “a very careful study.”

Gerber, Innovators and Institutions, 348-356. Believing that girls had evolved differently than boys, when Gulick started a Girls’ Branch of the New York Public School Athletic League in 1905, he made folk dancing the focus.


Cited in Ross, G. Stanley Hall, 341-342.


Cited in Ross, G. Stanley Hall, 340-342. According to Ida B. De Pencier, The History of the Laboratory Schools: The University of Chicago, 1896-1965 (Chicago: Quadrangle Books, 1967), although physical activities had been an important part of the laboratory school that John Dewey began in Chicago in the 1890s, it was not until the arrival of Charles Judd as the head of the university’s Department of Education in 1909 that a “fever of testing and experimentation” began (chaps. 2 and 5).

Two of the more influential publications that reflect this trend are Clark W. Hetherington, School Program in Physical Education (Yonkers-on-Hudson, N.Y.: World Book Co., 1922) and Thomas D.


