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## OPEN

# Inconsistent Use of Resistance Exercise Names in Research Articles: A Brief Note

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## Abstract

Nuzzo, JL. Inconsistent use of resistance exercise names in research articles: a brief note. *J Strength Cond Res* 35(12): 3518–3520, 2021—Academic fields require standard nomenclature to communicate concepts effectively. Previous research has documented resistance training exercises are named inconsistently. This inconsistent use has been observed among fitness professionals and within resistance training textbooks. The purpose of the current note was to explore inconsistent use of resistance training exercise names in scientific articles. Keyword searches were performed in PubMed to identify articles that referred to 4 different resistance training exercises. The search was limited to titles and abstracts of articles published between 1960 and 2020. For exercise 1, “shoulder press,” “overhead press,” and “military press” were searched. For exercise 2, “arm curl,” “bicep curl,” and “biceps curl” were searched. For exercise 3, “hamstring curl,” “leg curl,” and “knee curl” were searched. For exercise 4, “calf raise” and “heel raise” were searched. For exercise 1, 114 articles included “shoulder press” in their title or abstract, 42 articles included “overhead press,” and 45 articles included “military press.” For exercise 2, 244 articles included “arm curl,” 37 articles included “bicep curl,” and 177 articles included “biceps curl.” For exercise 3, 24 articles included “hamstring curl,” 159 articles included “leg curl,” and 7 articles included “knee curl.” For exercise 4, 68 articles included “calf raise” and 154 articles included “heel raise.” The results are evidence of inconsistent use of resistance training exercise names in scientific articles. A possible solution to inconsistent use of exercise names in research articles, educational texts, and clinical practice is a system that includes a standard exercise naming pattern and guidelines for communicating exercise names.

**Key Words:** fitness, language, nomenclature, strength, taxonomy, terminology

## Introduction

Academic fields require standard nomenclature to communicate concepts effectively. The field of strength and conditioning is no exception. Results from 2 studies have documented resistance training exercises are named inconsistently (6,7). In 2013, Jackson et al. (6) showed 205 fitness professionals photographs of 10 resistance training exercises and asked them to name the exercises. Fitness professionals responded with dissimilar exercise names and appeared to use different naming patterns when referring to the exercises. In 2017, Nuzzo (7) analyzed the names of 57 exercises in a resistance training technique manual. The analysis revealed inconsistent uses of words and word patterns for exercise names. Thus, to date, previous research has documented inconsistent use of exercise names in educational texts and among fitness professionals. The purpose of the current note was to explore the possibility of inconsistent use of resistance training exercise names in scientific articles. Results from such work might have implications for how information about resistance training is communicated with students and the general public and also how it is communicated between health professionals and researchers.

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## Methods

### Experimental Approach to the Problem

To explore potential inconsistent use of resistance exercise names in research, keyword searches were performed in PubMed to identify articles that referred to 4 different resistance training exercises.

### Procedures

The PubMed search was limited to the titles and abstracts of articles published between January 1, 1960, and December 31, 2020. The TIAB term in PubMed limits searches to the titles and abstracts of articles. The DP term in PubMed limits searches to the range of dates entered.

For exercise 1, the names “shoulder press,” “overhead press,” and “military press” were searched (e.g., “shoulder press” [TIAB] 1960/01/01:2020/12/31 [DP]). For exercise 2, the names “arm curl,” “bicep curl,” and “biceps curl” were searched. For exercise 3, the names “hamstring curl,” “leg curl,” and “knee curl” were searched. “Knee flexion” was not searched for exercise 3 because its use is common outside of the context of physical exercise. For exercise 4, “calf raise” and “heel raise” were searched. These 4 exercises were selected because they were part of the previous content analysis of educational texts (7) and were hypothesized to show inconsistencies. Example photographs of the movement patterns usually associated with exercises 1, 2, 3, and 4 can be found on pages 394 (or 395), 367, 393, and 369 (or 370) of the

**Table 1**  
**Number of times exercise names have been used in titles or abstracts of articles indexed in PubMed.**

Exercise names	Pre 2011	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Sum
Exercise 1												
“Shoulder press”	43	8	5	11	8	4	4	3	5	9	12	112
“Overhead press”	18	0	0	2	4	1	2	1	4	2	8	42
“Military press”	25	1	0	3	2	2	0	0	2	4	4	43
Exercise 2												
“Arm curl”	72	5	11	15	11	18	23	14	20	24	31	244
“Bicep curl”	11	0	2	2	2	1	4	1	4	4	6	37
“Biceps curl”	65	9	5	11	10	8	11	16	7	19	16	177
Exercise 3												
“Hamstring curl”	9	0	0	0	2	4	0	1	0	4	4	24
“Leg curl”	50	4	5	12	7	12	9	9	16	20	15	159
“Knee curl”	4	0	1	0	0	0	0	0	1	1	0	7
Exercise 4												
“Calf raise”	23	1	3	4	4	3	3	4	4	6	13	68
“Heel raise”	42	10	8	7	7	8	15	12	12	17	16	154

*Essentials of Strength Training and Conditioning* (4th edition) textbook, respectively (3). Use of the names of these exercises was also specifically examined in the *Journal of Strength and Conditioning Research (JSCR)*, as *JSCR* is one of the most notable journals for disseminating information on resistance training. In PubMed, the JOUR term was used to limit searches to *JSCR* (e.g., j strength cond res [JOUR] “shoulder press” [TIAB] 1960/01/01:2020/12/31 [DP]).

**Statistical Analyses**

Titles of the identified articles were screened to remove any articles that included use of the searched phrase in a way that was unrelated to physical exercise or muscle strength testing. Then, the number of articles that included the searched phrase in relation to physical exercise or muscle strength testing was recorded (i.e., frequency count). No further statistical analyses were performed.

**Results**

Of the articles identified, 4 were deemed ineligible because they did not relate to physical exercise or muscle strength testing. Two

of the excluded articles were associated with “military press,” and 2 were associated with “shoulder press.”

Table 1 displays results for the number of times exercise names were used in titles or abstracts of all articles indexed in PubMed. For exercise 1, the most commonly used name was “shoulder press.” For exercise 2, “arm curl” was the most common. For exercise 3, “leg curl” was the most common. For exercise 4, “heel raise” was the most common.

Table 2 displays the number of times exercise names were used in titles or abstracts of articles indexed in PubMed and published in *JSCR*. For exercise 1, “shoulder press” was the most common. For exercise 2, “biceps curl” was the most common. For exercise 3, “leg curl” was the most common. For exercise 4, “calf raise” and “heel raise” were used nearly the same number of times.

**Discussion**

Previous research has documented resistance exercises are named inconsistently in educational texts (7) and among health and fitness professionals (6). Results from the current analysis illustrate resistance exercises are also named

**Table 2**  
**Number of times exercise names have been used in titles or abstracts of articles indexed in PubMed and published in the Journal of Strength and Conditioning Research.**

Exercise names	Pre 2011	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Sum
Exercise 1												
“Shoulder press”	18	4	3	2	0	3	1	1	0	2	3	37
“Overhead press”	5	0	0	1	3	0	0	1	1	2	5	18
“Military press”	5	1	0	1	1	0	0	0	0	1	0	9
Exercise 2												
“Arm curl”	12	1	2	1	0	0	1	1	2	0	0	20
“Bicep curl”	2	0	1	0	0	0	2	0	0	0	1	6
“Biceps curl”	16	3	2	2	3	3	2	4	0	5	2	42
Exercise 3												
“Hamstring curl”	4	0	0	0	0	0	0	0	0	1	0	5
“Leg curl”	13	1	1	4	1	5	3	3	5	5	2	43
“Knee curl”	0	0	0	0	0	0	0	0	0	0	0	0
Exercise 4												
“Calf raise”	1	0	1	1	0	0	1	0	1	0	1	6
“Heel raise”	1	2	1	0	0	0	0	0	0	0	1	5

inconsistently in research articles. Thus, inconsistent use of exercise names is a pervasive issue.

Results from the current analysis reveal inconsistent use of exercise names in research articles for 4 different exercises. The magnitude of the problem may be underestimated given the study methods. For example, only titles and abstracts of articles indexed in PubMed were searched. Inconsistent use of exercise names will likely be magnified when entire texts of articles indexed in PubMed and other databases are analyzed. Also, only 4 exercises were assessed, and not all potential names were searched for the 4 exercises. For example, although the name “knee flexion” is sometimes used in research to describe exercise 3 (8,9), the name was not searched because it is commonly used in research that is unrelated to physical exercise or muscle strength testing. Thus, inconsistent use of exercise names is likely to be magnified when more exercises and more name variations are searched.

Some differences existed between the use of the exercise names in *JSCR* compared with all journals. For exercise 2, articles published in *JSCR* were more likely to include “biceps curl” than “arm curl.” For exercise 3, articles published in *JSCR* were equally likely to include “calf raise” and “heel raise,” whereas in all journals, “heel raise” was more common. These findings suggest researchers in different professional groups might use different exercise names. For example, “arm curl” was used in 22 different articles published in the following 4 aging and geriatrics journals: *Aging Clinical and Experimental Research*, *Archives of Gerontology and Geriatrics*, *Clinical Interventions in Aging*, *Geriatrics and Gerontology International*. “Biceps curl” appeared in the titles or abstracts of only 2 articles published in these 4 journals. This observation can be explained, in part, by the use of the “arm curl test” of muscle strength and endurance in physical fitness batteries for older adults.

The current analysis does not reveal which exercise names are correct. To determine this, further research and discussion on exercise names are necessary. Survey research can be used to understand exercise names that are used most commonly among the general population and fitness professionals. Such results might then inform professional consensus on how exercises should be named and what names should be used in the future. Such a consensus might involve input from physical culture historians, personal trainers, strength and conditioning coaches, physical therapists, and exercise science researchers. Physical culture historians might describe changes in the use of exercise names over time. For example, they could describe why and when the “deep knee bend” (1,2,5) was renamed the “squat” and why and when the “prone press” (4) was renamed the “bench press.” Personal trainers, strength and conditioning coaches, and physical therapists might describe what exercise names are most effective at communicating exercise information with clients, athletes, and patients. Exercise science researchers might contribute abstract knowledge associated with rules for naming exercises based on anatomical and biomechanical principles. For example, Jackson et al. (6) and Nuzzo (7) have quantified and discussed the general types of words used in exercise names. Further discussion about such information might help to develop a standard word pattern for naming exercises. Such information might also help journal editors decide if they want authors to adopt specific

exercise names when publishing research articles in their journals.

### Practical Applications

A solution to inconsistent use of exercise names in research and practice is the development of a taxonomy or system of naming exercises. Until such a system is developed, exercise information can be communicated in a way that balances scientific accuracy with communication effectiveness. This balance might depend on the context of the communication. For example, the name used to communicate an exercise might depend on the knowledge and previous experience of the individual being communicated with (e.g., general population, athlete, and other coaches or researchers) or the outlet for communication (e.g., a blog, television interview, student textbook, and research article). Also, until such a taxonomy is developed, researchers can consider adding photographs of exercises in appendices or supplemental materials to ensure readers are certain which exercises were completed by study subjects. When this is not possible, a textbook with relevant photographs can be cited and information on body posture (e.g., seated and standing) and type of equipment used (e.g., dumbbell, barbell, and machine) can be included in the article’s text. Similarly, for coaches and fitness professionals who prescribe exercise remotely, photographs and videos of exercises can be included along with exercise names to ensure the prescribed version of the exercise is performed. Also, as individuals refer to exercises by different names, developers of fitness applications for mobile phones might consider indexing a given exercise under multiple names to ensure its discovery within the application.

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