

REVIEW

Bibliometric guide to photographs of male participants in early exercise and physical medicine research

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Abstract

The history of exercise science research has undergone relatively little examination, and exercise science students receive little education about the field's history. Photographs are tools that lecturers and writers can use to educate audiences about history. Yet, no resource exists that tells educators where they can find photographs of individuals participating in early studies about exercise or related topics (e.g., physical education, physical medicine). Here, the aim was to identify papers published before 1980 that contain photographs of boys and men participating in studies about exercise or related topics, aggregate the papers into a bibliometric list, and describe the photographs. The current research focused on boys and men to give male experiences and contributions their own space for acknowledgement. The entire digital archives of *Journal of Applied Physiology* (1948–1979), *Medicine and Science in Sports* (1969–1979) and *Research Quarterly* (1930–1979) were searched. Papers published in other journals (e.g., *Physical Therapy*) were identified via searches of personal digital files from previous historical work. A total of 304 papers were identified. Of these papers, 44.1% were published in *Research Quarterly*. The earliest paper was published in 1894. The papers included 733 photographs of male participants (46 boys, 475 men), with some males appearing in multiple photographs. Of the 304 papers, 49.0% and 27.3% were classified as research primarily on neuromuscular and cardiorespiratory outcomes, respectively. Educators can use the bibliometric list to identify photographs to include in lectures and writings about the history of exercise science and the contributions made by male research participants.

Keywords

Boys; Exercise science; Fitness; History; Men

1. Introduction

History is the study of past events. Studying past events helps to clarify how and why things are the way they are. It also helps to appreciate how theories, practices and technologies have evolved or stabilized over time. Studying past events also helps to minimize the likelihood of repeating past mistakes.

For such reasons, history is an important component of all academic fields, including exercise science—one of the fastest growing academic majors in the United States of America [1]. Yet, exercise science students are rarely taught history. For example, the history of exercise science is presented in only a few of the field's textbooks [2]. Moreover, in one survey, 322 exercise science university professors and clinicians indicated that exercise science history should be taught to students, yet, the survey respondents rated history as one of the least important topics [2].

Such results conflict with education recommendations made by Ivy [3] in 2007. Ivy [3] concluded that the history of exercise science ought to be taught in undergraduate courses

to help students “acquire an appreciation for the discipline of exercise physiology” and understand how the field has evolved over time. Ivy's call is now nearly two decades old and little progress has been made in inculcating history into exercise science education.

The lack of exercise science history in textbooks and curricula might be due, in part, to the field's history garnering less attention from researchers than other topics. Consequently, educators who do not specialize in the field's history might be uncertain about what the history is and how to present it to students. More historical research can help to resolve this issue.

Photographs can be used as educational tools to facilitate the teaching of exercise science history. Because a picture is “worth a thousand words”, historical photographs can be used by educators to help students understand how exercise science has evolved. Yet, no resource exists where educators can easily find photographs that show the people, places and things associated with early exercise science research. Such photographs are scattered throughout the research literature.

Finding them requires significant time, effort and luck. Thus, the study of exercise science history could benefit from a single resource that documents where photographs of early exercise research can be found.

Therefore, the aim of the current work was to identify early research papers in exercise science (and historically related fields) that contain photographs of male participants, aggregate them into a bibliometric list, and describe the photographs. Male research participants were the focus of the current work because there is currently a need to give male experiences and contributions their own space for acknowledgement, in part, to counter misguided contemporary academic narratives about men (e.g., “male privilege”, “toxic masculinity”) [4–9].

2. Methods

2.1 Literature search

The literature search combined two methods. The first method was a search of the entire digital archives of the *Journal of Applied Physiology* (1948–1979), *Medicine and Science in Sports* (1969–1979), and *Research Quarterly* (1930–1979). These journals are three of the most important and relevant journals in terms of the history of exercise science research prior to 1980. For these three journals, the entire digital archives were downloaded to the author’s computer. Each paper was saved in portable document format (pdf) and then opened and browsed page-by-page for photographs. Other journals were not searched in their entirety because complete digital archives were not available to the author. The year 1979 was chosen as the end year of the analysis to align with other historical research [10–12] and to limit the scope of the project and make its completion more feasible.

The second search method was a check of personal digital files associated with previous historical research [10, 11]. This method allowed for identification of photographs of exercise science research published in other journals. Though the current paper is framed around education efforts in exercise science, exercise science has historical links with fields like physical education, medicine, therapy and rehabilitation. Thus, journals in those fields often contain studies classified as exercise science, and the final bibliometric list does not reflect solely the field of exercise science. Instead, the final bibliometric list represents an amalgamation of the fields of exercise science, physical education, applied physiology and physical medicine, therapy and rehabilitation.

2.2 Data extraction and processing

The following information was extracted from the papers and entered in a spreadsheet: journal name, year of publication, author name, number of photographs of boys or men, number of boys and men shown in the photographs and the general topic of the research study. One-sentence descriptions of each photograph were also generated by the author.

To be qualified for inclusion in the current bibliometric list, a paper had to include a photograph of a male—either as researcher or research participant. The photograph had to either show the individual’s face, or it had to show most of the individual’s body and state elsewhere in the paper that only

boys or men were participants in the study. For most papers in the final bibliometric list, faces of the male participants were visible in the photographs.

Some papers included several photographs taken as part of high-frequency motion capture biomechanical analyses. These biomechanical analyses were often conducted on sports skills, such as baseball swings, swimming strokes, or gymnastics maneuvers. Researchers typically presented these motion-capture photographs within the context of a single manuscript figure. For the current bibliometric list, such occurrences were classified as one photograph rather than as a dozen or so separate photographs.

Papers were classified by general topic. The classifications were: (a) cardiorespiratory and thermophysiology (e.g., a participant exercising while wearing an oxygen mask); (b) neuromuscular (e.g., a participant performing a test of muscle strength); (c) motor skill learning (e.g., a participant performing a motor learning task with their hand or finger); (d) biomechanics (e.g., a participant photographed by a motion capture system while performing a sports skill); (e) anthropometrics (e.g., a participant being assessed on skinfolds or somatotype); (f) posture (e.g., a participant being assessed on spinal curvature); (g) proprioception (e.g., a participant being assessed on perceived response to movement induced by an external stimulus); and (h) other (i.e., photographs that did not fit in the other categories). Study aims and methods often traversed multiple classification topics. Consequently, for the bibliometric list, the single most relevant classification for each study was recorded.

3. Results

A total of 304 papers published before 1980 were found to have included photographs of boys or men participating in exercise and physical medicine research. Paper publication dates ranged from 1894 to 1979. Of the 304 papers, 79 (26.0%) were published in *Journal of Applied Physiology* (Table 1, (Ref. [13–91])), 25 (8.2%) in *Medicine and Science in Sports* (Table 2, (Ref. [92–116])), 134 (44.1%) in *Research Quarterly* (Table 3, (Ref. [117–250])), and the remaining 65 (21.4%) were published in other journals (Table 4, (Ref. [251–316])). Of the 304 papers, 83 (27.3%) were classified as primarily cardiorespiratory and thermophysiology research; 149 (49.0%) were classified as primarily neuromuscular research; 18 (5.9%) were classified as primarily motor skill learning research; 28 (9.2%) were classified as primarily biomechanics; 9 (3.0%) were classified as primarily anthropometrics research; 8 (2.6%) were classified as primarily posture research; 7 (2.3%) were classified as primarily proprioception research; and 2 (0.7%) were classified as primarily other research.

The papers included a total of 733 photographs. In the photographs, 46 boys and 475 men were shown, with some boys and men appearing in multiple photographs. In 10 of the photographs, male participants were naked or near naked.

4. Discussion

The novel aspect of the current research was the identification of early exercise and physical medicine research papers that

TABLE 1. Descriptions of photographs published in the Journal of Applied Physiology (1948–1979) that include male researchers or participants.

Author year	Photograph description and source link
Corey 1948 [13]	Men in plane cockpit wearing nasal clips and mouthpieces attached to spirometers. https://journals.physiology.org/doi/abs/10.1152/jappl.1948.1.1.35
Spiro 1948 [14]	Man lying on table as two male researchers measure respiratory outcomes. https://journals.physiology.org/doi/abs/10.1152/jappl.1948.1.4.285
Spoor 1948 [15]	Male soldier rock climbing outdoors while wearing oxygen consumption device. https://journals.physiology.org/doi/abs/10.1152/jappl.1948.1.5.369
Manning 1949 [16]	Man sitting in a swing used to induce motion sickness. https://journals.physiology.org/doi/abs/10.1152/jappl.1949.1.9.619
Gordon 1951 [17]	Naval recruits performing hip-roll back pressure method of artificial respiration. https://journals.physiology.org/doi/abs/10.1152/jappl.1951.4.6.447
Brozek 1952 [18]	Man standing performing leg speed movement test; man seated performing arm speed movement test. https://journals.physiology.org/doi/abs/10.1152/jappl.1952.4.9.753
Warner 1953 [19]	Man lying on bed while connected to numerous measurement devices (e.g., spirometer, ear oximeter). https://journals.physiology.org/doi/abs/10.1152/jappl.1953.5.9.495
Hall 1954 [20]	Man in specialized suit entering cold water immersion tank. https://journals.physiology.org/doi/abs/10.1152/jappl.1954.7.2.188
Balke 1956 [21]	Man seated wearing a gas mask. https://journals.physiology.org/doi/abs/10.1152/jappl.1956.9.3.371
Bennett 1956 [22]	Man performing artificial respiration maneuvers on two men. https://journals.physiology.org/doi/abs/10.1152/jappl.1956.8.6.603
Duane 1956 [23]	Men wearing electroretinogram device while exposed to various gravitational forces in a human centrifuge. https://journals.physiology.org/doi/abs/10.1152/jappl.1956.9.1.105
Goff 1957 [24]	Man swimming in diving gear. https://journals.physiology.org/doi/abs/10.1152/jappl.1957.10.2.197
Rasch 1957 [25]	Men standing performing tests of isometric elbow flexion and overhead press strength. https://journals.physiology.org/doi/abs/10.1152/jappl.1957.11.1.29
Scholander 1958 [26]	Male researcher measuring naked Australian Aboriginal man's responses to temperature changes during sleep. https://journals.physiology.org/doi/abs/10.1152/jappl.1958.13.2.211
Rigatto 1961 [27]	Man sitting in decompression chamber using a spirometer. https://journals.physiology.org/doi/abs/10.1152/jappl.1961.16.2.391
Schmidt 1961 [28]	Man seated in a plethysmograph. https://journals.physiology.org/doi/abs/10.1152/jappl.1961.16.5.935
Sullivan 1961 [29]	Man modelling surface electromyography electrodes on the deltoid muscle. https://journals.physiology.org/doi/abs/10.1152/jappl.1961.16.5.939
Taylor 1961 [30]	Man posing naked for anthropometric measurements. https://journals.physiology.org/doi/abs/10.1152/jappl.1961.16.6.955
Rao 1962 [31]	Man in head-stand position while measured on respiratory outcomes. https://journals.physiology.org/doi/abs/10.1152/jappl.1962.17.1.117
Atkins 1963 [32]	Man performing lower-limb cycling ergometry while a male researcher supervises. https://journals.physiology.org/doi/abs/10.1152/jappl.1963.18.1.205
Buskirk 1963 [33]	Man seated in metabolic chamber. https://journals.physiology.org/doi/abs/10.1152/jappl.1963.18.3.603
Halliday 1963 [34]	Male researcher guides male participant into vessel used to measure radiation area of the body. https://journals.physiology.org/doi/abs/10.1152/jappl.1963.18.6.1285
Rao 1963 [35]	Man in a head-stand position while cardiorespiratory outcomes are measured. https://journals.physiology.org/doi/abs/10.1152/jappl.1963.18.5.987
Schneider 1963 [36]	Man in chair with gas delivery device connected to his nose. https://journals.physiology.org/doi/abs/10.1152/jappl.1963.18.2.414
Wood 1963 [37]	Man seated in a steel container filled with water; man modelling a photoelectric earpiece. https://journals.physiology.org/doi/abs/10.1152/jappl.1963.18.6.1171
Barry 1964 [38]	Man modelling a radio telemetry device on his head. https://journals.physiology.org/doi/abs/10.1152/jappl.1964.19.3.528

TABLE 1. Continued.

Author year	Photograph description and source link
Cook 1964 [39]	Boys measured on respiratory outcomes via a mouth piece and manometer. https://journals.physiology.org/doi/abs/10.1152/jappl.1964.19.5.1016
Miles 1964 [40]	Man seated on the floor in yoga pose while wearing a mask connected to a spirometer. https://journals.physiology.org/doi/abs/10.1152/jappl.1964.19.1.75
Rogers 1964 [41]	Man modelling an oxygen consumption apparatus. https://journals.physiology.org/doi/abs/10.1152/jappl.1964.19.1.1
Astrand 1965 [42]	Man performing upper- and lower-limb cycling ergometry while wearing an oxygen consumption mask. https://journals.physiology.org/doi/abs/10.1152/jappl.1965.20.2.253
Besch 1965 [43]	Male researcher showing impact stress device. https://journals.physiology.org/doi/abs/10.1152/jappl.1965.20.6.1241
Gorten 1965 [44]	Man cycling on ergometer while his arm receives intravenous administration of radioactive tracer. https://journals.physiology.org/doi/abs/10.1152/jappl.1965.20.6.1365
Morrison 1965 [45]	Australian aboriginal men preparing for ceremony. https://journals.physiology.org/doi/abs/10.1152/jappl.1965.20.6.1278
Bole 1966 [46]	Man wearing head and chin strap device used to measure genioglossus electromyography. https://journals.physiology.org/doi/abs/10.1152/jappl.1966.21.6.1695
Bouhuys 1966 [47]	Man seated in body plethysmograph up to his chin. https://journals.physiology.org/doi/abs/10.1152/jappl.1966.21.2.483
Dempsey 1966 [48]	Obese man in underwear performing lower-limb cycling while wearing an oxygen consumption mask. https://journals.physiology.org/doi/abs/10.1152/jappl.1966.21.6.1815
Kamon 1966 [49]	Man performing gymnastics exercise. https://journals.physiology.org/doi/abs/10.1152/jappl.1966.21.5.1611
Moore 1966 [50]	Man seated performing isometric contractions of forearm flexors with electromyography electrodes on forearm. https://journals.physiology.org/doi/abs/10.1152/jappl.1966.21.2.649
Denslow 1967 [51]	Man in various trunk postures while standing and in harness. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.23.2.243
Guyatt 1967 [52]	Man sitting in body plethysmograph chamber breathing through a pneumotachograph. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.22.2.390
Hoppin 1967 [53]	Male Naval officer seated in human centrifuge while exposed to various gravitational forces. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.22.3.469
Katch 1967 [54]	Man submerged underwater in a swimming pool cage while a male researcher measures his body volume. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.23.5.811
Konno 1967 [55]	Man standing performing breathing maneuvers. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.22.3.407
Murray 1967 [56]	Male researcher measuring boy's center of pressure and gravity while boy squats on force plate. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.23.6.831
Rawson 1967 [57]	Man lying in temperature chamber. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.22.2.287
Rosenberg 1967 [58]	Man modelling a gas mask. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.23.1.11
Spencer 1967 [59]	Male researchers engaging with a killer whale. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.22.5.974
Stenberg 1967 [60]	Man lying on table performing lower- and upper-limb cycling ergometry. https://journals.physiology.org/doi/abs/10.1152/jappl.1967.22.1.61
Craig 1968 [61]	Men on a boat measuring oxygen consumption of a male participant performing breath-hold diving. https://journals.physiology.org/doi/abs/10.1152/jappl.1968.24.2.190
Gilbert 1968 [62]	Man lying on table in a negative pressure chamber. https://journals.physiology.org/doi/abs/10.1152/jappl.1966.21.6.1699
Lloyd 1968 [63]	Man lying on table wearing two leg splints. https://journals.physiology.org/doi/abs/10.1152/jappl.1968.25.6.659
Morrison 1968 [64]	Man performing lower-limb cycling ergometry while wearing mouth piece connected to spirometer; male researchers checking chamber complex during simulated dive. https://journals.physiology.org/doi/abs/10.1152/jappl.1971.30.5.724

TABLE 1. Continued.

Author year	Photograph description and source link
Rao 1968 [65]	Man in head-stand position while wearing a mouth piece connected to a spirometer. https://journals.physiology.org/doi/abs/10.1152/jappl.1968.24.5.697
Schneider 1968 [66]	Man standing modelling portable blood pressure recorder. https://journals.physiology.org/doi/abs/10.1152/jappl.1968.24.1.115
Trank 1968 [67]	Male researcher applying electrocardiogram electrodes and conductive substance to boy's chest and abdomen. https://journals.physiology.org/doi/abs/10.1152/jappl.1968.24.2.267
Webb 1968 [68]	Man modelling water-cooling suit. https://journals.physiology.org/doi/abs/10.1152/jappl.1968.25.5.489
Akers 1969 [69]	Man in an underwater weighing tank while male researchers measure his respiratory outcomes. https://journals.physiology.org/doi/abs/10.1152/jappl.1969.26.5.649
Allen 1969 [70]	Man in altitude chamber with oxygen mask on while one female and two male researchers supervise. https://journals.physiology.org/doi/abs/10.1152/jappl.1969.26.2.182
Atkins 1969 [71]	Man in climate chamber performing lower-body cycling ergometry while cardiorespiratory outcomes measured. https://journals.physiology.org/doi/abs/10.1152/jappl.1969.26.4.510
Carter 1969 [72]	Man standing naked being measured on somatotype. https://journals.physiology.org/doi/abs/10.1152/jappl.1969.27.6.787
Glagov 1970 [73]	Man shirtless with electrocardiogram electrodes attached to body. https://journals.physiology.org/doi/abs/10.1152/jappl.1970.29.6.799
Goldman 1970 [74]	Man seated in chair breathing through pneumotachograph. https://journals.physiology.org/doi/abs/10.1152/jappl.1970.28.1.113
Petro 1970 [75]	Man seated performing isometric contraction of the elbow flexors with electrocardiogram electrodes on skin. https://journals.physiology.org/doi/abs/10.1152/jappl.1970.29.6.794
Rao 1970 [76]	Man seated in a chair with a crutch under one arm while ventilation measured with spirometry. https://journals.physiology.org/doi/abs/10.1152/jappl.1970.28.2.162
Webb 1970 [77]	Man modelling instrument attached to his head, chest, and waist that measures oxygen consumption. https://journals.physiology.org/doi/abs/10.1152/jappl.1970.28.6.867
Azer 1971 [78]	Man seated in an environmental chamber performing motor tasks. https://journals.physiology.org/doi/abs/10.1152/jappl.1971.31.5.669
Daniels 1971 [79]	Man running on road wearing oxygen consumption mask while three men drive car next to him holding timer and gas collection equipment. https://journals.physiology.org/doi/abs/10.1152/jappl.1971.31.1.164
Lee 1971 [80]	Man seated while eye movement measured during whole body vibration. https://journals.physiology.org/doi/abs/10.1152/jappl.1971.30.2.281
Maksud 1971 [81]	Man modelling a gas collection system used during running. https://journals.physiology.org/doi/abs/10.1152/jappl.1971.30.4.536
Keijzer 1972 [82]	Man modelling elastic suit that has heat flow meters attached to it. https://journals.physiology.org/doi/abs/10.1152/jappl.1972.33.5.677
Webb 1972 [83]	Man modelling water-cooling garments and a face mask used for measuring oxygen consumption. https://journals.physiology.org/doi/abs/10.1152/jappl.1972.32.3.412
Haines 1973 [84]	Man secured to tilt table while male and female researchers supervise. https://journals.physiology.org/doi/abs/10.1152/jappl.1973.34.3.329
Secher 1974 [85]	Man performing upper- and lower-limb cycling ergometry while wearing an oxygen consumption mask. https://journals.physiology.org/doi/abs/10.1152/jappl.1974.36.5.515
Shubrooks 1974 [86]	Man seated modelling an anti-gravity suit. https://journals.physiology.org/doi/abs/10.1152/jappl.1974.36.3.345
Lambetsen 1975 [87]	Men wearing ventilatable suits entering pressure chamber; men showing facial skin damage due to exposure. https://journals.physiology.org/doi/abs/10.1152/jappl.1975.39.3.434
Sybrecht 1975 [88]	Man modelling a chest strap worn during lung function tests. https://journals.physiology.org/doi/abs/10.1152/jappl.1975.39.5.707
Callin 1976 [89]	Man seated in a shower box. https://journals.physiology.org/doi/abs/10.1152/jappl.1976.40.4.641
Costill 1976 [90]	Male researcher taking a muscle biopsy of the lateral gastrocnemius of a study participant. https://journals.physiology.org/doi/abs/10.1152/jappl.1976.40.2.149
Hoar 1976 [91]	Man seated on a sled apparatus, wearing a gas mask and oxygen tank, preparing to enter water. https://journals.physiology.org/doi/abs/10.1152/jappl.1976.40.4.605

TABLE 2. Descriptions of photographs published in *Medicine and Science in Sports* (1969–1979) that include male researchers or participants.

Author year	Photograph description and source link
Ferguson 1969 [92]	Man in ice hockey arena, wearing hockey gear and a gas collection apparatus. https://journals.lww.com/acsm-msse/abstract/1969/12000/a_maximal_oxygen_uptake_test_during_ice_skating.7.aspx
Snook 1969 [93]	Male football players demonstrating tacking technique. https://journals.lww.com/acsm-msse/abstract/1969/09000/head_and_neck_injuries_in_contact_sports.4.aspx
Daniels 1970 [94]	Man running on an outdoor track while connected to a gas collection apparatus; the apparatus is held by a male researcher sitting on the hood of car driven by another male researcher. https://journals.lww.com/acsm-msse/abstract/1970/23000/the_effects_of_alternate_exposure_to_altitude_and.1.aspx
Ramey 1970 [95]	Man running on a force plate. https://journals.lww.com/acsm-msse/abstract/1970/23000/force_relationships_of_the_running_long_jump.9.aspx
Shaver 1970 [96]	Man performing unilateral arm exercise using an ergometer. https://journals.lww.com/acsm-msse/abstract/1970/23000/effects_of_training_on_relative_muscular_endurance.12.aspx
Moon 1971 [97]	Male football player wearing a telemetry system attached to shoulder pads to measure head accelerations. https://journals.lww.com/acsm-msse/abstract/1971/00310/peak_head_acceleration_of_athletes_during.8.aspx
De Vries 1972 [98]	Man walking and crawling wearing mouth piece connected to a spirometer, telemeter, and electromyography. https://journals.lww.com/acsm-msse/abstract/1972/00430/total_muscle_mass_activation_vs_relative_loading.8.aspx
Nelson 1972 [99]	Male researcher collecting and analyzing data (film analysis) of man running over ground and on treadmill. https://journals.lww.com/acsm-msse/abstract/1972/00440/biomechanics_of_overground_versus_treadmill.29.aspx
Goldfuss 1973 [100]	Man seated on table for knee stability and quadriceps electromyography tests while male researchers supervise. https://journals.lww.com/acsm-msse/abstract/1973/00540/effect_of_muscular_tension_on_knee_stability.11.aspx
Londeree 1973 [101]	Man cycling on bicycle ergometer while wearing a gas collection apparatus. https://journals.lww.com/acsm-msse/abstract/1973/23000/validation_of_the_oxygen_consumption_computer.17.aspx
Robertson 1974 [102]	Man lying on table performing isometric medial rotation of hip; male researcher modelling the cable tensiometer. https://journals.lww.com/acsm-msse/abstract/1974/06040/a_device_to_strengthen_and_evaluate_the_medial.12.aspx
Rodgers 1974 [103]	Man performing concentric and eccentric exercise of the right elbow flexors while a male researcher supervises. https://journals.lww.com/acsm-msse/abstract/1974/06040/motor_unit_involvement_and_tension_during_maximum,.8.aspx
Schmidt 1975 [104]	Men performing karate techniques. https://journals.lww.com/acsm-msse/abstract/1975/00710/fatal_anterior_chest_trauma_in_karate_trainers.12.aspx
Secher 1975 [105]	Man performing row strength test. https://journals.lww.com/acsm-msse/abstract/1975/00740/isometric_rowing_strength_of_experienced_and.6.aspx
Zwiren 1975 [106]	Paraplegic man performing upper-body ergometry while wearing a mouth piece connected to a spirometer. https://journals.lww.com/acsm-msse/abstract/1975/00720/responses_to_exercise_of_paraplegics_who_differ_in.15.aspx
Jackson 1976 [107]	Male researcher and participant in a kayak outdoors as the participant has oxygen consumption measured via a gas collection apparatus. https://journals.lww.com/acsm-msse/abstract/1976/00830/the_aerobic_demands_of_rowing_in_two_olympic.6.aspx
Millar 1976 [108]	Male patient stretching the ankle plantar flexors. https://journals.lww.com/acsm-msse/abstract/1976/21000/an_early_stretching_routine_for_calf_muscle.21.aspx
Ridge 1976 [109]	Man performing exercise on a kayak ergometer while wearing a mouth piece connected to spirometer and with four male researchers supervising. https://journals.lww.com/acsm-msse/abstract/1976/21000/responses_to_kayak_ergometer_performance_after.16.aspx

TABLE 2. Continued.

Author year	Photograph description and source link
Robertson 1976 [110]	Man lying on table performing strength tests and resistance exercise; male researcher models cable tensiometer. https://journals.lww.com/acsm-msse/abstract/1976/00840/the_effect_of_two_exercise_routines_on_the.11.aspx
Shanebrook 1976 [111]	Man modelling a running posture to be submitted to biomechanical analysis. https://journals.lww.com/acsm-msse/abstract/1976/21000/aerodynamic_drag_analysis_of_runners.22.aspx
Tesch 1976 [112]	Man in a canoe in a lake wearing a gas collection apparatus. https://journals.lww.com/acsm-msse/abstract/1976/00840/physiological_investigations_of_swedish_elite.2.aspx
Perrine 1978 [113]	Man performing isokinetic muscle contractions of the right knee extensors. https://journals.lww.com/acsm-msse/abstract/1978/10030/muscle_force_velocity_and_power_velocity.4.aspx
Coyle 1979 [114]	Man performing isokinetic leg press. https://journals.lww.com/acsm-msse/abstract/1979/01110/leg_extension_power_and_muscle_fiber_composition.3.aspx
Enoka 1979 [115]	Man performing the pull in Olympic weightlifting. https://journals.lww.com/acsm-msse/abstract/1979/01120/the_pull_in_olympic_weightlifting.2.aspx
Putnam 1979 [116]	Man performing strength tests of hip flexors and knee extensors. https://journals.lww.com/acsm-msse/abstract/1979/01130/a_mathematical_model_of_hiking_positions_in_a.13.aspx

TABLE 3. Descriptions of photographs published in Research Quarterly (1930–1979) that include male researchers or participants.

Author	Photograph description and source link
Cureton 1930 [117]	Men performing swimming techniques. https://www.tandfonline.com/doi/abs/10.1080/23267402.1930.10625804
Cureton 1930 [118]	Man tested on respiratory measures while in a swimming pool or on a pool deck. https://www.tandfonline.com/doi/abs/10.1080/23267402.1930.10622526
Cureton 1931 [119]	Man standing measured on spinal curvature. https://www.tandfonline.com/doi/abs/10.1080/23267402.1931.10625046
Hindman 1931 [120]	Man having blood pressure recorded by a male researcher. https://www.tandfonline.com/doi/abs/10.1080/23267402.1931.10625042
Miles 1931 [121]	Male football players in 3-point stances preparing to have charge times measured; male researchers supervise and model the measurement tool. https://www.tandfonline.com/doi/abs/10.1080/23267402.1931.10625036
Anderson 1932 [122]	Man measured by an ergograph while performing pull-ups and dips. https://www.tandfonline.com/doi/abs/10.1080/23267402.1932.10761532
Christenson 1933 [123]	Boys measured on standing posture. https://www.tandfonline.com/doi/abs/10.1080/23267402.1933.10761584
Jackson 1933 [124]	Men performing acrobatic techniques. https://www.tandfonline.com/doi/abs/10.1080/23267402.1933.10761582
Wilson 1934 [125]	Man swimming. https://www.tandfonline.com/doi/abs/10.1080/23267402.1934.10761641
Cureton 1935 [126]	Male test administrator measuring spinal curvature of male participant. https://www.tandfonline.com/doi/abs/10.1080/23267402.1935.10761730
Cureton 1935 [127]	Boy standing for assessment of center of gravity. https://www.tandfonline.com/doi/abs/10.1080/23267402.1935.10761731
Hubbard 1935 [128]	Boys measured on posture while standing and seated. https://www.tandfonline.com/doi/abs/10.1080/23267402.1935.10761688
Wickens 1937 [129]	Men photographed in standing posture. https://www.tandfonline.com/doi/abs/10.1080/23267402.1937.10761848

TABLE 3. Continued.

Author	Photograph description and source link
Burge 1938 [130]	Man seated with electrode on head and connected to a galvanometer. https://www.tandfonline.com/doi/abs/10.1080/23267429.1938.11802448
Everts 1938 [131]	Man performing the isometric back and leg dynamometer test while a male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/23267429.1938.11802451
Slater-Hammel 1940 [132]	Man performing step exercise while his pulse is recorded. https://www.tandfonline.com/doi/abs/10.1080/10671188.1940.10624621
Cureton 1941 [133]	Men photographed in standing posture. https://www.tandfonline.com/doi/abs/10.1080/10671188.1941.10624690
Cureton 1941 [134]	Man performing ankle plantarflexion strength test; male researchers measuring ankle joint angles. https://www.tandfonline.com/doi/abs/10.1080/10671188.1941.10624691
Cureton 1941 [135]	Men performing stretches and flexibility tests. https://www.tandfonline.com/doi/abs/10.1080/10671188.1941.10624692
Cureton 1941 [136]	Men performing various resistance exercises; man performing isometric back-and-leg dynamometer strength test as a male researcher monitors hip and knee angles with a goniometer. https://www.tandfonline.com/doi/abs/10.1080/10671188.1941.10624693
Phillips 1941 [137]	Men performing various motor skills with the upper-limbs while a male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1941.10624671
Slater-Hammel 1941 [138]	Man performing lower-limb cycling. https://www.tandfonline.com/doi/abs/10.1080/10671188.1941.10624680
Kireilis 1947 [139]	Men modelling body types, man walking on treadmill, male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1947.10620963
Groves 1950 [140]	Men performing diving techniques. https://www.tandfonline.com/doi/abs/10.1080/10671188.1950.10624839
Slater-Hammel 1950 [141]	Men performing elbow flexor exercise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1950.10624851
Karpovich 1951 [142]	Man measured on chest circumference with measurement tape. https://www.tandfonline.com/doi/abs/10.1080/10671188.1951.10621323
Zorbas 1951 [143]	Man standing performing a test of arm speed. https://www.tandfonline.com/doi/abs/10.1080/10671188.1951.10761933
Solley 1952 [144]	Men performing motor skill striking movement of the upper-limb. https://www.tandfonline.com/doi/abs/10.1080/10671188.1952.10761978
Henderschott 1953 [145]	Male researcher showing an apparatus used for measuring forces of falling objects. https://www.tandfonline.com/doi/abs/10.1080/10671188.1953.10761984
Henry 1953 [146]	Man standing performing arm proprioception test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1953.10624909
Mumby 1953 [147]	Man on hands and knees on stabilimeter. https://www.tandfonline.com/doi/abs/10.1080/10671188.1953.10624929
Clarke 1954 [148]	Man performing wrist flexion strength test; male researchers display spring calibration scale and supervise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1954.10624985
Hubbard 1954 [149]	Man performing baseball swing with two male researchers, one male baseball pitcher, and one male baseball catcher also participating in study. https://www.tandfonline.com/doi/abs/10.1080/10671188.1954.10624942
Rasch 1954 [150]	Man seated performing arm speed test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1954.10624975
Clarke 1955 [151]	Man seated on table performing strength tests and resistance exercise of knee extensors while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1955.10612831
Counsilman 1955 [152]	Male researcher showing rig for swimming biomechanics tests. https://www.tandfonline.com/doi/abs/10.1080/10671188.1955.10612813
Manolis 1955 [153]	Man in football stance ready to be measured on speed of charge. https://www.tandfonline.com/doi/abs/10.1080/10671188.1955.10612818

TABLE 3. Continued.

Author	Photograph description and source link
Van Huss 1955 [154]	Man swimming and modelling test equipment while male researchers supervise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1955.10612822
Clarke 1956 [155]	Man sitting with his upper arm on table undergoing X-ray. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10612881
Hall 1956 [156]	Boy performing pull-ups outside with male researchers and other boys supervising; male researcher supervises girl performing isometric arm pull strength test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10762002
Hall 1956 [157]	Man lying prone on table performing trunk extension while a male researcher holds his legs and measures range of motion with a protractor. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10762003
Johnson 1956 [158]	Boy cycling on stationary bike as male researcher measures the boy's blood pressure. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10612869
Rasch 1956 [159]	Man standing performing an isometric strength test of the elbow flexors. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10762008
Sigerseth 1956 [160]	Man performing arm movements with electromyography electrodes on the shoulder. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10612885
Whitley 1956 [161]	Man performing test of shoulder strength. https://www.tandfonline.com/doi/abs/10.1080/10671188.1966.10614746
Wolbers 1956 [162]	Boys performing partner-assisted isometric resistance exercises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1956.10612888
King 1957 [163]	Men swimming while their technique is assessed by motion capture photographic analysis. https://www.tandfonline.com/doi/abs/10.1080/10671188.1957.10612930
Pacheco 1957 [164]	Man modelling an apparatus used to measure jump performance. https://www.tandfonline.com/doi/abs/10.1080/10671188.1957.10612901
Healy 1958 [165]	Boy with cerebral palsy seated on a table performing resistance exercise of knee extensors. https://www.tandfonline.com/doi/abs/10.1080/10671188.1958.10612990
Rarick 1958 [166]	Boy seated in a chair performing an isometric strength test of the wrist flexors. https://www.tandfonline.com/doi/abs/10.1080/10671188.1958.10762026
Sills 1958 [167]	Man lying on a table performing resistance exercise of one arm while muscle activity of the other arm is measured with electromyography. https://www.tandfonline.com/doi/abs/10.1080/10671188.1958.10612984
Swegan 1958 [168]	Man standing performing elbow flexion-extension movements while joint angle is measured by male researcher. https://www.tandfonline.com/doi/abs/10.1080/10671188.1958.10612965
Thompson 1958 [169]	Male football player in 3-point stance with two male researchers prepared to measure movement time. https://www.tandfonline.com/doi/abs/10.1080/10671188.1958.10612985
Lotter 1959 [170]	Man standing performing speed of movement test of the upper limb. https://www.tandfonline.com/doi/abs/10.1080/10671188.1959.10613008
Mastropaolo 1959 [171]	Man performing fencing techniques while kinetics and kinematics assessed. https://www.tandfonline.com/doi/abs/10.1080/10671188.1959.10613037
Padden 1959 [172]	Deaf male swimmer blindfolded sitting on a pool ledge, then thrown in pool by male researcher. https://www.tandfonline.com/doi/abs/10.1080/10671188.1959.10613027
Wilson 1959 [173]	Man standing performing reaction and movement time tests with the upper limb. https://www.tandfonline.com/doi/abs/10.1080/10671188.1959.10613013
Franklin 1960 [174]	Man standing blindfolded prepared to perform a locomotor test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613289
Henry 1960 [175]	Man standing with the right hand grasping an apparatus designed to measure movement speed. https://www.tandfonline.com/doi/abs/10.1080/10671188.1960.10762051
Smith 1961 [176]	Man performing a test of shoulder strength. https://www.tandfonline.com/doi/abs/10.1080/10671188.1961.10613136
Smith 1961 [177]	Man standing performing reaction and movement time tests with leg and foot. https://www.tandfonline.com/doi/abs/10.1080/10671188.1961.10762076

TABLE 3. Continued.

Author	Photograph description and source link
Cratty 1962 [178]	Man performing a maze learning task in seated and standing positions. https://www.tandfonline.com/doi/abs/10.1080/10671188.1962.10762103
Hermann 1962 [179]	Man modelling placement of surface electromyography electrodes on the chest, arm, and shoulders. https://www.tandfonline.com/doi/abs/10.1080/10671188.1962.10762089
Nelson 1962 [180]	Man performing lower-limb bicycle ergometry with earphones on. https://www.tandfonline.com/doi/abs/10.1080/10671188.1962.10762111
Piscopo 1962 [181]	Boy having abdominal skinfold measured by a male researcher. https://www.tandfonline.com/doi/abs/10.1080/10671188.1962.10613200
Smith 1962 [182]	Man performing hand-eye coordination task. https://www.tandfonline.com/doi/abs/10.1080/10671188.1962.10613205
Faulkner 1963 [183]	Boy having heart rate measured by a male researcher. https://www.tandfonline.com/doi/abs/10.1080/10671188.1963.10613224
Lindeburg 1963 [184]	Boy performing inverted leg press exercise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1963.10613260
Smith 1963 [185]	Boy performing hand steadiness test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1963.10762131
Alexander 1964 [186]	Man performing slap shot in ice hockey rink while wearing hockey gear. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613287
Dempsey 1964 [187]	Men measured on arm circumferences, arm skinfolds, and body morphology via photographs. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613311
Kitzman 1964 [188]	Men performing baseball swings while upper-limb muscle activity is measured via electromyography. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613295
Lindeburg 1964 [189]	Boy performing the isometric leg press while a male researcher measures the boy's knee angle with goniometer. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613296
Pierson 1964 [190]	Man standing performing isometric strength test of the elbow flexors while two male researchers supervise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613315
Sedgwick 1964 [191]	Man performing grip endurance test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613350
Smith 1964 [192]	Man performing reaction time and speed of movement tests of the right upper limb. https://www.tandfonline.com/doi/abs/10.1080/10671188.1964.10613352
Kaye 1965 [193]	Man swimming in pool with flotation device around his waist. https://www.tandfonline.com/doi/abs/10.1080/10671188.1965.10614693
Nelson 1965 [194]	Man seated performing a test of elbow flexion speed against load. https://www.tandfonline.com/doi/abs/10.1080/10671188.1965.10614677
Nelson 1965 [195]	Men performing tests of elbow flexion strength and speed while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1965.10614696
Bowers 1966 [196]	Man performing "autosuggested" elbow flexion and elbow flexion strength test with male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1966.10614755
Howard 1966 [197]	Man running on outdoor track while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1966.10614762
Sharkey 1966 [198]	Man performing lower-limb exercise while oxygen consumption and blood pressure are monitored. https://www.tandfonline.com/doi/abs/10.1080/10671188.1966.10614787
Christina 1967 [199]	Man standing blindfolded performing arm position test while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1967.10613377
Meyers 1967 [200]	Man performing isometric exercise of the left elbow flexors while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1967.10613412
Morehouse 1967 [201]	Man seated in chair performing isometric strength test of the right elbow flexors. https://www.tandfonline.com/doi/abs/10.1080/10671188.1967.10613414
Rivenes 1967 [202]	Men performing a motor learning task. https://www.tandfonline.com/doi/abs/10.1080/10671188.1967.10613419
Woods 1967 [203]	Two boys playing tennis outside while their swing technique is assessed by photography. https://www.tandfonline.com/doi/abs/10.1080/10671188.1967.10614812

TABLE 3. Continued.

Author	Photograph description and source link
Alexander 1968 [204]	Man performing upper- and lower-body resistance exercises with partner. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616524
Belka 1968 [205]	Man seated performing isometric strength test of the elbow flexors while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10618044
Brannon 1968 [206]	Male researcher showing experimental setup of animal motor driven treadmill. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10618065
Fieldman 1968 [207]	Man standing performing toe touch test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616574
Holland 1968 [208]	Man performing a jumping and upper-limb manipulation skills tests. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10618049
Macintosh 1968 [209]	Man lying on a table performing elbow flexion speed test. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616542
Maglisco 1968 [210]	Man performing a swim start while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616586
Marteniuk 1968 [211]	Man performing a reaction time task with his fingers. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10613455
McCatty 1968 [212]	Man swimming with a floatation device. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616588
McGlynn 1968 [213]	Man seated performing an isometric strength test of the index finger. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616541
Prior 1968 [214]	Men running and swimming while assessed with a light tracing technique. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10616626
Singer 1968 [215]	Man sitting on the ground performing the “sit-out maneuver”. https://www.tandfonline.com/doi/abs/10.1080/10671188.1968.10618060
Carlson 1969 [216]	Many lying on a table performing an isometric strength test of elbow flexors. https://www.tandfonline.com/doi/abs/10.1080/10671188.1969.10614865
Glaser 1969 [217]	Man modelling a radiotelemetry transmitter adhered to chest. https://www.tandfonline.com/doi/abs/10.1080/10671188.1969.10614892
Holt 1969 [218]	Man performing handball techniques. https://www.tandfonline.com/doi/abs/10.1080/10671188.1969.10614905
Nelson 1969 [219]	Man measured on speed of elbow flexion movement. https://www.tandfonline.com/doi/abs/10.1080/10671188.1969.10614850
Whitley 1969 [220]	Man seated performing a motor skill task with foot and ankle. https://www.tandfonline.com/doi/abs/10.1080/10671188.1969.10614925
Glaser 1970 [221]	Man modelling a radiotelemetry transmitter mounted on his head. https://www.tandfonline.com/doi/abs/10.1080/10671188.1970.10614974
Hartung 1970 [222]	Man modelling a electrocardiogram harness. https://www.tandfonline.com/doi/abs/10.1080/10671188.1970.10614998
Johnson 1970 [223]	Man standing on a low friction platform. https://www.tandfonline.com/doi/abs/10.1080/10671188.1970.10615006
Molnar 1970 [224]	Man lying supine performing lower-limb bicycle ergometry with two male researchers supervising. https://www.tandfonline.com/doi/abs/10.1080/10671188.1970.10614999
Singh 1970 [225]	Man standing performing isometric back and leg dynamometer strength tests while male researchers supervise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1970.10615016
Walton 1970 [226]	Man performing gymnastics exercise. https://www.tandfonline.com/doi/abs/10.1080/10671188.1970.10614977
Blattner 1971 [227]	Man performing isokinetic squat exercise. https://www.tandfonline.com/doi/abs/10.1080/00345377.1979.10615653
Carlson 1971 [228]	Man lying on a table performing a test of isometric elbow flexion strength. https://www.tandfonline.com/doi/abs/10.1080/10671188.1971.10615067
Meyers 1971 [229]	Man performing body weight squat exercise and strength tests of the lower limbs. https://www.tandfonline.com/doi/abs/10.1080/10671188.1971.10615089

TABLE 3. Continued.

Author	Photograph description and source link
Shaver 1971 [230]	Man lying on a table performing strength and endurance tasks of the elbow flexors. https://www.tandfonline.com/doi/abs/10.1080/10671188.1971.10615057
Freischlag 1973 [231]	Boy performing a motor skill task with the hand while a male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671188.1973.10615193
Ketlinski 1973 [232]	Man performing fencing techniques. https://www.tandfonline.com/doi/abs/10.1080/10671188.1973.10615223
Noble 1973 [233]	Men performing isometric bench and leg press strength tests. https://www.tandfonline.com/doi/abs/10.1080/10671188.1973.10615181
Vorro 1973 [234]	Man measured by stroboscopic photographs while throwing a ball. https://www.tandfonline.com/doi/abs/10.1080/10671188.1973.10615198
Duncan 1974 [235]	Man seated blindfolded ready to perform a reaction time task with electromyography electrodes on his deltoid. https://www.tandfonline.com/doi/abs/10.1080/10671315.1974.10615294
Katch 1974 [236]	Man performing isokinetic lower-limb cycling. https://www.tandfonline.com/doi/abs/10.1080/10671188.1974.10615244
Ashton 1975 [237]	Man performing the back-lift dynamometer test with surface electromyography electrodes on his low back. https://www.tandfonline.com/doi/abs/10.1080/10671315.1975.10616678
Cramer 1975 [238]	Man performing a visual acuity test while under water in a swimming pool. https://www.tandfonline.com/doi/abs/10.1080/10671315.1975.10615310
Croussore 1975 [239]	Man performing a vision test. https://www.tandfonline.com/doi/abs/10.1080/10671315.1975.10616700
Ellison 1975 [240]	Man completing a pain tolerance test while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671315.1975.10615330
Cavanagh 1976 [241]	Men performing karate chop techniques. https://www.tandfonline.com/doi/abs/10.1080/10671315.1976.10616718
Fairbanks 1976 [242]	Man performing simultaneous lower- and upper-limb cranking exercise on a cycle ergometer. https://www.tandfonline.com/doi/abs/10.1080/10671315.1976.10616720
Israel 1976 [243]	Man performing the start and sprint phases of various base stealing techniques. https://www.tandfonline.com/doi/abs/10.1080/10671315.1976.10615362
Fisher 1977 [244]	Man performing the barbell back squat with a goniometer attached to his right lower limb. https://www.tandfonline.com/doi/abs/10.1080/10671315.1977.10762175
Halverson 1977 [245]	Boy performing an overhead ball throw while under biomechanical investigation in a laboratory. https://www.tandfonline.com/doi/abs/10.1080/10671315.1977.10615427
Baker 1978 [246]	Two male researchers test string tension of tennis rackets. https://www.tandfonline.com/doi/abs/10.1080/10671315.1978.10615532
Kermond 1978 [247]	Man with markers on body joints performing punt kick technique in laboratory while male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/10671315.1978.10615507
Shapiro 1978 [248]	Male researcher standing next to a cinematography experimental setup. https://www.tandfonline.com/doi/abs/10.1080/10671315.1978.10615524
Budney 1979 [249]	Man performing golf swing outside while measured on grip pressure. https://www.tandfonline.com/doi/abs/10.1080/10671315.1979.10615610
Gabbard 1979 [250]	Boy performing arm hang test while a female researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/00345377.1979.10615670

TABLE 4. Descriptions of photographs published in various journals before 1980 that include male researchers or participants.

Journal	Author year	Photograph description and source link
Acta Paediatr Scand	Eklblom 1968 [251]	Man in wheelchair performing upper-body cycling ergometer while supervised by a male and female researcher. https://onlinelibrary.wiley.com/doi/10.1111/j.1651-2227.1968.tb07280.x
Acta Physiol Scand	Ballesteros 1965 [252]	Man standing modelling telemetry system on head and electromyography electrodes on body used to measure muscle activity during walking. https://onlinelibrary.wiley.com/doi/10.1111/j.1748-1716.1965.tb04069.x
Am Correct Ther J	Carlson 1971 [253]	Man standing on rotating platform that uses gravity as a loading force for isometric exercise. https://pubmed.ncbi.nlm.nih.gov/5545662/
Am Correct Ther J	Wertz 1974 [254]	Male quadriplegic patients performing resistance exercises. https://pubmed.ncbi.nlm.nih.gov/4851194/
Am J Med Sci	Beyer 1894 [255]	Man performing tests of muscle strength: back-leg dynamometer, dips, pull-ups, grip. https://wellcomecollection.org/works/yvkzrnre
Am J Phys Med	Gregg 1957 [256]	Man lying supine holding dumbbell in right hand while electromyography measured from right biceps. https://journals.lww.com/ajpmr/citation/1957/10000/cross_exercise_a_review_of_the_literature_and.2.aspx
Am J Phys Med	DeVries 1968 [257]	Man lying supine on table performing an isometric strength test of elbow flexors. https://journals.lww.com/ajpmr/citation/1968/02000/_efficiency_of_electrical_activity__as_a.4.aspx
Am Phys Educ Rev	McKenzie 1970 [258]	Boys modelling spinal postures. https://www.tandfonline.com/doi/pdf/10.1080/23267224.1907.10650323
Am Phys Educ Rev	McKenzie 1918 [259]	Male soldiers performing exercises of the upper and lower limbs. https://www.tandfonline.com/doi/abs/10.1080/23267224.1918.10650732?src=recsys
Am Phys Educ Rev	Perry 1922 [260]	Man performing resistance exercises. https://www.tandfonline.com/doi/abs/10.1080/23267224.1922.10650805
Ann Phys Med	Chapman 1970 [261]	Man standing performing horizontal isometric pull exercise with the upper-limbs. https://academic.oup.com/rheumatology/article-abstract/10/6/262/1790817
Arch Phys Med Rehabil	DeLorme 1946 [262]	Men performing resistance exercises. https://pubmed.ncbi.nlm.nih.gov/21000039/
Arch Phys Med Rehabil	DeLorme 1948 [263]	Man performing resistance exercises. https://pubmed.ncbi.nlm.nih.gov/18860422/
Arch Phys Med Rehabil	DeLorme 1949 [264]	Boy performing resistance exercise of the hip rotators. https://pubmed.ncbi.nlm.nih.gov/18128254/
Arch Phys Med Rehabil	DeLorme 1952 [265]	Boy measured on muscle contraction time of the elbow flexors and knee extensors. https://pubmed.ncbi.nlm.nih.gov/14904187/
Arch Phys Med Rehabil	McMorris 1954 [266]	Man seated performing a test of upper-limb strength; man standing while back development assessed. https://pubmed.ncbi.nlm.nih.gov/13181572/
Arch Phys Med Rehabil	Humphrey 1958 [267]	Boy supine and strapped to a table measured on neck flexor strength via a head and neck harness and weight plates hanging from his head. https://pubmed.ncbi.nlm.nih.gov/13572151/
Arch Phys Med Rehabil	Sutton 1963 [268]	Man performing triceps extension and lateral raise resistance exercises with a male researcher assisting in the triceps extension exercise. https://pubmed.ncbi.nlm.nih.gov/13979424/
Arch Phys Med Rehabil	Smith 1965 [269]	Man seated grasping a handle with his right hand and measured on arm speed. https://pubmed.ncbi.nlm.nih.gov/5843862/
Arch Phys Med Rehabil	Gardner 1966 [270]	Man measured on joint range of motion and performing resistance exercise of the elbow and knee flexors. https://pubmed.ncbi.nlm.nih.gov/5902995/

TABLE 4. Continued.

Journal	Author year	Photograph description and source link
Arch Phys Med Rehabil	Machover 1966 [271]	Man performing an isometric contraction of the knee extensors. https://pubmed.ncbi.nlm.nih.gov/5926405/
Arch Phys Med Rehabil	Thistle 1967 [272]	Man performing isokinetic knee extension exercise. https://pubmed.ncbi.nlm.nih.gov/6026595/
Arch Phys Med Rehabil	Less 1977 [273]	Man performing finger exercise with the Hand Gym apparatus. https://pubmed.ncbi.nlm.nih.gov/880015/
Arch Phys Med Rehabil	Gettman 1979 [274]	Man performing isokinetic resistance exercise. https://pubmed.ncbi.nlm.nih.gov/880015/
Br J Phys Med	Zinovieff 1951 [275]	Man performing resistance exercise of the knee extensors with a plate-loaded boot and measured on isometric strength of the knee extensors with a strain gauge. https://pubmed.ncbi.nlm.nih.gov/14839228/
Br J Sports Med	Barker 1972 [276]	Men performing partner push-ups. https://bjsm.bmj.com/content/6/3-4/138
Br Med J	Nicoll 1943 [277]	Man seated in chair performing upper-limb pulley exercise. https://www.bmj.com/content/1/4302/747
Electromyography	Chapman 1969 [278]	Men performing horizontal pull exercise with the upper limbs; one man has electromyography electrodes on his lumbar extensor muscles. https://pubmed.ncbi.nlm.nih.gov/5372286/
Ergonomics	Whitley 1967 [279]	Man performing test of arm movement speed in the horizontal plane. https://www.tandfonline.com/doi/abs/10.1080/00140136708930872
Hum Factors	Morehouse 1959 [280]	Man performing isometric strength tests of various muscle groups; male researcher holds spring scale that participant produces force against. https://journals.sagepub.com/doi/10.1177/001872085900100206
Hum Factors	Smith 1968 [281]	Man performing grip strength test. https://journals.sagepub.com/doi/10.1177/001872086801000404
Int Z Angew Physiol	Rarick 1959 [282]	Boy seated performing isometric strength test and training for the wrist flexors. https://link.springer.com/article/10.1007/BF00699032
Int Z Angew Physiol	Rohmert 1960 [283]	Man standing performing upper-limb strength tests in different upper-limb postures. https://link.springer.com/article/10.1007/BF00698871
Int Z Angew Physiol	Seliger 1968 [284]	Man performing the barbell back squat while wearing an oxygen consumption mask. https://link.springer.com/article/10.1007/BF00695111
J Bone Joint Surg	Brunnstrom 1941 [285]	Boys modelling movement of the shoulder and scapulae. https://journals.lww.com/jbjsjournal/abstract/1941/23020/muscle_testing_around_the_shoulder_girdle__a_study.5.aspx
J Bone Joint Surg	DeLorme 1945 [286]	Man performing resistance exercises. https://journals.lww.com/jbjsjournal/abstract/1945/27040/restoration_of_muscle_power_by_heavy_resistance.14.aspx
J Bone Joint Surg	Gallagher 1949 [287]	Boys performing knee extension and leg press resistance exercise. https://journals.lww.com/jbjsjournal/abstract/1949/31040/the_use_of_the_technique_of_progressive_resistance.18.aspx
J Health Phys Educ	Edwards 1940 [288]	Man performing resistance exercises. https://www.tandfonline.com/doi/abs/10.1080/23267240.1940.10622793
J Health Phys Educ	Bender 1964 [289]	Man performing resistance exercise of the knee extensors and flexors. https://www.tandfonline.com/doi/abs/10.1080/00221473.1964.10611645
J Health Phys Educ	Hay 1969 [290]	Man lying on table simulating high jump positions; man lying supine on bench performing barbell bench press exercise. https://www.tandfonline.com/doi/abs/10.1080/00221473.1969.10613906
J Health Phys Educ	Ness 1974 [291]	Mentally handicapped men performing resistance exercises while supervised by a male researcher. https://www.tandfonline.com/doi/abs/10.1080/00221473.1974.10612178

TABLE 4. Continued.

Journal	Author year	Photograph description and source link
J Sports Med Phys Fitness	Baley 1967 [292]	Men and boys performing isometric resistance exercises using a strap around the upper- and lower-limbs and head. https://pubmed.ncbi.nlm.nih.gov/5582935/
J Am Med Assoc	Mead 1950 [293]	Man performing trunk extension resistance exercise with added load and counter load. https://jamanetwork.com/journals/jama/article-abstract/296603
J Am Phys Ther Assoc	Patridge 1962 [294]	Boy performing shoulder abduction movement before and after exercise program. https://academic.oup.com/ptj/article-abstract/42/4/233/4630078
J Am Phys Ther Assoc	Hislop 1963 [295]	Man lying on a table performing isometric muscle contractions of the elbow flexors. https://academic.oup.com/ptj/article/43/1/21/4628479
J Am Phys Ther Assoc	Pierson 1963 [296]	Man standing performing isometric elbow flexion exercise while two male researchers supervise. https://academic.oup.com/ptj/article/43/8/582/4628825
J Assoc Phys Ment Rehabil	Muller 1957 [297]	Man performing an isometric contraction of the elbow flexors
J Assoc Phys Ment Rehabil	Klein 1962 [298]	Men performing resistance exercise of the knee extensors. https://pubmed.ncbi.nlm.nih.gov/14456760/
J Assoc Phys Ment Rehabil	Klein 1963 [299]	Men performing resistance exercise of the knee extensors while a male researcher supervises. https://pubmed.ncbi.nlm.nih.gov/14055461/
J Assoc Phys Ment Rehabil	Klein 1964 [300]	Man performing hip adduction resistance exercise. https://pubmed.ncbi.nlm.nih.gov/14206416/
J Assoc Phys Ment Rehabil	Leighton 1964 [301]	Man performing overhead jerk exercise and man in bodybuilding pose. https://pubmed.ncbi.nlm.nih.gov/14174593/
J Assoc Phys Ment Rehabil	Klein 1965 [302]	Man performing resistance exercises while a male researcher supervises. https://pubmed.ncbi.nlm.nih.gov/5828761/
Lancet	Russell 1954 [303]	Man seated grasping a dynamometer used to measure grip strength and endurance. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(54)91084-3
N Engl J Med	Watkins 1948 [304]	Man performing trunk extension resistance exercise with counter load. https://www.nejm.org/doi/10.1056/NEJM194804292381805
Percept Mot Skills	Smith 1970 [305]	Man lying on a table with a male researcher securing a device to the leg to measure movement and reaction time. https://journals.sagepub.com/doi/abs/10.2466/pms.1970.30.3.775
Phys Ther	Kendall 1965 [306]	Man and boy performing sit-ups while male researcher holds their ankles. https://academic.oup.com/ptj/article/45/3/187/4615764
Phys Ther	May 1968 [307]	Man performing tests of isometric hip abductor strength while lying on a table and standing with a male researcher supervising. https://academic.oup.com/ptj/article/48/8/845/4615140
Phys Ther	Moffroid 1969 [308]	Man seated performing isokinetic muscle contractions of the left knee extensors. https://academic.oup.com/ptj/article/49/7/735/4595866
Phys Ther	Inaba 1973 [309]	Male patient lying supine on a table performing resistance exercise. https://academic.oup.com/ptj/article/53/1/28/4566673
Phys Ther Rev	Gurewitsch 1952 [310]	Male polio patient performing resistance exercises. https://academic.oup.com/ptj/article-abstract/40/8/577/4648381
Phys Ther Rev	Lawrence 1960 [311]	Man performing resistance exercise of the knee extensors. https://academic.oup.com/ptj/article-abstract/32/7/366/4696854
Physiotherapy	MacQueen 1956 [312]	Men performing resistance exercise and showing joint mobility issues. https://pubmed.ncbi.nlm.nih.gov/13349474/
Physiother Rev	Keith 1947 [313]	Men with paralysis performing resistance exercises while male researcher supervises. https://academic.oup.com/ptj/article-abstract/27/1/10/4709056

TABLE 4. Continued.

Journal	Author year	Photograph description and source link
Public Health Rep	Martin 1920 [314]	Man performs various tests of isometric strength against a strain gauge held by a male researcher and as two other male researchers supervise. https://www.jstor.org/stable/4575683
Scand J Rehabil Med	Nilsson 1975 [315]	Male paraplegic patients seated on floor performing upper-limb cycling ergometry and resisted dip exercise. https://pubmed.ncbi.nlm.nih.gov/1162298/
Physician Sportsmed	Costill 1977 [316]	Man performing resistance exercise of the right knee extensors while a male researcher supervises. https://www.tandfonline.com/doi/abs/10.1080/00913847.1977.11710615

contain photographs of male participants, aggregating them into a bibliometric list, and describing them. A total of 733 photographs from 304 papers were identified. They depicted 46 boys and 475 men undergoing various experimental procedures. Participants were often shown completing tests of muscle strength, having their oxygen consumption measured during cycling and other activities, performing various sport and motor learning skills, and being assessed on body build and posture.

4.1 Education

The bibliometric list can aid efforts by lecturers and writers to educate audiences about the history of exercise science research. The bibliometric list can be used as a quick reference to find photographs that are relevant to the topic of one's presentations or writings. After educators obtain relevant copyright permissions, they can use the photographs in classroom lectures, conference presentations, journal articles, and textbooks. Such photographs can be used to help achieve Ivy's [3] suggestion that the history of exercise science be taught to undergraduate students to help them "acquire an appreciation for the discipline of exercise physiology" and understand how the field has evolved over time. Use of such photographs might also facilitate an overall greater interest in and knowledge of exercise science history.

4.2 Male participants

The current research focused on male participants because there is currently a need to give male experiences and contributions their own space for acknowledgment. Within exercise physiology, a growing number of researchers have been conducting audits of journals and reporting on numbers of male and female research participants [317]. The underlying rationale for these audits is often that women have been historically "underrepresented" in research trials and that this imbalance needs to be corrected. Putting aside the sometimes-inaccurate portrayal of women's representation as participants in exercise and medical research [10, 318, 319], contextual discussion points about men's more frequent research participation often are absent from this audit literature. Lack of contextual discussion about men's early research participation occurs, in part, because authors of audit papers frequently assume that greater male than female representation is due to bias against women. However, there are many factors other than gender bias that can contribute to sex differences in research representations

[317, 319, 320]. One example is the sex of the researcher [321, 322]. Other examples include sex differences in interest and willingness to participate in certain types of experiments [317, 319, 320] and sex differences in factors that are considered when deciding to participate in a study [317, 320]. One recent survey about exercise research participation revealed that men are more willing than women to undergo procedures that are discomforting, exhaustive, and involve monitoring or improving muscle mass and power. Moreover, compared to the women who completed the survey, the men reported being less concerned about their confidence to complete the study procedures and less concerned about the anxiety they might experience during the experiment [317, 320]. Results from other survey studies also support the existence of sex differences in interest and willingness to participate in specific types of research [319]. These sex differences are important to acknowledge because they illustrate the unique ways that men and masculinity contribute to society and the advancement of science—for example, through risk taking [323].

Photographs in the current bibliometric list illustrate what men's historical participation in exercise physiology has entailed. These photographs show men participating in a range of physiological and medical procedures. It is difficult to imagine women being more likely than men to volunteer to undergo many of these procedures. Some examples include exposure to high gravitational forces or other environmental conditions that cause "blackouts" or increase the risk of losing consciousness [23, 37, 53, 324]; exposure to gasses that cause itchiness and damage to the skin of the face [87]; sitting on an apparatus designed to induce motion sickness [16]; and standing on one's head while cardiorespiratory outcomes are measured [31, 35, 65]. In another study, men who were deaf or who had trouble hearing were dumped into a swimming pool to try to better understand human proprioception [172]. Finally, two papers on the bibliometric list include photographs of men sitting on moving cars, while holding gas collection bags, which are attached to a man who is running next to the moving car [79, 94].

The idea that men might be more willing to expose themselves to unique and risky medical and physiological scenarios is not new. In the first half of the 1900s, men were recognized as the "martyrs of medicine", sometimes submitting themselves to risky experiments that resulted in illness or death [325]. Such aspects of men's historical participation in medical research lacks explicit mention in contemporary writings on research participant representations. Moreover, to

the extent that men might have been more frequent participants in early research than women, this should not be automatically regarded as a negative for women. Men might have spared women from participating in certain experimental procedures until such procedures were better understood and deemed safe.

4.3 Male researchers

Male participants, not male researchers, were the focus of the current study. Nevertheless, male researchers appeared in many of the photographs. They were often shown conducting, observing, and supervising the research.

Some recent historical work has highlighted male accomplishments in exercise science, including men being the most prolific researchers of resistance exercise [11] and the inventors of nearly all resistance exercise equipment [12]. However, other opportunities for highlighting male accomplishment in the field have been missed. For example, de Koning *et al.* [326] surveyed 52 exercise scientists about essential readings for undergraduate and graduate students. From the survey responses, de Koning *et al.* [326] generated the “100 essential papers in sports and exercise physiology”. A quick browse of the top 100 list seemed to indicate that most of the papers were written by male researchers. Yet, sex of the researchers was not considered [326]. A secondary analysis of the top 100 list, presented here in Fig. 1 (Ref. [326]), reveals that men were first authors of 95 of the top 100 papers. Such important male contributions to humanity warrant acknowledgement, in part, to combat misguided negative portrayals of men and masculinity made in academia and the media (*e.g.*, “male privilege”, “toxic masculinity”) [4–9].

4.4 Limitations

The current research has limitations. First, the entire archives prior to 1980 were searched for only three journals. Papers published in other journals were identified, but these discoveries resulted from searches of personal digital files related to previous historical work [10, 11]. Thus, some photographs of boys and men published in certain journals are likely missing from the bibliometric list. Future work can aim to identify additional photographs of boys and men participating in exercise science experiments prior to 1980. The journals in which photographs were most likely missed include general medicine journals and physical medicine and therapy journals (*e.g.*, Archives of Physical Medicine and Rehabilitation, Physical Therapy).

Second, the current research focused on papers published before 1980. This era of research was chosen because it is the oldest era, it aligned with other exercise history papers [10–12], and it limited the scope of the work to allow for more feasible completion of the bibliometric list. Nevertheless, papers in the 1980s and 1990s will also contain photographs of boys and men participating in exercise and physical medical research. Identifying and creating a bibliometric list of these photographs is something that can be addressed in future research. This future research can also focus on subareas of exercise and physical medicine and present photographs that show the evolution of laboratory techniques and exercise equipment over time.

Third, the current study’s bibliometric list is likely biased toward topics associated with the author’s previous historical research (*i.e.*, resistance exercise, tests of neuromuscular function) [11]. Nevertheless, the current study is a “first step” in identifying photographs that depict the history of exercise

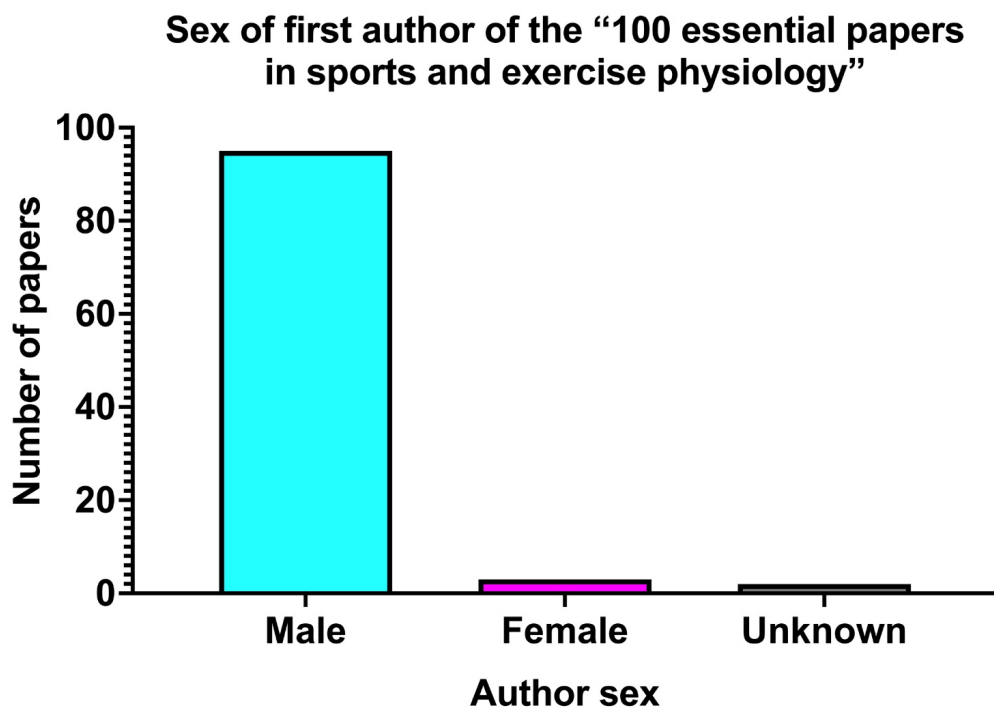


FIGURE 1. Sex of the first author of the “100 essential papers in sports and exercise physiology”. These data on author sex are a secondary analysis of the list of top 100 papers presented by de Koning *et al.* [326].

science research. Future work can focus exclusively on other exercise modalities and test types.

Fourth, the current work focused explicitly on boys and men. The current work did not identify papers that include photographs of girls and women. This was not done to dismiss or minimize the role of female participants in early exercise research. Instead, it was done to limit the scope of the work and provide a dedicated space for presentation and discussion of male experiences and contributions. The author is currently developing a similar bibliometric list of exercise and physical medicine papers that include photographs of girls and women participating in early research.

4.5 Conclusion

Photographs of male participants in early exercise and physical medicine research papers were identified, aggregated into a bibliometric list and described. The bibliometric list can be used as a quick reference for educators who want to find historical photographs to use in their lectures and writings. Presentation of photographs is likely to facilitate learning of the history of exercise science. The role that men have played as participants and conductors of this early research ought to also be emphasized in future education efforts.

AVAILABILITY OF DATA AND MATERIALS

Data from this study are available upon reasonable request made to the author.

AUTHOR CONTRIBUTIONS

JLN—designed and performed the research, analyzed the data, wrote the manuscript, revised the manuscript and read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval is not required for a review of published literature.

ACKNOWLEDGMENT

The author acknowledges the BC3 forum for helpful discussions.

FUNDING

This research received no external funding.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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How to cite this article: James L. Nuzzo. Bibliometric guide to photographs of male participants in early exercise and physical medicine research. *Journal of Men's Health*. 2024; 20(12): 9-32. doi: 10.22514/jomh.2024.197.