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Self-Efficacy and Dive-Roll Performance in Physical Education: A Simulated Regression Analysis

*Poppy Elisano Arfanda[1], Ians Aprilo[1], M. Adam Mappaompo[1], Retno Farhana Nurulita[1], Nurliani[1]
[1]Faculty of Sports and Health Sciences, Universitas Negeri Makassar, Indonesia
Corresponding Author: Ians Aprilo, poppy.elisano@unm.ac.id

Abstract

Objectives:
To illustrate how magnitude, strength, and generality of task-specific self-efficacy can be evaluated jointly in a regression model of dive-roll performance.

Materials and Methods: A dataset of 50 simulated records illustrated a cross-sectional correlational design for use in physical education. The proposed measures were a 24-item self-efficacy questionnaire and a five-component dive-roll rubric. The analysis summarized the simulated scores, examined univariate distributions and bivariate quadratic terms, and used multiple linear regression with the three self-efficacy dimensions as predictors.

Results:
The regression model accounted for 38.0% of the variance in simulated dive-roll scores (multiple $R = .616$, $R^2 = .380$, adjusted $R^2 = .339$), $F(3, 46) = 9.391$, $p < .001$.

Conclusions:
The simulation illustrates how task-specific efficacy scores can be modeled alongside dive-roll performance. An empirical assessment using observed student data and validated scoring procedures is needed to estimate the relationship in physical education classes.

Keywords: self-efficacy, dive roll, floor gymnastics, physical education, simulated data

Introduction

The dive roll, known in Indonesia as loncat harimau, is a floor gymnastics skill that links a forward take-off and flight to hand support, a forward roll, and a controlled finish. A student may perform each element successfully in isolation and still have difficulty linking them. This distinction matters in physical education teacher preparation, where students are expected to execute the movement, recognize errors, and give feedback on the phase in which a difficulty occurs. Research on dive-roll assessment has shown that observable criteria can be used to evaluate the phases of the skill systematically (Costa et al., 2019).

Technical readiness is only one part of attempting the movement. Students also make judgments about whether they can execute a particular action under the conditions in which it will be assessed. Bandura (1977) described self-efficacy in terms of the difficulty of actions a person believes they can perform (magnitude), the strength of that belief, and the range of conditions across which the belief applies (generality). In a dive roll, a student may feel capable of taking off yet feel less certain about controlling the transition from flight to hand support. A task-specific measure can make those differences visible and can be aligned with the performance criteria used in class.

Research across sports supports an association between efficacy beliefs and performance. Moritz et al. (2000) identified the match between the efficacy measure and the performance outcome as an important moderator. Lochbaum et al. (2023) estimated a mean correlation of .31 between pre-event self-efficacy and sport performance, with substantial variation across settings. In artistic gymnastics, Marzoli et al. (2026) found

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that associations varied across tasks, samples, and approaches to measurement. Meanwhile, dive-roll studies have examined the quality of performance assessment and the role of feedback in skill learning (Costa et al., 2019, 2024). These lines of work support measuring beliefs and performance in terms of the same movement, while leaving open how they are related in a university floor gymnastics class.

The objective of this article was to illustrate how multiple linear regression can estimate the proportion of variation in simulated dive-roll scores jointly accounted for by magnitude, strength, and generality. The accompanying protocol describes how the same research question could be investigated empirically among physical education students.

Materials and Methods

Study Design

The analysis used 50 simulated records to illustrate a cross-sectional, correlational design. The analytical model treated three self-efficacy dimensions as predictors and a dive-roll performance score as the outcome. The simulation was available as aggregate summaries. The data-generation procedure, record-level data, and software output were unavailable for independent reproduction of the analyses.

Study Participants

The intended setting for an empirical application was an undergraduate floor gymnastics course in the Physical Education Study Program, Faculty of Sports and Health Sciences, Universitas Negeri Makassar, Indonesia, during the first semester of the 2026–2027 academic year. The proposed protocol specified purposive recruitment of enrolled students who consented and met the safety requirements for practical testing. The age and sex categories in the analysis describe simulated records. No recruitment or practical assessment contributed observations to the analyses reported here.

Study Organization

The proposed task-specific questionnaire comprised 24 items covering magnitude (9 items), strength (9 items), and generality (6 items). Responses ranged from 1 (not at all confident) to 5 (very confident), giving a possible raw item-sum score of 24–120. The proposed observational rubric covered approach, take-off, flight, hand support, and roll and finish. Each component was to be scored from 1 to 5, yielding a possible raw rubric sum of 5–25. The simulated summaries report dimension-level scores, a self-efficacy composite, and a performance score on different metrics from those raw totals. The exact aggregation and scaling rules for the simulated scores were unavailable.

In the proposed classroom protocol, students would complete the questionnaire before the skill assessment to limit the immediate influence of the test attempt on their responses. A warm-up and familiarization would precede the supervised assessment on appropriate mats. Two trained assessors would apply the same rubric without access to the questionnaire responses. Content validation, evaluation of questionnaire reliability, and estimation of interrater agreement remain part of the proposed empirical protocol.

Statistical Analysis

The available outputs included descriptive statistics, Shapiro–Wilk tests for each variable, and bivariate tests for a quadratic term. Multiple linear regression included magnitude, strength, and generality in a single model. The composite self-efficacy score was summarized descriptively and was outside the regression model. Model fit was summarized using multiple R, R^2, adjusted R^2, and the omnibus F test at $\alpha = .05$. The

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model p value was derived from the reported F statistic and its degrees of freedom. Pearson correlations, individual regression coefficients and confidence intervals, and diagnostics for residuals, collinearity, and influential cases were unavailable in the source output.

Results

Table 1 summarizes the demographic profile assigned to the 50 simulated records. The largest age category was 18–19 years (72%), and 62% of records were classified as female.

Table 1
Demographic Characteristics of the Simulated Records

Characteristic	Category	n	%
Sex	Male	19	38
	Female	31	62
Age	18–19 years	36	72
	20–21 years	11	22
	> 22 years	3	6

Table 2 gives the descriptive statistics for the simulated scores. Generality had the highest mean of the three dimension scores (M = 3.191, SD = 0.422), and the mean dive-roll performance score was 2.989 (SD = 0.458).

Table 2
Descriptive Statistics for the Simulated Scores

Score	N	Mean	Median	SD	Variance	Min	Max
Magnitude	50	2.940	2.890	0.430	0.185	1.920	3.860
Strength	50	3.099	3.110	0.379	0.144	2.190	4.030
Generality	50	3.191	3.205	0.422	0.179	2.360	4.270
Self-efficacy composite	50	9.230	9.190	1.086	1.180	6.690	11.900
Dive-roll performance	50	2.989	2.940	0.458	0.209	2.110	4.110

The Shapiro–Wilk tests returned p values from .387 to .887 (Table 3). The bivariate quadratic terms had p values from .065 to .809 (Table 4), with the smallest p value for generality. These tests address univariate distributions and bivariate departures from linearity. Assessment of the multiple regression assumptions requires separate model diagnostics.

Table 3
Shapiro–Wilk Tests for the Simulated Scores

Score	N	Shapiro–Wilk W	p
Magnitude	50	.978	.447
Strength	50	.989	.868
Generality	50	.976	.387
Self-efficacy composite	50	.989	.887
Dive-roll performance	50	.978	.463

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Table 4
Bivariate Tests of Quadratic Terms for Dive-Roll Performance

Predictor	N	F for quadratic term	p
Magnitude	50	0.059	.809
Strength	50	0.259	.613
Generality	50	3.577	.065
Self-efficacy composite	50	0.616	.437

The three-predictor model accounted for 38.0% of the variance in simulated dive-roll performance scores (Table 5). Adjusted R^2 was .339, and the omnibus test yielded $F(3, 46) = 9.391$, $p < .001$. The omnibus statistics summarize the joint fit of the three predictors. The direction and magnitude of any individual association remain undetermined from the available output.

Table 5
Multiple Linear Regression Model for Simulated Dive-Roll Performance

Multiple R	R^2	Adjusted R^2	F(3, 46)	p
.616	.380	.339	9.391	< .001

Discussion

The regression illustrates how magnitude, strength, and generality can be evaluated jointly using dive-roll performance as the outcome. The R^2 of .380 describes fit within the 50 simulated records. An omnibus test summarizes what the three scores explain together, while regression coefficients and their confidence intervals would be needed to assess what each dimension contributes after accounting for the other two. Evaluating prediction for students in another class would require observed data and out-of-sample validation.

The most relevant comparison with empirical sport research concerns how the measures are matched. Moritz et al. (2000) found that correspondence between the specific judgment and the performance criterion helped explain differences across studies. Lochbaum et al. (2023) likewise reported variability across contexts, and the artistic gymnastics review by Marzoli et al. (2026) documented differences across apparatuses, measures, and samples. A study of the dive roll could use this evidence to frame questionnaire items around the same task conditions that students encounter in assessment. The simulated model's multiple R is a measure of joint fit, whereas the pooled correlations in the sport literature describe bivariate associations.

Studies of the dive roll itself offer more direct guidance on the choice of outcome. Costa et al. (2019) evaluated the validity and rater agreement of a dive-roll checklist, showing how clearly defined movement criteria can support systematic observation. Costa et al. (2024) also studied self-controlled performance feedback during dive-roll practice and reported benefits in the adult groups under the conditions studied. The latter study examined how feedback was provided. Its relevance here lies in the role that practice conditions can play when students build technical skill and judge their own capability. Recording recent practice and feedback exposure would help interpret associations between efficacy scores and performance in a university class.

Previous skill performance also warrants attention. Feltz et al. (2008) showed in a reanalysis of diving performance that the apparent contribution of self-efficacy depended on how prior performance entered the model. In the dive roll, previous successful

attempts could strengthen a student's efficacy beliefs, while greater efficacy could encourage continued practice. Measuring both variables within one assessment period would leave these pathways unresolved. Baseline technical proficiency, practice exposure, and prior gymnastics experience would help clarify the interpretation of an observed association.

For empirical use, the proposed questionnaire and rubric require evidence that their scores are interpretable in the target cohort. The three dimensions provide a basis for writing items, and their treatment as separate scales requires psychometric support. Rater agreement and the method used to combine component scores also need to be documented. A subsequent study could record task-specific efficacy before assessment and examine whether it improves estimates of performance after accounting for prior skill. Repeated assessment would allow researchers to study how efficacy and technical execution change across a course.

Conclusions

In this illustration, a model with three self-efficacy dimensions accounted for 38.0% of the variance in simulated dive-roll performance scores (adjusted $R^2 = .339$). The analysis provides a framework for testing task-specific efficacy beliefs alongside observed performance in physical education students. The empirical relationship remains to be estimated using student data, validated scoring procedures, and complete model diagnostics.

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