"How about Some Muscle?": C. H. McCloy and Strength Training Research at the University of Iowa, 1940–1959

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IN THE FALL of 1943 the University of Iowa campus was home to one of the best football teams in the nation.[1] Yet it was not the Iowa Hawkeyes who nearly won the championship that season; instead, the runners-up for 1943 were the Seahawks of the navy preflight program.[2] In the midst of the Seahawks' run to the top of the college football rankings, several graduate students from the physical education program at the University of Iowa sought the opinion of one of their instructors on the training practices of the cadets. Specifically, the students had noticed that the cadets trained with barbells and dumbbells as part of their daily conditioning. Lifting weights, they had been told, was bad for athletes, so would the football players not be better off if they skipped weight training?[3] The professor whose insight the students sought was Charles Harold (C. H.) McCloy, by then nearing his fortieth year in physical education and an eminent figure in the field. For his part, McCloy was familiar

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1. Victor Mather, "The Best College Football Team You've Probably Never Heard Of," *New York Times*, 8/21/2017, B9.

2. "Notre Dame Heads Final Football Poll," *New York Times*, 12/1/1943, 29.

3. C. H. McCloy, "Weight Training for Athletes?" *Strength & Health*, July 1955, 8–11, 39–40, 44.

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with the opinion that weight training would hamper athletic performance, but since he had never done any specific investigation in that area, he could not answer their question with any certainty. McCloy assured the students that he would look into the matter, though.

C. H. McCloy was an enormously influential figure in the field of physical education in the first half of the twentieth century. His work was lauded with numerous awards, fellowships, and honorary doctorates.[4] In addition, his impact on the field of physical education has been discussed in one full-length dissertation and a handful of journal articles.[5] The focus of those works, however, was on his influence over some of the main areas of his writing and research, including the philosophy of physical education, assessment of physical capacity, and mechanical analysis of sport skills. McCloy's role in the acceptance of weight training as a beneficial and important adjunct to sport performance has been underappreciated, with only brief mentions in the academic literature.[6] This article seeks to correct that oversight.

Through the middle of the twentieth century, coaches advised and sometimes threatened their athletes to avoid weight training, fearing that it would make them slow and "muscle bound."[7] In the twenty-first century, specialized strength and conditioning coaches are hired to supervise strength programs for athletes on

4. "In Memoriam: C. H. McCloy," *Journal of Health, Physical Education, and Recreation* 30, no. 8 (1959), 79; Louis E. Alley, Paul W. Brechler, and Arthur J. Wendler, "In Memoriam, Charles Harold McCloy (March 30, 1886–September 18, 1959)," typed manuscript, folder 1, box 6, Charles H. McCloy Papers, University of Iowa Archives, University of Iowa Libraries, Iowa City.

5. James Robert Little, "Charles Harold McCloy: His Contributions to Physical Education" (Ph.D. diss., University of Michigan, 1969); Little, "Charles Harold McCloy and Physical Education—Dr. McCloy's Early Life," Proceedings of the Sixty Eighth Annual Meeting of the National College Physical Education Association for Men, January 7, 1965, 30–33; Eleanor B. English, "Charles H. McCloy: The Research Professor of Physical Education," *Journal of Physical Education, Recreation, and Dance* 54, no. 4 (1983), 16–18; Eleanor B. English, "The Enigma of Charles H. McCloy," *Journal of Physical Education, Recreation, and Dance* 54, no. 5 (1983), 40–42.

6. Terry Todd, "A Pioneer of Physical Training: C. H. McCloy," *Iron Game History* 1, no. 6 (1991), 1–2; Little, "Charles Harold McCloy: His Contributions," 133–35, 173–75.

7. Terry Todd and Jan Todd, "Pioneers of Strength Research: The Legacy of Dr. Richard A. Berger," *Journal of Strength and Conditioning Research* 15 (2001), 275.

high school, collegiate, and professional teams across the country. For the contemporary athlete, strength training is no longer ill-advised; rather, it is required. Few people are as responsible for hastening this seismic shift in the perception of weight training as C. H. McCloy, who, while working as a research professor at the University of Iowa, encouraged, supervised, and promoted some of the earliest scientific investigations into the effects of strength training on athletic performance.

McCloy's Early Years

C. H. McCloy was born on March 30, 1886, in Marietta, Ohio, the only son of William Alexander and Emma Langley McCloy. His father worked for the Bellaire, Zanesville, and Cincinnati Railroad as a telegrapher and station agent. Two years after young "Harold" was born, his father was transferred to rural western North Dakota. The family took up residence in Dickinson, North Dakota, where William also bought a share of a hardware store. In 1894 William died unexpectedly at the age of 32, leaving Emma to run the hardware store and the young McCloy to look after himself most of the time. As a boy, and continuing throughout his life, McCloy was relatively thin. As children are wont to do, his classmates seized on his undersized stature and teased him with nicknames that included "skinny," "slivers," "pipestems," and "spindleshanks."[8]

The jeers inspired in McCloy a desire, common among many adolescent boys, to be stronger and more muscular. To remedy the situation, McCloy purchased *The Athlete's Guide*, a small textbook on track and field, during a trip to Saint Paul, Minnesota, when he was 12. Published by A. G. Spalding, the book was a series of descriptions of events as well as methods of training for them, all of which were written by top athletes of the day. In the chapter on distance running, the author claimed that the exercise would build up the legs, so McCloy set off running in the hills of western North Dakota, working up to three miles per run, several times weekly. McCloy trained for the other events as well, throwing a five-pound rock as his shot put and

8. Little, "Charles Harold McCloy: His Contributions," 3–5; C. H. McCloy, "A Half Century of Physical Education," *Physical Educator* 17, no. 3 (1960), 83.

even setting up standards for a rudimentary pole vault and broad jump pit.[9]

On another trip to the Twin Cities two years later, McCloy purchased a copy of Bernarr Macfadden's *Physical Culture* magazine. While Macfadden's magazine advocated strength training, he warned specifically about the dangers of heavy lifting, arguing that such training was "of no value to a man who desires simply superabundant health."[10] Nonetheless, *Physical Culture* featured articles describing the use of light weights, bodyweight, chairs, and stools for resistance. The magazine even drew some connections between muscular strength and sport performance, arguing that a program that included light strength training had helped Babe Ruth turn his career around. After reading his first copy, McCloy quickly subscribed to the magazine. Through his mother's wholesale ordering at the hardware store he was able to obtain dumbbells, Indian clubs, boxing gloves, and a punching bag. In his attic, he installed a trapeze bar and a pair of flying rings. Following the programs in the pages of *Physical Culture*, McCloy began to train. By the age of 15, he had decided that he wanted to pursue a career in physical education.[11]

The decision led McCloy to move back to Marietta, Ohio, where he lived with his grandmother so that he would have more opportunities to participate in sports. As a high school student at Marietta Academy, and again after he enrolled at Marietta College, McCloy was a member and captain of the track team.[12] Near the end of his first year of college, the physical education teacher resigned to pursue graduate work, leaving a vacancy on the faculty. Although only 19 at the time, McCloy applied for the position, requesting a salary of $150 annually. The proposed compensation was chosen because it was the amount McCloy would need for tuition, a train ticket, and

9. McCloy, "Half Century"; C. H. McCloy, "The Day I Became a Man," typed manuscript, folder 3, box 10, McCloy Papers.

10. McCloy, "Half Century"; McCloy, "The Day I Became a Man"; Kimberly Beckwith, "Building Strength: Alan Calvert, The Milo Bar-Bell Company, and the Modernization of American Weight Training" (Ph.D. diss., University of Texas–Austin, 2006), 116–17 (quotation).

11. McCloy, "Half Century," 83.

12. Little, "Charles Harold McCloy: His Contributions," 9–11.

room and board at Dudley Sargent's summer physical education program at Harvard University, one of the few programs for physical educator certification available at the time.[13] College officials were hesitant to employ a current student as an instructor, but they ultimately did so, marking McCloy's first year as a physical educator in 1905.[14] After completing Harvard's summer sessions in 1905, 1906, and 1907, McCloy was awarded a certificate in physical education. The prior spring, he had also completed his bachelor's degree, with honors, in only three years. With a degree and certificate in hand, he accepted his first position as director of physical education at Yankton College in southeastern South Dakota.[15]

At Yankton, McCloy not only oversaw physical education but also filled in as an instructor of biology during another instructor's absence, coached four sports, and helped direct the band. As a coach, the energetic McCloy was an innovator, capitalizing on his coursework at Harvard to bring the most current sporting strategies to the rural college. In addition to strategy, McCloy also put his football team through rigorous exercises, leading the school paper to observe that McCloy's employment of physical culture was "a close second to the value of his coaching." In spite of his herculean efforts in the classroom and on the playing fields, McCloy was not renewed for the 1908–9 school year, perhaps because, during a faculty meeting, McCloy had called the university president "a damned fool" for siding with another faculty member during a dispute.[16]

Following his dismissal, McCloy worked for the YMCA in various capacities and locales between 1910 and 1930, including Virginia, China, and New York City. In 1910 he completed his

13. Walter Kroll, *Perspectives in Physical Education* (New York, 1971), 29–44.

14. McCloy wrote that he was paid his first year as a janitor of the gymnasium, which allowed him to keep his amateur status and continue to compete in track. His second year he was given a raise to $200, which, in his telling, made him a professional and thus ended his competitive collegiate career, although he continued to coach. McCloy, "Half Century," 84; Jack Raskopf, "Ambassador for Physical Education," *Staff [of State University of Iowa] Magazine*, Summer 1955, 25–29, folder 2, box 10, McCloy Papers.

15. Little, "Charles Harold McCloy: His Contributions," 18, 23.

16. Ibid., 24-32.

C. H. McCloy, ca. 1913, when he was serving as a YMCA physical director in China. Courtesy of the University of Minnesota.

master's degree, with specializations in the psychology of adolescence and human physiology, in absentia from Marietta College. While serving as the YMCA's secretary for research in physical education in New York City, McCloy enrolled at Columbia University to pursue a Ph.D. degree in physical education. In 1930, before completing his doctorate, McCloy was offered a position as research professor of anthropometry and physical education at the University of Iowa.[17]

Although he would not assume the role for which he is best known until he was 44, McCloy had written widely prior to that time and would continue to do so after joining the faculty at Iowa. In his writing and in his teaching McCloy was particularly critical of the movement in physical education to minimize

17. Little, "Charles Harold McCloy: His Contributions," 97–105.

physical training in favor of a heavy emphasis on sports.[18] The early years of McCloy's career coincided with the decline of summer certification programs, like the one at Harvard, which were supervised by physicians. In their place emerged more formal college programs, a majority of which were run by individuals with a coaching background.[19] Writing in 1934, McCloy lamented that in the prior decade "muscular development became somewhat unfashionable," giving way to games.[20]

To McCloy, being sufficiently strong was a duty both to oneself and to society more generally. He charged that training had become passé because people found it to be boring and because it was easier to train teachers to simply roll out a ball and act as a referee than to instruct students through an exercise program. In 1936 he asked his fellow physical educators, "How about some muscle?" arguing that physical education had forgotten its exercise roots, instead focusing on athletics and character development. He credited the training of his youth and the style of training that he learned at Harvard with developing sufficient strength that an individual could do productive work without "undue fatigue."[21]

This was an idea McCloy would advance repeatedly. He advocated what we might call "functional strength" in that an individual was strong enough that they could perform their job, their studies, or anything else they might be required to do without being limited by their physical capacity.[22] Carrying the idea further—and echoing *Physical Culture* publisher Bernarr Macfadden, whose tagline was "weakness is a crime, don't be a

18. C. H. McCloy, "The Place of Physical Training in Colleges," *Marietta College Olio* 35, no. 4 (1907), 49–51, folder 3, box 11, McCloy Papers.

19. Kroll, *Perspectives in Physical Education*, 43–44.

20. C. H. McCloy, "A New Deal in Physical Education," *Research Quarterly* 5, no. 4 (1934), 60–71.

21. C. H McCloy, "How about Some Muscle?" *Journal of Health and Physical Education* 7, no. 5 (1936), 302–3, 355.

22. See, for example, C. H. McCloy, "An Adventure in Human Engineering," *Midland Schools*, December 1945, 88, 105, folder 2, box 10, McCloy Papers; C. H. McCloy, "The Child's Physical Characteristics," *Nineteenth Yearbook of The National Elementary Principal*, July 1940, 260–72, folder 3, box 10, McCloy Papers; McCloy, "Half Century," 88.

criminal"—McCloy asserted that "the over-weak relatively seldom do the constructive work of the world."[23]

McCloy's consistent emphasis on the importance of physical training drew criticism from other physical educators who saw his philosophy as limited.[24] It should be noted, however, that the narrow view may well have been the one taken by McCloy's critics. Throughout his career, McCloy emphasized that physical education developed not only the body but the mind and character as well.[25] Thus, while McCloy advocated physical training throughout his career, he was no pessimist about physical education's utility in developing qualities that were less quantifiable than muscular strength.[26]

In addition to his consistent support for physical training, McCloy was also unswerving in his calls for research in physical education. While still working toward his Ph.D., which he completed in 1932, McCloy authored a series of articles in the *Journal of Physical Education* instructing educators on research techniques.[27] He also kept and published lists of important areas of inquiry.[28] Looking back on his career in the mid-1950s,

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23. C. H. McCloy, "Forgotten Objectives in Physical Education," *Physical Education, Health and Recreation Digest* 4, no. 2 (1937), 4.

24. English, "The Enigma of Charles H. McCloy"; Delbert Oberteuffer, "An Open Letter to Mr. Schrader and Mr. McCloy," *Journal of Health and Physical Education* 14 (1943), 310–11; Delbert Oberteuffer, "In Response to C. H. McCloy," *Physical Educator* 10 (1953), 72; Jesse F. Williams, "A Reply to Dr. McCloy," *Physical Educator* 10 (1953), 71.

25. McCloy, "The Place of Physical Training in Colleges"; McCloy, "A New Deal"; C. H. McCloy, "Character Building through Physical Education," *Research Quarterly* 1, no. 3 (1930), 41–61; C. H. McCloy, "The Case for Physical Education," *Journal of Health and Physical Education* 4, no. 4 (1933), 3–6, 62–63.

26. McCloy repeated his arguments about the educational value of physical education in *Philosophical Bases for Physical Education* (New York, 1940), a collection of his philosophical articles reprinted from the professional journals *Journal of Health, Physical Education, and Recreation*; *Journal of Physical Education*; and *Chinese Journal of Health and Physical Education*.

27. C. H. McCloy, "Techniques of Research in Physical Education," *Journal of Physical Education*, March 1931, 130–35; April 1931, 151–58; May 1931, 168–73; and June 1931, 190–94.

28. Included in his papers is an undated 22-page list of potential graduate research topics. C. H. McCloy, "Some Unexplored Areas for Research," *Research Quarterly* 10, no. 4 (1939), 3–10; C. H. McCloy, "Suggested Thesis Topics," n.d., folder 11, box 6, McCloy Papers.

McCloy was critical of how frequently opinions without facts had become gospel in the field. Many of the principles guiding physical education practice, according to McCloy, were nothing more than the "average opinions of people who don't know, but who are all anxious to contribute their averaged ignorance to form a consensus of uninformed dogma."[29]

The Beginning of Strength Research at the University of Iowa

The graduate students at Iowa who sought McCloy's opinion on the effect of weight training on athletic performance had thus chosen to ask one of the most fitting people in the field. At age 57, McCloy had spent his career calling for more research in a variety of areas related to physical education. He was always loath to accept conventional wisdom and had been a proponent of strength training since he was an adolescent. In addition, McCloy had been an avid exerciser throughout his life, regularly participating in handball, tennis, or badminton with colleagues. In keeping with his introduction to physical culture, however, McCloy's workouts emphasized gymnastic movements and some calisthenics. Fellow faculty at Iowa recalled that, regardless of what he was doing, he would stop each day at 3:30, have a cup of tea, and then begin his workout promptly at 4:00. The consistency kept McCloy in good condition; he kept his weight reliably around 145 pounds on a 5'8" frame.[30]

By the time the Iowa students asked his opinion, McCloy had an inkling that the notion of a muscle-bound condition might be unfounded. In an article published nearly a decade earlier, McCloy had observed that it was likely that "the development of the strength of the upper limbs would improve the performance of any type of athlete."[31] Similarly, he had observed in 1937 that "adequate muscular strength" was "a prerequisite to superior performance in any form of sports."[32] Yet

29. McCloy, "Half Century," 91.

30. Little, "Charles Harold McCloy: His Contributions," 171.

31. C. H. McCloy, "The Apparent Importance of Arm Strength in Athletics," *Research Quarterly* 5, no. 1 (1934), 3–11.

32. C. H. McCloy, "Forgotten Objectives in Physical Education," *Journal of Health and Physical Education* 8, no. 8 (1937), 458–61 (quotation), 512–13.

when McCloy specifically advocated lifting and throwing "heavy" weights, he was referring more to overweight implements and gymnastic-style training, not training with barbells and near maximal poundages. When considering how to develop strength, McCloy largely had gymnastic-based training in mind.

In keeping with his long-standing professional practice, McCloy first attempted to review the literature on the matter but found "almost nothing," particularly as it pertained to the combination of strength training and athletics.[33] With literature on the subject essentially nonexistent, McCloy determined that a study of the issue was in order. On the chance that conventional wisdom might be right, he elected not to use any active athletes as subjects in his initial trial. Instead, as many scientists have done, he and colleague Arthur Wendler chose to experiment upon themselves. Since he was 57 years old at the time and more than a decade removed from any sort of competitive athletics, McCloy reasoned that it would not be an issue if barbell training did result in his becoming slow and muscle-bound. McCloy found, however, that after the training he was stronger than he had been more than three decades earlier, in his mid-twenties, and he was no slower after the weight program than when he had begun.[34]

Given that a major source of inspiration for McCloy's early training was *Physical Culture* magazine, he was no stranger to that genre of publications. In the middle decades of the twentieth century, the most widely circulated of those magazines was *Strength & Health*, published by Bob Hoffman. Hoffman owned the York Barbell Company and used the magazine to promote his products, but he was a true believer in the power of weight training to improve one's health, life, and athletic performance.[35] From the first issue of the magazine in 1932, Hoffman continually pounded the drum for weight training as a means to improve athletic performance. He would tell anyone who would listen that barbells were the key to "improve at your

33. McCloy, "Weight Training for Athletes?" 8.

34. Ibid.; Louis E. Alley, "Barbells on Campus: State University of Iowa," *Strength & Health*, June 1960, 24–25, 52.

35. John Fair, *Muscletown USA: Bob Hoffman and the Manly Culture of York Barbell* (University Park, PA, 1999).

chosen sport" and was glad to hit the road with members of the York and Olympic weightlifting teams to give demonstrations of what weights could do.[36]

Shortly after taking up barbell training, McCloy was able to test the power and flexibility of four of those weightlifting national champions himself in 1944.[37] "Not only were they not slow and inflexible," McCloy would later write, "but they were fast enough in a vertical jump to be within the top ten percent of track athletes and they were much more flexible in their movements than the vast majority of athletes with whom the author has worked."[38] Paired with his own strength improvements following barbell training, the observations of competitive weightlifters convinced McCloy that further study of the matter was warranted.

By 1945, McCloy advocated barbell training for physical education programs. Pointing to the recently coined "overload principle," which posits that physiological systems only adapt if forced to work beyond the intensity to which they are accustomed, McCloy argued that calisthenics were insufficient to really develop strength. Improvement of muscular strength, he observed, required lifting greater amounts of weight, with barbell training being one modality to accomplish that goal.[39] As he and Arthur Wendler worked to develop their own strength after the war, they were joined in their workouts by some physical education graduate students, including Edward Chui and Edward Capen. McCloy encouraged his new lifting partners to research the effect of weight training on athletic performance as their thesis projects.[40]

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36. Bob Hoffman, "How to Improve at Your Chosen Sport," *Strength & Health*, December 1932, 6–8.

37. C. H McCloy, "The Development of Strength by Progressive Resistance Exercises and its Relationship to the Improvement of Athletic Ability in Sports and Track and Field Athletes," n.d., typed manuscript, folder 3, box 10, McCloy Papers; C. H. McCloy, "Weight Training Routine for All-around Athletes," n.d., typed manuscript, folder 1, box 12, McCloy Papers.

38. McCloy, "Weight Training Routine."

39. C. H. McCloy, "Adequate Overload," *Journal of Physical Education* 42, no. 4 (March–April 1945), 69.

40. Alley, "Barbells on Campus," 24.

In the late 1940s, Chui put a group of 23 untrained young men through a series of barbell exercises two to three times weekly as research for his master's thesis. The experimental group was compared to a control group of 22 young men who performed the calisthenics and other activities of the required physical education program at Iowa. At the end of the three-month study period, the weight-trained group, on average, increased their vertical and broad jumps by nearly twice as much as the control, saw greater improvements in their shot putting ability, and ran faster in a 60-yard dash. The study was published two years later in the *Research Quarterly,* the journal of the American Association for Health, Physical Education, and Recreation (AAHPER). In the article's introduction Chui, a former Hawkeye football player whose career was cut short by injury, specifically mentioned the pervasive fear of the muscle-bound condition. "Very frequently," he wrote, "in the classroom, on the gymnasium floor, and on the athletic field, the term 'weight training' is associated with 'muscle-boundness.'" Chui went on to note that "no scientific evidence, however, has been advanced to support these beliefs." Quite the contrary, his work appeared to demonstrate that the opposite was true: weight training not only did not slow an athlete down but might actually enable them to run faster and jump higher.[41]

Like Chui, Edward Capen referenced the pervasive notion of the muscle-bound condition in the introduction to his work. He further noted Bob Hoffman's claims that weight training could bestow a host of benefits, including for athletic performance. Neither side, however, had scientific evidence on which to stand. In an experiment with a design similar to Chui's, Capen studied two groups of young men: one trained with barbells and dumbbells twice weekly while the other performed calisthenic and gymnastic exercises and running. Both trained for 11 weeks as part of a class and were ultimately tested for strength, muscular and cardiovascular endurance, and muscular power. At the study's conclusion, the weight-trained group

41. Edward C. Chui, "The Effect of Systematic Weight Training on Athletic Power" (M.A. thesis, University of Iowa, 1948); Chui, "The Effect of Systematic Weight Training on Athletic Power," *Research Quarterly* 21, no. 3 (1950), 188–94; "Chui's Many Roles at UH included AD," *Honolulu Advertiser*, 11/19/2003.

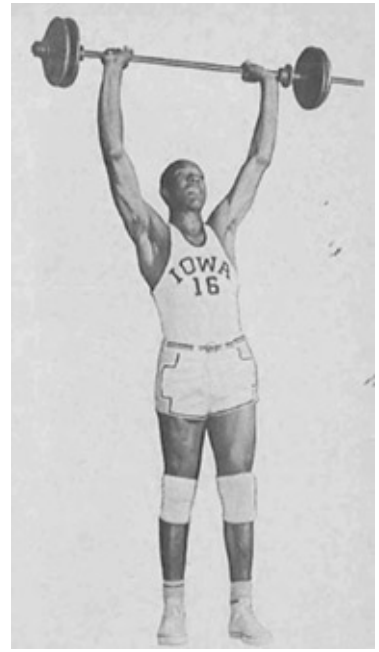
showed greater improvements in strength and muscular power. Based on the results, Capen concluded that weight training "does not result in muscular tightness and a decrease of speed of muscular contraction, as is commonly assumed." As with Chui's work, Capen's research was published in *Research Quarterly* in 1950.[42]

Following the promising results of the work of Chui and Capen, another Iowa graduate student, Richard Garth, was able to study the effects of weight training on Hawkeye men's varsity basketball players.[43] In collaboration with McCloy, Arthur Wendler, and another professor in the department, Frank Sills, Garth devised a program with an eye toward increasing the vertical

42. Edward Capen, "The Effect of Systematic Weight Training on Power, Strength, and Endurance," *Research Quarterly* 21, no. 2 (1950), 83–93. The year before, Bernard Walters's 1949 master's thesis compared the effects of performing a set of 10–12 repetitions or a set of 20–22 repetitions on muscular strength and endurance. Walters found that the lower repetition and higher intensity program was more effective at producing both muscular strength and endurance. Bernard Ross Walters, "The Relative Effectiveness of High and Low Repetitions in Weight Training Exercises on Strength and Endurance of the Arms" (M.S. thesis, University of Iowa, 1949). Clayton Henry experimented with Thomas DeLorme's recently coined "Progressive Resistance Exercise" (PRE) program. Clayton G. Henry, "Comparison of the Effectiveness of Two Methods of Exercise for the Development of Muscular Strength" (M.S. thesis, University of Iowa, 1949). A pioneer in his own right, DeLorme had applied relatively high-intensity strength-training exercises to soldiers recovering from a variety of service-related orthopedic injuries in the mid-1940s. Thomas L. DeLorme and Arthur L. Watkins, "Technics of Progressive Resistance Exercise," *Archives of Physical Medicine and Rehabilitation* 29, no. 5 (1948), 263–73; Thomas L. DeLorme, "Restoration of Muscle Power by Heavy Resistance Exercises," *Journal of Bone and Joint Surgery* 27, no. 4 (1945), 645–67; Thomas L. DeLorme, "Heavy Resistance Exercises," *Archives of Physical Medicine* 27, no. 10 (1946), 607–30. For more about the contributions of Thomas DeLorme to strength training for sport performance, see Jan Todd, Jason Shurley, and Terry Todd, "Thomas L. DeLorme and the Science of Progressive Resistance Exercise," *Journal of Strength and Conditioning Research* 26, no. 11 (2012), 2913–23. Everett Faulkner tested the effects of altering the order of the sets in the PRE program, while William Teufel compared the original to a program with additional sets. Everett W. Faulkner, "A Comparison of the Effectiveness of Two Methods of Exercise for the Development of Muscular Strength" (M.S. thesis, University of Iowa, 1949); William F. Teufel, "A Comparison of the Effectiveness of Two Methods of Exercise for the Development of Muscular Strength" (M.S. thesis, University of Iowa, 1952).

43. Richard L. Garth, "A Study of the Effect of Weight Training on the Jumping Ability of Basketball Players" (M.S. thesis, University of Iowa, 1954).

jumping ability of the cagers.[44] The initial program consisted of six weeks of weight training implemented in the lead-up to the 1953–54 season. Headed into that fall, the Hawkeyes were coming off a disappointing 12–10 season, the second for coach Frank "Bucky" O'Connor and a significant downturn after his successful first year.[45] Following encouraging improvements in the players' vertical jumping ability, the program was continued beyond the original six-week protocol. After a year of weight training, the players increased their vertical jump by an average of 2.7 inches, with one player, Bill Logan, adding 5 inches to his jump.[46] O'Connor was pleased with the results, noting that the weight work "made them stronger for the rugged work under the baskets."[47] The players' increased strength and power were also evident on the scoreboard as the Hawkeyes finished the 1954 season with a record of 17–5, earning them second place in the Big Ten conference. Weight training continued into the 1954–55 season as the Iowa squad built on its initial success



Hawkeye basketball forward McKinley "Deacon" Davis performs an overhead press as part of a pre-season weight training program in the early 1950s. Photo courtesy of York Barbell Company.

44. C. H. McCloy, "Weight Training Routine Used by State University of Iowa Basketball Team in the Training Season Preceding the Competitive Schedule in 1954," *Journal of Physical Education* 53, no. 2 (November–December 1955), 50.

45. "Iowa Basketball Yearly Record," *2011–2012 University of Iowa Men's Basketball Media Guide*, 196, http://grfx.cstv.com/photos/schools/iowa/sports/m-baskbl/auto_pdf/2011-12/misc_non_event/mediaguide-12.pdf.

46. McCloy, "Weight Training for Athletes?" 9.

47. Ibid., 8.

Bill Schoof performing an exercise to strengthen the calf muscles. Photo courtesy of York Barbell Company.

making the school's first-ever trip to the Final Four, winning its first outright Big Ten conference championship, and becoming the first team in school history to average more than 80 points per game. The following year, the "Fabulous Five" and the rest of the Hawkeyes repeated as conference champions, losing in the national championship game to San Francisco.[48]

Beyond the basketball court, McCloy mentioned working with soccer players and swimmers as early as 1945, though he did not specifically mention weight training.[49] Track and field coach George Bresnahan and swimming coach David Armbruster both recalled that McCloy encouraged them to incorporate weight training for their athletes well before it was accepted practice.[50] Otto Vogel, coach of the Hawkeye baseball team (1925–1942 and 1946–1962) claimed that McCloy and Wendler were the "first to experiment with systematic weight training for baseball players."[51] Prior to the 1947 season, Wendler supervised six weeks of training for the team. According to Vogel, the athletes were stronger and had improved endurance after the program, though no details were provided. In 1955 Wendler supervised a weight-training intervention with the team, utilizing an experimental

48. "Iowa Final Four Teams," *2011–2012 University of Iowa Men's Basketball Media Guide*, 160.

49. McCloy, "Adequate Overload," 69.

50. Little, "Charles Harold McCloy: His Contributions," 174.

51. Otto Vogel, "Weight Training Programs for Selected Sports: Baseball," in *Weight Training in Sports and Physical Education*, ed. Frank D. Sills, Laurence E. Morehouse, and Thomas L. DeLorme (Washington, DC, 1962), 59–60; "Year by Year Team Records," 2017 *University of Iowa Baseball Media Guide*, 76, https://hawkeyesports.com/documents/2017/2/15//2017_Iowa_Baseball_Media_Guide_web.pdf?id=13284.

group that trained with weights and a control group that did not. Both groups went through typical baseball practice, while the weight training group also performed a series of five upper body and abdominal strength exercises. At the end of the 12 weeks, the control group had increased their throwing velocity 6.2 percent, while the weight-trained players more than doubled that, increasing their velocity by an average of 13.7 percent.[52]

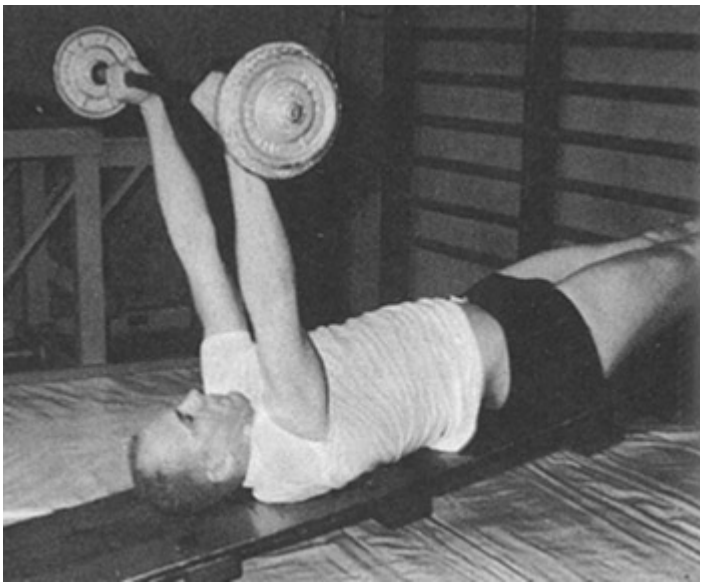
In 1953 master's student Elden Keller put eight adolescent high jumpers through an 11-week program that combined jumping and weight training. By the conclusion of the intervention, the boys had improved their jumping ability an average of 3.38 inches and increased their strength nearly 18 percent. Doctoral student Jack Davis put 17 college-age males with competitive swimming experience through an 8-week program of weight training three times weekly. After the intervention, the swimmers decreased their time in the 25-yard dash by an average of .57 seconds and in the 50-yard dash by 1.08 seconds. Davis published his findings in *Physical Educator* in 1955, writing that the study had been undertaken because of the pervasive belief among swimmers and coaches that weight training "is detrimental to speed in swimming."[53]

"Barbells on Campus": The Proliferation of Barbell Training in the Mid-Twentieth Century

The postwar years were fertile ground for the spread of weight training despite many coaches' hesitation to take up barbells. Following passage of the Servicemen's Readjustment Act in 1944, more commonly known as the G.I. Bill, millions of former servicemen enrolled in colleges across the country. By 1947, veterans, including Edward Capen, made up 49 percent of college admissions, and by 1956 nearly 8 million of the 16 million World War II

52. Vogel, "Weight Training Programs," 60.

53. Elden Keller, "A Study of the Relationship of Strength and Weight to Ability in Running Jump Height" (M.A. thesis, University of Iowa, 1953); Jack Farr Davis, "The Effect of Weight Training on Speed in the Swimming Crawl Stroke" (Ph.D. diss, University of Iowa, 1951); Davis, "The Effect of Weight Training on Speed in Swimming," *Physical Educator* 12, no. 1 (1955), 28–29 (quotation).



University of Iowa medley, butterfly, and breast stroke swimmer Charles Mitchell performs straight-arm pullovers to train for his events in the late 1950s. Photo courtesy of York Barbell Company.

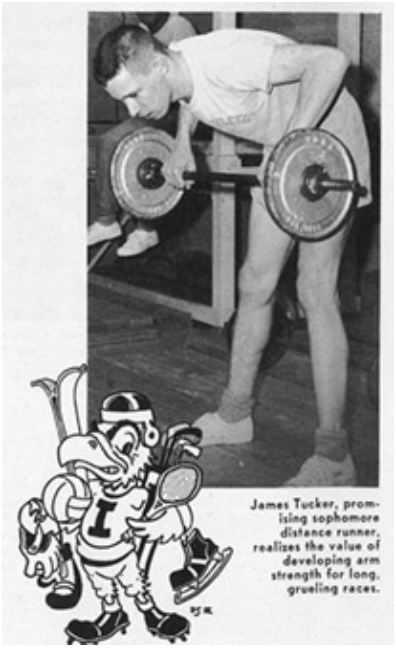
veterans had attended college or occupational programs.[54] Many of those veterans had been exposed to strength training during the war and were eager to continue the activity as they began their undergraduate careers.[55]

Additionally, interest in all forms of sport increased beginning in the late 1940s. Rule changes during the war had allowed college football teams to substitute freely rather than requiring players to play both offense and defense. The rule change facilitated an expansion of rosters and specialization of players, which resulted in significant changes in how the game was

54. U.S. Department of Veterans' Affairs, "History and Timeline" (Washington, DC, n.d.), https://www.benefits.va.gov/gibill/history.asp.

55. The use of weight training among American service members was documented in the *Strength & Health* series "Barbell Training in the Service," which transitioned into "Barbell Men in the Service" and ran from 1941 to 1946. As examples, see "Barbell Training in the Service" articles by Bob Hoffman, D. A. Downing, and Tony Terlazzo, respectively, in *Strength & Health*, August 1941, 22, 37; January 1943, 22–23, 43–46; and November 1945, 4–6.

played.[56] As players focused on the techniques of only one or two positions, they were able to execute increasingly complex offenses and defenses, making for a faster and more interesting game.[57] The rise of television, found in 75 percent of households by 1956, also allowed for an expanded viewership of college and professional sports, with teams like the University of Pennsylvania signing lucrative deals to broadcast their games, and the NFL's 1958 championship reaching 40 million viewers.[58] As teams jockeyed for athletes in the increasingly competitive college sports landscape, the National Collegiate Athletic Association (NCAA) officially sanctioned full athletic scholarships in 1956.[59]



Athletes from a variety of sports at Iowa, including those not traditionally associated with muscularity and power, trained with weights to improve their performances. Photo courtesy of York Barbell Company.

56. The NCAA allowed unlimited substitution of players in 1941. The rule was briefly returned to one-platoon football in 1953 and then gradually evolved back into full two-platoon play by 1965. The National Football League made a permanent change to unlimited substitutions in 1950. John Eisenberg, *The League: How Five Rivals Created the NFL and Launched a Sports Media Empire* (New York, 2018), 286–88; National Collegiate Athletic Association, "Football Bowl Subdivision Records" (2016), 188, http://fs.ncaa.org/docs/stats/football_records/2016/FBS.pdf.

57. Pamela C. Grundy and Benjamin G. Rader, *American Sports: From the Age of Folk Games to the Age of the Internet* (New York, 2019), 223.

58. Penn's 1950 contract with the American Broadcasting Company enabled it to earn up to $175,000 for the rights to televise its games. Grundy and Rader, *American Sports*, 197; Eisenberg, *The League*, 326; Ronald A. Smith, *Pay for Play: A History of Big-Time College Athletic Reform* (Urbana, IL, 2011), 105.

59. Grundy and Rader, *American Sports*, 222.

With larger rosters and athletic scholarships as leverage, college football coaches after the war began to put players through increasingly brutal trials to instill toughness in their players and weed out those in whom it could not be developed. As an example, legendary football coach Paul "Bear" Bryant "ran off a few" players when he coached at the University of Kentucky starting in 1946. Bryant, who had served in the navy during the war and coached at the Georgia Pre-Flight camp, an equivalent to the one at Iowa, was well versed in the philosophy of using grueling exercises and physical games to develop perseverance and resilience.[60] Other coaches, such as Darrell Royal at the University of Texas, himself a veteran, used what his players derisively called "shit drills" to winnow the Longhorn roster.[61] The tactics used by Bryant and Royal are consistent with what historian Donald Mrozek has called a "cult of toughness," which "used sport and physical training in increasingly ritualized forms to develop a tough and winning attitude in the Cold War."[62] Cold War anxieties about toughness, or lack thereof, have also been credited as a driving force behind professional football's ascent in the 1950s.[63] With a style of play that was faster and more violent than the college game and similarly cloaked in militaristic language, the NFL eclipsed baseball to become the country's most popular sport in 1956.

As the Soviet Union expanded its influence globally, many fretted about Americans' physical condition. Fears about a citizenry made soft by decadence were seemingly realized when North Korean forces invaded South Korea, and the ill-prepared and poorly equipped American forces were nearly pushed off of the peninsula by communist forces. Combined with the fact

60. Michael Oriard, *Bowled Over: Big-Time College Football from the Sixties to the BCS Era* (Chapel Hill, NC, 2009), 37; "Bowl Bid for Tide Hinges on Pre-Flight Tilt Result," *Tuscaloosa [AL] News*, 11/27/1942, 7.

61. Gary Shaw, *Meat on the Hoof: The Hidden World of Texas Football* (New York, 1972), 122–34.

62. Donald Mrozek, "The Cult and Ritual of Toughness in Cold War America," in *Sport in America: From Wicked Amusement to National Obsession*, ed. David K. Wiggins (Champaign, IL, 1995), 257–67.

63. Stephen H. Norwood, "The New York Giants and Cold War Manhood," in *New York Sports: Glamour and Grit in the Empire City*, ed. Stephen H. Norwood (Fayetteville, AR, 2018), 81–106.

that more than 38 percent of American prisoners died during the war, more than in any previous conflict, it was charged that Americans were both physically and mentally soft.[64] To make matters worse, the physical weakness of American children was seemingly confirmed in a 1953 study by Hans Kraus and Ruth Hirschland, which tested strength and flexibility. The researchers noted that nearly 57 percent of American children between the ages of 6 and 19 years failed at least one of the tests, while only 8 percent of European children did.[65] On the international stage, the Russians proceeded to "trounce" the United States, in the words of an article in the *Saturday Evening Post*, at the 1956 Olympic Games in Melbourne, Australia, and the 1960 games in Rome.[66] With improved broadcast technology, Americans were able to witness Soviet dominance from their own living rooms on a daily basis for the first time during the Rome Olympics.[67] In the five years that followed, Americans were also able to watch a series of televised dual track meets between the United States and the USSR, of which the Soviets won four.[68]

Not only were American servicemen and athletes weak, then, but the testing of children provided little hope that the situation would reverse course in the near future. Concern over the fitness of American youth reached President Eisenhower, who established the President's Council on Youth Fitness in 1956.

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64. David Halberstam, *The Fifties* (New York, 1993), 62–77; Shelly McKenzie, "Mass Movements: A Cultural History of Physical Fitness and Exercise, 1953–1989" (Ph.D. diss, George Washington University, 2008), 69.

65. Hans Kraus and Ruth P. Hirschland, "Muscular Fitness and Health," *Journal of the American Association for Health, Physical Education, and Recreation* 24, no. 10 (1953), 17–19.

66. In the 1956 Summer Games, the Soviets amassed 98 total medals (37 gold, 29 silver, and 32 bronze); the U.S. won 74 medals (32 gold, 25 silver, and 17 bronze) for second place overall. In 1960 the gap widened to a total medal count of 103 for the Soviets (43 gold, 29 silver, and 31 bronze) to 71 for the U.S. (34 gold, 21 silver, and 16 bronze). Mrozek, "The Cult and Ritual of Toughness," 263 (quotation); "Map of Olympic Medals," *New York Times*, 8/4/2008; David Maraniss, *Rome 1960: The Olympics That Changed the World* (New York, 2008), 426; James Riordan, *Sport in Soviet Society: The Development of Sport and Physical Education in Russia and the U.S.S.R.* (London, 1977), 147.

67. Maraniss, *Rome 1960*, 133.

68. Travis Vogan, *ABC Sports: The Rise and Fall of Network Sports Television* (Berkeley, CA, 2018), 45–59.

The council had little funding but maintained a high media presence in the late 1950s and early 1960s, working to convince children and their parents that fitness was a civic duty.[69]

It was in this milieu of increased visibility and revenue for college sporting teams, growing college enrollments, and Cold War concerns about the physical fitness of American citizens that McCloy and the Iowa students researched the effects of weight training. As coaches were under increased pressure to win games and generate revenue, they were increasingly open to accepting weight training as a viable modality for training their athletes and instilling strength and toughness. Further, the brute strength required at many positions in football made the game ideally suited to the increased size and power bestowed by barbell training. As policymakers fretted about the condition of American children, they were also more accepting of the idea of including weight training in the physical education curriculum.

While Cold War concerns mixed with the rise of professional football and big-time college athletics, and evidence mounted that the concept of "muscle-bound" athletes was likely erroneous, McCloy prepared to enter a new phase in his career. In July 1954, after 50 years in the field of physical education, including 24 at the University of Iowa, McCloy retired and was named a research professor emeritus. The transition freed him from many of the administrative duties required of a full-time professor, while still allowing him to teach as he wished and to focus on research.

At the end of his first semester as an emeritus, McCloy suffered a heart attack in December 1954. It was followed by a second in April 1955.[70] Despite the setbacks, McCloy continued to write voluminously and began to branch out beyond the professional literature. In a 1955 article in *Strength & Health* magazine, McCloy addressed the criticisms of weight training for athletes head-on. He suggested that readers would be surprised by the "unintelligent" answers offered if they were to ask physiologists or coaches to define the muscle-bound condition. "There is no more to the 'weight lifting makes muscles short, stiff, and muscle-bound' idea," McCloy informed readers, "than

69. McKenzie, "Mass Movements," 29–40.

70. Little, "Charles Harold McCloy: His Contributions," 175–76.

McCloy in the late 1950s, near the end of his career. Photo courtesy of York Barbell Company.

there is to the 'weight training makes athletes slow' superstition." As evidence, McCloy pointed to the Iowa research, which demonstrated increases in muscular strength and power after weight training with no reduction in muscular flexibility.[71]

He referenced those studies again in 1956, writing that an appropriate weight training program "can greatly aid in achieving specialized athletics fitness." In another manuscript, McCloy asserted that "muscular strength can be developed more rapidly through progressive weight training than through almost any other convenient means." Around this time, McCloy also drafted a manual for training athletes in a variety of sports. In the introduction, he specifically refuted the idea of muscle-bound athletes and went on to recount his observation of competitive weightlifters who were both quite flexible and ex-

71. McCloy, "Weight Training for Athletes?" 10, 39.

plosively quick. Further, he cited track athletes in events ranging from the shot put to hurdlers, pole vaulters, and runners who were both record holders and "ardent weight trainers." The manual listed weight training programs for 16 sports, including football, rowing, gymnastics, tennis, golf, and soccer. Although the manual was not published, McCloy did publish two articles in *Scholastic Coach* that discussed the use of weight training in baseball players.[72]

McCloy's Legacy

On September 18, 1959, Charles H. McCloy died as a result of a hemorrhagic stroke at the age of 73.[73] His effect on the field of physical education and on the training of athletes, however, continued long after his passing. By the late 1950s, a sea change was beginning to take place around the perception of the utility of weight training. Some of that change was due to the success of athletes and teams who incorporated such training into their programs. As coaches and players saw what weight training did for athletes in various sports—for example, Billy Cannon, star running back for the Louisiana State University Tigers and winner of the 1959 Heisman Trophy; Frank Stranahan, the "Toledo Strongman" who won more than 50 amateur golf titles; and Parry O'Brien, two-time Olympic gold medalist in the shot put and 17-time American champion—they began to realize that barbells might not be so harmful.[74] Coaches and physical educators were also increasingly exposed to research demonstrating just that.

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72. C. H. McCloy, "Weight Training as a Contribution to Physical Fitness," typed manuscript, folder 1, box 12, McCloy Papers; McCloy, "Weight Training for Physical Development," typed manuscript, folder 1, box 12, McCloy Papers; McCloy, "Weight Training Routine for All-Around Development for Athletes," typed manuscript, folder 1, box 12, McCloy Papers; McCloy, "'Kinesphylaxis' in the Training Program," *Scholastic Coach*, October 1957, 48; McCloy, "Exercise Program for Pitchers," *Scholastic Coach*, March 1958, 27, 65.

73. Little, "Charles Harold McCloy: His Contributions," 179.

74. Frank Litsky, "Billy Cannon, Football Star with a Troubled Life, Dies at 80," *New York Times*, 5/20/2018; Associated Press, "Frank Stranahan, Amateur Golfer Who Stressed Fitness, Dies at 90," *Washington Post*, 6/26/2013; Frank Litsky, "Parry O'Brien, Pioneer of Shot-Putting Technique, Dies at 75," *New York Times*, 4/23/2007.

During his 24 years at the University of Iowa, C. H. McCloy directed 230 master's theses and 46 doctoral dissertations, including some of the most influential early work on the effects of strength training.[75] The results of Edward Chui's thesis, which showed that young men who trained with relatively heavy weights improved muscular strength and power more than those in a traditional physical education program, were published in *Research Quarterly* in 1950. That article has been cited more than 100 times, including by other pioneers in the field of strength research: Peter Karpovich, Patrick O'Shea, Richard Berger, and Bill Kraemer, whose works have been cited hundreds and thousands of additional times.[76] Similarly, Edward Capen's thesis results, which were published in *Research Quarterly* the same year, have been cited 118 times. In addition to the authors noted above, influential physiologists Jack Wilmore and Mike Stone cited Capen's work, and both have been cited hundreds of additional times.[77] Jack Davis's experiment on swimmers was cited by leading physiologists David Costill and Hirofumi Tanaka.[78] Elden Keller parlayed his research with high jumpers

75. Little, "Charles Harold McCloy: His Contributions," 175.

76. According to Google Scholar, Chui's article had 101 citations as of March 27, 2019. The Karpovich, O'Shea, Berger, and Kraemer works have been cited 426, 113, 109, and 2,483 times, respectively. Peter V. Karpovich, *Physiology of Muscular Activity* (Philadelphia, 1965); Patrick O'Shea, "Effects of Selected Weight Training Programs on the Development of Strength and Muscle Hypertrophy," *Research Quarterly* 37, no. 1 (1966), 95–102; Richard A. Berger, "Effects of Dynamic and Static Training on Vertical Jumping Ability," *Research Quarterly* 34, no. 4 (1963), 419–24; Steven J. Fleck and William Kraemer, *Designing Resistance Training Programs* (Champaign, IL, 2014).

77. Wilmore's work has been cited 435 times, while the work of Stone et al. has been cited 254 times. Jack H. Wilmore, "Alterations in Strength, Body Composition and Anthropometric Measurements Consequent to a 10-week Weight Training Program," *Medicine and Science in Sports and Exercise* 6, no. 2 (1974), 133–38; Michael H. Stone, Steven J. Fleck, N. Travis Triplett, and William J. Kraemer, "Health- and Performance-Related Potential of Resistance Training," *Sports Medicine* 11, no. 4 (1991), 210–31.

78. The study by Tanaka et al. has been cited 185 times. Hirofumi Tanaka, David L. Costill, Robert Thomas, William J. Fink, and Jeffrey J. Widrick, "Dry-Land Resistance Training for Competitive Swimming," *Medicine and Science in Sports and Exercise* 25, no. 8 (1993), 952–59.

into a piece in the American Association for Health, Physical Education, and Recreation's 1962 text on weight training for sports.[79]

Beyond his supervision and encouragement of research, McCloy had a tremendous impact in the classroom. During their studies at Iowa, students learned that there was no evidence for the "muscle-bound" condition, and they carried that information into their careers as physical educators, coaches, and professors throughout the country. Following his retirement, McCloy was honored with the American Academy of Physical Education's Clark W. Hetherington Award. A letter accompanying the award lauded him as a man who "teaches with a unique fire." It noted that he had been called "a giant among American physical educators" and that "literally hundreds of thousands of teachers from every quarter have come under his influence."[80] No doubt those physical educators took with them what they had learned about the value of weight training as they moved to colleges like the University of Hawaii, the University of Tennessee, Florida State University, the University of California, and many more.[81] Some, like Edward Capen, supervised research on strength training themselves, magnifying McCloy's effect on the field.[82]

At Iowa, weight training had become quite popular by the time of McCloy's passing. Graduate students, like Robert Campbell, continued to study the effects of weight training on

79. Elden Keller, "Track and Field," in *Weight Training in Sports and Physical Education*, ed. Sills et al., 65–67.

80. "Hetherington Award for 1956," folder 1, box 6, McCloy Papers.

81. Edward Chui became the athletic director for a time at the University of Hawaii. Edward Capen spent his entire career at the University of Tennessee, retiring as a full professor. Peter Everett was a McCloy student who retired as a professor from Florida State University. Eleanor Metheny spent her entire career at the University of California. Sharon L. Van Oteghen and Allys M. Swanson, "In Memoriam: Peter W. Everett, 1924–2006," *Journal of Physical Education, Recreation, and Dance* 77, no. 7 (2006), 8–9; Mary Leigh and Ginny Studer, "Leaders Series: Eleanor Metheny," *Journal of Physical Education, Recreation, and Dance* 54, no. 7 (1983), 74–77.

82. As an example, Capen was the major supervisor for a thesis comparing training methods to improve vertical jump ability. Bobby Carter, "Comparison of Two Methods of Training for Improving Jumping Ability" (M.S. thesis, University of Tennessee, 1963).

athletes in football, basketball, and track and field.[83] Barbell training was incorporated into the required physical education curriculum as well as the training of varsity athletes, including distance runners, swimmers, and football players. Writing in 1960, one of McCloy's departmental colleagues remarked that "most athletes follow the exercise routines outlined by Dr. C. H. McCloy."[84] For non-athletes, weight rooms were opened for recreational use, though the hours were limited to 3:30 to 5:30 p.m. three days per week and 7:00 to 9:30 p.m. another two days. Enthusiastic weight trainers apparently found those hours insufficient, however, as the weight room door was "smashed from its hinges" twice during the 1959–60 academic year.[85]

Upon learning of his passing, *Strength & Health* called McCloy "a pioneer in the use of weight training for athletics" and noted that he "was one of the very first eminent physical educators to endorse this type of training." Bob Hoffman remarked that McCloy's writing in the magazine was "a significant asset to the advance of weight training." In an article on training for track and field in *Physical Educator* in 1965, John Jesse pointed to two researchers as being especially significant in the scientific investigation of strength: Thomas DeLorme and C. H. McCloy.[86]

DeLorme's work provided medical sanction for the efficacy of strength training; McCloy's work did the same in the field of physical education. He encouraged investigations of the effects of weight training and trumpeted the positive results in professional journals, talks, and magazines. His work, and that of students he supervised, was cited repeatedly in later research that reinforced the effectiveness of weight training for enhancing parameters of athletic performance, like muscular strength and power. With time, dogma changed, and coaches became more

83. Robert L. Campbell, "Effects of Supplemental Weight Training on the Physical Fitness of Athletic Squads," *Research Quarterly* 33, no. 3 (1962), 343–48.

84. Alley, "Barbells on Campus," 52.

85. Ibid.

86. Ray Van Cleef, "Strongmen the World Over," *Strength & Health*, February 1960, 23, 26; Little, "Charles Harold McCloy: His Contributions," 175; John P. Jesse, "A New Look at Strength Development in Track and Field Athletes," *Physical Educator* 22, no. 2 (May 1965), 72.

interested in including weight training in their programs. Within ten years of McCloy's passing, the University of Nebraska had hired a full-time coach to supervise strength training for its football players.[87] Within 20 years, strength coaches had formed a professional organization.

Strength training is now integral to interscholastic, collegiate, and professional sports, as evidenced by the impressive facilities in which many athletes train and the cadre of coaches who supervise such training. At the University of Iowa, Chris Doyle, who serves as the director of strength and conditioning, earned a base salary of $725,000 in 2018.[88] In 2017, when Doyle's total compensation package was $717,800, he ranked as the seventeenth-highest paid employee at the university. Of the eight academics who earned more than Doyle at Iowa that year, seven were medical doctors and one was a dentist; all taught in the medical school. One reason for the staggering salaries of some contemporary strength coaches is the structure of NCAA rules allowing those coaches to have more contact with athletes than any other coach on staff. As a result, strength coaches become proxies for the head coach and are often responsible for setting the culture of the team and instilling "toughness" in players. The role has led to some headline-grabbing incidents in which players at schools like Iowa, Oregon, and Nebraska were hospitalized with a condition called rhabdomyolysis, which results from excessive muscle damage following rigorous workouts.[89] Despite such notorious incidents, the adoption of strength training to prepare athletes has made a marked impact on athletic performance.[90]

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87. Jason Shurley and Jan Todd, "'The Strength of Nebraska': Boyd Epley, Husker Power, and the Formation of the Strength Coaching Profession," *Journal of Strength and Conditioning Research* 26, no. 12 (2012), 3177–88.

88. Steve Berkowitz, "Iowa Strength Coach Chris Doyle, Already Highest Paid, Gets a Raise to $725,000," *USA Today*, 7/10/2018.

89. Jon Solomon, "The Unregulated World of Strength Coaches and College Football's Killing Season," *CBSSports.com*, 3/10/2017, www.cbssports.com/college-football/news/the-unregulated-world-of-strength-coaches-and-college-footballs-killing-season/; "Iowa Players Battling Muscle Disorder," *ESPN.com*, 1/26/2011, www.espn.com/college-football/news/story?id=6061650.

90. As examples, see John R. Olson and Gary R. Hunter, "A Comparison of 1974 and 1984 Player Sizes, and Maximal Strength and Speed Efforts for Divi-

It is not possible to say with certainty what C. H. McCloy would have thought about what strength training for sport has become, but we might speculate that he would have been critical. McCloy consistently framed training as a means to improve one's functional capacity—as a modality that enables people to be more productive—but he was no advocate of excess. "It may well be," he commented in 1956, "that too much strength may be a parasite." Speaking broadly of bodybuilders, "whose only use for his huge hypertrophied muscles is to lift more weights," he asked, "Why seek to surpass the mountaintops when the treetops will do as well?"[91]

Although he might have been put off by current athletic practices, it is likely that McCloy would have appreciated that there are now reams of research validating many strength-training practices, including more than 400 articles in the *Journal of Strength and Conditioning Research* alone in the past year. Numerous factors and many individuals played important roles in facilitating the acceptance of strength training as a means to enhance athletic performance, but few were as integral as C. H. McCloy. Writing in 1960, one of McCloy's Iowa colleagues observed, "From all indications, barbells and dumbbells are now permanent fixtures in university gymnasiums and fieldhouses."[92] Indeed they are, and the work of C. H. McCloy and his students and colleagues at the University of Iowa was crucial in making that happen.

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sion I NCAA Universities," *NSCA Journal* 6, no. 6 (1985), 26–28; Craig A. Secora, Richard W. Latin, Kris E. Berg, and John M. Noble, "Comparison of Physical and Performance Characteristics of NCAA Division I Football Players: 1987 and 2000," *Journal* of *Strength and Conditioning Research* 18, no. 2 (2004), 286–91.

91. C. H. McCloy, "Why Not Some Physical Fitness?" *Physical Educator* 13, no. 3 (1956), 83–84, 85–86.

92. Alley, "Barbells on Campus," 52.