

Exercise Safety Awareness and Misconceptions in Relation to Selected Health and Physical Fitness Indicators Among University Students

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ABSTRACT

Engaging in regular physical activity and exercise has many physical and psychological health benefits; however, performing exercises without sufficient knowledge of safety guidelines may lead to poor training methods, overload, potential injury, and unsafe exercises. University students are becoming increasingly aware of exercises through their peers, social media platforms, fitness apps, and other non-formal sources. Students' misconception on exercise intensity, warm-up, recovery process, pain, and fluid intake may affect their approach to training; nevertheless, exercise knowledge, exercise beliefs, and actual physical fitness of participants have not been investigated simultaneously yet. This conceptual paper suggests a framework of connections between awareness of exercise safety and exercise misconceptions on four health and physical fitness indicators: resting heart rate, resting blood pressure, handgrip strength, and sit-and-reach flexibility. A narrative synthesis based on theory has been used to develop the suggested framework that has generated three propositions regarding the relationships among awareness, misconceptions, participant characteristics, and selected indicators. Further, a cross-sectional research design will be used to test the framework, consisting of a questionnaire and Sports Science Laboratory tests at different university. The paper presents an example of a research-based approach to exercise-safety education in the universities as well as demonstrates how the University Sports Science Laboratory can be used for this purpose. This project was funded by Seed Money of Poornima University.

Keywords: exercise safety, exercise misconceptions, university students, handgrip strength, flexibility, resting heart rate, blood pressure, physical fitness

INTRODUCTION

Regular physical. Participation in organised exercise form key parts of a healthy lifestyle. Exercise is linked to health benefits, including better heart health, stronger muscles, higher physical fitness improved mental well-being and a lower risk of several chronic health conditions (Warburton & Bredin 2017).

University is a time for shaping long-term health habits because students leave school routines and gain more freedom over their physical activity, diet, sleep and other lifestyle choices. With these benefits low levels of physical activity remain common worldwide (Guthold et al. 2018) and in India (Anjana et al., 2014). University students may have access to sports facilities, gyms, fitness programs, recreational activities and exercise-related content. However, that access does not guarantee that exercise is performed safely or appropriately. Safety in exercise goes beyond being active. Safe exercise requires

preparation, the right choice of activity gradual training progression, correct technique, enough recovery time, proper hydration, awareness of warning signs and a clear understanding of personal limits (Garber et al., 2011; Liguori et al., 2021). Many students perform exercise without knowing how to increase training volume and intensity or where to place recovery in a program. A lack of warm-up an exercise intensity, poor technique, insufficient recovery and ignoring pain or other warning signs can raise the risk of exercise-related problems (Soligard et al. 2016; Thompson et al., 2007). Knowing and understanding the principles of exercise safety is essential for responsible participation in physical activity.

The university population is particularly important for studying exercise safety because students span a range of activity and exercise experience (Keating et al., 2005). Some students train regularly in sports or structured resistance training while others exercise only occasionally for recreation. Some students start exercise programs

without any instruction. Therefore, understanding the principles of exercise is vital for everyone whether a competitive athlete, a recreationally active student or a novice.

Another key issue is misconceptions about exercise. A misconception is an incomplete belief about exercise, physical fitness, injury prevention, recovery or related health practices. Such misconceptions might state that exercise must always involve pain to be effective that more exercise is always better that a warm-up is unnecessary for sessions or that all types of stretching prevent injury. These false beliefs can shape exercise decisions. Lead to inappropriate training behaviour. Misconceptions are often strengthened by information from sources that have not been properly examined for scientific validity. This problem grows larger as more exercise information becomes available. University students can find fitness advice from coaches, physical education professionals, physiotherapists, exercise professionals, peers, websites, social media, videos and mobile apps. While information can raise health awareness a large amount of information does not guarantee accuracy or suitability for an individual. Students may encounter fitness claims, general recommendations, promotional content or exercise practices that do not match their fitness level (Pilgrim & Bohnet-Joschko 2019; Tiggemann & Zaccardo 2018). Therefore, knowing exercise safety principles helps students critically evaluate exercise information and make safer choices.

Questionnaires on exercise safety awareness reveal what students know and believe. Yet questionnaire assessment alone cannot provide data on a student's physical fitness characteristics. Hence combining self-reported awareness and misconception assessment with laboratory measurements can offer a more complete picture of the university student population.

This study aims to close the gap between exercise knowledge and objective physical assessment. Of measuring awareness alone the study merges a questionnaire on exercise safety awareness and misconceptions with objective measurements from a Sports Science Laboratory. This method may create a complete baseline profile of university students and show how laboratory assessment can aid health promotion and research on campus. The Sports Science Laboratory, at different university was created to provide hands-on assessment of physiological, anthropometric strength, flexibility and performance parameters for research-based fitness profiling and student projects. Therefore, this study directly uses the laboratory infrastructure built through the Seed Money Project.

Therefore, this paper proposes a framework that links exercise safety awareness and exercise-related misconceptions to resting heart rate resting blood pressure, hand-grip strength and flexibility in university students and explains a research design that can test this framework. In this paper I add to the literature by defining the constructs stating propositions and suggesting a practical measurement design that can be carried out in the

laboratory. To propose a framework that connects exercise safety awareness and exercise-related misconceptions with selected health and physical fitness indicators, among university students.

Specific Objectives

- To define the concepts of exercise safety awareness and exercise-related myths and rationalize the selection of the four health and physical fitness measures.
- To formulate testable hypotheses regarding the interrelationships between awareness, misconceptions, participant profile variables, and the criteria.
- To outline an approach to research, data collection, and analysis.

2. REVIEW OF LITERATURE

2.1 Exercise safety principles and common misconceptions

Safety in exercise is typically discussed in light of well-defined exercise prescription principles: individualization and progression of loads, warm-up and cool-down, proper recovery period, and the awareness of alarm signals (Garber et al., 2011; Liguori et al., 2021). There are nuances in evidence for particular practices, thus giving rise to possible misinterpretations. Strength and proprioception training can help avoid sports injuries while stretching does not have any preventive effect on its own (Lauersen et al., 2014). Moreover, regular stretching exercises were not proven to prevent injuries (Behm et al., 2016; Herbert & Gabriel, 2002). An excessive increase in the training volume is a risk factor for injury occurrence (Gabbett, 2016; Soligard et al., 2016), which refutes the idea that more exercises mean less risk of an injury. Recovery is a key part of any training process (Kellmann et al., 2018), and individual hydration requirements should be considered (Sawka et al., 2007). One should distinguish between the effects of muscle soreness after unfamiliar exercise (Cheung et al., 2003) and pain indicating an injury. Hard physical activity can cause acute cardiovascular events temporarily, especially in sedentary individuals (Thompson et al., 2007).

2.2 Information sources, health literacy, and health behaviour

The sources of exercise information include several platforms, such as social media, where the information about fitness has an emphasis on appearance and commercialism (Pilgrim & Bohnet-Joschko, 2019; Tiggemann & Zaccardo, 2018). In such a way, the possibility to find, interpret, and evaluate the information, which is called health literacy, becomes an important factor influencing safe exercise practice (Nutbeam, 2000). According to the Health Belief Model and the Theory of Planned Behaviour, risk perception, advantages, and attitudes influence health behaviour (Ajzen, 1991; Rosenstock, 1974); thus, perceptions about exercise, even misperceptions, might affect student training.

2.3 Selected health and physical fitness indicators

In the present study, selected health and physical fitness indicators would be resting heart rate, resting blood pressure, hand grip strength and flexibility. These measures were chosen because they provide information about different aspects of physiological and physical status and can be measured relatively quickly with basic Sports Science Laboratory equipment.

Resting heart rate is a simple physiological measure, which gives an indication of a person's cardiovascular condition at rest. Resting heart rate can be affected by several factors including physical activity, fitness level, stress, sleep, caffeine intake and other physiological factors. Thus, resting heart rate might be a useful physiological baseline measure in a university population when obtained under standardised resting conditions. Higher resting heart rate is associated with all-cause and cardiovascular mortality (Zhang et al., 2016).

Another important measure of cardiovascular health is resting blood pressure. Blood pressure measurement is a simple, non-invasive procedure, and is appropriate for screening large groups of university students. Although a single resting blood pressure measurement is not sufficient for the diagnosis of hypertension (Unger et al., 2020), it is useful for descriptive information about the cardiovascular health profile of the study population. It is important to measure blood pressure (BP) under standardised conditions because temporary factors such as recent physical activity, stress, caffeine intake, and lack of sleep can affect BP (Muntner et al., 2019).

Handgrip strength is an objective measure of muscle strength. Handgrip dynamometry is relatively easy to administer, takes little time, and produces a quantitative measure that can be recorded for statistical analysis. Grip strength has been used as a practical indicator of overall muscular strength and physical functioning, in addition to being a measure of hand and forearm strength (Bohannon, 2019). In the current study, it offers an objective physical fitness variable that can be studied in relation to exercise safety awareness and misconceptions. Higher mortality is associated with lower grip strength (Leong et al., 2015; García-Hermoso et al., 2018).

The sit-and-reach test will be used to measure flexibility. The test provides a practical measure of flexibility in the lower back and hamstring region and can be performed with little equipment (Wells & Dillon, 1952). Flexibility is one component of physical fitness and may be influenced by physical activity habits, training practices, age, sex, and individual characteristics. Hence, the sit-and-reach test is suitable to derive a quick standardised measure of flexibility in a university population. It is a better indicator of hamstring extensibility than lumbar extensibility (Mayorga-Vega et al., 2014). Flexibility is a less robust predictor of health outcomes than muscular strength or cardiorespiratory fitness (Nuzzo, 2020).

Importantly, the present study will not consider resting heart rate, blood pressure, handgrip strength and flexibility as an overall assessment of physical fitness (Caspersen et al., 1985). Instead, these variables will be expressed as selected measures of health and physical fitness. Their inclusion means that objective measures of

physiological, muscular and flexibility-related domains are possible, while still keeping the assessment practical for a large university population.

2.4 Research gap

The connection between the awareness of exercise safety and the misconceptions in relation to the objective measures of fitness also presents itself for research. Those students who have more awareness of the issues related to the safety of exercises can show better exercise habits, even though the cross-sectional study cannot provide any causal relations. Also, those students who have more experience in exercises might be characterized by more knowledge about the exercises and other characteristics of fitness. At the same time, misconceptions can be found among those students who have less formal training in this field.

3. RESEARCH METHODOLOGY

3.1 Research approach

The research paper is conceptual and not empirical. The research paper is based on the Model framework for conceptual papers as suggested by Jaakkola (2020), whereby the theory and evidence already available are used to describe the constructs and relationships between the constructs that would be tested empirically at a later stage. According to Whetten (1989), the framework will comprise four major parts, namely what the constructs included are, how there are relationships between the constructs, why the relationships exist, and under what conditions they exist (who, where, and when).

3.2 Literature identification and synthesis

Purposive selection of literature was done from the fields of exercise science, sports medicine, public health, and health communication, with an emphasis on guidelines, consensus statements, systematic reviews, and meta-analyses. Narrative and theoretical synthesis of literature was undertaken (Snyder, 2019). Literature was studied for their discussion on the principle of safety of exercises, common perceptions of exercise, information environments, and how the four indicators are measured and related to health. This is not a systematic review, and no search or quality appraisal protocol has been undertaken.

3.3 Constructs

Safe exercise knowledge includes knowledge about exercising safely, including such aspects as warming up, loading, techniques, recovery, hydration, and symptom warning signs (Garber et al., 2011). Exercise myths are misconceptions related to exercise, its injuries, recovery, and other related matters. Since it is possible that a person possesses both accurate information and myths about a subject, these constructs are considered independent from each other and not opposite ends of a single scale. The selected health and physical fitness indicators include

resting heart rate, resting blood pressure, handgrip strength, and sit-and-reach test. They do not represent an overall measure of physical fitness. The participant characteristics include sex, age group, and exercise experience. The exercise practices are present only as a pathway construct in the research design.

3.4 Proposed conceptual framework and propositions

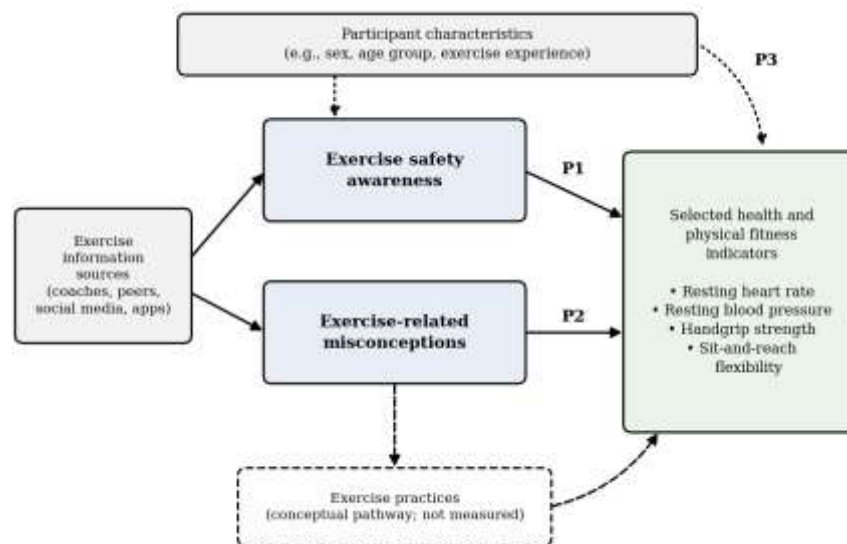


Figure 1. Proposed conceptual framework. Solid arrows show the pathways examined; the dashed pathway is conceptual and not measured; dotted arrows show participant characteristics.

P1: Exercise safety awareness is associated with resting heart rate, resting blood pressure, handgrip strength, and sit-and-reach flexibility.

P2: Exercise-related misconceptions are associated with the same four indicators.

P3: Participant characteristics are associated with awareness, misconceptions, and the indicators.

The propositions are non-directional because the existing evidence does not justify specifying a direction. The boundary conditions are university students aged 18 years or above who can perform the assessments safely, single-occasion measurement, and a cross-sectional design, so the propositions concern association and not causation.

4. PROPOSED EMPIRICAL RESEARCH DESIGN

To empirically validate the above conceptual framework, the present study proposes to conduct a cross-sectional analysis on university students studying at different university. The research shall investigate the awareness and misconception about the safety aspects of exercise of the students and find out its relationship with some selected objective measures of health and fitness. As the empirical part of the research has not yet been undertaken, all the methods mentioned in this section refer to the proposed research method and will be executed only once the necessary ethical approvals have been obtained. The

The model (Figure 1) postulates that sources of exercise information affect awareness and misperceptions about safe exercise. These awareness and misconceptions might in turn affect exercise practices, which in turn affect the physiological and physical fitness traits. Since exercise practices are not being measured, the model explores the relationship between the two variables and their corresponding indicators taking into account the intervening variable. Three propositions follow:

research method shall include a questionnaire-based measure for safety awareness and misconception regarding exercises along with objective measures that will use the facilities of the Sports Science Laboratory. The study will be reported in line with the recommendations of STROBE guidelines (von Elm et al., 2007).

4.1 Study Design

For the purpose of assessing the relationship between exercise safety knowledge, exercise-related misconceptions, and certain aspects of physical and psychological health of university students, a cross-sectional analytical research design will be adopted. Information about both the independent variables and the dependent variables will be gathered during the specified period of the study from the pool of potential subjects. While the questionnaire survey part of the research will measure the knowledge and attitudes of the students toward exercising safely, the laboratory test part of the research will measure their resting heart rate, resting blood pressure, hand grip strength, and flexibility.

4.2 Objectives of the Proposed Empirical Study

The main purpose of the proposed research is to evaluate the exercise safety awareness and exercise misconception and explore the relationship between exercise safety

awareness and selected health and physical fitness measures among university students.

In particular, the study will evaluate the exercise safety awareness among university students and the extent of exercise misconceptions among students. It will also evaluate selected health and physical fitness measures, which include resting heart rate, resting blood pressure, hand grip strength, and flexibility assessed through the sit and reach test. The study will also explore the relationship between exercise safety awareness and the selected health and physical fitness measures and explore if exercise misconceptions are associated with the selected health and physical fitness measures. Additionally, selected participant characteristics will be evaluated to determine if they are associated with exercise safety awareness, exercise misconceptions, and health/physical fitness measures.

4.3 Study Setting and Population

Proposed Study

The study shall be carried out in different university, utilizing the facilities and equipment present in the Sports Science Laboratory. This laboratory offers facilities for practical training, fitness assessment, profiling of students/athletes, rehabilitation activities, and academic work through research. The participants will consist of the students admitted to the undergraduate and/or postgraduate programmes in the University. Students who fit the criteria defined for inclusion/exclusion will be called upon to participate. The proposed study will use the facilities of the Sports Science Laboratory at Poornima University, Jaipur, developed through the Seed Money Project.

4.4 Eligibility Criteria

The students eligible for participation must be at least 18 years old, must be currently studying at the university, must be able to volunteer themselves, must be able to comprehend and fill out the questionnaire of the study, and lastly must be able to go through the physical assessment procedures suggested in the study. Any student who is currently suffering from any acute injury or illness and who cannot undergo the physical assessment process will be excluded. In addition to that, any student who has been advised against any physical tests by a healthcare practitioner will also be excluded from the study.

4.5 Sample Size

The required sample size will be estimated a priori using GPower software (Faul et al., 2009). Assuming a small-to-moderate correlation of ($r = 0.20$), consistent with Cohen's (1992) recommendations, with statistical power of 80% and a two-sided significance level of 0.05, approximately 194 participants will be required. The final target sample size will be confirmed through the formal GPower calculation before participant recruitment. Additional participants may be considered to compensate for potential non-response, incomplete questionnaires, withdrawals, or unusable physical assessment data.

4.6 Study Variables

The main predictor variables will include knowledge of exercise safety and misconceptions about exercise, both determined via a questionnaire. The main outcome variables measured in the laboratory will include resting heart rate, resting systolic and diastolic blood pressure, handgrip strength, and flexibility. These measurements will give an objective measurement of certain characteristics of the subjects in question

Table 1. Proposed laboratory instruments and measured variables

Instrument	Variable measured	Measurement/output	Unit	Representation
Pulse oximeter	Resting heart rate	Heart beats at rest	beats/min	Resting cardiovascular/physiological status
Digital blood pressure monitor	Resting blood pressure	Systolic and diastolic blood pressure	mmHg	Cardiovascular health indicator
Handgrip dynamometer	Handgrip strength	Maximum grip force	kg	Muscular strength
Sit-and-reach box	Flexibility	Maximum forward reach distance	cm	Lower-back and hamstring flexibility

4.7 Assessment Instruments and Measurement Procedures

4.7.1 Exercise Safety Awareness and Misconception Questionnaire

Awareness of exercise safety and exercise myths will be measured through a structured questionnaire that is specifically designed for this research proposal. The questionnaire will include questions from different areas related to the safety of exercises such as warm up and cooling down procedures, exercise intensity and

progression, exercise techniques, injury prevention, exercise recovery, hydration, exercise pain and warning symptoms, proper exercise procedures, and exercise myths. Before administering the questionnaire in the actual study, it will first be subjected to expert assessment to determine content validity, and then the questionnaire will be tested among a group of students which will not be included in the final sample of this research. Content validity index (CVI) will be calculated for the expert panel (Lynn, 1986; Polit & Beck, 2006). Internal consistency reliability will then be assessed through Cronbach's alpha with interpretations made according to the recommended guidelines (Tavakol & Dennick, 2011).

4.7.2 Resting Heart Rate

The resting heart rate will be measured with the use of a pulse oximeter which can be found in the Sports Science Laboratory. The participants will be asked to sit down quietly and rest for long enough prior to the measurement. Following the standard process of resting, the heart rate will be measured in beats per minute.

4.7.3 Resting Blood Pressure

The resting blood pressure will be obtained using a digital blood pressure monitor that can be found in the Sports Science Laboratory. The participants will be allowed to sit quietly for no less than five minutes prior to measuring blood pressure, and the correct positioning of the arm will be done while conducting the test. As per current guidelines, the average reading will be taken based on two or more readings (Muntner et al., 2019). Systolic blood pressure and diastolic blood pressure will be obtained in mmHg. The participants will be asked to refrain from vigorous physical activities before obtaining the readings since transient physiological changes may affect the blood pressure readings.

4.7.4 Handgrip Strength

Handgrip strength is to be measured using a handgrip dynamometer. Standardized instructions and procedures will be used to position the subjects during the test, and the handgrip dynamometer will be calibrated as appropriate for each subject. The test will either be conducted for the dominant and non-dominant hands, or only for one hand, depending on the specific procedure used for the test. In cases where there is a need for repeated tests, either the highest or an average value will be used. Handgrip strength will be measured in kilogram (kg).

4.7.5 Flexibility: Sit-and-Reach Test

Flexibility shall be tested using the standard sit and reach test, whereby the participant is required to use a sit and reach box. Appropriate instructions will be given to the participant prior to carrying out the test. The sit and reach test shall be conducted following the standard protocol, whereby the greatest forward stretch will be measured in centimeters. The test procedure and the apparatus shall remain constant for all participants to enhance accuracy. Standardized sit and reach tests (Wells & Dillon, 1952; Liguori et al., 2021).

4.8 Data Collection Procedure and Quality Control

Ethical approval will be sought and informed consent will be obtained from all eligible participants before data collection begins. Written informed consent will be obtained from the participants after explaining the purpose and procedures of the study. Basic demographic and participant characteristics will then be recorded followed by completion of the exercise safety awareness and misconception questionnaire. The questionnaire will be administered either prior to the lab assessments or in a standardised order determined by the research team to ensure consistency across participants.

Laboratory based assessments will be performed following completion of questionnaires. Following a preliminary rest period, resting heart rate will be measured, followed by resting blood pressure, handgrip strength and sit-and-reach flexibility assessment. Therefore, the suggested order of testing will be: resting period → resting heart rate → resting blood pressure → handgrip strength → sit-and-reach flexibility. All observations will be documented on a standardised data-collection sheet.

A number of quality-control procedures will be put in place to improve the reliability of the measurements. Prior to data collection, assessors will be trained appropriately on the standardised measurement procedures. Wherever possible, the same equipment will be used throughout the study. All equipment will be checked before use. Participants will receive standardised verbal instructions and measurements will be taken under similar environmental and procedural conditions. Laboratory equipment will be maintained and calibrated in accordance with the recommendations of the respective manufacturers. Repeat measurements will be performed where so required by the chosen test protocols. Moreover, the consumables for the calibration and maintenance of the laboratory equipment will be considered according to the Seed Money proposal. This project was funded by the Seed Money Project of Poornima University, Jaipur.

4.9 Ethical Considerations

Approval for ethical considerations will be sought from the relevant institutional ethics board prior to participant recruitment and data collection. Participation will be strictly voluntary, and written consent will be sought from all participants after provision of sufficient information on the study process, risks, benefits and the right to withdraw from participation. The study will be undertaken following the ethical considerations of the Declaration of Helsinki (World Medical Association, 2013).

Confidentiality of participants will be maintained through the whole process of the study. Personal identifiers will not be included in the analytical data set; rather, participants will be coded appropriately. Participants will be notified that they have the right to withdraw from the study without suffering any penalties or negative consequences at any point in the research process. Before the physical examination, participants will be assessed regarding their capacity to perform the test procedures in a safe manner. A suitable pre-examination screening protocol, such as the Physical Activity Readiness

Questionnaire for Everyone (PAR-Q+), will be utilized for this purpose (Warburton et al., 2011). Participants who are affected by a condition, symptom, injury or other factor making a specific test unsuitable will not take part in the test.

4.10 Statistical Analysis

After data collection, the data will be entered into appropriate statistical software and systematically checked for completeness, consistency, missing observations and possible data entry errors. Participant characteristics, exercise safety awareness scores, misconception scores, resting heart rate, systolic and diastolic blood pressure, handgrip strength and sit and reach flexibility scores at the beginning will be summarised using descriptive statistics. Continuous variables will be reported as mean and standard deviation if data are approximately normally distributed or median and interquartile range if distributional assumptions are not met. Categorical variables will be presented as frequencies and percentages.

Distributional characteristics of continuous variables will be examined prior to the choice of inferential statistical procedures. We will perform correlation analyses to investigate the relationships between exercise safety awareness, exercise-related misconceptions and the selected laboratory indicators. For continuous variables that are approximately normally distributed, Pearson's correlation coefficient will be used, whereas Spearman's rank correlation coefficient will be used when the distributional or measurement characteristics make a non-parametric approach more appropriate.

Group comparisons may also be conducted to evaluate if awareness, misconception scores and laboratory-based health and fitness indicators vary according to relevant participant characteristics. The choice of suitable parametric or nonparametric tests will depend on the number and type of groups to be compared and on the distribution of the variables. If the sample size and

structure of the data allow, multivariable analysis can then be conducted to determine which participant characteristics and questionnaire based variables are independently associated with selected health and physical fitness outcomes. The final multivariable model will be based on the measurement properties of the dependent variable, the data distribution, relevant assumptions and the available sample size.

Statistical significance will be assessed using a two-sided p-value of <0.05. Given the multiple correlations and inferential tests, the false discovery rate will be controlled using the Benjamini–Hochberg procedure to decrease false-positive findings (Benjamini & Hochberg, 1995). Where applicable, effect sizes and their associated 95% confidence intervals will be reported in addition to p-values to convey information about the magnitude and precision of observed associations.

4.11 Proposed Outcome Framework

The empirical research that will be conducted will be aimed at testing the hypotheses on the association between exercise safety awareness, exercise-related misconceptions, and objective measures of health and physical fitness of university students. Exercise safety awareness and exercise-related misconceptions will be the main explanatory variables derived from the questionnaire survey, whereas heart rate at rest, blood pressure (systolic and diastolic), handgrip strength, and sit-and-reach flexibility will be the main outcome indicators obtained objectively. Characteristics of participants will be considered as explanatory or covariates, when it is appropriate theoretically and statistically.

The fit of the research objectives, variables, and methods of analysis used will be outlined in Table 2. Such an approach will provide a clear basis for testing of the proposed relationships and ensuring the relevance of each research objective to the relevant outcomes and statistics. Since the empirical research has not been conducted yet, there will be no results or conclusions made at this point

Table 2. Alignment of objectives, propositions, and planned analyses

Objective(s) of proposed study	Proposition	Variables	Proposed analysis
1	–	Exercise safety awareness score	Descriptive statistics (mean $\pm$ SD or median [IQR])
2	–	Misconception score and item-level endorsement	Descriptive statistics; frequencies and percentages
3	–	Resting heart rate, systolic and diastolic blood pressure, handgrip strength, sit-and-reach distance	Descriptive statistics
4	P1	Awareness score and the four laboratory indicators	Pearson's or Spearman's correlation
5	P2	Misconception score and the four laboratory indicators	Pearson's or Spearman's correlation

Objective(s) of proposed study	Proposition	Variables	Proposed analysis
6	P3	Participant characteristics; awareness, misconception, and indicator values	Group comparisons suited to the data distribution; multivariable analysis if the sample allows

5. Implications, Limitations, Future Research, and Conclusion

5.1 Implications

The universities are well equipped with the potential to encourage evidence-based exercise programs since they provide the means to access academic programs, sports facilities, health care centers, physical activities, and professionals. The identification of knowledge gaps and misconceptions regarding exercise safety could guide the universities to conduct interventions for solving such problems. The interventions could be conducted as part of the physical education, sports science, student wellness, fitness, injury prevention, or student orientation program. Conducting the proposed framework could also aid the academic goals of the Sports Science Laboratory as it would provide the opportunity to collect assessment data from students which could later be used in research, practical learning, fitness profiling, and future intervention studies. According to the Seed Money Project, some of the expected outputs include the enablement of research, student fitness and physiology assessments, practical learning, and laboratory development. The current study addresses these objectives using the capabilities of the laboratory.

5.2 Limitations

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The conceptual framework has not yet been empirically validated, and the hypotheses are tentative in nature. The review of the literature was narrative rather than systematic in nature, and therefore, relevant research studies could have been overlooked. The chosen variables do not reflect all aspects of physical fitness, and single-measure resting assessments could be biased due to factors such as stress, sleep, and caffeine consumption. Self-reports of awareness may suffer from biases related to social desirability and memory.

5.3 Future research

Potential future research could examine P1 to P3 in the suggested study design, validate the questionnaire, measure actual exercise behavior directly using the causal chain depicted in Figure 1, use a wider sample across multiple institutions, or employ longitudinal or experimental designs to assess exercise safety education.

5.4 Conclusion

The proposed conceptual framework in this paper links exercise safety awareness and myths with the resting heart rate, blood pressure, hand grip strength, and flexibility of university students along with a possible methodology of testing the framework. This framework is the basis for evidence-based exercise safety education and how it can be used to assess students in a sports science laboratory

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