

RESEARCH ARTICLE

Correlation of Fatigue Severity, Volition in Exercise, and Lifestyle Physical Activity with Movement Competency

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ABSTRACT

Movement competency is essential in physical education (PE) because it reflects students' capacity to perform movement tasks through the integration of physical, cognitive, and motivational processes. With the expansion of online and blended PE, concerns have emerged about how fatigue, motivation, and daily physical activity relate to students' movement learning. Anchored in Cognitive Load Theory, Self-Determination Theory, and Dynamic Systems Theory, this study examined the levels of fatigue severity, volition in exercise, lifestyle physical activity, and movement competency, and whether the first three were associated with movement competency, among 390 first-year college students enrolled in PATHFit 1 in an online PE setting in Cagayan de Oro City. Using the Fatigue Severity Scale, the Volition in Exercise Questionnaire, a confirmatory-factor-validated Lifestyle Physical Activity Scale, and the Movement Competency Screen, data were analyzed through descriptive statistics, Pearson's r (with Spearman's ρ for robustness) at the .05 level using JASP. Participants reported moderate fatigue severity ($M = 2.74$), often-level lifestyle physical activity ($M = 3.64$), high exercise volition ($M = 3.83$), and outstanding movement competency ($M = 4.64$). A weak but significant negative association was found between fatigue severity and movement competency, $r(388) = -.119$, $p = .018$, whereas volition ($r = .019$, $p = .709$) and lifestyle physical activity ($r = .038$, $p = .449$) showed no significant association. Movement competency scores were strongly concentrated at the upper end of the scale, indicating a ceiling effect that constrains the detection of relationships. The findings suggest that foundational movement competency remained stable despite variation in motivation and lifestyle activity, although fatigue may slightly constrain movement performance. The study underscores the value of fatigue-aware instructional strategies in digitally mediated PE.

KEYWORDS movement competency, fatigue severity, volition in exercise, lifestyle physical activity, online physical education

Introduction

Movement competency has become a central concern in contemporary physical education, as it reflects not only the ability to perform motor skills but also the cognitive, motivational, and psychosocial dimensions of physical literacy (Zoellner *et al.*, 2021; Gustian *et al.*, 2023). It is closely associated with student engagement, lifelong physical activity, and overall well-being (Han & Lee, 2022). Despite its importance, many students experience difficulties in developing adequate movement competence because of instructional constraints, psychosocial challenges, and changing educational contexts (Guo *et al.*, 2023; Houser & Kriellaars, 2023).

Globally, students have encountered increased fatigue, reduced physical activity, and lower engagement amid sedentary lifestyles and digitally mediated learning. Studies in China and Turkey have reported elevated fatigue among students, often associated with academic pressures, online learning, and poor health behaviors (Liu *et al.*, 2021; Güneş & Demirer, 2022; Oducado *et al.*, 2022). In the Philippines, similar trends have been observed, with students reporting fatigue, anxiety, and decreased physical activity during online learning (Pusta, 2022; Lim *et al.*, 2022).

Fatigue severity is known to affect both cognitive and motor performance. Research has shown that fatigue alters sensorimotor processing and reduces physical output (Zabihhosseinian *et al.*, 2021; Matsuo *et al.*, 2021; Daub *et al.*, 2023). Volition in exercise, in turn, reflects an individual's self-regulatory capacity to initiate and sustain physical activity even under challenging conditions (Quinzi *et al.*, 2024; Kopp *et al.*, 2020). Lifestyle physical activity—daily movements such as walking, chores, and recreational play—also contributes to physical health and movement-skill development (Arsapakdee & Sriprom, 2024; Carl *et al.*, 2024). While these variables have been studied independently, limited research has examined their joint association with movement competency, particularly in the Philippine context and within online physical education settings. The present study addresses this gap.

This study was grounded in Cognitive Load Theory (CLT; Sweller, 1988), Self-Determination Theory (SDT; Deci & Ryan, 1985), and Dynamic Systems Theory (DST; Thelen, 1989). From a CLT perspective, greater fatigue severity is expected to be negatively associated with movement competency because fatigue increases extraneous cognitive load and reduces working-memory capacity, thereby constraining the processing, retention, and execution of motor tasks (Sweller, 1988; van Merriënboer & Sweller, 2005). SDT frames volition in exercise as autonomous motivation that supports sustained engagement and self-regulation; through repeated, self-directed practice, volition may relate to the refinement of movement skill (Deci & Ryan, 1985; Ryan & Deci, 2000). Finally, DST conceptualizes movement competency as emerging from the continuous interaction among individual, task, and environmental constraints, with lifestyle physical activity serving as both an outcome and a driver of motor development (Thelen, 1989; Newell, 1986). Together, these perspectives frame fatigue, volition, and lifestyle activity as physiological, motivational, and behavioral factors that may be associated with—rather than deterministically cause—movement competency.

Moreover, this study investigated the levels of fatigue severity, volition in exercise, and lifestyle physical activity and their association with movement competency among first-year students who experienced online PE. Specifically, it sought to answer the following questions: (1) What is the extent of fatigue severity among the participants? (2) What is the extent of volition in exercise among the participants? (3) What is the participants' extent of lifestyle physical activity? (4) What is the participants' extent of movement competency? and (5) Are fatigue severity, volition in exercise, and lifestyle physical activity significantly associated with movement competency?

The following null hypotheses were tested at the .05 level of significance: (H_{01}) Fatigue severity is not significantly associated with movement competency; (H_{02}) Volition in exercise is not significantly associated with movement competency; and (H_{03}) Lifestyle physical activity is not significantly associated with movement competency.

Methods and Materials

This study employed a descriptive–correlational, non-experimental quantitative design to describe the levels of the study variables and to examine their associations without manipulation. As emphasized by Deckert and Wilson (2023) and Miksza *et al.* (2023), this design can determine the presence, strength, and direction of relationships among variables but cannot establish cause-and-effect; accordingly, the findings are interpreted in associational rather than causal terms.

A total of 390 first-year students enrolled in PATHFit 1 at a private higher education institution in Cagayan de Oro City were selected through stratified random sampling to ensure proportional representation across class sections. Participants met inclusion criteria covering enrollment status and medical readiness for physical activity, as determined through the Physical Activity Readiness Questionnaire (PAR-Q).

Four instruments were used. The Fatigue Severity Scale (FSS; Krupp *et al.*, 1989) measured perceived fatigue across nine items and demonstrated excellent internal consistency in this sample (Cronbach's $\alpha = .930$). The Volition in Exercise Questionnaire (VEQ; Elsborg *et al.*, 2017; Fallahzadeh *et al.*, 2023) measured volitional regulation across six dimensions and 18 items ($\alpha = .902$). The Lifestyle Physical Activity Scale (LPAS), a researcher-adapted instrument, was refined through confirmatory factor analysis into an eight-item, three-factor structure—Intentional Lifestyle Physical Activity, Routine Ambulatory Activity, and Functional/Domestic Physical Activity—with acceptable model fit; the overall lifestyle activity score was computed as the mean of the three factor scores. The Movement Competency Screen (MCS; Kritz, 2012; Benoit-Piau *et al.*, 2022) assessed five functional movement patterns (bodyweight squat, lunge and twist, bend and pull, push-up, single-leg squat) using a five-level scoring rubric; inter-rater reliability (Krippendorff's α) ranged from .719 to .880 across tasks. All self-report instruments used a five-point Likert format and were pilot-tested for clarity and contextual appropriateness.

After ethical clearance and informed consent, the FSS, VEQ, and LPAS were administered in person and through secure institutional platforms, while the MCS was administered face-to-face in a controlled environment (gymnasium or covered court) to ensure safety and standardized scoring. All procedures followed the ethical principles of the Belmont Report and the Data Privacy Act of 2012, including confidentiality, voluntary participation, and secure data handling.

Data were analyzed using JASP version 0.18.1. Descriptive statistics (mean, standard deviation, frequency, and percentage) summarized the levels of each variable. To test the hypotheses, Pearson's r was computed, with Spearman's ρ calculated to confirm robustness under non-normal conditions (all Shapiro–Wilk $p < .05$). Assumptions of normality, linearity, and homoscedasticity were examined. Statistical significance was set at $p < .05$.

Results

Table 1 presents the extent of fatigue severity among the participants, including the frequency and percentage distribution, overall mean and standard deviation, and item-level results.

Table 1. *Extent of Fatigue Severity of the Participants*

	Range	Interpretation	f	%
	4.51 – 5.00	Very High	9	2.31
	3.51 – 4.50	High	71	18.21
	2.51 – 3.50	Moderate	147	37.69
	1.51 – 2.50	Low	130	33.33
	1.00 – 1.50	Very Low	33	8.46
Total			390	100
Mean			2.74	
Interpretation			Moderate	
SD			0.89	
No.	Item	M	SD	Interpretation
1	The intensity of my fatigue significantly reduces my motivation to engage in daily activities.	3.14	1.08	Moderate
2	Even after a little physical activity, my fatigue is so strong that I can't keep going.	2.58	1.02	Moderate
3	I am easily fatigued.	2.74	1.10	Moderate
4	The severity of my fatigue interferes with my physical functioning.	2.82	1.02	Moderate
5	The severity of my fatigue causes frequent problems for me.	2.68	1.07	Moderate
6	The severity of my fatigue prevents sustained physical functioning.	2.72	1.08	Moderate
7	The severity of my fatigue interferes with carrying out certain duties and responsibilities.	2.73	1.05	Moderate
8	The severity of my fatigue makes it one of the most disabling aspects of my daily life.	2.58	1.07	Moderate
9	The severity of my fatigue interferes with my work, family, or social life.	2.66	1.08	Moderate

Note. Overall mean and SD are based on the JASP composite score (N = 390).

The participants experienced a moderate level of fatigue severity ($M = 2.74$, $SD = 0.89$), with the largest proportions falling in the moderate (37.69%) and low (33.33%) categories and few reporting very high fatigue (2.31%). At the item level, all nine indicators were interpreted as moderate; the highest was “The intensity of my fatigue significantly reduces my motivation to engage in daily activities” ($M = 3.14$), indicating that the motivational dimension of fatigue was most salient.

Table 2 presents the extent of volition in exercise, including the distribution, overall mean and standard deviation, and item-level results across the dimensions of volition.

Table 2. *Extent of Volition in Exercise of the Participants*

	Range	Interpretation	f	%
	4.51 – 5.00	Very High	70	17.95
	3.51 – 4.50	High	191	48.97
	2.51 – 3.50	Moderate	118	30.26
	1.51 – 2.50	Low	10	2.56
	1.00 – 1.50	Very Low	1	0.26
Total			390	100
Mean			3.83	
Interpretation			High	
SD			0.69	

No.	Item	M	SD	Interpretation
Reasons				
1	During my exercise activity, I focus on my reason for participating.	3.89	1.02	High
2	I think a lot about my reason for participating in my exercise activity.	3.79	1.14	High
Postponing Training				
3	I begin my exercise activity on time without needing pressure.	3.73	1.09	High
4	I usually start my exercise activity as soon as I plan it.	3.55	1.02	High
5	I feel ready and motivated to participate in my exercise activity without delay.	3.69	0.96	High
6	I prepare and begin my exercise activity without waiting until the last minute.	3.48	1.02	Moderate
Unrelated Thoughts				
7	I am able to stay focused on my exercise activity without distraction.	3.74	1.01	High
8	During my exercise activity, I concentrate fully on what I'm doing.	3.90	0.97	High
9	I can maintain focus throughout my exercise activity without unrelated thoughts.	3.71	0.94	High
Self-Confidence				
10	I believe in my ability to do well in my exercise activity.	4.02	0.94	High
11	I am convinced that I am able to carry out strenuous exercise activities.	3.73	1.02	High
12	I believe that my will is strong enough to carry out strenuous exercise activities.	3.74	1.01	High
Seeking Approval from Others				
13	I feel confident participating in my exercise activity based on my own goals.	4.00	0.95	High
14	I stay true to my personal pace and preferences during my exercise activity.	4.18	0.84	High
15	I focus on doing my best rather than worrying about others' opinions during my exercise activity.	4.14	0.86	High
Coping with Failure				
16	Even though my exercise activity is not going well, it is easy for me to get back on track.	3.89	0.89	High
17	If I make a mistake during my exercise activity, I am quick to improve my effort.	3.96	0.91	High
18	When I make a mistake during my exercise activity, I quickly move on.	3.85	0.97	High

Participants demonstrated a high level of volition in exercise ($M = 3.83$, $SD = 0.69$), with most in the high (48.97%) and very high (17.95%) categories. All six dimensions were interpreted as high, with the strongest indicator being autonomy-related ("I stay true to my personal pace and preferences," $M = 4.18$).

Table 3 presents the extent of lifestyle physical activity, based on the confirmatory-factor-validated eight-item scale, including the distribution, overall mean and standard deviation, and item-level results by factor.

Table 3. Extent of Lifestyle Physical Activity of the Participants

Range	Interpretation	f	%
4.51 – 5.00	Very Often (everyday)	35	8.97
3.51 – 4.50	Often (3–6×/week)	187	47.95
2.51 – 3.50	Regularly (1–2×/week)	145	37.18
1.51 – 2.50	Occasionally (1–3×/month)	22	5.64
1.00 – 1.50	Never	1	0.26

Total		390	100	
Mean		3.64		
Interpretation		Often (3–6×/week)		
SD		0.70		
No.	Item	M	SD	Interpretation
Intentional Lifestyle Physical Activity (factor M = 3.05)				
1	I play with my friends to be physically active.	3.23	1.30	Regularly
2	I walked in place while watching TV to get extra steps.	2.75	1.31	Regularly
3	I used workout exercise videos to be physically fit.	3.12	1.28	Regularly
4	I prefer to do exercise at home.	3.11	1.30	Regularly
Routine Ambulatory Activity (factor M = 4.02)				
5	I walked during breaks (e.g., at lunch).	4.12	1.00	Often
6	I purposely walked further in stores.	3.91	1.11	Often
Functional/Domestic Physical Activity (factor M = 3.86)				
7	I do household chores as a way to get more steps.	3.88	0.99	Often
8	I took small breaks during the day to get up and move.	3.84	0.96	Often

Note. The lifestyle physical activity score is the mean of the three validated factor scores; nine of the original items were removed during confirmatory factor analysis.

Using the validated eight-item scale, participants demonstrated an often-level of lifestyle physical activity ($M = 3.64$, $SD = 0.70$), with the largest proportion in the often (47.95%) and regularly (37.18%) categories. The highest factor was Routine Ambulatory Activity ($M = 4.02$), reflecting walking-based, incidental movement, whereas Intentional activity was lower ($M = 3.05$).

Table 4 presents the level of movement competency, including the distribution, overall mean and standard deviation, and item-level results across the five functional movement tasks.

Table 4. Extent of Movement Competency of the Participants

Range		Interpretation	f	%
4.51 – 5.00		Outstanding	286	73.33
3.51 – 4.50		Very Good	102	26.15
2.51 – 3.50		Good	2	0.51
1.51 – 2.50		Fair	0	0.00
1.00 – 1.50		Poor	0	0.00
Total			390	100
Mean			4.64	
Interpretation			Outstanding	
SD			0.32	
No.	Item	M	SD	Interpretation
1	Single-leg squat	4.88	0.37	Outstanding
2	Lunge and twist	4.69	0.53	Outstanding
3	Bodyweight squat	4.63	0.62	Outstanding
4	Push-up	4.51	0.62	Outstanding
5	Bend and pull	4.48	0.64	Very Good

The participants demonstrated an outstanding level of movement competency ($M = 4.64$, $SD = 0.32$), with 73.33% rated Outstanding, 26.15% Very Good, and none rated Fair or Poor. All five tasks were performed at a high level, led by the single-leg squat ($M = 4.88$). Importantly, the very small standard deviation and the absence of low scores indicate a pronounced ceiling effect in the outcome measure.

Table 5 presents the Pearson correlations between each predictor and movement competency, which directly test the study's hypotheses.

Table 5. Correlations of Fatigue Severity, Volition in Exercise, and Lifestyle Physical Activity with Movement Competency

Predictor (with Movement Competency)	r	p	Spearman ρ	Decision
Fatigue Severity	-.119	.018*	-.128	Reject H_{01}
Volition in Exercise	.019	.709	.060	Retain H_{02}
Lifestyle Physical Activity	.038	.449	.051	Retain H_{03}

Note. $N = 390$; $df = 388$. * $p < .05$ (two-tailed). Spearman's ρ is reported for robustness and was consistent with Pearson's r .

Fatigue severity was weakly but significantly negatively associated with movement competency, $r(388) = -.119$, $p = .018$; thus H_{01} was rejected. Volition in exercise ($r = .019$, $p = .709$) and lifestyle physical activity ($r = .038$, $p = .449$) were not significantly associated with movement competency; H_{02} and H_{03} were therefore retained. Spearman's ρ yielded the same pattern, supporting the robustness of these associations.

Discussion

The findings are interpreted below in relation to the study variables and the three hypotheses, drawing on relevant theory and prior research. The moderate fatigue levels observed are consistent with reports of moderate, manageable fatigue among students in technology-mediated learning (Kupcewicz *et al.*, 2022; Liu *et al.*, 2021; Güneş & Demirel, 2022) and with Philippine post-pandemic findings linking online learning to motivational rather than severely disabling fatigue (Egcas *et al.*, 2021; Oducado *et al.*, 2022).

The high volition scores align with conceptualizations of volition as a multidimensional, self-regulatory capacity (Quinzi *et al.*, 2024; Kopp *et al.*, 2020) and with local evidence on exercise volition among college students in Northern Mindanao (Gomez & Salva, 2025). High scores in self-confidence and coping with failure are consistent with Breitwieser and Brod (2022) and Kaushal *et al.* (2022), while the strong autonomy reported echoes work on autonomy-supportive regulation (Mascret, 2020; Yoncalik, 2023).

The greater reliance on embedded daily movement than on structured exercise—reflected in the higher Routine Ambulatory Activity factor—is consistent with international and local findings (Morgan *et al.*, 2024; Aquino, 2023; Sari *et al.*, 2022), indicating that lifestyle activity among college students is shaped largely by environmental accessibility and daily routines.

The outstanding movement-competency scores are consistent with research showing that students regularly exposed to movement-based instruction demonstrate high proficiency in fundamental tasks (Morano *et al.*, 2020; Menescardi *et al.*, 2023). From a Dynamic Systems perspective, the consistently high performance indicates well-developed organismic constraints established through repeated practice (Bernstein, 1996; Thelen & Smith, 1994). The pronounced ceiling effect in this measure—evident in the very small standard deviation and the absence of low scores—restricts variance and bears directly on the correlational findings discussed next.

The weak negative association for fatigue is consistent with Cognitive Load Theory: fatigue consumes attentional and working-memory resources needed to monitor body position and execute movement, functioning as an extraneous load that can slightly reduce movement quality (Sweller, 1988; Zabihhosseinian et al., 2021; Matsuo et al., 2021; Daub et al., 2023). The non-significant association for volition aligns with the view that motivation primarily supports behavioral engagement rather than directly producing motor skill, especially under constrained online conditions (Bento et al., 2023; Mascret, 2020; Gomez & Salva, 2025). The non-significant association for lifestyle activity is consistent with the observation that incidental, low-complexity movement may contribute less to advanced motor competence than structured, skill-rich practice (Carl et al., 2024; Izaskun et al., 2022; Peers et al., 2020).

Limitations

Several limitations should temper the interpretation of these findings. First and most importantly, movement competency exhibited a pronounced ceiling effect: scores were tightly clustered at the top of the scale ($M = 4.64$, $SD = 0.32$; 73.33% Outstanding and no scores below “Good”). This restriction of range mathematically attenuates correlations toward zero, meaning the weak and null associations observed here may partly reflect limited variance in the outcome rather than a true absence of relationships. A more demanding or more finely graded movement assessment would be needed to detect such associations more sensitively. Second, the cross-sectional, non-experimental design precludes causal inference; the results describe associations at a single point in time. Third, fatigue, volition, and lifestyle activity were measured by self-report and may be subject to response biases. Fourth, participants were drawn from a single private institution and an online PE context, which limits generalizability to face-to-face settings and other populations.

Conclusion

This study examined the levels of fatigue severity, volition in exercise, and lifestyle physical activity and their association with movement competency among first-year students who experienced online PE. Participants reported moderate fatigue, often-level lifestyle physical activity, high exercise volition, and outstanding movement competency. Only fatigue severity was significantly—though weakly and negatively—associated with movement competency, while volition and lifestyle activity were not. Grounded in Cognitive Load Theory, Self-Determination Theory, and Dynamic Systems Theory, the findings suggest that foundational movement competency remained relatively stable despite variation in motivational and lifestyle factors, although fatigue may slightly constrain movement quality. Given the strong ceiling effect in the outcome, these null and weak associations should be read with caution. The study nonetheless underscores the value of fatigue-aware instructional strategies—appropriate pacing, activity breaks, and motivational support—for sustaining movement quality and student well-being in online and blended physical education. Future research should employ more sensitive movement assessments and longitudinal designs across diverse settings.

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Ethical Approval: The study was conducted in accordance with the ethical principles of the Belmont Report and received institutional approval prior to data collection. Informed consent was obtained from the teacher-participants; for the students

involved in the classroom implementation and focus group discussion, written parental consent and student assent were secured. Data were handled in compliance with the Data Privacy Act of 2012.

AI Declaration: This study utilized artificial intelligence tools to assist in preparing this article. Specifically, an AI assistant (ChatGPT) was used to help condense the full thesis manuscript into a reduced journal-article format and to enhance language quality, clarity, and tone, with human supervision and editing throughout. The author carefully reviewed and edited all outputs to ensure academic rigor and integrity.

Data Availability Statement: The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request. Requests for access will be evaluated in accordance with ethical guidelines and data privacy policies.