

Integrating Resistance Exercises in PathFit 2: Impact on Out-of-School Physical Activity Participation of Maritime Students

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Abstract. This study aimed to determine the impact of adding resistance exercises to PathFit 2 Movement Competency training on the outside Physical Activity (PA) participation of maritime college students. This research is quantitative, with maritime students as the dependent variable and resistance exercises/training in PathFit 2 as the independent variable. Selected sections of first-year students from a maritime school in the Philippines were the respondents of this research. This research used the International Physical Activity Questionnaire (IPAQ) to measure the 7-day physical activity of the maritime students. A questionnaire was given during the orientation day at the start of the first semester of the school year 2025- 2026. Data were tested for normality using the Kolmogorov-Smirnov test. The pre- and post-intervention K-S test results were 0.134 and 0.143, respectively, with $df=327$, $p < .001$, which is less than the alpha of 0.05. Since the data were not normally distributed, the Wilcoxon Signed-Rank Test was administered. There was a statistically significant difference in adding resistance exercises to Pathfit classes for maritime students on outside participation in physical activities (PA), with a p-value of .008 ($\alpha=0.05$). The effect size was also computed using the matched-pairs rank-biserial correlation ($r=.15$), indicating that even with the resistance training added in the Pathfit classes, the weight of its effect falls in the small effect range. The result of this paper showed that adding resistance exercises has a positive effect on the outside physical activity participation of maritime students. This paper might help develop the Pathfit curriculum by adding resistance and weight exercises and training in students' Pathfit subjects. Moreover, by doing so, more students might get engaged in physical activities even after school hours due to their confidence in exercise movements and knowledge of different resistance exercises.

Keywords: Exercise; Maritime; PathFit; Physical Activity, Resistance Training

Introduction

Participating in physical fitness activities, such as regular exercise, positively affects the body. Regular physical activity promotes physical, cognitive, and social development (Di Liegro et al., 2019; Bull et al., 2020). This is not new information about fitness participation, as most papers on physical activity participation report a direct positive effect on one's health. Regular physical activity positively affects cardiovascular health, reducing the risk of heart disease and conditions such as high blood pressure and stroke (Lavie et al., 2019). Physical activity also impacts mental health. In the paper by Schuch and Vancampfort (2021), physical activity is considered an effective intervention for mental illnesses, and long-term engagement has a positive effect on mental health and can reduce or prevent future mental illnesses.

Physical activity is a key part of weight management; it helps address weight gain from a sedentary lifestyle, which can lead to weight issues such as obesity and ultimately cause health problems (Jakicic & Rogers, 2014). According to Guthold et al. (2020), a global lack of physical activity among adolescents is a significant issue affecting cardiovascular health; this connects to Lavie et al. (2019), which found that physical activity directly affects an individual's cardiovascular health. One factor is technological advancement, such as the use of gadgets by children and adolescents, which has contributed significantly to a sedentary lifestyle (Di Liegro et al., 2019), as cited by Bull et al. (2020). Participation in physical fitness plays a crucial role in daily

life and must be instilled at every level of education, from elementary to college. Hence, the importance of physical education and fitness is evident.

Research Questions

This study aims to investigate the impact of adding resistance exercises to the out-of-school physical activity participation of Maritime students. Specifically, this study aims to address the following research questions.

1. What is the level of out-of-school physical activity participation of maritime students before the integration of resistance exercises in PathFit 2 in terms of:
 - 1.1 Frequency,
 - 1.2 Duration,
 - 1.3 Intensity, and
 - 1.4 Type of physical activity?
2. What is the level of out-of-school physical activity participation of maritime students after the integration of resistance exercises in PathFit 2 in terms of:
 - 2.1 Frequency,
 - 2.2 Duration,
 - 2.3 Intensity, and
 - 2.4 Type of physical activity?
3. Based on the findings of the study, what enhancement program can be proposed to sustain the out-of-school physical activity participation of maritime students through resistance exercises in PathFit 2?

Scope and Delimitation of the Study

This study investigated the impact of adding resistance exercises to the PathFit 2 subjects for maritime students. Additionally, this paper examines changes in students' out-of-school engagement in physical activities after the intervention. This study was conducted at a maritime school in Quezon City, Philippines, during the first semester of the 2025 to 2026 school year. This study was limited to enrolled maritime students and did not include other courses. Moreover, factors that might affect the students' participation in physical activity outside the school, such as dietary habits, medical conditions, and socioeconomic status, are beyond the scope of this study.

Literature Review

Seafarers' Nature of Work

Because of the nature of seafarers' work, psychosocial health problems may arise and can also affect their physical health (Sampson & Ellis, 2019). This is because they often work offshore, far from their families and care. This may also affect their emotional and social well-being, ultimately affecting their work performance. In addition, the nature of work at sea contributes to seafarers' fatigue, which can lead to chronic diseases (Zhao et al., 2026). Mapping, ship maintenance, and cargo handling are among a seafarer's responsibilities, requiring not only good mental health but also physical health. In their research, Pauksztalt et al. (2022) concluded that seafarers' mental and physical well-being should improve. This conclusion is connected to the above papers by Sampson and Ellis (2019), which address stress and fatigue among seafarers. Currier et al. (2020) show that men who engage in 150 minutes of physical activity are less likely to have moderate/severe depression, underscoring the importance of physical activity in daily life. Maritime-specific evidence further supports this, showing that regular physical exercise on cargo ships is directly linked to improved well-being and reduced depressive symptoms onboard (Reck et al., 2025).

Physical Fitness and Work Performance

Physical status, or an individual's body condition, greatly affects work performance. Given the nature of a seafarer's work, one cannot argue that physical fitness is not a requirement for this job. For this reason, strength exercises are important. This is supported by Pohjola et al. (2024), which states that good musculoskeletal and cardiorespiratory fitness directly affects perceived work ability. This is supported by tests (BMI, single-leg balance, vertical jump test, and six-minute walk test), which show that people with high perceived work ability perform well under work demands. Grimani et al. (2019) show that work performance and physical fitness are correlated. In their paper, they show that employees who engage in physical activity are more focused and can concentrate better while performing their tasks. They also concluded that workplace physical activity increases employees' productivity. In seafarers' work, ship maintenance and navigation require long working hours and involve heavy lifting. Physical fitness is necessary for this type of work. Rinne

et al. (2020) found that seafarers have a higher mortality rate than workers in other occupations; this may be due to differing working conditions across departments (e.g., engine maintenance, ship navigation). Seafarers face various issues, including health and mental health issues; one is a lack of sleep due to emergencies on deck or in the engine room (Sampson and Ellis, 2020).

This is why we must instill awareness of the importance of physical activity, such as exercise or fitness, at a young age. This paper examines the effectiveness of Pathfit (Physical Activity Towards Health and Fitness) for first-year maritime students. It assesses its impact on their participation in Physical activity outside of class.

Resistance Training as a Catalyst for Movement Competency and Exercise Self-Efficacy

To effectively prepare maritime students for these occupational challenges, physical education curricula must adopt modalities that build functional strength, movement efficiency, and physical resilience. Because seafarers must meet the demands of their work, higher education curricula should consider adding or modifying subjects focused on resistance exercises in PathFit classes.

Resistance training (RT) has emerged in modern sports science as a primary, highly accessible form of physical activity to optimize physical fitness, enhance metabolic health, and prevent musculoskeletal injuries (Zwolski et al., 2017), as cited by Chaanbene et al. (2025). Rather than viewing resistance training as an extracurricular pursuit reserved for competitive athletes or hobbyist weightlifters, contemporary research argues that RT should be a core pillar of youth and tertiary physical education. Implementing structured, school-based strength and conditioning programs has proven feasible and effective across international school systems, offering a scalable way to counter adolescent inactivity and improve physical literacy (Kennedy et al., 2021), as cited by Hartman et al. (2024). Furthermore, innovative methods such as integrating elastic bands or progressive bodyweight protocols into standard PE classes show that students can achieve significant muscular strength adaptations without complex, cost-prohibitive gym facilities (Fang et al., 2023).

Research Gap and Synthesis

Research shows the importance of physical activity, whether through fitness or simple movement. It is also important in daily activities, such as work. Seafarers' work is demanding not only emotionally but also physically, which is why they should take care of their mental and physical health (Sampson & Ellis, 2019; Pauksztat et al., 2022; Reck et al., 2025). Moreover, research shows that a strong body and good stamina can help an individual endure the physical demands of their job (Pohjola et al., 2024). Because of these findings, students at maritime schools must be exposed to resistance training as part of their Pathfit classes before embarking on careers as seafarers.

The literature also indicates that resistance training, as an additional lesson in physical education and Pathfit classes, can positively affect students' fitness and exercise behavior (Chaabene et al., 2025; Zwolski et al., 2017). These programs can also help students build confidence in their movement. When equipment is limited, students can use bodyweight exercises or resistance bands as alternatives (Hartman et al., 2024; Kennedy et al., 2021; Fang et al., 2023). Therefore, adding resistance training to Pathfit classes can positively affect students' movement and confidence in executing specific exercises.

Despite the findings, the literature has investigated exercises, working demands, physical fitness, and resistance training. Few studies connect the influence of resistance training in Pathfit lessons to its effects on physical activity participation outside the school setting. In other words, there is no direct evidence that adding resistance training in maritime students' Pathfit classes can influence their physical activity participation. Addressing this gap matters because maritime students are preparing for a demanding career, not just emotionally but physically. By adding resistance exercises to maritime students' PathFit 2 classes, they can gain proper knowledge and practice in movement and exercise that they can use even outside school. Thus, this study aims to address this gap by investigating the effect of adding resistance training and exercises to maritime students' PathFit 2 classes. The results of this study can be used to create a program that helps students continue engaging in physical activity even outside school.

Methodology

Research Design

This study used a one-group pretest-posttest quasi-experimental design to assess the effect of resistance exercises on Maritime students' participation in outdoor physical activity after implementation in the PathFit 2 subject. This research design suits this study because it measures baseline data from pre-test assessments and compares them with post-test results after an intervention for the same group (Al-Mutairi et al., 2026). The International Physical Activity Questionnaire was used to assess maritime students' physical

activity participation before and after the implementation of resistance exercises in students' Pathfit 2 classes. Because no control group was available, the same group was measured using the IPAQ after the intervention. The pre-test served as the baseline data for this study; it measured the students' physical activity participation for 7 days. After one semester (roughly 6 months) of intervention, the post-test was administered. The pre-test and post-test results were compared to determine whether physical activity participation differed significantly after the intervention. The quasi-experimental approach was suitable for this study because it was implemented in PathFit 2 classes, and the respondents were not randomly assigned to two groups (experimental and control). Instead, existing PathFit 2 students received the intervention, and pre- and post-tests were administered. Therefore, this approach aligned with the study's purpose: to investigate the effect of adding resistance exercises to PathFit 2 classes on the outside-of-school physical activity participation of maritime students. The study employed a non-probability convenience sampling method. Convenience sampling facilitated the selection of sections from two colleges, particularly students under an instructor handling the PathFit 2 subject.

Research Locale

The study was conducted at PMI Colleges Inc. in Quezon City, Philippines. The respondents were students from the College of Marine Engineering and the College of Marine Transportation. The study profiled the students based on sex, age, year, and section, examined the influence of resistance exercises, and assessed their 7-day physical activity participation.

Research Respondents

Three hundred twenty-seven (327) students participated in this study. Respondents are from two (2) courses: Bachelor of Science in Maritime Engineering 2. Bachelor of Science in Maritime Transportation. Sections were selected based on the instructor's teaching load from BSMT and BSME, but respondents were first-year students only. Of the 327 respondents, 69 students, or 21.10%, are enrolled in the Bachelor of Science in Maritime Engineering (BSME), and 258, or 78.90%, are enrolled in the Bachelor of Science in Maritime Transportation. Of the 311 respondents, 95.11% were male, and 16 (4.89%) were female. This reflects the college's male-to-female population ratio, and respondents' ages ranged from 17 to 26 years, with a mean age of 18.3. Most of the respondents in this research are 18 years old, comprising 208 (63.61%) of the 327 respondents. This research uses purposive targeted sampling, with respondents consisting of first-year students at a maritime school in the Philippines.

Research Instrument

This research uses the International Physical Activity Questionnaire (IPAQ), developed in 1998 and validated and used in various studies (Craig et al., 2003; Lee et al., 2011; van Poppel et al., 2010). This questionnaire aims to measure respondents' physical activity intensity, including the number of hours spent sitting. The target audience of this questionnaire is youth aged 15 years and older. This questionnaire uses open-ended questions and a 7-day recall of physical activity. This questionnaire has test-retest reliability ($\alpha < .80$). The re-test and post-test of the IPAQ (International Physical Activity Questionnaire) were distributed to respondents online via a Google Form. The questionnaire was converted into a Google Form, ensuring the original content was not altered. The pre-test was conducted at the start of the semester, and the post-test was administered one week before the end of the semester. All data were stored in Google Forms and converted and downloaded to Microsoft Excel for data treatment.

Data Gathering Procedure

A letter was sent to the office of the college president to ask for research permission, indicating the following purposes: 1. Our team will be conducting research in the Institute, 2. Our team will request the participation of students from two (2) courses, and respondents will undergo fitness testing. 3. Our team will provide the students with survey instruments. After the school approved the request, the team oriented the respondents on the first day of class, explaining the following to the students: a. that this research targets the first-year students from their courses (BSMT and BSME), b. that a survey questionnaire will be given to them after the orientation, c. that this questionnaire will be given to them one week before the end of the current semester (first semester), d. Resistance training will be added to the learners' Pathfit 2 class, and e. that all the information will be strictly confidential. After the orientation, the researchers distributed questionnaires to the students and gave them time to complete them. The researchers then collected the data for descriptive statistics. Students completed regular Physical Education classes with resistance training for six months (one semester), and the researchers then administered the post-test using the same tool (IPAQ) after the semester.

Results and Discussions

Research Question 1: What is the level of out-of-school physical activity participation of maritime students before the integration of resistance exercises in PathFit 2 in terms of: Frequency, Duration, Intensity, and Type of physical activity?

Table 1. Frequency and Percentage Distribution of Respondents According to Course

Courses	Frequency	Percentage
Maritime Engineering	69	21.10%
Maritime Transportation	258	78.90%

Table 1 shows the distribution of respondents based on the courses. The table shows that 69 respondents participated in Maritime Engineering (ME) or 21.10% and 258 respondents from Maritime Transportation (MT) or 78.90%.

Research Question 2. What is the level of out-of-school physical activity participation of maritime students after the integration of resistance exercises in PathFit 2 in terms of: Frequency, Duration, Intensity, and Type of physical activity?

Table 2. Descriptive statistics of Pre and Post IPAQ Scores

Measurement	N	25th Percentile	Median	75th Percentile	IQR
Pre-intervention	327	180	240	360	180
Post-intervention	327	210	300	390	180

This study found a statistically significant difference in maritime students' participation in out-of-school physical activity after adding resistance exercises to Pathfit 2 classes ($Z = 2.642$, $p = 0.008$). It was also found that more students had higher post-intervention scores; this indicates that adding resistance exercises in Pathfit 2 classes was associated with increased physical activity participation outside school. These findings are consistent with the literature that resistance training develops movement competence and boosts physical activity participation. Integrating resistance exercises into the school curriculum, especially in Physical Education or Pathfit classes, is important, and curriculum developers must consider the importance of resistance training and exercises (Hartman et al., 2024; Kennedy et al., 2021). This study showed that after the intervention, most students improved their physical activity participation ($Median = 300.00$, $IQR = 210.00$ to 390.00). This showed that resistance training as an additional activity in a PE or Pathfit class can turn into an interest that pushes students to engage in PA outside school. (Kennedy et al., 2025; Robinson et al., 2023). In addition, when students actually know not just how to use the weights but also how to execute an exercise because they have already experienced lifting and done resistance training while in Pathfit class, they cannot be intimidated outside the gym or commercial gyms due to the practice of resistance training inside the school, since it is a part of their class.

Research Question 3: Based on the findings of the study, what enhancement program can be proposed to sustain the out-of-school physical activity participation of maritime students through resistance exercises in PathFit 2?

Resistance training is not just lifting gym equipment or bodyweight; it teaches students the fundamentals of movement exercises, which makes them confident in performing specific exercises. This helps students build confidence in specific movements because they know what they are performing in the gym or during PA participation. Resistance training should not be a prerequisite or an extracurricular activity for learners; it should be a core part of PE classes (Chaabene et al., 2025; Zwolski et al., 2017). Yes, getting strong is important; however, someone should start with something, a stepping stone. Verbally teaching students to be active is not effective; they must feel it, execute the exercise, and experience it to gain confidence, and it should start in school. Setting students' minds through experience is far more effective than verbally telling them to be active (Collins et al., 2019).

Ethical Considerations

This study protects the rights and welfare of the student respondents. Under the Data Privacy Act of 2012 (Republic Act No. 10173), all respondents' records and data are handled confidentially and anonymously,

and all information is kept secure electronically. Additionally, all data gathered from the respondents are used solely for academic and research purposes and strictly follow research ethical standards. Before conducting the study, a letter was sent to the school presidents requesting consent to conduct the study in the school, with students as the respondents. Consent was obtained from the students before data gathering, informing them that participation was voluntary and that they could withdraw at any time. All the respondents' information is properly handled based on the Data Privacy Act of 2012 (Republic Act No. 10173)

Conclusion

The study found that after adding resistance exercises to maritime students' Pathfit 2 classes, their IPAQ physical activity scores increased from 240.00 pre-intervention to 300.00 post-intervention. The Wilcoxon Signed-Rank Test showed a statistically significant difference between pre- and post-intervention ($Z = -2.642$, $p = .008$). Although the findings were statistically significant, the effect size was $r = .15$, indicating a small intervention effect. The findings suggested that adding resistance exercises to Pathfit 2 classes was associated with increased physical activity participation among the first-year maritime respondents. However, because this study employed a one-group pretest-posttest design without a control group, the observed change could not be attributed exclusively to the intervention. The findings support the effect of adding resistance exercises in Pathfit 2 classes, but further studies with a control group are needed.

Recommendations

Based on the study's findings, it is recommended that Pathfit 2 classes incorporate resistance exercises to increase students' out-of-school physical activity participation. Students should be guided through progressive, appropriate, and safe resistance exercises to support proper execution and encourage continued engagement after school. School institutions should add resistance exercises as part of Pathfit 2 classes or physical education classes, with proper instructor training and equipment. For future researchers, consider using a two-group pretest-posttest experimental design to support and provide stronger evidence of the effectiveness of incorporating resistance exercises in Pathfit 2 classes into out-of-school physical activity participation.

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