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Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study

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ABSTRACT

Introduction: Rapid changes in technology, communication, and transportation prompted challenges in achieving the recommended level of physical activity. Although the students are returning for in-campus classes to promote more interaction and socialization, the youth still fall short of living up to the desired level of physical activity. Mode of transportation plays a pivotal role in physical activity, yet its relationship is poorly elucidated. The aim of the study is to explore the relationship between the types of transportation and the level of physical activity among senior high school students (SHS) from the University of Santo Tomas (UST).

Methods and Analysis: This will be an observational, cross-sectional, analytic study design. Participants' demographics, and anthropometric measurements such as height, weight, and hip & waist circumferences will be collected. To measure the variables of interest, the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ) will be used. Descriptive statistics will be utilized to characterize the samples using frequency, mean, median, and standard deviation, while inferential statistics such as Analysis of Variance for comparison and Pearson's and Spearman for correlation will be used. All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Ethics and Dissemination: Ethical approval was obtained from the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC) with the protocol number SI-2023-029. The study will comply with the principles of the Declaration of Helsinki, Ethical Guidelines on Health-Related Social Research of the Philippine Health Research Ethics Board, and Data Privacy Act 2012. All results, regardless of outcome, whether positive or negative, will be accessible through publication and by reporting to the participant through email and other relevant authorities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The study is of low-risk nature in several aspects such as psychological, social, economic, privacy/confidentiality, and legal.
- The methods and tools that will be used in the study are standardized and supported by literature to be valid and reliable.
- One of the limitations of the study is that it is only limited to SHS students within UST, which may yield different results compared to other SHS students from other schools, given the difference in location and size, among others.

Keywords: Transport, Physical Activity, High School

Word count: 3804

INTRODUCTION

Background

As of 2022, the World Health Organization (WHO) reports that more than 80% of teenagers fail to meet the required physical activity standards.[1] The significant level of inactivity is partly attributed to sedentary lifestyles at school and home and inactivity during leisure.[2] Moreover, in a publication by Yeung and Johnston, specific attention has been drawn to the countries in Asia, namely the Philippines, Malaysia, Singapore, Japan, South Korea, India, Pakistan, and several Pacific nations, which exhibit the highest proportions of inactive populations in the region.[3] In the local setting, the Food and Nutrition Research Institute states that 84.5% of Filipino youth aged 10 to 17 fall short of meeting the recommended level of PA.[4]

WHO defines physical activity as body movements driven by skeletal muscles necessitating energy expenditure.[1] On the other hand, an active lifestyle is characterized by regular PA, while sedentary behavior is associated with low energy expenditure, such as TV viewing.[5,6] The enhancement of one's PA depends on the consideration of both invariable and modifiable factors. Invariable factors include age, gender, race, and ethnicity. Conversely, modifiable elements include environmental circumstances, community settings, and one's behavioral and personality characteristics.[7] Delving further, a 2022 assessment regarding the PA of children and adolescents in the Philippines encompassed ten indicators of PA, namely Overall Physical Activity, Organized Sport and Physical Activity, Active Play, Active Transportation, Sedentary Behaviors, Physical Fitness, Family and Peers, School, Community and Environment, and Government.[4] Evidently, a study by Khan et al. elucidates a positive correlation between active school transport and PA in adolescents, concurrent with a decrease in sedentary behavior. With this, it can be concluded that one's mode of transportation contributes to determining an individual's level of PA.[8]

An active mode of transport is defined as a way of traveling that entails energy expenditure, with walking and cycling as prominent examples. In contrast, passive transport is attributed to using motorized transportation, such as cars, buses, and trains, requiring no physical exertion or energy expenditure.[9] When both modes are employed in combination, it is referred to as mixed transport. Considering such, recent studies have investigated the factors contributing to the choice of transportation mode. In a student setting, an increase in active transport has been associated with the proximity of house to school, social support from peers, parental active transport, and access to services.[10] In the Philippines, the Asian Development Bank reports that urban transportation has been dominated by public utility vehicles such as jeepneys, taxis, tricycles, and pedicabs.[11] Given its extensive usage, passive transportation can be inferred to be the most common transport mode in the country. Correspondingly, Cagas et al. document that only 29.5% of Filipino schoolchildren utilize active transportation to school at least five days a week.[4]

To advance the use of active transportation in adolescents, physical therapists play an imperative role in primary health promotion and in addressing the sedentary lifestyle of individuals, starting with assessment. In rehabilitation, the level of PA is evaluated through functional assessment using outcome measure tools called the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ). The IPAQ is primarily intended for adult population surveillance, as it has been created and tested for use by those aged 15 to 69. Furthermore, the questionnaire evaluates PA across various domains, including leisure, domestic and gardening activities, and work-related and transportation-related activities.[12] On the other hand, the GPAQ assesses PA in relation to occupation, transport, and leisure.[13] In a study conducted by Herrmann et al., the GPAQ version 2 validity has shown low to moderately high validity (r = 0.25 to 0.63) against measures of physical fitness, body composition, and objective (accelerometer, pedometer) and subjective measures of PA (IPAQ). The questionnaire has shown overall strong reliability. It presented that GPAQ, including its domains such as occupation, transportation, and leisure, provided acceptable short-term reliability (all > 0.80). However, the long-term reliability of reporting moderate intensity activity for recreation, work, and travel was low (< 0.70). In their summary, they also mentioned that GPAQ has also "showed acceptable evidence of short- and long-term test-retest reliability by activity category and modest validity evidence."[14]

Another significant contribution that physical therapy offers within the domain of transport and health is the emerging discipline of environmental physiotherapy (EPT), an expansion in the profession with inherent benefits for both the patients and the environment. This evolving domain, propelled by the increased number of consumers and the consequential depletion of natural resources, confronts the ensuing adverse environmental impacts.[15] With this, the study will also introduce EPT by promoting active transportation. If EPT is widely practiced in the country, then it could increase the number of teenage groups that would opt for active transportation. This not only encourages people to go for active transportation, but it will also help improve the condition of the environment, specifically reducing gas emissions. In addition, practicing active transport contributes to the pursuit of Sustainable Development Goals (SDG) 3 (Good Health), 11 (Sustainable Cities and Communities), and 13 (Climate Action).

The University of Santo Tomas Senior High School (UST SHS) was established in 2016 and houses six strands namely: Science, Technology, Engineering, and Mathematics Strand (STEM), Accountancy and Business Management Strand (ABM), General Academic Strand - Health-Allied (GA-HA), Humanities and Social Sciences Strand (HUMSS), Music, Arts, and Design Strand (MAD), and the Physical Education and Sports Track (PES). The study on the topic is to be piloted at the UST SHS as it fits the age criteria of the population and is accessible to the researchers due to their affiliation with the university.[16]

Knowledge Gap

The continuous decline in physical activity (PA) levels among school-going adolescents[17] has underscored the need for further investigation into the relationship between modes of transport and PA levels. Active transport has shown promise in increasing PA levels due to its easy integration into daily routines,[18] though its relationship remains inconclusive as it relies solely on cross-sectional data. [19] This limitation warrants attention for the current study. Additionally, in exploring the relationship between mode of transport and PA levels, the roles of passive and mixed transports remain understudied compared to active transportation. Other notable gaps include the absence of input from physical therapists and limited research conducted in the Philippine context, which fails to consider environmental differences influencing transport choices and, consequently, PA levels. Evans et al. suggest that multiple factors, including individual, social, and environmental aspects, should be taken into account when monitoring PA levels to maximize effectiveness.[20] Given the differences in geographic locations and environmental conditions, data from the current study is likely to differ from previous findings, considering the routes taken by UST SHS students in Manila to which Leather et al. note that regions beyond the Central Business Districts in Manila lack sufficient facilities for pedestrians and cyclists to travel safely.[21] Addressing infrastructure disparities is vital in the exploration of the relationship between the modes of transportation and PA levels of UST SHS Students.

Objective

The primary aim of this study is to explore the relationship between the types of transport and the physical activity levels of senior high school students from UST. To achieve the primary objective, the following are the secondary aims of the study:

1. To determine the level of physical activity of UST SHS Students.
2. To compare the level of physical activity to the modes of transportation.
3. To correlate the level of physical activity to the modes of transportation.
4. To correlate the level of physical activity to the anthropometric measurements of UST SHS students.

Significance

The study's findings hold significant importance in public health as it can raise awareness about the impact of transportation on PA, enabling targeted health interventions for primary care. The study may also promote PA within educational institutions, fostering healthier student environments. Moreover, the study can provide empirical evidence to inform policy decisions related to PA. This paves the way for future research into health, environment, and SDGs, offering a comprehensive understanding of transportation's effects on individuals and the community.

Delimitation

Based on the study's objective, an observational cross-sectional study design will be implemented in the academic year 2024 to 2025. The study will highlight UST SHS students' PA

based on their transportation mode, and participants will include UST SHS Students aged 16 to 18 years old. The study will examine the following factors influencing students' PA: Active, Passive, and Mixed Transportation. The study will not include other PA factors, such as screen time and physical/social environments.

METHODS

Ethical Considerations

Ethical approval will be sought from the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC) and will comply with the principles of the Declaration of Helsinki, Ethical Guidelines on Health-Related Social Research of the Philippine Health Research Ethics Board, and Data Privacy Act 2012. All data and information collected will be securely stored in a 10-character password-protected Google Drive folder, which will only be accessible to the researchers. Hard copies of the questionnaire will be safeguarded in the residence of an assigned researcher. The data gathered will be stored for the duration of the study, and it will be destroyed ten years after publication of results in accordance with the rules and provisions of RA 10173 or the Data Privacy Act. The results of the study will be disseminated to the participants and fellow SHS Students from UST. All results, regardless of outcome, whether positive or negative, will be accessible through publication or by reporting to the participant through email and other relevant authorities. A copy of the final manuscript will be submitted to the UST-CRS ERC. There are no conflicts of interest presumed to occur between researchers and participants of this study.

The study is of a low-risk nature in terms of psychological, social, economic, loss of privacy/confidentiality, and legal aspects drawn from the data-gathering of the participant's personal information and measurements, such that they may be effectively managed by the researchers. Meanwhile, the research will indirectly benefit the participants through knowledge transfer on the relationship between physical activity and mode of transport and through taking part in a study which will benefit various facets of society in terms of health awareness and promotion in facilitating lifestyle changes with regards to physical activity on a personal and societal scale. Despite the risks outweighing the benefits in number, such risks are modifiable and may be mitigated by the researchers. Managing the risks one by one would lead to a better methodology and assurance that the dignity and safety of the participants are prioritized. Thus, ultimately facilitating improvement in the quality of the study.

In response to the psychological risk of possible mental fatigue while answering the questionnaires, the researchers have given the participants the liberty to take breaks or withdraw their participation in the study at any moment. The researchers will also be the ones to privately take the participant's anthropometric measurements for concerns regarding body image. To address potential social risks, such as embarrassment about the participant's mode of transportation due to associated negative stigma, the researchers will strictly enforce privacy and confidentiality. All collected information will remain confidential and be shared only between the researchers and the participants. To address legal concerns, parents or guardians of underaged participants will be notified via short messaging services (SMS) or email to ensure the authenticity of consent forms and prevent any forgery of signatures with regard to the participation of their

child in the study. Additionally, prior to scheduling the data collection, a survey will be conducted to determine the participants' preferred time and date to minimize disruptions of daily routines.

To ensure confidentiality and privacy, the researchers will thoroughly explain the protection and disclosure policies in place to safeguard each participant's rights and privacy. Protection policies include measures to minimize harm and protect personal information, wherein soft copies containing such data will be securely stored in a password-protected Google Drive folder with only the researchers having access. Moreover, hard copies of the answered questionnaires will be securely stored in the residence of the group liaison officer. Coded identifiers will also be implemented to protect participants' identities and information, and all collected data will be destroyed and deleted 10 years after the publication of the results to ensure that no misuse occurs. Meanwhile, disclosure policies address how and when data may be shared with others. The completed paper will be disseminated to the participants via email and publicly shared through publications or conferences, and they may gain access to their own information upon request.

Design

This research will utilize an observational, cross-sectional analytic study design to explore the relationship between active, passive, & mixed modes of transportation and physical activity. Moreover, this study will be reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[22]

Participants

Participants in the study are students recruited from UST SHS and officially enrolled in all strands of the eleventh to twelfth grade aged 16-18 years old and above. However, people with mobility-related health issues, such as arthritis, osteoporosis, musculoskeletal disorders, neurological disorders, balance disorders, severe cardiopulmonary diseases, and so forth, that might affect the mode of transportation or commute used, are ineligible to participate. Approximately 373 students will be invited to participate, as estimated from the current 148 sections of the A.Y. 2023 - 2024 and calculated using Slovin's formula with a confidence level of 95%. The registration form will be generated using Google Forms. The link to the forms will be provided to the prospective presidents of each class at UST SHS, who will share it with the rest of their classmates, and through publication materials posted online. Those who completed the applications and signed up, provided that they fit the inclusion criteria, will be eligible to participate in the study. Moreover, the study will employ stratified random sampling to recruit the students, wherein the participants will be stratified based on their strand. The percentage of their strand population to the total population will be determined. Following that, the sample per strand will be calculated. With this, the sample will represent the population with respect to the different grade levels. Moreover, the characteristics of each stratum may also be established separately.[23] The specific sampling frame cannot be obtained as of the moment due to data privacy matters. However, the

exact number of members in the population will be obtained once the enrollment period for A.Y. 2024-2025 concludes. To further clarify our recruitment criteria, similar to the recruitment criteria of Mendoza, participants in "The Walking School Bus and Children's Physical Activity: A Pilot Cluster Randomized Controlled Trial" were eligible if they were enrolled in fourth grade and had no health limitations that prevented them from walking to school.[24] This supports the study's inclusion criteria, which state that only students enrolled in the eleventh to twelfth grade of UST SHS and free of mobility-related health concerns are eligible to participate.

Setting

The study will take place at the UST SHS, Frasatti Building from August 2025 to October 2025. Specifically, the data gathering will be implemented at the UST SHS Campus in one of its rooms to further investigate the level of physical activity of students who utilize active, passive, and mixed modes of transportation. In order to magnify the recruitment process, the team will execute an educational seminar following the data gathering process.

Tools

Two screening tools will be utilized to gather data regarding the participants' physical activity levels: the IPAQ (International Physical Activity Questionnaire) and the GPAQ (Global Physical Activity Questionnaire). The IPAQ is a self-report, seven-item questionnaire that assesses the types of intensity of physical activity and sitting time that an individual does.[25] The questionnaire contains open-ended questions regarding one's physical activity over the last seven days and is proven to have good stability in test-retest reliability and high reliability (α <.80). Moreover, the screening tool was also tested valid in terms of predictive validity, concurrent validity, convergent validity, criterion validity, and discriminant validity.

On the other hand, the GPAQ is a self-report questionnaire consisting of 16 items developed by the World Health Organization (WHO) for physical activity surveillance. It contains questions about physical activity participation in three domains, namely activity at work (occupational), travel to and from places (transport-related), and recreational activities (leisure time). The screening tool's short-term and long-term test-retest reliability is measured as good to very good, while its concurrent validity is poor to fair. Moreover, it is also important to note that the second version of the GPAQ will be used in this study as advised by the GPAQ Analysis Guide. The first version of GPAQ initially contains 19 questions. However, the WHO excluded three items due to redundancy, leaving 16 questions in the second version.[13, 26]

The Detecto eye-level mechanical weigh beam and its stadiometer will be used to measure the weight and height for its precision and reliability.[27] Furthermore, the Detecto scale has both components established as the "gold standard" for measuring height and weight: a standing scale and a stadiometer, respectively[28]. Correspondingly, standardized nonstretch body tape

measures will be used to assess the waist and hip circumferences of the participants, following Casadei and Kiel's recommendations.[29]

Procedures

The data gathering procedure will include two phases. Phase 1 involves obtaining approval from the Ethics Review Committee to ensure the study's ethical foundation. This phase would also include strategic planning, budgeting, and coordinating with the secretary general to be followed by the principal of the UST SHS department. Additionally, the group will organize a health promotion talk, conduct interest checks, and promote the study through the posting of publication materials on social media. These materials will outline the study's purpose, participation criteria, and associated components, such that:

1. Interested students must complete an informed consent form (ICF) prior to participating.
2. The activity will entail the collection of their demographic information and presence of regular athletic activities, taking of their anthropometric measurement, and answering the IPAQ and GPAQ. Moreover, they will be asked to state their primary mode of transportation to and from school.
3. Participation will involve attending a talk on physical activity to educate participants about its importance.

Following Phase 2, participants will be recruited and asked to preregister and fill out the ICF indicating their approval to participate in the study. The research group will be requesting UST SHS faculty members to serve as witness to the participant's completion of the ICF. Participants under the age of 18 will fill out a separate informed consent form, cosigned with a parent or guardian, than those aged 18. Participants will also be provided a list of guidelines outlining expectations, such as the need to obtain their demographic information, strand, and anthropometric measurements, which include hip and waist circumferences, height, and weight, which will be taken individually in a typical classroom of the UST SHS Building by the research team. Included in the instructions prior to the assessment is the necessity to wear appropriate attire. During the anthropometric measurement, participants will be asked to don cycling shorts and a fitting shirt, standing erect with weight evenly distributed on both feet. Height and weight will be measured using the Detecto eye-level mechanical weigh beam while the participants are barefoot. Moreover, waist circumference will be measured around the midpoint of the lower ribs and iliac crest, while hip circumference will be assessed at the largest circumference around the buttocks using standardized tape measures.[30] The body mass index (BMI) and the waist-hip ratio will be calculated by the researchers afterward. Specifically, the BMI will be computed by dividing the weight in kilograms by the square of the height in meters (weight/height^2), and the waist-hip ratio will be computed by dividing the waist circumference by the hip circumference (waist circumference/hip circumference).[31, 32]

To assess the participants' level of physical activity, the IPAQ and GPAQ will be utilized and physically distributed by the research team after the measurements. In order to mitigate the effects of confounding variables, additional information will be gathered, including the athletic activities of the participants, such as sports activities and gym memberships. Furthermore, to minimize potential selection bias, the team will be asking about the mode of transportation at the endmost part of the data collection. This approach will help ensure objectivity among researchers when collecting anthropometric measurements from participants, reducing the likelihood of disparities. The team will ensure that data confidentiality and security are upheld throughout the data collection.

Subsequently, a 30-minute talk will be conducted aimed at promoting and enhancing awareness of physical activity among the youth, designed to reinforce participants' knowledge. A licensed Physical Therapist will be present to supervise the whole process. The study will span from January 2024 to November 2024.

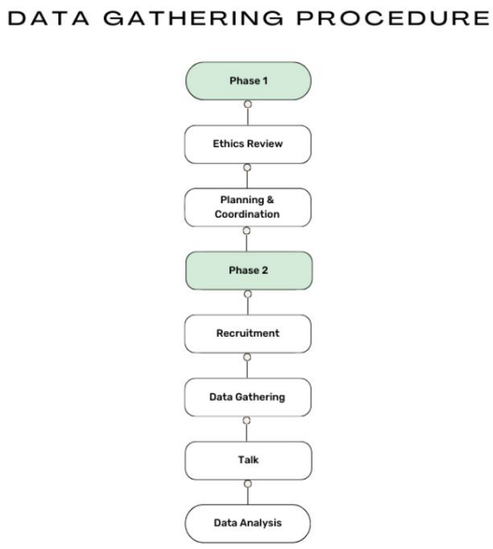

Figure 1. Data Gathering Procedure

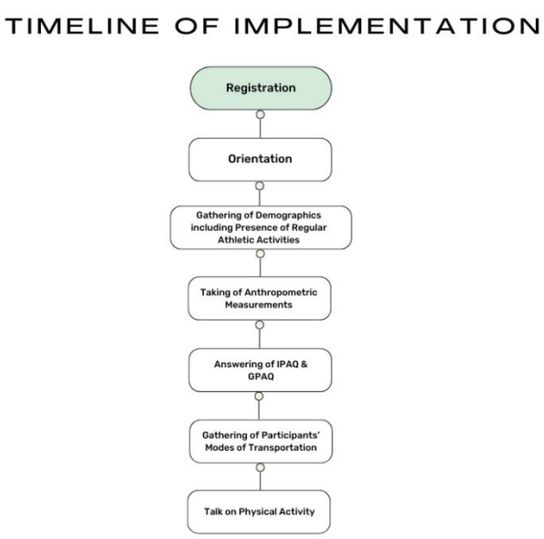

Figure 2. Timeline of Data Gathering

Data Analysis

Descriptive statistics will be utilized to describe the population using the frequency, proportion, mean, median, and standard deviation. This analysis will enable the categorization of participants into their modes of transportation: active, passive, and mixed transport groups. Furthermore, the participants' demographic information, anthropometric measures, programs, and levels of physical activity will also be characterized. Their physical activity levels will be determined through their computed responses to the IPAQ and GPAQ. The information on demographics, anthropometrics, and athletic activities will be analyzed using Pearson's Correlation wherein Cohen's recommendation of interpretation of relationship will be used where $|r|<0.30$ is considered a weak relationship, $0.30 \ |r| \ 0.50$ is considered a moderate relationship, and $|r|>0.50$ is considered a strong relationship. Statistical significance will be accepted at $p<0.05$. On the other hand, ANOVA will also be employed to compare the level of physical activity to the modes of transportation, and inferential statistics using Spearman Correlation will also be undertaken to determine the relationship between the different modes of transportation and the interested variables (see Appendix 5). Should there be any missing data, a single imputation method will be utilized wherein a single estimated value will be used to fill in the missing data and standard statistical methods will be applied to complete the resulting data.[33] Additionally, visual sensitivity analysis will be used to give a representation of the relationships between the dependent variable with each of the independent variables.[34] All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

AUTHORS' CONTRIBUTIONS

Contributors: Donald Manlapaz introduced the research concept and, alongside Zyra Mae Sicat, oversaw the drafting and revision of the proposal. April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee conducted literature reviews, gathered references, and collaborated on writing the proposal, with guidance and input from Donald Manlapaz and Zyra Mae Sicat.

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COMPETING INTERESTS STATEMENT

We declare that we do not have any conflict of interests with regards to this research.

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Appendix 1: Literature Review Extraction Table

Table 1. Literature Review Data Extraction Table

Author (Year)	Objective	Design	Setting	Participants	Data Gathering Procedures	Main finding/s
Passi-Solar, A., Margozzini, P., Cortinez-O'Ryan, A., Munoz, J.C., Mindell, J.S. (2020)	To explore the relationship between active transportation and objective health measures in Chile	Cross-sectional	The study was conducted in Chile, including both urban and rural areas, covering all 15 geographical regions of the country	6,113 adolescents aged 15 years and above.	The study utilized data from the Chilean National Health Survey (ENS) 2016-2017, a household survey with a stratified multistage probability sample. One participant per household was randomly selected using a computational Kish algorithm.	Higher levels of active transport were observed in males, younger groups, less educated and rural populations. Both active and public transport were associated with multiple nutritional and metabolic benefits such as lower BMI, lower waist circumference, less obesity, higher vitamin D, lower cholesterol and lower hepatic inflammation. Associations persisted after adjusting for other healthy lifestyles. Stronger benefits were observed in males than in females.
Ikeda, E., Stewart, T., Garrett, N., Egli, V., Mandic, S., Hosking, J., Witten, K., Hawley, G., Tautolo, E., Rodda, J., Moore, A., Smith, M (2018)	(1) To systematically identify New Zealand research that had measured ATS, distance to school, and the neighborhood built environment in children and youth. (2) To collate data from identified studies and combine them in a consistent manner. (3) To identify associations between ATS and built environment features across the combined dataset.	Systematic Review	Databases	2844 children and youth aged 6-19 years from five studies	EBSCO Host, ProQuest, Web of Science, Scopis, NZResearch.org.nz, NewzText were used to access scholarly published journals. Unpublished researches were sought through New Zealand Educational Theses Database, Aotearoa New Zealand International Development Studies Network, and Scholarly Commons/Institutional Repository. Government and local council related reports were sought through major Government agency websites and Google.	Active travel to school was positively associated with intersection density ($p < 0.001$) (1 km buffer) and negatively associated with school socioeconomic status ($p = 0.001$), dwelling density ($p = 0.004$) (1 km buffer), and distance to school ($p < 0.001$), including age, sex, ethnicity and number of siblings as fixed effects in the final model.
Khan, A., Mandic, S., Uddin, R. (2021)	To examine associations of active school commuting (ASC) with time spent	Cross-sectional	9 countries from Africa, 25 from the Americas, 19 from Eastern Mediterran	277,833 adolescents aged 11–17 years (48.9% girls)	Global School-based Student Health Survey data was used & collected during 2007–2016, & were analysed. Adolescents were asked how many	ASC is strongly and positively associated with PA recommendations and moderately with lower SB in adolescents.

	in physical activity (PA) and sedentary behaviour (SB) among adolescents.		ean, 1 from Europe, 8 from South East Asia, 18 from the Western Pacific		days per week they walked or bicycled to and from school, were physically active, and how much time they spent sitting on a typical day.	Promoting ASC has the potential to promote active lifestyle among adolescents around the globe.
Ganzar, L., Burford, K., Zhang, Y., Gressett, A., Kohl, H., Hoelscher, D. (2023)	To examine the association between school policies and ACS, and to assess whether this relation varied by grade.	Cross-sectional	Schools in Texas	94 students from texas school	study used data from schools recruited to the Safe Travel Environment Evaluation in Texas School study (n = 94). The percent of trips made by active travel modes was measured through tallies among third to fifth grade classrooms from 5 school districts in Central Texas in 2018–2019.	Results from this study demonstrate a correlation between the school policies designed to support walking and biking and ACS. Results from this study can be used to justify the use of school-based policy interventions to promote ACS.
Mendoza, J.A., Watson, K., Baranowski, T., Nicklas, T.A., Uscanga, D.K., Hanfling, M.J. (2012)	To prospectively examine potential benefits of active commuting to school on measures of weight status and physical activity in a sample of youth.	Randomized Controlled Trial	Schools in southern California	1083 participants in the fall of fourth grade (53.2% boys and 46.8% girls).85% white, 7% Hispanic/Latino, 6% Asian/Pacific Islander, 1% African-American, and 1% other.	Questionnaire for Mode of Transportation to School. Caltrac accelerometers for physical activity. Weight, height, and skinfolds were measured by trained staff.	Boys who actively commuted to school had lower BMI ($p < 0.01$) and skinfolds ($p < 0.05$) than non-active commuters to school in the fourth grade. Active commuting to school over 2 years was not associated with BMI change or overweight status. Walking and cycling to school may contribute to preventing excessive weight gain, or leaner children may walk or cycle to school.
Rosenberg, D.E., Sallis, J.F., Conway, T.L., Cain, K.L., Mckenzie,T. L. (2011)	To evaluate the impact of a "walking school bus" program on children's rates of active commuting to school and physical activity.	Randomized Controlled Trial	8 schools in Houston, Texas	4th-graders from 8 schools (N = 149)	The primary outcome was the percentage of trips made by active commuting over 1 school week (percent active commuting), which was assessed every school day for 1 week during times 1 and 2 using a questionnaire with high test-retest reliability ($\kappa = 0.97$; $P < .001$) and convergent validity with parental report ($\kappa = 0.87$; $P < .001$). The secondary outcome was MVPA (minutes per day) measured by using accelerometry, which provides a valid, objective measure of physical activity.2	The program improved children's active commuting to school and daily moderate-to-vigorous physical activity.
Østergaard, L., Kolle, E., Steene-Johannessen, J., Anderssen, S., Andersen, L.	To investigate the associations between body composition, cardiorespir	Cross-sectional	Schools in Norway	1694 participants from 40 elementary schools and 23 high schools in Norway	Data gathering procedures used include anthropometry for skinfold thickness, waist circumference, and BMI); cardiorespiratory fitness was assessed	Active commuting to school, particularly cycling, may have a positive impact on physical fitness in children and adolescents. Males cycling to school had a lower sum of skin

(2013)	atory and muscular fitness in relation to travel mode to school in children and adolescents.				using a VO2max test; handgrip strength and standing long jump tests for muscular fitness; and questionnaires to register the mode of transport to school, age, gender, and levels of leisure time physical activity.	folds than adolescents walking to school. Higher cardiorespiratory fitness was observed in adolescents and male cyclists compared to walkers and passive commuters 2. The study suggests that promoting active commuting to school, particularly cycling, may have public health benefits for children and adolescents.
Villa-González, E., Ruiz, J.R., Chillón, P. (2015)	To investigate the association between active commuting to school and health-related physical fitness in Spanish school-aged children.	Cross-sectional	Primary Schools in Spain	494 Spanish school-aged children ranging from 8-11 years old	Assessing Levels of Physical Activity (ALPHA) fitness test battery and a self-reported questionnaire regarding the weekly travel mode to school were used in the study.	Active commuting to school was positively associated with improved fitness among Spanish school-aged children . Specifically, active commuting to school was associated with higher levels of speed-agility and lower body muscular fitness in boys and girls. However, a study found no differences in adiposity, physical fitness, and cognitive performance between active commuters and nonactive commuters.
Campos-Garzón, P., Sevil-Serrano, J., García-Hermoso, A., Chillón, P., Barranco-Ruiz, Y. (2023)	To analyze the contribution of active commuting to and from school (ACS) to device-measured light physical activity (LPA) and moderate-to- vigorous physical activity (MVPA) levels in young people aged 6 to 18 years old, as well as, in both trip directions (i.e., home-school, school-home)	Systematic Review and Meta-analysis	Databases	7127 participants with ages 6-18 years old from different countries	Data extracted from the studies were as follows: (1) author(s), year, and country; (2) sociodemographic variables/information (e.g., residence place or gender); (3) sample and age; (4) study design; (5) ACS mode (i.e., walking, cycling, or ACS [when the study specified or did not specify the ACS mode]); (6) trip direction (i.e., home-school and/or school-home); (7) identification of the ACS trip start/end points/times (methodology used to define the time frame where and when ACS took place, using GPS or predefined time intervals); (8) mean MVPA in minutes during ACS; and (9) mean LPA in minutes during ACS. In case that the included studies reported multiple measurement times (e.g., pre– post data after an intervention program), the	(1) ACS could contribute about the 48% of the daily PA recommendations for health in young people on school days; (2) higher levels of LPA and MVPA were found in the school- home trips compared to home-school trips

					information included was for the first measurement (i.e., baseline). It should be noted that the age and sample of each study are of the participants who actively commutes to and/or from school. Finally, in case an item was not reported or was not clear in the study, it was rated as "not reported" or "not clear," respectively.	
Martin-Moraleda, E., Mandic, S., Queralt, A., Romero-Blanco, C., Aznar, S. (2022)	To assess the association between ACS with overweight/ obesity parameters in adolescents aged 11 to 19 years.	Systematic Review	Databases	38,136 Adolescents aged 11-19 from different countries	Data were collected and organized by year of publication, author, study population and characteristics, study location, study design, method used to assess ACS and body composition and outcomes of measures.	Fifteen articles (68.18%) found a consistent association between ACS and body composition and seven studies (31.82%) showed no differences in body composition between active and passive commuters to school. Fourteen studies observed that active commuters to school had a more favorable body composition and one study reported that ACS was associated with unfavorable body composition.
Rosenberg, D., Sallis, J., Conway, T., Cain, K., Mckeznie, T. (2006)	To prospectively examine potential benefits of active commuting to school on measures of weight status and physical activity in a sample of youth.	Randomized Controlled Trial	Seven Elementary schools in the United States	1083 fourth grade and 924 fifth grade students from seven elementary schools	Participants were classified as active (walking, biking, or skateboarding to school almost every day for baseline analyses or at least 2 d/wk for analyses of consistent active commuting) or non-active commuters to school. Accelerometers were used to measure physical activity. Height, weight, and skinfolds were objectively assessed.	Boys who actively commuted to school had lower BMI ($p < 0.01$) and skinfolds ($p < 0.05$) than non-active commuters to school in the fourth grade. Active commuting to school over 2 years was not associated with BMI change or overweight status.
Voorhees, C., Ashwood, S., Evenson, K., Sirard, J., Rung, A., Dowda, M., Mckeznie, T. (2010)	To investigate whether perceived and actual neighborhood features were associated with walking to or from school among adolescent girls.	Randomized Controlled Trial	Neighborhoods in the United States	890 eighth grade girls from the Trial of Activity in Adolescent Girls (TAAG) study living within 1.5 miles of their middle school	Participants completed a self-administered survey on their neighborhood and walking behavior. Geographic information system data were used to assess objective neighborhood features. Nested multivariable logistic regression analyses were conducted to determine the contribution of perceived and	Girls were nearly twice as likely to walk to or from school if they perceived their neighborhoods as safe and perceived that they had places they liked to walk, controlling for other potential confounders. In addition, girls who lived closer to school, had more active destinations in their neighborhood, and had smaller-sized blocks were more

					objective measures of walking to or from school.	likely to walk to or from school than those who did not.
Wanjau, M., Dalugoda, Y., Oberai, M., Möller, H., Standen, C., Haigh, F., Milat, A., Lucas, P., Veerman, J.L. (2023)	To determine if active transport results in net additional physical activity and the extent of any displacement of physical activity in other domains.	Systematic Review	Databases	Adults, excluding professional athletes and individuals with chronic diseases	A systematic search of PubMed, Embase, NHS Economic Evaluation Database, EBSCO Host (CINAHL, Business Source Complete, Business Source Ultimate Sport Discus), Scopus, Web of Science, SAGE, and Taylor & Francis Online, and reference lists from included studies.	Active transport has the potential to elevate overall physical activity levels without significant compensatory reductions in other domains, observed among adults. This highlights the need to incorporate the health-related economic benefits of active transport into business cases and cost-benefit analyses pertaining to transport infrastructure investments, thereby enhancing the academic rigor and validity of such evaluations.

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Appendix 2: Gantt Chart

Table 2. Gantt Chart

	2024											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Student authors is set to meet with the Faculty members												
Last day of submission to TWC for Ethical Approval												
Undergo Ethics Review												
Coordinate with SHS Principal												
Recruitment of Students												
Commencement of data collection												
50% of data collection												
100% of data collection												
Seminar Proper												
Survey												
Data Analysis												
Complete First thesis draft submitted to research writing coordinator												
Final thesis draft submitted to paper presentation judges												
Paper Presentation												
Poster Presentation												

Appendix 3: Budget

Table 3. Research Budget Proposal

RESEARCH PROPOSAL BUDGET			
Expenses	**Quantity**	**Price**	**Total**
VENUE			
Room	1	₱ 0	₱ 0
REFRESHMENTS			
Skyflakes (25g)	351	₱ 7	₱ 2,457
Summit Bottled water (500 ml)	351	₱ 15	₱ 5,265
OTHER EXPENSES			
Ethics review fee	-	₱3,500	₱ 3,500
Speaker	6	₱ 0	₱ 0
Raffle/Token	1 prize x 10 sessions	₱ 300	₱ 3,000
Fitness planner	351	₱ 35	₱ 12,285
Photocopy of Questionnaires	351	₱ 2	₱ 702
Photocopy of Informed Consents	351	₱ 2	₱ 702
Total			₱ 27,911

Appendix 4: Assessment Tools

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____**days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____**hours per day**

   _____**minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____**days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

Supplemental Figure 1. IPAQ Page 1 from International Physical Activity Questionnaire - Short Form by Youthrex

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____**hours per day**

_____**minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____**days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____**hours per day**

_____**minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____**hours per day**

_____**minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

Supplemental Figure 2. IPAQ Page 2 from International Physical Activity Questionnaire - Short Form by Youthrex

2 The questionnaire

Physical Activity		
Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed]*. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.		
Question	**Response**	**Code**
Work		
Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 4*	P1
In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊__⌋	P2
How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P3 (a-b)
Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 7*	P4
In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊__⌋	P5
How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P6 (a-b)
Travel to and from places		
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. *[Insert other examples if needed]*		
Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7
In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊__⌋	P8
How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P9 (a-b)

Continued on next page

Supplemental Figure 3. GPAQ Questionnaire Page 1 from Global Physical Activity Questionnaire (GPAQ) Analysis Guide

2 The questionnaire, Continued

Physical Activity, Continued		
Question	**Response**	**Code**
Recreational activities		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), *[Insert relevant terms]*.		
Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P13*	P10
In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊_⌋	P11
How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P12 (a-b)
Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, *[cycling, swimming, volleyball]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P16*	P13
In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊_⌋	P14
How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P15 (a-b)
Sedentary behaviour		
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping. *[INSERT EXAMPLES] (USE SHOWCARD)*		
How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P16 (a-b)

GPAQ Analysis Guide 5

Supplemental Figure 4. GPAQ Questionnaire Page 2 from Global Physical Activity Questionnaire (GPAQ) Analysis Guide

Appendix 5: Data Extraction Table

Table 4. Sample Data Extraction Table for Descriptive Statistics

	Frequency	Proportion	Mean	Median	St. dev
Age					
16					
17					
16					
Sex					
Male					
Female					
Programs					
STEM					
ABM					
GA-HA					
HUMSS					
MAD					
PES					

Table 5. Sample Data Extraction Table for Inferential Statistics

Variables	Active	Passive	Mixed
Demographic Information			
Age			
Sex			
Programs			
STEM			
ABM			
GA-HA			
HUMSS			
MAD			
PES			
Anthropometric Measurements			
Ht			
Wt			
BMI			
Waist Circumference			
Hip Circumference			
Waist-Hip Ratio			
Physical Activity			
IPAQ			
GPAQ			

Appendix 6: Informed Consent for 18-y/o participants

UNIVERSITY OF SANTO TOMAS
THE PONTIFICAL AND ROYAL UNIVERSITY OF SANTO TOMAS,
THE CATHOLIC UNIVERSITY OF THE PHILIPPINES

College of Rehabilitation Sciences
BS Physical Therapy A.Y. 2023-2024

Participant Information Sheet and Informed Consent (PIS-ICF) for 18-year-old UST SHS Students of AY 2024-25

Donald G. Manlapaz, PhD, PTRP, RPT
University of Santo Tomas - College of Rehabilitation Sciences

Exploring the relationship between different modes of transportation and levels of physical activity among senior high school students of the University of Santo Tomas: A cross-sectional study

PART I: INFORMATION SHEET

ABSTRACT

Introduction: Rapid changes in technology, communication, and transportation prompted challenges in achieving the recommended level of physical activity. Although the students are returning for in-campus classes to promote more interaction and socialization, the youth still fall short of living up to the desired level of physical activity.

Objectives: The aim of the study is to explore the relationship between the types of transport and the level of physical activity among senior high school students (SHS) from the University of Santo Tomas (UST).

Methods: This will be an observational, cross-sectional, analytic study design where the researchers will physically obtain the participants' demographic information, programs, and anthropometric measurements such as height, weight, and hip & waist circumferences. Meanwhile, the level of physical activity will be collected through the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ).

Plan for Data Analysis: Descriptive statistics will be utilized to characterize the samples using frequency, mean, median, and standard deviation, while inferential statistics such as Analysis of Variance for comparison and Pearson's and Spearman for correlation will be used. All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Keywords: Transport, Physical Activity, High School

INTRODUCTION

We are currently undergraduate Physical Therapy students from the College of Rehabilitation Science of the University of Santo Tomas, inviting you to participate in our research study on exploring the relationship between your mode of transportation and your physical activity levels. It is your choice if you want to be in this study or not, and you may take your time to reflect on this matter, as participation is voluntary.

It is explained in this form why the study is being pursued and how it will be conducted in detail. Should you wish to participate or have any questions or concerns, the research team will gladly assist you at any time. Please do not hesitate to contact any member of the research team. All contact information will be found on this informed consent form. We are expecting a total number of approximately 373 participants for this study.

PURPOSE OF THE RESEARCH

You are being asked to take part in a research study, but before you decide to participate, it is important that you understand why the research is being conducted and what it entails. Please read the following information carefully and let us know if anything is unclear or if you need more information.

The purpose of this study is to determine whether or not the mode of transportation used by senior high school students from the University of Santo Tomas influences their physical activity levels.

With this, the modes of transportation will be active, passive, or mixed modes of transportation. Active transportation includes those that require the individual to spend energy, such as walking or cycling. On the other hand, passive transportation involves the use of motorized vehicles, such as driving or riding a bus. Lastly, mixed transportation employs both active and passive transport in combination, such as walking to the bus stop and then riding the bus to school.

TYPE OF RESEARCH INTERVENTION

The research study involves the following interventions:

1. Gathering of each participant's basic information such as name, age, birthday, strand, section, presence of regular athletic activities, and their mode(s) of transportation.
2. Anthropometric measurements, including height, weight, hip circumference, and weight circumference, will be physically taken by a designated member of the research team for each participant.
3. Two self-administered questionnaires, the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ), will be deployed to assess and quantify the level of physical activity of each participant.

PARTICIPANT SELECTION

Our research focuses on assessing the physical activity levels of adolescents, specifically senior high school students enrolled in the University of Santo Tomas Senior High School (UST SHS). The reason for selecting this population is because of its alignment with the adolescent age group, allowing us to investigate the levels of physical activity within this demographic, given their mode of transportation.

VOLUNTARY PARTICIPATION

Your decision to participate in this study is entirely voluntary. Deciding not to participate, discontinue, or withdraw from this study at any period will entail no penalty and will not affect your academic standing or any evaluation thereof. In the event that data collection has been completed and you opt to withdraw, you may formally request the exclusion of your information from the study.

PROCEDURES

The study has been approved by the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC). The research group has since acquired authorization from the UST Secretary General, along with the UST SHS Principal.

The procedures that you are entailed to participate in this study include:

1. **Assessment of eligibility**: Participants in the study must only include students officially enrolled from the University of Santo Tomas Senior High School (UST SHS) between the ages of 16 and 18 years old. However, people with mobility-related health issues, such as those with physical disabilities or other illnesses that might affect the mode of transportation or commute used, are ineligible to participate.
2. **Recruitment**: The eligible participants will be recruited via publication materials posted physically around the campus and virtually on social media. If they are interested, they will be asked to pre-register.
3. **Informed Consent**: The pre-registered students will be asked to fill out an informed consent form confirming their understanding of the study, what it entails, and their voluntary participation in the research. Faculty members will be asked to witness the signing of consent forms.
4. **Data Collection**: The participants will be asked to state their demographic information and program. Then, the researchers will obtain their anthropometric measurements individually in a private space, which include hip and waist circumferences, height, and weight. Lastly, they will be asked to answer two questionnaires: the International Physical Activity Questionnaire and the Global Physical Activity Questionnaire.
5. **Educational Seminar**: A seminar regarding physical activity will be conducted after the data collection to provide an in-depth understanding of its significance.
6. **Data Management and Retrieval**: The hard copies of the questionnaires will be safeguarded by the group liaison officer. Furthermore, soft copies and backup data will be kept in a password-protected Google Drive folder that is only accessible to the researchers.

The interview will be conducted within the premises of the University of Santo Tomas Senior High School building at a time convenient for you and the research team in the case that you wish to participate in the study. The timetable for data collection has been reviewed by the secretary general and the UST SHS principal to guarantee that no interference with your academic schedule will occur. You have the choice to skip questions during the interview and move on to the next one. The interview setting will be one-on-one unless you prefer otherwise.

Moreover, the participant will also be asked to answer two self-administered questionnaires. The participant may choose to answer the questionnaires personally or have it read to them, answered aloud, and noted by a member of the research team. The participant may skip the questions and proceed to the next question should they wish to. The recorded information is confidential; the participants' names are not included on the forms, only a coded identifier. No one else except Donald Manlapaz, Zyra Mae Sicat, April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee will have access to the results of the survey.

For research purposes, the interview and answering of the questionnaires will be recorded and digitally encoded through a password-protected Google Drive folder. Hard copies of the questionnaire will be safeguarded in the residence of an assigned researcher. Be assured that the information will remain confidential and accessible only to the research team. Study records will be maintained for 10 years and then securely destroyed. If you have concerns, you may reach out to any of the following numbers listed in this form.

DURATION

Data collection, including the interview, taking of measurements, and answering of questionnaires, will be done within one day. This will be followed by a process of data analysis. In the case that a follow-up is needed, a member of the research team will be reaching out to you via email, SMS, or Messenger.

RISKS

The following are the possible risks or discomforts that may affect the participants of the study:

- **Psychological**: The data gathering procedure entails the participants answering two short questionnaires regarding their physical activity. Despite the low probability, you might experience mental fatigue and would not be able to answer the survey as efficiently and accurately. Moreover, concerns regarding body image may be elicited while taking the participant's body measurements. With this, the researchers will be taking charge of obtaining the anthropometric measurements, only revealing the personal information to the participant if requested. You do not have to answer any questions or take part in the interview or survey if you feel that the questions are too personal or if talking about them makes you uncomfortable. Participants have the liberty to take breaks or withdraw their participation in the study at any moment.
- **Social**: The process poses a low risk of experiencing embarrassment when disclosing their primary mode of transportation to and from school due to the prevailing negative societal stigma associated with these. However, these can be mitigated by maintaining strict confidentiality measures among the participants.
- **Economic**: The participant will be asked to provide your own means of transportation to the site on the day of data collection. Reimbursement will not be provided.
- **Loss of Privacy/Confidentiality**: There is a low risk for breach of privacy as the collected data may inadvertently get disclosed to the public. Nevertheless, the researchers will apply stringent measures to restrict data access. With this, soft copies will be securely stored in a password-protected Google Drive folder, and only the researchers whose names are

listed in this form will have access to them. Moreover, hard copies of the answered questionnaires will be stored in the residence of the group liaison officer. Coded identifiers will also be implemented to decrease the likelihood of revealing personal information. All of these data will be destroyed and deleted 10 years after the publication of the results.

- **Legal**: Forgery of parental consent forms by underaged participants can also be a legal risk in the study. To prevent any potential issues, the research team will request the contact numbers and email addresses of the parents or legally authorized representative (LAR) of underaged participants. An assigned researcher will subsequently reach out to the parents/LARs to inform them that their child is taking part in the study.
- **Others**: The data gathering process would occupy time from the participants' schedules as each and every one will take part in a seminar regarding physical activity. To minimize disruption to daily routines, a survey will be conducted to determine the participants' preferred time and date for data collection.

BENEFITS

The students will better understand the relationship between physical activity & mode of transport and will take part in a study that will benefit various facets of society. Moreover, the study holds significant importance in public health as it can raise awareness about the impact of transportation on physical activity, enabling targeted health interventions for primary care. The participants will gain a new perspective that will facilitate taking active measures to prevent health risks from occurring in which students will be able to make informed decisions toward better overall physical health/level. The study may also promote physical activity within educational institutions, fostering healthier student environments. Furthermore, it provides empirical evidence to inform policy decisions related to PA and pave the way for future research into health, environment, and SDGs, offering a comprehensive understanding of transportation's effects on individuals and the community.

TERMINATION OF THE RESEARCH

Although this research is a low-risk study, termination of the whole study may be possible to protect the participants from unforeseen excessive risks and to maintain the integrity of the data. Meanwhile, termination of the subjects' participation may also be done due to the following reasons:

- Failure of the researchers to obtain the participant's consent form
- Failure of the participant/s to attend the data collection
- Failure of the participant/s to follow proper procedures
- Failure of the researcher to collect the participant's complete data
- Deliberate provision of false information

In addition, if the study is prematurely ended for any other reason aside from mentioned above, the researchers will immediately notify the participants who have already been recruited. The principal investigator will also promptly inform the ERC regarding management measures. Moreover, the research team will submit a written and detailed explanation of the termination or suspension in all cases.

REIMBURSEMENTS

There will be no reimbursement for any charges incurred during your voluntary participation. Any expenses you have incurred during the span of your participation will not be compensated by the research team. Nevertheless, tokens of appreciation and a raffle with cash prizes will be given per data gathering session. Refreshments will also be provided for the length of the data collection.

CONFIDENTIALITY

All records will be held in strict confidence and access will be restricted to the research team exclusively. Moreover, names will not be included in the data gathered, and only coded identifiers will be used.

Soft copies of the data will be secured in a password-protected Google Drive with restricted access. Meanwhile, hard copies of the questionnaires will be kept in the residence of the group liaison officer. No unauthorized personnel may access your personal information. Confidentiality will be upheld as permitted by the law and as guaranteed by the consent form. The records will be securely stored with a validity of 10 years. The privacy and anonymity of all participants will be maintained throughout the study and analysis thereafter.

SHARING THE RESULTS

After the completion of the study, the results of the data collection process, along with the entire paper, will be disseminated to the participants via email for transparency. These will also be publicly shared, through publications or conferences, once the study has been completed, all while ensuring your anonymity. You may gain access to your own information if you wish to obtain them.

RIGHT TO REFUSE OR WITHDRAW

Your participation in this study is voluntary. You have the right to refuse or withdraw from this research study at any time. Should you wish to exclude yourself or any personal information included in this study, kindly reach out to any of the researchers with the contact information provided. A review of your interview data is also permitted, provided that you request one.

WHO TO CONTACT

Suppose you have questions about the study, you may contact two authors, Dr. Donald G. Manlapaz and April Alexandra A. Engbino. Should you have any concerns regarding the ethicality of the study, you may contact the College of Rehabilitation Sciences - Ethics Review Committee Head, Dr. Lea Enriquez. The following contact information can be found on this form. The authors and the Ethics Review Committee should be able to address any concerns or inquiries that you may have.

You may reach the following through

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Assoc. Prof. Anna Lea L. Enriquez, MD, DBPA, FPSA
Chairman, Ethics Review Committee
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4061611 local 8280

PART II: CERTIFICATE OF CONSENT

I **(participant's name)**, agree to participate in the research project entitled **Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study**, conducted by Donald Manlapaz, Zyra Mae Sicat, April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee. The said researchers have discussed the research project with me.

I have read the foregoing information, or it has been read to me. I have received and kept a copy of the information letter/plain language statement. I have had the opportunity to ask questions about it, and any questions I have been asked have been answered to my satisfaction. I understand the general purposes, risks, and methods of this research. I consent voluntarily to be a participant in this study.

I consent to participate in the research project, and the following has been explained to me:

- The research may not be of direct benefit to me
- My participation is completely voluntary
- My right to withdraw from the study at any time without any implications to me
- The risks including any possible inconvenience as a consequence of my participation in the research study
- The steps that have been taken to minimize any possible risks
- Public liability insurance arrangements
- What I am expected and required to do
- Who I should contact for any complaints about the research or the conduct of the research
- I am able to review and request a copy of the research findings and reports
- Security and confidentiality of my personal information.

In addition, I consent to:

- Audio-visual recording of any part of or all research activities (if applicable)
- Publication of results from this study on the condition that my identity will not be revealed.

Print Name of Participant:

Signature of Participant:

Date: [MM/DD/YYYY]

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness:
Signature of witness
Date: [MM/DD/YYYY]

STATEMENT BY THE RESEARCHER OR PERSON TAKING CONSENT

I have accurately read out the information sheet to the potential participant, and to the best of my ability, making sure that the participant understands that the following will be done:

1. Collection of demographic information, strand, presence of athletic activities, and their primary mode of transportation
2. Collection of their anthropometric measurement, including height, weight, hip circumference, and waist circumference
3. Answering of two self-administered questionnaires: the International Physical Activity Questionnaire (IPAQ) and the Global Physical Activity Questionnaire (GPAQ)

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this Informed Consent Form has been provided to the participant.

Print Name of Researcher or Person Taking the Consent:
Signature of Researcher or Person Taking the Consent:
Date: [MM/DD/YYYY

Appendix 7: Informed Consent for 16- to below 18-y/o participants

UNIVERSITY OF SANTO TOMAS
THE PONTIFICAL AND ROYAL UNIVERSITY OF SANTO TOMAS,
THE CATHOLIC UNIVERSITY OF THE PHILIPPINES

College of Rehabilitation Sciences
BS Physical Therapy A.Y. 2023-2024

Participant Information Sheet and Informed Consent (PIS-ICF) for 16- to below 18-year-old UST SHS Students of AY 2024-25

Donald G. Manlapaz, PhD, PTRP, RPT
University of Santo Tomas - College of Rehabilitation Sciences

Exploring the relationship between different modes of transportation and levels of physical activity among senior high school students of the University of Santo Tomas: A cross-sectional study

PART I: INFORMATION SHEET

ABSTRACT

Introduction: Rapid changes in technology, communication, and transportation prompted challenges in achieving the recommended level of physical activity. Although the students are returning for in-campus classes to promote more interaction and socialization, the youth still fall short of living up to the desired level of physical activity.

Objectives: The aim of the study is to explore the relationship between the types of transport and the level of physical activity among senior high school students (SHS) from the University of Santo Tomas (UST).

Methods: This will be an observational, cross-sectional, analytic study design where the researchers will physically obtain the participants' demographic information, programs, and anthropometric measurements such as height, weight, and hip & waist circumferences. Meanwhile, the level of physical activity will be collected through the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ).

Plan for Data Analysis: Descriptive statistics will be utilized to characterize the samples using frequency, mean, median, and standard deviation, while inferential statistics such as Analysis of Variance for comparison and Pearson's and Spearman for correlation will be used. All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Keywords: Transport, Physical Activity, High School

INTRODUCTION

We are currently undergraduate Physical Therapy students from the College of Rehabilitation Science of the University of Santo Tomas, inviting your child to participate in our research study on exploring the relationship between the participant's mode of transportation and the participant's physical activity levels. It is your and your child's choice to participate in this study or not, and you may take your time to reflect on this matter, as participation is voluntary.

It is explained in this form why the study is being pursued and how it will be conducted in detail. Should you allow your child to participate or have any questions or concerns, the research team will gladly assist you at any time. Please do not hesitate to contact any member of the research team. All contact information will be found on this informed consent form. We are expecting a total number of approximately 373 participants for this study.

PURPOSE OF THE RESEARCH

Your child is being asked to take part in a research study, but before you decide, it is important that you understand why the research is being conducted and what it entails. Please read the following information carefully and let us know if anything is unclear or if you need more information.

The purpose of this study is to determine whether or not the mode of transportation used by senior high school students from the University of Santo Tomas influences their physical activity levels.

With this, the modes of transportation will be active, passive, or mixed modes of transportation. Active transportation includes those that require the individual to spend energy, such as walking or cycling. On the other hand, passive transportation involves the use of motorized vehicles, such as driving or riding a bus. Lastly, mixed transportation employs both active and passive transport in combination, such as walking to the bus stop and then riding the bus to school.

TYPE OF RESEARCH INTERVENTION

The research study involves the following interventions:

1. Gathering of each participant's basic information such as name, age, birthday, strand, section, presence of regular athletic activities, and their mode(s) of transportation.
2. Anthropometric measurements, including height, weight, hip circumference, and weight circumference, will be physically taken by a designated member of the research team for each participant.
3. Two self-administered questionnaires, the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ), will be deployed to assess and quantify the level of physical activity of each participant.

PARTICIPANT SELECTION

Our research focuses on assessing the physical activity levels of adolescents, specifically senior high school students enrolled in the University of Santo Tomas Senior High School (UST SHS). The reason for selecting this population is because of its alignment with the adolescent age group, allowing us to investigate the levels of physical activity within this demographic, given their mode of transportation.

VOLUNTARY PARTICIPATION

Your decision to allow your child to participate in this study is entirely voluntary. Deciding not to participate, discontinue, or withdraw from this study at any period will entail no penalty and will not affect the participant's academic standing or any evaluation thereof. In the event that data collection has been completed and you or the participant opt to withdraw, you may formally request the exclusion of your child's information from the study.

PROCEDURES

The study has been approved by the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC). The research group has since acquired authorization from the UST Secretary General, along with the UST SHS Principal.

The procedures that the participant is entailed to participate in this study include:

1. **Assessment of eligibility**: Participants in the study must only include students officially enrolled from the University of Santo Tomas Senior High School (UST SHS) between the ages of 16 and 18 years old. However, people with mobility-related health issues, such as those with physical disabilities or other illnesses that might affect the mode of transportation or commute used, are ineligible to participate.
2. **Recruitment**: The eligible participants will be recruited via publication materials posted physically around the campus and virtually on social media. If they are interested, they will be asked to pre-register.
3. **Informed Consent**: The pre-registered students will be asked to fill out an informed consent form confirming their understanding of the study, what it entails, and their voluntary participation in the research. Faculty members will be asked to witness the signing of consent forms. Underaged participants will also have to sign with their parent or legal guardian.
4. **Data Collection**: The participants will be asked to state their demographic information and program. Then, the researchers will obtain their anthropometric measurements individually in a private space, which include hip and waist circumferences, height, and weight. Lastly, they will be asked to answer two questionnaires: the International Physical Activity Questionnaire and the Global Physical Activity Questionnaire.
5. **Educational Seminar**: A seminar regarding physical activity will be conducted after the data collection to provide an in-depth understanding of its significance.
6. **Data Management and Retrieval**: The hard copies of the questionnaires will be safeguarded by the group liaison officer. Furthermore, soft copies and backup data will be kept in a password-protected Google Drive folder that is only accessible to the researchers.

The interview will be conducted within the premises of the University of Santo Tomas Senior High School building at a time convenient for the participant and the research team in the case that you wish for your child to participate in the study. The timetable for data collection has been reviewed by the secretary general and the UST SHS principal to guarantee that no interference with your child's academic schedule will occur. The participant has the choice to skip questions

during the interview and move on to the next one. The interview setting will be one-on-one unless you or your child prefer otherwise.

Moreover, the participant will also be asked to answer two self-administered questionnaires. The participant may choose to answer the questionnaires personally or have it read to them, answered aloud, and noted by a member of the research team. The participant may skip the questions and proceed to the next question should they wish to. The recorded information is confidential; the participants' names are not included on the forms, only a coded identifier. No one else except Donald Manlapaz, Zyra Mae Sicat, April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee will have access to the results of the survey.

For research purposes, the interview and answering of the questionnaires will be recorded and digitally encoded through a password-protected Google Drive folder. Hard copies of the questionnaire will be safeguarded in the residence of an assigned researcher. Be assured that the information will remain confidential and accessible only to the research team. Study records will be maintained for 10 years and then securely destroyed. If you have concerns, you may reach out to any of the following numbers listed in this form.

DURATION

Data collection, including the interview, taking of measurements, and answering of questionnaires, will be done within one day. This will be followed by a process of data analysis. In the case that a follow-up is needed, a member of the research team will be reaching out to you and your child via email, SMS, or Messenger.

RISKS

The following are the possible risks or discomforts that may affect the participants of the study:

- **Psychological**: The data gathering procedure entails the participants answering two short questionnaires regarding their physical activity. Despite the low probability, the participant might experience mental fatigue and would not be able to answer the survey as efficiently and accurately. Moreover, concerns regarding body image may be elicited while taking the participant's body measurements. With this, the researchers will be taking charge of obtaining the anthropometric measurements, only revealing the personal information to the participant if requested. The participant does not have to answer any questions or take part in the interview or survey if they feel that the questions are too personal or if talking about them makes them uncomfortable. Participants have the liberty to take breaks or withdraw their participation in the study at any moment.
- **Social**: The process poses a low risk of experiencing embarrassment when disclosing their primary mode of transportation to and from school due to the prevailing negative societal stigma associated with these. However, these can be mitigated by maintaining strict confidentiality measures among the participants.
- **Economic**: The participant will be asked to provide their own means of transportation to the site on the day of data collection. Reimbursement will not be provided.
- **Loss of Privacy/Confidentiality**: There is a low risk for breach of privacy as the collected data may inadvertently get disclosed to the public. Nevertheless, the researchers will apply

stringent measures to restrict data access. With this, soft copies will be securely stored in a password-protected Google Drive folder, and only the researchers whose names are listed in this form will have access to them. Moreover, hard copies of the answered questionnaires will be stored in the residence of the group liaison officer. Coded identifiers will also be implemented to decrease the likelihood of revealing personal information. All of these data will be destroyed and deleted 10 years after the publication of the results.

- **Legal**: Forgery of parental consent forms by underaged participants can also be a legal risk in the study. To prevent any potential issues, the research team will request the contact numbers and email addresses of the parents or legally authorized representative (LAR) of underaged participants. An assigned researcher will subsequently reach out to the parents/LARs to inform them that their child is taking part in the study.
- **Others**: The data gathering process would occupy time from the participants' schedules as each and every one will take part in a seminar regarding physical activity. To minimize disruption to daily routines, a survey will be conducted to determine the participants' preferred time and date for data collection.

BENEFITS

The students will better understand the relationship between physical activity & mode of transport and will take part in a study that will benefit various facets of society. Moreover, the study holds significant importance in public health as it can raise awareness about the impact of transportation on physical activity, enabling targeted health interventions for primary care. The participants will gain a new perspective that will facilitate taking active measures to prevent health risks from occurring in which students will be able to make informed decisions toward better overall physical health/level. The study may also promote physical activity within educational institutions, fostering healthier student environments. Furthermore, it provides empirical evidence to inform policy decisions related to PA and pave the way for future research into health, environment, and SDGs, offering a comprehensive understanding of transportation's effects on individuals and the community.

TERMINATION OF THE RESEARCH

Although this research is a low-risk study, termination of the whole study may be possible to protect the participants from unforeseen excessive risks and to maintain the integrity of the data. Meanwhile, termination of the subjects' participation may also be done due to the following reasons:

- Failure of the researchers to obtain the participant's consent form
- Failure of the participant/s to attend the data collection
- Failure of the participant/s to follow proper procedures
- Failure of the researcher to collect the participant's complete data
- Deliberate provision of false information

In addition, if the study is prematurely ended for any other reason aside from mentioned above, the researchers will immediately notify the participants who have already been recruited. The principal investigator will also promptly inform the ERC regarding management measures. Moreover, the research team will submit a written and detailed explanation of the termination or suspension in all cases.

REIMBURSEMENTS

There will be no reimbursement for any charges incurred during your child's voluntary participation. Any expenses incurred by the participant during the span of their participation will not be compensated by the research team. Nevertheless, tokens of appreciation and a raffle with cash prizes will be given per data gathering session. Refreshments will also be provided for the length of the data collection.

CONFIDENTIALITY

All records will be held in strict confidence and access will be restricted to the research team exclusively. Moreover, names will not be included in the data gathered, and only coded identifiers will be used.

Soft copies of the data will be secured in a password-protected Google Drive with restricted access. Meanwhile, hard copies of the questionnaires will be kept in the residence of the group liaison officer. No unauthorized personnel may access your child's personal information. Confidentiality will be upheld as permitted by the law and as guaranteed by the consent form. The records will be securely stored with a validity of 10 years. The privacy and anonymity of all participants will be maintained throughout the study and analysis thereafter.

SHARING THE RESULTS

After the completion of the study, the results of the data collection process, along with the entire paper, will be disseminated to the participants via email for transparency. These will also be publicly shared, through publications or conferences, once the study has been completed, all while ensuring the participant's anonymity. You may gain access to your child's information if you wish to obtain them.

RIGHT TO REFUSE OR WITHDRAW

The participant's participation in this study is voluntary. The participant and the parent/LAR have the right to refuse or withdraw from this research study at any time. Should you or your child wish to exclude themself or any personal information included in this study, kindly reach out to any of the researchers with the contact information provided. A review of your child's interview data is also permitted, provided that you request one.

WHO TO CONTACT

Suppose you have questions about the study, you may contact two authors, Dr. Donald G. Manlapaz and April Alexandra A. Engbino. Should you have any concerns regarding the ethicality of the study, you may contact the College of Rehabilitation Sciences - Ethics Review Committee Head, Dr. Lea Enriquez. The following contact information can be found on this form. The authors and the Ethics Review Committee should be able to address any concerns or inquiries that you may have.

You may reach the following through

Assoc. Prof. Donald G. Manlapaz, PTRP, MSPT, PhD

Faculty Co-Author
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April Alexandra A. Engbino
Liaison Officer
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+63 975 741 0379

Assoc. Prof. Anna Lea L. Enriquez, MD, DBPA, FPSA
Chairman, Ethics Review Committee
ethicsreview.crs@ust.edu.ph
4061611 local 8280

PART II: CERTIFICATE OF CONSENT

I **(participant's name)**, agree to participate in the research project entitled **Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study**, conducted by Donald Manlapaz, Zyra Mae Sicat, April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee. The said researchers have discussed the research project with me.

I have read the foregoing information, or it has been read to me. I have received and kept a copy of the information letter/plain language statement. I have had the opportunity to ask questions about it, and any questions I have been asked have been answered to my satisfaction. I understand the general purposes, risks, and methods of this research. I consent voluntarily to be a participant in this study.

I consent to participate in the research project, and the following has been explained to me:

- The research may not be of direct benefit to me
- My participation is completely voluntary
- My right to withdraw from the study at any time without any implications to me
- The risks including any possible inconvenience as a consequence of my participation in the research study
- The steps that have been taken to minimize any possible risks
- Public liability insurance arrangements
- What I am expected and required to do
- Who I should contact for any complaints about the research or the conduct of the research
- I am able to review and request a copy of the research findings and reports
- Security and confidentiality of my personal information.

In addition, I consent to:

- Audio-visual recording of any part of or all research activities (if applicable)
- Publication of results from this study on the condition that my identity will not be revealed.

Print Name of Participant:

Signature of Participant:

Date: [MM/DD/YYYY]

Print Name of Parent/LAR:

Signature of Parent/LAR:

Date: [MM/DD/YYYY]

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of Witness:

Signature of Witness:

Date: [MM/DD/YYYY]

STATEMENT BY THE RESEARCHER OR PERSON TAKING CONSENT

I have accurately read out the information sheet to the potential participant, and to the best of my ability, making sure that the participant understands that the following will be done:

1. Collection of demographic information, strand, presence of athletic activities, and their primary mode of transportation
2. Collection of their anthropometric measurement, including height, weight, hip circumference, and waist circumference
3. Answering of two self-administered questionnaires: the International Physical Activity Questionnaire (IPAQ) and the Global Physical Activity Questionnaire (GPAQ)

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this Informed Consent Form has been provided to the participant.

Print Name of Researcher or Person Taking the Consent:

Signature of Researcher or Person Taking the Consent:

Date: [MM/DD/YYYY]

Appendix 8: First Ethics Review Committee Evaluation

April 12, 2024

Donald Manlapaz, PhD
Primary Investigator

Dear Dr. Manlapaz:

Greetings in the name of St. Thomas of Aquinas!

This is to inform you that the proposal with the following details:

Title	Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among UST SHS Students: A Cross-Sectional Study
Protocol Number	SI-2023-029 (Version 1)

has undergone **Full Board Review** by the University of Santo Tomas – College of Rehabilitation Sciences Ethics Review Committee. The following comments and recommendations were concurred:

Technical Issues:

- No issues found

Ethical Issues:

For the manuscript

- The age group in the background is not consistent with the methodology and PIS-ICF
- If participants will include <18 years old, there is a need to address possible vulnerability issues and revise the informed consent form
- Please add a statement about the following:
    - Risk/Benefit Ratio
    - Measures to mitigate risks
    - Plans for Confidentiality and privacy
- Ensure that information in the PIS-ICF is consistent with the ethical consideration section of the manuscript.

For the PIS-ICF

- Include the total number of expected participants.
- Provide just reimbursement in cash or kind. This is to show appreciation for the participants' lost time, inconvenience, and effort.
- Include foreseeable circumstances or any reasons for possible termination of the researcher in the subjects' participation in the study and/or of the study as a whole
- Include witness
- In line 11, change the title TO "Participant Information Sheet and Informed Consent (PIS ICF)for 18-year-old UST SHS Students of AY 2024-25."
- Submit Informed Assent Form for 15 below 18-year-old UST SHS Students of AY 2024-25
- (Cosign with Parent /Legal Guardian) and the duly accomplished Form E Informed Consent Assessment Form
    - It should be divided into two parts: Part 1, the Participant Information Sheet, and Part 2, the Certificate of Assent.
    - Include the parent/legal guardian as co-signatory, and witness as signatories in Part 2 Certificate of Assent.
    - Take note of suggestions in PIS ICF for 18-year-old

As such, your proposal requires **Major Revision**.

Please submit an electronic copy of the entire protocol containing the revisions within 14 working days. Actions taken and/or responses to comments and suggestions should be documented and submitted using the Form H: Resubmission Form. Failure to do so will constitute **CANCELLATION** of protocol and any re-submission will be considered as a new protocol. Please include the protocol and version number (next submission will be version 2) in the filename of all documents for resubmission. Please also include the protocol and version number as a footer to the revised protocol, appendices, and PIS-ICF.

Please be reminded to keep a copy of this letter and to include this as part of the appendix of the final manuscript.

For the Ethics Review Committee

Assoc. Prof. Anna Lea L. Enriquez, MD, DPBA, FPSA
Chairman
Ethics Review Committee
College of Rehabilitation Sciences
University of Santo Tomas

Appendix 9: Second Ethics Review Committee Evaluation

May 11, 2024

Donald Manlapaz, PhD
Primary Investigator

Dear Dr. Manlapaz:

Greetings in the name of St. Thomas of Aquinas!

This is to inform you that the proposal with the following details:

Title	Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among UST SHS Students: A Cross-Sectional Study
Protocol Number	SI-2023-029 (Version 2)

has undergone **Full Board Review** by the University of Santo Tomas – College of Rehabilitation Sciences Ethics Review Committee. The following comments and recommendations were concurred:

Include the total number of expected participants.	Complied
Provide just reimbursement in cash or kind. This is to show appreciation for the participants' lost time, inconvenience, and effort.	Complied
Include foreseeable circumstances or any reasons for possible termination of the researcher in the subjects' participation in the study and/or of the study as a whole	Complied
Include witness	complied. Please be reminded that the witness should not be part of the research team and must be acceptable to the participant.
In line 11, change the title TO "Participant Information Sheet and Informed Consent (PIS ICF)for 18-year-old UST SHS Students of AY 2024-25."	Complied
Submit Informed Assent Form for 15 below 18-year-old UST SHS Students of AY 2024-25	Complied

(Cosign with Parent /Legal Guardian) and the duly accomplished Form E Informed Consent Assessment Form ● It should be divided into two parts: Part 1, the Participant Information Sheet, and Part 2, the Certificate of Assent. ● Include the parent/legal guardian as co-signatory, and witness as signatories in Part 2 Certificate of Assent. ● Take note of suggestions in PIS ICF for 18-year-old	Revise statements in **Part II Certificate of Assent.** This portion is intended for the student participant and not for the parent/legal guardian. It should be written in the first person point of view e.g " I have read the foregoing information … ". I consent voluntarily to be participant in this study…" The "I" here, refer to the student participant. The student participant name and signature should come immediately after, followed by so the name and signature of the parent/legal guardian as co-signatory.

As such, your proposal requires **Minor Revision**.

Please submit an electronic copy of the entire protocol containing the revisions within 14 working days. Actions taken and/or responses to comments and suggestions should be documented and submitted using the Form H: Resubmission Form. Failure to do so will constitute **CANCELLATION** of protocol and any re-submission will be considered as a new protocol. Please include the protocol and version number (next submission will be version 3) in the filename of all documents for resubmission. Please also include the protocol and version number as a footer to the revised protocol, appendices, and PIS-ICF.

Please be reminded to keep a copy of this letter and to include this as part of the appendix of the final manuscript.

For the Ethics Review Committee

Assoc. Prof. Anna Lea L. Enriquez, MD, DPBA, FPSA
Chairman
Ethics Review Committee
College of Rehabilitation Sciences
University of Santo Tomas

Table 1. Literature Review Data Extraction Table

Author (Year)	Objective	Design	Setting	Participants	Data Gathering Procedures	Main finding/s
Passi-Solar, A., Margozzini, P., Cortinez-O'Ryan, A., Munoz, J.C., Mindell, J.S. (2020)	To explore the relationship between active transportation and objective health measures in Chile	Cross-sectional	The study was conducted in Chile, including both urban and rural areas, covering all 15 geographical regions of the country	6,113 adolescents aged 15 years and above.	The study utilized data from the Chilean National Health Survey (ENS) 2016-2017, a household survey with a stratified multistage probability sample. One participant per household was randomly selected using a computational Kish algorithm.	Higher levels of active transport were observed in males, younger groups, less educated and rural populations. Both active and public transport were associated with multiple nutritional and metabolic benefits such as lower BMI, lower waist circumference, less obesity, higher vitamin D, lower cholesterol and lower hepatic inflammation. Associations persisted after adjusting for other healthy lifestyles. Stronger benefits were observed in males than in females.
Ikeda, E., Stewart, T., Garrett, N., Egli, V., Mandic, S., Hosking, J., Witten, K., Hawley, G., Tautolo, E., Rodda, J., Moore, A., Smith, M (2018)	(1) To systematically identify New Zealand research that had measured ATS, distance to school, and the neighborhood built environment in children and youth. (2) To collate data from identified studies and combine them in a consistent manner. (3) To identify associations between ATS and built environment features across the combined dataset.	Systematic Review	Databases	2844 children and youth aged 6-19 years from five studies	EBSCO Host, ProQuest, Web of Science, Scopis, NZResearch.org.nz, NewzText were used to access scholarly published journals. Unpublished researches were sought through New Zealand Educational Theses Database, Aotearoa New Zealand International Development Studies Network, and Scholarly Commons/Institutional Repository. Government and local council related reports were sought through major Government agency websites and Google.	Active travel to school was positively associated with intersection density ($p < 0.001$) (1 km buffer) and negatively associated with school socioeconomic status ($p = 0.001$), dwelling density ($p = 0.004$) (1 km buffer), and distance to school ($p < 0.001$), including age, sex, ethnicity and number of siblings as fixed effects in the final model.

Khan, A., Mandic, S., Uddin, R. (2021)	To examine associations of active school commuting (ASC) with time spent in physical activity (PA) and sedentary behaviour (SB) among adolescents.	Cross-sectional	9 countries from Africa, 25 from the Americas, 19 from Eastern Mediterranean, 1 from Europe, 8 from South East Asia, 18 from the Western Pacific	277,833 adolescents aged 11–17 years (48.9% girls)	Global School-based Student Health Survey data was used & collected during 2007–2016, & were analysed. Adolescents were asked how many days per week they walked or bicycled to and from school, were physically active, and how much time they spent sitting on a typical day.	ASC is strongly and positively associated with PA recommendations and moderately with lower SB in adolescents. Promoting ASC has the potential to promote active lifestyle among adolescents around the globe.
Ganzar, L., Burford, K., Zhang, Y., Gressett, A., Kohl, H., Hoelscher, D. (2023)	To examine the association between school policies and ACS, and to assess whether this relation varied by grade.	Cross-sectional	Schools in Texas	94 students from texas school	study used data from schools recruited to the Safe Travel Environment Evaluation in Texas School study (n = 94). The percent of trips made by active travel modes was measured through tallies among third to fifth grade classrooms from 5 school districts in Central Texas in 2018–2019.	Results from this study demonstrate a correlation between the school policies designed to support walking and biking and ACS. Results from this study can be used to justify the use of school-based policy interventions to promote ACS.
Mendoza, J.A., Watson, K., Baranowski, T., Nicklas, T.A., Uscanga, D.K., Hanfling, M.J. (2012)	To prospectively examine potential benefits of active commuting to school on measures of weight status and physical activity in a sample of youth.	Randomized Controlled Trial	Schools in southern California	1083 participants in the fall of fourth grade (53.2% boys and 46.8% girls).85% white, 7% Hispanic/Latino, 6% Asian/Pacific Islander, 1% African-American, and 1% other.	Questionnaire for Mode of Transportation to School. Caltrac accelerometers for physical activity. Weight, height, and skinfolds were measured by trained staff.	Boys who actively commuted to school had lower BMI ($p < 0.01$) and skinfolds ($p < 0.05$) than non-active commuters to school in the fourth grade. Active commuting to school over 2 years was not associated with BMI change or overweight status. Walking and cycling to school may contribute to preventing excessive weight gain, or leaner children may walk or cycle to school.
Rosenberg, D.E., Sallis, J.F., Conway, T.L., Cain, K.L., Mckenzie,T. L. (2011)	To evaluate the impact of a "walking school bus" program on children's rates of active commuting to school and physical activity.	Randomized Controlled Trial	8 schools in Houston, Texas	4th-graders from 8 schools (N = 149)	The primary outcome was the percentage of trips made by active commuting over 1 school week (percent active commuting), which was assessed every school day for 1 week during times 1 and 2 using a questionnaire with high test-retest reliability ($\kappa = 0.97$; $P < .001$) and convergent validity with parental report ($\kappa = 0.87$; $P < .001$). The secondary	The program improved children's active commuting to school and daily moderate-to-vigorous physical activity.

					outcome was MVPA (minutes per day) measured by using accelerometry, which provides a valid, objective measure of physical activity.2	
Østergaard, L., Kolle, E., Steene-Johannessen, J., Anderssen, S., Andersen, L. (2013)	To investigate the associations between body composition, cardiorespiratory and muscular fitness in relation to travel mode to school in children and adolescents.	Cross-sectional	Schools in Norway	1694 participants from 40 elementary schools and 23 high schools in Norway	Data gathering procedures used include anthropometry for skinfold thickness, waist circumference, and BMI); cardiorespiratory fitness was assessed using a VO2max test; handgrip strength and standing long jump tests for muscular fitness; and questionnaires to register the mode of transport to school, age, gender, and levels of leisure time physical activity.	Active commuting to school, particularly cycling, may have a positive impact on physical fitness in children and adolescents. Males cycling to school had a lower sum of skin folds than adolescents walking to school. Higher cardiorespiratory fitness was observed in adolescents and male cyclists compared to walkers and passive commuters 2. The study suggests that promoting active commuting to school, particularly cycling, may have public health benefits for children and adolescents.
Villa-González, E., Ruiz, J.R., Chillón, P. (2015)	To investigate the association between active commuting to school and health-related physical fitness in Spanish school-aged children.	Cross-sectional	Primary Schools in Spain	494 Spanish school-aged children ranging from 8-11 years old	Assessing Levels of Physical Activity (ALPHA) fitness test battery and a self-reported questionnaire regarding the weekly travel mode to school were used in the study.	Active commuting to school was positively associated with improved fitness among Spanish school-aged children . Specifically, active commuting to school was associated with higher levels of speed-agility and lower body muscular fitness in boys and girls. However, a study found no differences in adiposity, physical fitness, and cognitive performance between active commuters and nonactive commuters.
Campos-Garzón, P., Sevil-Serrano, J., García-Hermoso, A., Chillón, P., Barranco-Ruiz, Y. (2023)	To analyze the contribution of active commuting to and from school (ACS) to device-measured light physical activity (LPA) and	Systematic Review and Meta-analysis	Databases	7127 participants with ages 6-18 years old from different countries	Data extracted from the studies were as follows: (1) author(s), year, and country; (2) sociodemographic variables/information (e.g., residence place or gender); (3) sample and age; (4) study design; (5) ACS mode (i.e., walking, cycling, or ACS [when the study specified or did	(1) ACS could contribute about the 48% of the daily PA recommendations for health in young people on school days; (2) higher levels of LPA and MVPA were found in the school- home trips compared to home-school trips

	moderate- to- vigorous physical activity (MVPA) levels in young people aged 6 to 18 years old, as well as, in both trip directions (i.e., home-school, school-home)				not specify the ACS mode]); (6) trip direction (i.e., home-school and/or school-home); (7) identification of the ACS trip start/end points/times (methodology used to define the time frame where and when ACS took place, using GPS or predefined time intervals); (8) mean MVPA in minutes during ACS; and (9) mean LPA in minutes during ACS. In case that the included studies reported multiple measurement times (e.g., pre– post data after an intervention program), the information included was for the first measurement (i.e., baseline). It should be noted that the age and sample of each study are of the participants who actively commutes to and/or from school. Finally, in case an item was not reported or was not clear in the study, it was rated as "not reported" or "not clear," respectively.	
Martin-Moraleda, E., Mandic, S., Queralt, A., Romero-Blanco, C., Aznar, S. (2022)	To assess the association between ACS with overweight/ obesity parameters in adolescents aged 11 to 19 years.	Systematic Review	Databases	38,136 Adolescents aged 11-19 from different countries	Data were collected and organized by year of publication, author, study population and characteristics, study location, study design, method used to assess ACS and body composition and outcomes of measures.	Fifteen articles (68.18%) found a consistent association between ACS and body composition and seven studies (31.82%) showed no differences in body composition between active and passive commuters to school. Fourteen studies observed that active commuters to school had a more favorable body composition and one study reported that ACS was associated with unfavorable body composition.

Rosenberg, D., Sallis, J., Conway, T., Cain, K., Mckeznie, T. (2006)	To prospectively examine potential benefits of active commuting to school on measures of weight status and physical activity in a sample of youth.	Randomized Controlled Trial	Seven Elementary schools in the United States	1083 fourth grade and 924 fifth grade students from seven elementary schools	Participants were classified as active (walking, biking, or skateboarding to school almost every day for baseline analyses or at least 2 d/wk for analyses of consistent active commuting) or non-active commuters to school. Accelerometers were used to measure physical activity. Height, weight, and skinfolds were objectively assessed.	Boys who actively commuted to school had lower BMI ($p < 0.01$) and skinfolds ($p < 0.05$) than non-active commuters to school in the fourth grade. Active commuting to school over 2 years was not associated with BMI change or overweight status.
Voorhees, C., Ashwood, S., Evenson, K., Sirard, J., Rung, A., Dowda, M., Mckeznie, T. (2010)	To investigate whether perceived and actual neighborhood features were associated with walking to or from school among adolescent girls.	Randomized Controlled Trial	Neighborhoods in the United States	890 eighth grade girls from the Trial of Activity in Adolescent Girls (TAAG) study living within 1.5 miles of their middle school	Participants completed a self-administered survey on their neighborhood and walking behavior. Geographic information system data were used to assess objective neighborhood features. Nested multivariable logistic regression analyses were conducted to determine the contribution of perceived and objective measures of walking to or from school.	Girls were nearly twice as likely to walk to or from school if they perceived their neighborhoods as safe and perceived that they had places they liked to walk, controlling for other potential confounders. In addition, girls who lived closer to school, had more active destinations in their neighborhood, and had smaller-sized blocks were more likely to walk to or from school than those who did not.
Wanjau, M., Dalugoda, Y., Oberai, M., Möller, H., Standen, C., Haigh, F., Milat, A., Lucas, P., Veerman, J.L. (2023)	To determine if active transport results in net additional physical activity and the extent of any displacement of physical activity in other domains.	Systematic Review	Databases	Adults, excluding professional athletes and individuals with chronic diseases	A systematic search of PubMed, Embase, NHS Economic Evaluation Database, EBSCO Host (CINAHL, Business Source Complete, Business Source Ultimate Sport Discus), Scopus, Web of Science, SAGE, and Taylor & Francis Online, and reference lists from included studies.	Active transport has the potential to elevate overall physical activity levels without significant compensatory reductions in other domains, observed among adults. This highlights the need to incorporate the health-related economic benefits of active transport into business cases and cost-benefit analyses pertaining to transport infrastructure investments, thereby enhancing the academic rigor and validity of such evaluations.

Table 2. Gantt Chart

	2024											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Student authors is set to meet with the Faculty members												
Last day of submission to TWC for Ethical Approval												
Undergo Ethics Review												
Coordinate with SHS Principal												
Recruitment of Students												
Commencement of data collection												
50% of data collection												
100% of data collection												
Seminar Proper												
Survey												
Data Analysis												
Complete First thesis draft submitted to research writing coordinator												
Final thesis draft submitted to paper presentation judges												
Paper Presentation												
Poster Presentation												

Table 3. Research Budget Proposal

RESEARCH PROPOSAL BUDGET			
Expenses	**Quantity**	**Price**	**Total**
VENUE			
Room	1	₱ 0	₱ 0
REFRESHMENTS			
Skyflakes (25g)	351	₱ 7	₱ 2,457
Summit Bottled water (500 ml)	351	₱ 15	₱ 5,265
OTHER EXPENSES			
Ethics review fee	-	₱3,500	₱ 3,500
Speaker	6	₱ 0	₱ 0
Raffle/Token	1 prize x 10 sessions	₱ 300	₱ 3,000
Fitness planner	351	₱ 35	₱ 12,285
Photocopy of Questionnaires	351	₱ 2	₱ 702
Photocopy of Informed Consents	351	₱ 2	₱ 702
Total			₱ 27,911

Table 4. Sample Data Extraction Table for Descriptive Statistics

	Frequency	Proportion	Mean	Median	St. dev
Age					
16					
17					
16					
Sex					
Male					
Female					
Programs					
STEM					
ABM					
GA-HA					
HUMSS					
MAD					
PES					

Table 5. Sample Data Extraction Table for Inferential Statistics

Variables	Active	Passive	Mixed
Demographic Information			
Age			
Sex			
Programs			
STEM			
ABM			
GA-HA			
HUMSS			
MAD			
PES			
Anthropometric Measurements			
Ht			
Wt			
BMI			
Waist Circumference			
Hip Circumference			
Waist-Hip Ratio			
Physical Activity			
IPAQ			
GPAQ			

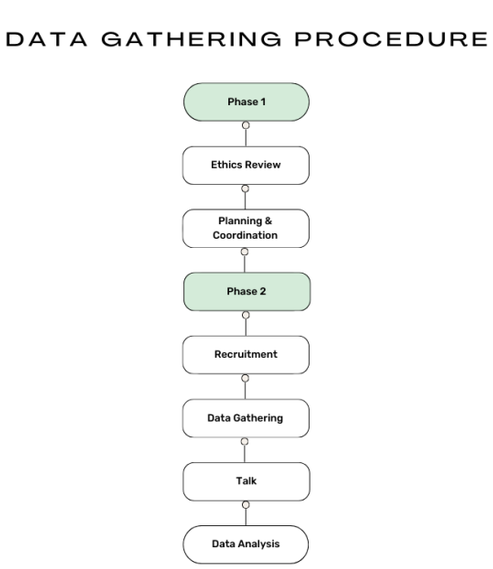

Figure 1. Data Gathering Procedure

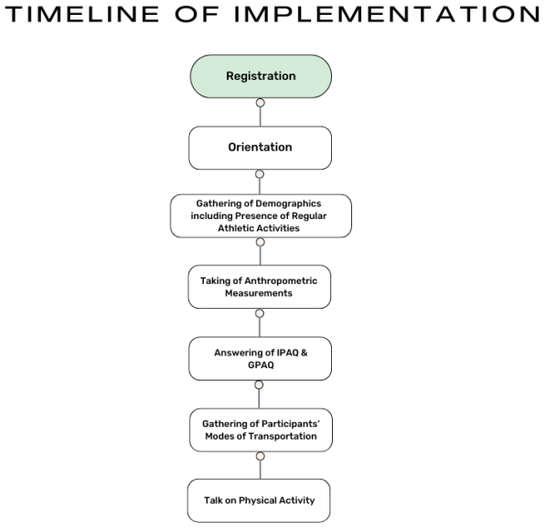

Figure 2. Timeline of Data Gathering

1

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____**days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____**hours per day**

   _____**minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____**days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

2
3 *Supplemental Figure 1. IPAQ Page 1 from International Physical Activity Questionnaire - Short Form by Youthrex*

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____**hours per day**

_____**minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____**days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____**hours per day**

_____**minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____**hours per day**

_____**minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

Supplemental Figure 2. IPAQ Page 2 from International Physical Activity Questionnaire - Short Form by Youthrex

2 The questionnaire

Physical Activity		
Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed].* In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.		
Question	**Response**	**Code**
Work		
Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P4*	P1
In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊__⌋	P2
How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P3 (a-b)
Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P7*	P4
In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊__⌋	P5
How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P6 (a-b)
Travel to and from places		
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. *[Insert other examples if needed]*		
Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P10*	P7
In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊__⌋	P8
How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P9 (a-b)

Continued on next page

Supplemental Figure 3. GPAQ Questionnaire Page 1 from Global Physical Activity Questionnaire (GPAQ) Analysis Guide

2 The questionnaire, Continued

Physical Activity, Continued		
Question	**Response**	**Code**
Recreational activities		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), *[Insert relevant terms]*.		
Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P13*	P10
In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊__⌋	P11
How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P12 (a-b)
Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, *[cycling, swimming, volleyball]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P16*	P13
In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊__⌋	P14
How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P15 (a-b)
Sedentary behaviour		
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping. *[INSERT EXAMPLES] (USE SHOWCARD)*		
How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ ; ⌊__⌋⌊__⌋ hrs mins	P16 (a-b)

GPAQ Analysis Guide 5

Supplemental Figure 4. GPAQ Questionnaire Page 2 from Global Physical Activity Questionnaire (GPAQ) Analysis Guide

June 24, 2024

Donald Manlapaz, PhD
Primary Investigator

Dear Dr. Manlapaz:

Greetings in the name of St. Thomas of Aquinas!

This is to inform you that the proposal with the following details:

Title	Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among UST SHS Students: A Cross-Sectional Study
Protocol Number	SI-2023-029 (Version 3)

the University of Santo Tomas-College of Rehabilitation Sciences Ethics Review Committee has favorably granted the authors APPROVAL. You may now proceed with your research. Please be reminded that the version of the protocol given Ethical Clearance should only be the one used throughout the conduct of the study

The following are standard requirements attached to approved protocols:

1. Approval will be for a period of one (1) year commencing on the stamped date of approval. At the end of this period, if the research project has been completed or discontinued for any reason, the investigator is required to inform the Committee in writing. If the investigator completes the work earlier than planned, he/she must inform the Committee in writing as soon as the work is completed.
2. Submit to the Committee any pending documents (e.g. letters, contracts, memorandum of understanding) that are pertinent to the research project, if applicable.
3. Notify the Committee thru submission of post-approval review application (see SOP 6-13 for complete requirements) for any of the following:
    a. Early Termination: Decision of the researcher, principal investigator, the institution, or sponsor to end the implementation of a study before its completion
    b. Continuing Review: Extension or renewal of approval for another year.
    c. Amendment: Any changes in the approved protocol submitted for review and approval of the committee.
    d. Protocol Deviation: Non-compliance with the approved protocol that does not increase risk or decrease benefit to participants or does not significantly affect their rights, safety or welfare or the integrity of data
    e. Protocol Violation: Non-compliance with the approved protocol that increases risk or decreases benefit to participants or significantly affects their rights, safety or welfare or the integrity of data.

f. Reportable Negative Events: Occurrences in the study site that indicate risks or actual harms to participants and to members of the research team and to integrity of data.
g. Serious Adverse Event (SAE): An unfortunate event leading to serious harm to the participants such as death, life threatening incident or high risk; events resulting to prolonged hospitalization, significant disability, incapacity, congenital anomaly or another episode which is considered to be harmful to the research participant.
h. Suspected Unexpected Serious Adverse Reaction (SUSAR): Any serious adverse reaction/event in the research participant who were provided with intervention, which may or may not be dose/parameter related, but are not expected or anticipated since the reaction are not consistent with current information about the intervention in question.
i. Unexpected Adverse Event (UAE): Any non-serious adverse reaction/event in the research participant who were provided with intervention, which may or may not be dose/parameter related, but are not expected or anticipated since the reaction is not consistent with current information about the intervention in question.

4. The investigator, at all times, is responsible for the ethical conduct of the research in accordance with the guidelines established by the University of Santo Tomas and the Declaration of Helsinki. **The stamped, approved version of the informed consent should be the only version used during the conduct of the study. Note that ERC stamp will be added in the informed consent, upon submission of the approved copy to ethicsreview.crs@ust.edu.ph**
5. Upon the completion of the research project, the investigator is required to submit to the Ethics Research Committee a digital copy of the complete manuscript (including all results, discussions, appendices, and correspondences) and a final report form.

For the Ethics Review Committee,

Alleana - Enriquez M.D.

Assoc. Prof. Anna Lea L. Enriquez, MD, DPBA, FPSA
Chairman
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Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study Protocol

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Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study Protocol

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ABSTRACT

Introduction: Rapid changes in technology, communication, and transportation prompted challenges in achieving the recommended level of physical activity. Although the students are returning for in-campus classes to promote more interaction and socialization, the youth still fall short of living up to the desired level of physical activity. Mode of transportation plays a pivotal role in physical activity, yet its relationship is poorly elucidated. The aim of the study is to explore the relationship between the types of transportation and the level of physical activity among senior high school students (SHS) aged 16-18 from the University of Santo Tomas (UST).

Methods and Analysis: This will be an observational, cross-sectional, analytic study design. Participants' demographics, and anthropometric measurements such as height, weight, and hip & waist circumferences will be collected. To measure the variables of interest, the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ) will be used. Descriptive statistics will be utilized to characterize the samples using frequency, mean, median, and standard deviation, while inferential statistics such as Analysis of Variance for comparison and Pearson's and Spearman for correlation will be used. All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Ethics and Dissemination: Ethical approval was obtained from the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC) with the protocol number SI-2023-029. The study will comply with the principles of the Declaration of Helsinki, Ethical Guidelines on Health-Related Social Research of the Philippine Health Research Ethics Board, and Data Privacy Act 2012. All results, regardless of outcome, whether positive or negative, will be accessible through publication and by reporting to the participant through email and other relevant authorities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The study is of low-risk nature in several aspects such as psychological, social, economic, privacy/confidentiality, and legal.
- The methods and tools that will be used in the study are standardized and supported by literature to be valid and reliable.
- The study will be conducted solely within Metro Manila, which may limit the generalizability of the findings to other regions in the country with different geographical, seasonal, socio-economic, or cultural contexts.
- The study focuses exclusively on senior high school students from the University of Santo Tomas, which may not fully represent the variability in other populations.

- The study will not account for other factors that could influence physical activity and the mode of transportation, such as infrastructures, access to transportation, neighborhood, seasonal and weather variability, screen time, diet, and socioeconomic factors.

Keywords: Transport, Physical Activity, High School

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INTRODUCTION

Background

As of 2022, the World Health Organization (WHO) reports that more than 80% of teenagers fail to meet the required physical activity standards.[1] The significant level of inactivity is partly attributed to sedentary lifestyles at school and home and inactivity during leisure.[2] Moreover, in a publication by Yeung and Johnston, specific attention has been drawn to the countries in Asia, namely the Philippines, Malaysia, Singapore, Japan, South Korea, India, Pakistan, and several Pacific nations, which exhibit the highest proportions of inactive populations in the region.[3] In the local setting, the Food and Nutrition Research Institute states that 84.5% of Filipino youth aged 10 to 17 fall short of meeting the recommended level of PA.[4]

WHO defines physical activity as body movements driven by skeletal muscles necessitating energy expenditure.[1] On the other hand, an active lifestyle is characterized by regular PA, while sedentary behavior is associated with low energy expenditure, such as TV viewing.[5,6] The enhancement of one's PA depends on the consideration of both invariable and modifiable factors. Invariable factors include age, gender, race, and ethnicity. According to a study by Kretschmer et al., boys have a higher moderate to vigorous PA than girls, and this is supported by Espada et al., which also reports that women have lower levels of PA than men.[7,8] In addition, a study conducted by Goel et al. mentions that females are more likely to walk and use public transport while males tend to use bicycles instead.[9] Likewise, Lejsková et al. state that men would often use cars as drivers, trains, buses, and bicycles, while women tend to use cars as passengers, public transport, and walking.[10] Conversely, modifiable elements include environmental circumstances, community settings, and one's behavioral and personality characteristics.[11] Delving further, a 2022 assessment regarding the PA of children and adolescents in the Philippines encompassed ten indicators of PA, namely Overall Physical Activity, Organized Sport and Physical Activity, Active Play, Active Transportation, Sedentary Behaviors, Physical Fitness, Family and Peers, School, Community and Environment, and Government.[4] Evidently, a study by Khan et al. elucidates a positive correlation between active school transport and PA in adolescents, concurrent with a decrease in sedentary behavior. With this, it can be concluded that one's mode of transportation contributes to determining an individual's level of PA.[12]

An active mode of transport is defined as a way of traveling that entails energy expenditure, with walking and cycling as prominent examples. In contrast, passive transport is attributed to using motorized transportation, such as cars, buses, and trains, requiring no physical exertion or energy expenditure.[13] When both modes are employed in combination, it is referred to as mixed transport. Considering such, recent studies have investigated the factors contributing to the choice of transportation mode. In a student setting, an increase in active transport has been associated with the proximity of house to school, social support from peers, parental active

transport, and access to services.[14] In the Philippines, the Asian Development Bank reports that urban transportation has been dominated by public utility vehicles such as jeepneys, taxis, tricycles, and pedicabs.[15] Given its extensive usage, passive transportation can be inferred to be the most common transport mode in the country. Correspondingly, Cagas et al. document that only 29.5% of Filipino schoolchildren utilize active transportation to school at least five days a week.[4]

To advance the use of active transportation in adolescents, physical therapists play an imperative role in primary health promotion and in addressing the sedentary lifestyle of individuals, starting with assessment. In rehabilitation, the level of PA is evaluated through functional assessment using outcome measure tools called the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ). The IPAQ is primarily intended for adult population surveillance, as it has been created and tested for use by those aged 15 to 69. Furthermore, the questionnaire evaluates PA across various domains, including leisure, domestic and gardening activities, and work-related and transportation-related activities.[16] On the other hand, the GPAQ assesses PA in relation to occupation, transport, and leisure.[17] In a study conducted by Herrmann et al., the GPAQ version 2 validity has shown low to moderately high validity (r = 0.25 to 0.63) against measures of physical fitness, body composition, and objective (accelerometer, pedometer) and subjective measures of PA (IPAQ). The questionnaire has shown overall strong reliability. It presented that GPAQ, including its domains such as occupation, transportation, and leisure, provided acceptable short-term reliability (all > 0.80). However, the long-term reliability of reporting moderate intensity activity for recreation, work, and travel was low (< 0.70). In their summary, they also mentioned that GPAQ has also “showed acceptable evidence of short- and long-term test-retest reliability by activity category and modest validity evidence.”[18]

Another significant contribution that physical therapy offers within the domain of transport and health is the emerging discipline of environmental physiotherapy (EPT), an expansion in the profession with inherent benefits for both the patients and the environment. This evolving domain, propelled by the increased number of consumers and the consequential depletion of natural resources, confronts the ensuing adverse environmental impacts.[19] With this, the study will also introduce EPT by promoting active transportation. If EPT is widely practiced in the country, then it could increase the number of teenage groups that would opt for active transportation. This not only encourages people to go for active transportation, but it will also help improve the condition of the environment, specifically reducing gas emissions. In addition, practicing active transport contributes to the pursuit of Sustainable Development Goals (SDG) 3 (Good Health), 11 (Sustainable Cities and Communities), and 13 (Climate Action).

The University of Santo Tomas Senior High School (UST SHS) was established in 2016 and houses six strands namely: Science, Technology, Engineering, and Mathematics Strand (STEM), Accountancy and Business Management Strand (ABM), General Academic Strand - Health-Allied

(GA-HA), Humanities and Social Sciences Strand (HUMSS), Music, Arts, and Design Strand (MAD), and the Physical Education and Sports Track (PES). The study on the topic is to be piloted at the UST SHS as it fits the age criteria of the population and is accessible to the researchers due to their affiliation with the university.[20]

Knowledge Gap

The continuous decline in physical activity (PA) levels among school-going adolescents[21] has underscored the need for further investigation into the relationship between modes of transport and PA levels. Active transport has shown promise in increasing PA levels due to its easy integration into daily routines,[22] though its relationship remains inconclusive as it relies solely on cross-sectional data. [23] This limitation warrants attention for the current study. Additionally, in exploring the relationship between mode of transport and PA levels, the roles of passive and mixed transports remain understudied compared to active transportation. Other notable gaps include the absence of input from physical therapists and limited research conducted in the Philippine context, which fails to consider environmental differences influencing transport choices and, consequently, PA levels. Evans et al. suggest that multiple factors, including individual, social, and environmental aspects, should be taken into account when monitoring PA levels to maximize effectiveness.[24] Given the differences in geographic locations and environmental conditions, data from the current study is likely to differ from previous findings, considering the routes taken by UST SHS students in Manila to which Leather et al. note that regions beyond the Central Business Districts in Manila lack sufficient facilities for pedestrians and cyclists to travel safely.[25] Addressing infrastructure disparities is vital in the exploration of the relationship between the modes of transportation and PA levels of UST SHS Students.

Objective

The primary aim of this study is to explore the relationship between the types of transport and the physical activity levels of senior high school students from UST. To achieve the primary objective, the following are the secondary aims of the study:

1. To determine the level of physical activity of UST SHS Students.
2. To compare the level of physical activity to the modes of transportation.
3. To correlate the level of physical activity to the modes of transportation.
4. To correlate the level of physical activity to the anthropometric measurements of UST SHS students.

Significance

The study's findings hold significant importance in public health as it can raise awareness about the impact of transportation on PA, enabling targeted health interventions for primary care. The study may also promote PA within educational institutions, fostering healthier student

environments. Moreover, the study can provide empirical evidence to inform policy decisions related to PA. This paves the way for future research into health, environment, and SDGs, offering a comprehensive understanding of transportation's effects on individuals and the community.

Delimitation

Based on the study's objective, an observational cross-sectional study design will be implemented in the academic year 2024 to 2025. The study will highlight UST SHS students' PA based on their transportation mode, and participants will include UST SHS Students aged 16 to 18 years old. The study will examine the following factors influencing students' PA: Active, Passive, and Mixed Transportation. The study will not include other PA factors, such as screen time and physical/social environments.

METHODS

Ethics and Dissemination

Ethical approval has been granted by the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC) and will comply with the principles of the Declaration of Helsinki, Ethical Guidelines on Health-Related Social Research of the Philippine Health Research Ethics Board, and Data Privacy Act 2012. All data and information collected will be securely stored in a 10-character password-protected Google Drive folder, which will only be accessible to the researchers. Hard copies of the questionnaire will be safeguarded in the residence of the group's liaison officer. The data gathered will then be securely stored for the duration of the study, and it will be destroyed ten years after publication of results in accordance with the rules and provisions of RA 10173 or the Data Privacy Act. The results of the study will be disseminated to the participants and fellow SHS Students from UST. All results, regardless of outcome, whether positive or negative, will be accessible through publication or by reporting to the participant through email and other relevant authorities. A copy of the final manuscript will be submitted to the UST-CRS ERC. There are no conflicts of interest presumed to occur between researchers and participants of this study.

Participants will be asked to fill out informed consent forms (ICF) distinct to their age group: 18-year-old and 16- to below 18-year-old. The document will encompass information regarding their participation, including the scope of the study, expected procedures, and their rights. The ICF for participants below 18 years old will primarily be addressed to their parents or legally authorized representatives (LAR). The document, signed by the parent/LAR and cosigned by the participant, will be collected to confirm their consent for participation.

The study is of a low-risk nature in terms of psychological, social, economic, loss of privacy/confidentiality, and legal aspects drawn from the data-gathering of the participant's personal information and measurements, such that they may be effectively managed by the researchers. Meanwhile, the research will indirectly benefit the participants through knowledge transfer on the relationship between physical activity and mode of transport and through taking part in a study which will benefit various facets of society in terms of health awareness and promotion in facilitating lifestyle changes with regards to physical activity on a personal and societal scale. Despite the risks outweighing the benefits in number, such risks are modifiable and may be mitigated by the researchers. Managing the risks one by one would lead to a better methodology and assurance that the dignity and safety of the participants are prioritized. Thus, ultimately facilitating improvement in the quality of the study.

In response to the psychological risk of possible mental fatigue while answering the questionnaires, the researchers have given the participants the liberty to take breaks or withdraw their participation in the study at any moment. The researchers will also be the ones to privately

take the participant's anthropometric measurements for concerns regarding body image. To address potential social risks, such as embarrassment about the participant's mode of transportation due to associated negative stigma, the researchers will strictly enforce privacy and confidentiality at all times. All collected information will remain confidential and be shared only between the researchers and the participants. To address legal concerns, parents or guardians of underaged participants will be notified via short messaging services (SMS) or email to ensure the authenticity of consent forms and prevent any forgery of signatures with regard to the participation of their child in the study. Additionally, prior to scheduling the data collection, a survey will be conducted to determine the participants' preferred time and date to minimize disruptions of daily routines.

To ensure confidentiality and privacy, the researchers will thoroughly explain the protection and disclosure policies in place to safeguard each participant's rights and privacy. Protection policies include measures to minimize harm and protect personal information, wherein soft copies containing such data will be securely stored in a password-protected Google Drive folder with only the researchers having access. Moreover, hard copies of the answered questionnaires will be securely stored in the residence of the group liaison officer. Coded identifiers will also be implemented to protect participants' identities and information. All collected data will be kept at the said locations for 10 years after the publication of the results and will be destroyed and deleted after the set duration to ensure that no misuse occurs. Meanwhile, disclosure policies address how and when data may be shared with others. The completed paper will be disseminated to the participants via email and publicly shared through publications or conferences, and they may gain access to their own information upon request. To ensure data privacy, the names of the participants will not be included in the data gathered, and coded identifiers will be used. The records will be securely stored for 10 years and the privacy of all participants will be maintained throughout the study.

Design

This research will utilize an observational, cross-sectional analytic study design to explore the relationship between active, passive, & mixed modes of transportation and physical activity. Moreover, this study will be reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[26]

Participants

Participants in the study are students recruited from UST SHS and officially enrolled in all strands of the eleventh to twelfth grade aged 16-18 years old and above. However, people with mobility-related health issues, such as arthritis, osteoporosis, musculoskeletal disorders, neurological disorders, balance disorders, severe cardiopulmonary diseases, and so forth, that might affect the mode of transportation or commute used, are ineligible to participate. Approximately 373 students will be invited to participate, as estimated from the current 148 classes of the academic

year (A.Y.) 2023 - 2024 with approximately 38 students per class, calculated using Slovin's formula $n=N/(1+Ne^2)$ wherein *n* is the sample size, *N* is the population size, and *e* is the acceptable margin of error. with a confidence level of 95%. The registration form will be generated using Google Forms. The link to the forms and publication materials will be sent to the student council for dissemination to the class presidents of each class at UST SHS, who will share it with the rest of their classmates. To address non-response bias per strand, the strand societies will be informed about this study via email of important links and information for dissemination. To address non-response bias per year level, the researchers will ask the senior high school administration to reserve rooms on different floors of the Frassati building during the data collection to ensure accessibility of different year levels. Those who completed the applications and signed up, provided that they fit the inclusion criteria, will be eligible to participate in the study. Moreover, the study will employ stratified random sampling to recruit the students, wherein the participants will be stratified based on their strand. The percentage of their strand population to the total population will be determined. Following that, the sample per strand will be calculated. With this, the sample will represent the population with respect to the different grade levels. Moreover, the characteristics of each stratum may also be established separately.[27] The specific sampling frame cannot be obtained as of the moment due to data privacy matters. However, the exact number of members in the population will be obtained once the enrollment period for A.Y. 2024-2025 concludes. To further clarify our recruitment criteria, similar to the recruitment criteria of Mendoza, participants in "The Walking School Bus and Children's Physical Activity: A Pilot Cluster Randomized Controlled Trial" were eligible if they were enrolled in fourth grade and had no health limitations that prevented them from walking to school.[28] This supports the study's inclusion criteria, which state that only students enrolled in the eleventh to twelfth grade of UST SHS and free of mobility-related health concerns are eligible to participate.

Setting

The study will take place at the UST SHS and Blessed Giorgio Frassati Building from August 2025 to October 2025. Specifically, the data gathering will be implemented to further investigate the level of physical activity of students who utilize active, passive, and mixed modes of transportation. In order to magnify the recruitment process, the team will execute an educational seminar following the data gathering process.

Tools

Two screening tools will be utilized to gather data regarding the participants' physical activity levels: the IPAQ (International Physical Activity Questionnaire) and the GPAQ (Global Physical Activity Questionnaire). The IPAQ is a self-report, seven-item questionnaire that assesses the types of intensity of physical activity and sitting time that an individual does.[29] The questionnaire contains open-ended questions regarding one's physical activity over the last seven days and is proven to have good stability in test-retest reliability and high reliability (α <.80). Moreover, the

screening tool was also tested valid in terms of predictive validity, concurrent validity, convergent validity, criterion validity, and discriminant validity.

On the other hand, the GPAQ is a self-report questionnaire consisting of 16 items developed by the World Health Organization (WHO) for physical activity surveillance. It contains questions about physical activity participation in three domains, namely activity at work (occupational), travel to and from places (transport-related), and recreational activities (leisure time). The screening tool's short-term and long-term test-retest reliability is measured as good to very good, while its concurrent validity is poor to fair. Moreover, it is also important to note that the second version of the GPAQ will be used in this study as advised by the GPAQ Analysis Guide. The first version of GPAQ initially contains 19 questions. However, the WHO excluded three items due to redundancy, leaving 16 questions in the second version.[17, 30]

Using the IPAQ and the GPAQ together offers significant strengths in assessing physical activity levels. Such that the high validity of both questionnaires ensures reliable cross-validation of results, while their coverage allows for a thorough understanding of activity across different domains. Additionally, this combination is cost-effective, enabling large-scale assessments without the need for expensive equipment.

The Detecto eye-level mechanical weigh beam and its stadiometer will be used to measure the weight and height for its precision and reliability.[31] Furthermore, the Detecto scale has both components established as the “gold standard” for measuring height and weight: a standing scale and a stadiometer, respectively[32]. Correspondingly, standardized nonstretch body tape measures will be used to assess the waist and hip circumferences of the participants, following Casadei and Kiel’s recommendations.[33]

Procedures

The data gathering procedure will include two phases. Phase 1 involves obtaining approval from the Ethics Review Committee to ensure the study’s ethical foundation. This phase would also include strategic planning, budgeting, and coordinating with the secretary general to be followed by the principal of the UST SHS department. Additionally, the group will organize a health promotion talk, conduct interest checks, and promote the study through the posting of publication materials on social media. These materials will outline the study's purpose, participation criteria, and associated components, such that:

1. Interested students must complete an informed consent form prior to participating.
2. The activity will entail the collection of their demographic information and presence of regular athletic activities, taking of their anthropometric measurement, and answering the IPAQ and GPAQ. Moreover, they will be asked to state their primary mode of transportation to and from school.

3. Participation will involve attending a talk on physical activity to educate participants about its importance.

Following Phase 2, participants will be recruited and asked to pre-register and fill out the ICF indicating their approval to participate in the study. The research group will be requesting UST SHS faculty members to serve as witnesses to the participant's completion of the ICF. Participants under the age of 18 will fill out a separate ICF cosigned with a parent or guardian, than those aged 18. Participants will also be provided a list of guidelines outlining expectations, such as the need to obtain their demographic information, strand, and anthropometric measurements, which include hip and waist circumferences, height, and weight, which will be taken individually in a typical classroom of the UST SHS Building by the research team. Included in the instructions prior to the assessment is the necessity to wear appropriate attire. During the anthropometric measurement, participants will be asked to don cycling shorts and a fitting shirt, standing erect with weight evenly distributed on both feet. Height and weight will be measured using the Detecto eye-level mechanical weigh beam while the participants are barefoot. Moreover, waist circumference will be measured around the midpoint of the lower ribs and iliac crest, while hip circumference will be assessed at the largest circumference around the buttocks using standardized tape measures.[34] The body mass index (BMI) and the waist-hip ratio will be calculated by the researchers afterward. Specifically, the BMI will be computed by dividing the weight in kilograms by the square of the height in meters (weight/height^2), and the waist-hip ratio will be computed by dividing the waist circumference by the hip circumference (waist circumference/hip circumference).[35, 36]

To assess the participants' level of physical activity, the IPAQ and GPAQ will be utilized and physically distributed by the research team after the measurements. In order to mitigate the effects of confounding variables, additional information will be gathered, including the athletic activities of the participants, such as sports activities and gym memberships. Furthermore, to minimize potential selection bias, the team will be asking about the mode of transportation at the endmost part of the data collection. This approach will help ensure objectivity among researchers when collecting anthropometric measurements from participants, reducing the likelihood of disparities. The team will ensure that data confidentiality and security are upheld throughout the data collection.

Subsequently, a 30-minute talk will be conducted aimed at promoting and enhancing awareness of physical activity among the youth, designed to reinforce participants' knowledge. A licensed Physical Therapist will be present to supervise the whole process. Data analysis will follow thereafter. Figure 1 outlines the process of data gathering from phases 1 to 2 which will span from January 2024 to November 2024. Meanwhile, Figure 2 outlines the timeline of implementation on the day of data collection which includes the steps a participant may expect to take.

Data Analysis

Descriptive statistics will be utilized to describe the population using the frequency, proportion, mean, median, and standard deviation. This analysis will enable the categorization of participants into their modes of transportation: active, passive, and mixed transport groups. Furthermore, the participants' demographic information, anthropometric measures, programs, and levels of physical activity will also be characterized. Their physical activity levels will be determined through their computed responses to the IPAQ and GPAQ. The information on different modes of transportation and levels of physical activity will be analyzed using Spearman's Rho wherein Cohen's recommendation of interpretation of relationship is used where $|r|<0.10$ is considered a weak relationship, 0.30 $|r|$ 0.50 is considered a moderate relationship, and $|r|>0.50$ is considered a strong relationship. On the other hand, Kendall's Tau is undertaken to determine the relationship between the different modes of transportation and anthropometrics. Statistical significance is accepted at $p<0.05$. Should there be any missing data, a single imputation method will be utilized wherein a single estimated value will be used to fill in the missing data and standard statistical methods will be applied to complete the resulting data.[37] Additionally, visual sensitivity analysis will be used to give a representation of the relationships between the dependent variable with each of the independent variables.[38] All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Patient and Public Involvement Statement

None

AUTHORS' CONTRIBUTIONS

Contributors: Donald Manlapaz introduced the research concept and, alongside Zyra Mae Sicat, oversaw the drafting and revision of the proposal. April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee conducted literature reviews, gathered references, and collaborated on writing the proposal, with guidance and input from Donald Manlapaz and Zyra Mae Sicat. Guarantor is Donald Manlapaz.

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COMPETING INTERESTS STATEMENT

We declare that we do not have any conflict of interest with regard to this research.

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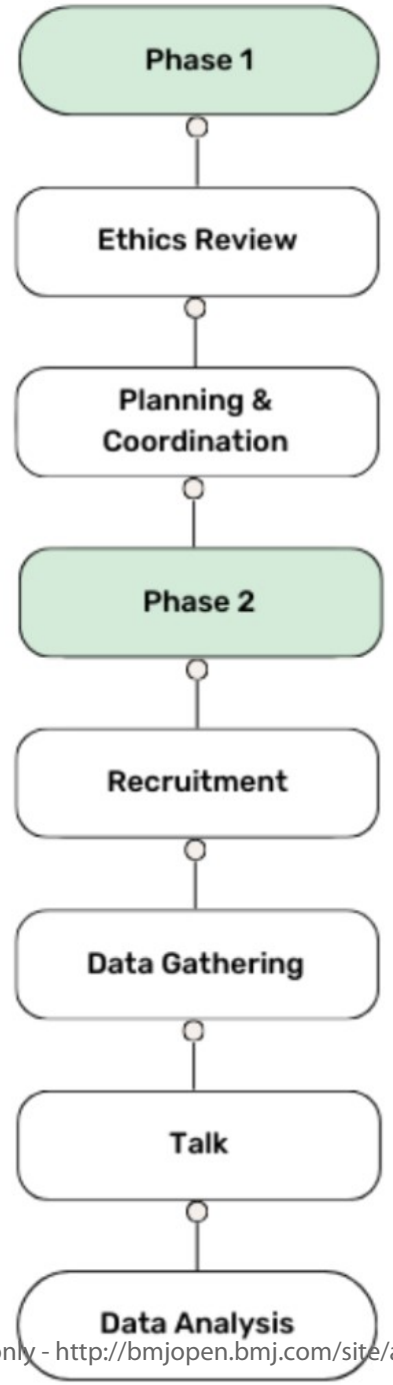
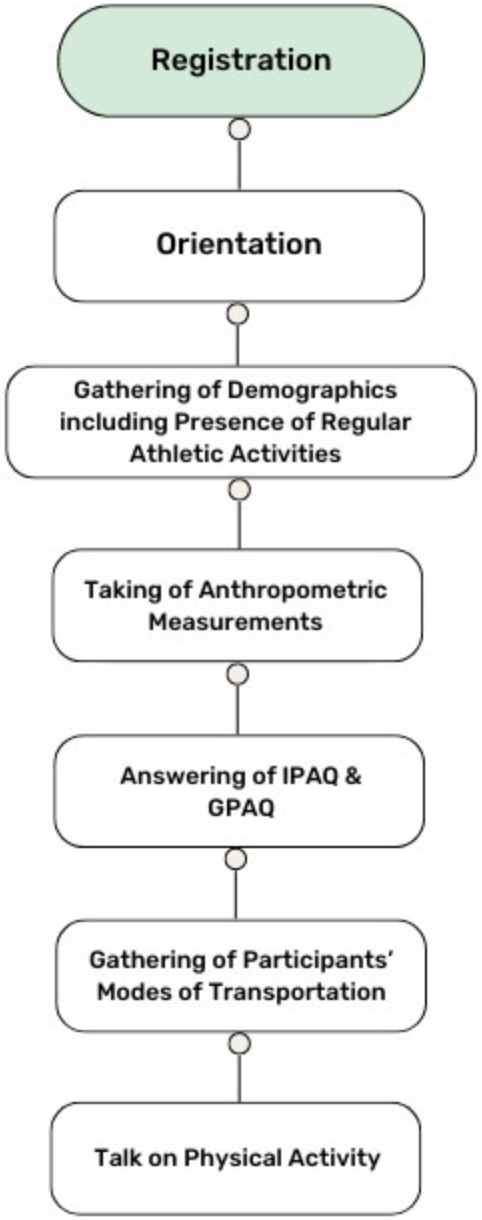
Figure 1. Data Gathering Procedure

Figure 2. Timeline of Data Gathering

DATA GATHERING PROCEDURE



TIMELINE OF IMPLEMENTATION



June 24, 2024

Donald Manlapaz, PhD
Primary Investigator

Dear Dr. Manlapaz:

Greetings in the name of St. Thomas of Aquinas!

This is to inform you that the proposal with the following details:

Title	Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among UST SHS Students: A Cross-Sectional Study
Protocol Number	SI-2023-029 (Version 3)

the University of Santo Tomas-College of Rehabilitation Sciences Ethics Review Committee has favorably granted the authors APPROVAL. You may now proceed with your research. Please be reminded that the version of the protocol given Ethical Clearance should only be the one used throughout the conduct of the study

The following are standard requirements attached to approved protocols:

1. Approval will be for a period of one (1) year commencing on the stamped date of approval. At the end of this period, if the research project has been completed or discontinued for any reason, the investigator is required to inform the Committee in writing. If the investigator completes the work earlier than planned, he/she must inform the Committee in writing as soon as the work is completed.
2. Submit to the Committee any pending documents (e.g. letters, contracts, memorandum of understanding) that are pertinent to the research project, if applicable.
3. Notify the Committee thru submission of post-approval review application (see SOP 6-13 for complete requirements) for any of the following:
    a. Early Termination: Decision of the researcher, principal investigator, the institution, or sponsor to end the implementation of a study before its completion
    b. Continuing Review: Extension or renewal of approval for another year.
    c. Amendment: Any changes in the approved protocol submitted for review and approval of the committee.
    d. Protocol Deviation: Non-compliance with the approved protocol that does not increase risk or decrease benefit to participants or does not significantly affect their rights, safety or welfare or the integrity of data
    e. Protocol Violation: Non-compliance with the approved protocol that increases risk or decreases benefit to participants or significantly affects their rights, safety or welfare or the integrity of data.

f. Reportable Negative Events: Occurrences in the study site that indicate risks or actual harms to participants and to members of the research team and to integrity of data.
g. Serious Adverse Event (SAE): An unfortunate event leading to serious harm to the participants such as death, life threatening incident or high risk; events resulting to prolonged hospitalization, significant disability, incapacity, congenital anomaly or another episode which is considered to be harmful to the research participant.
h. Suspected Unexpected Serious Adverse Reaction (SUSAR): Any serious adverse reaction/event in the research participant who were provided with intervention, which may or may not be dose/parameter related, but are not expected or anticipated since the reaction are not consistent with current information about the intervention in question.
i. Unexpected Adverse Event (UAE): Any non-serious adverse reaction/event in the research participant who were provided with intervention, which may or may not be dose/parameter related, but are not expected or anticipated since the reaction is not consistent with current information about the intervention in question.

4. The investigator, at all times, is responsible for the ethical conduct of the research in accordance with the guidelines established by the University of Santo Tomas and the Declaration of Helsinki. **The stamped, approved version of the informed consent should be the only version used during the conduct of the study. Note that ERC stamp will be added in the informed consent, upon submission of the approved copy to ethicsreview.crs@ust.edu.ph**
5. Upon the completion of the research project, the investigator is required to submit to the Ethics Research Committee a digital copy of the complete manuscript (including all results, discussions, appendices, and correspondences) and a final report form.

For the Ethics Review Committee,

Assoc. Prof. Anna Lea L. Enriquez, MD, DPBA, FPSA
Chairman
Ethics Review Committee
College of Rehabilitation Sciences
University of Santo Tomas

BMJ Open

Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study Protocol

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Exploring the Relationship Between Different Modes of Transportation and Levels of Physical Activity Among Senior High School Students of the University of Santo Tomas: A Cross-Sectional Study Protocol

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ABSTRACT

Introduction: Rapid changes in technology, communication, and transportation prompted challenges in achieving the recommended level of physical activity. Although the students are returning for in-campus classes to promote more interaction and socialization, the youth still fall short of living up to the desired level of physical activity. Mode of transportation plays a pivotal role in physical activity, yet its relationship is poorly elucidated. The aim of the study is to explore the relationship between the types of transportation and the level of physical activity among senior high school students (SHS) aged 16-18 from the University of Santo Tomas (UST).

Methods and Analysis: This will be an observational, cross-sectional, analytic study design. Participants' demographics, and anthropometric measurements such as height, weight, and hip & waist circumferences will be collected. To measure the variables of interest, the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ) will be used. Descriptive statistics will be utilized to characterize the samples using frequency, mean, median, and standard deviation, while inferential statistics such as Analysis of Variance for comparison and Pearson's and Spearman for correlation will be used. All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Ethics and Dissemination: Ethical approval was obtained from the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC) with the protocol number SI-2023-029. The study will comply with the principles of the Declaration of Helsinki, Ethical Guidelines on Health-Related Social Research of the Philippine Health Research Ethics Board, and Data Privacy Act 2012. All results, regardless of outcome, whether positive or negative, will be accessible through publication and by reporting to the participant through email and other relevant authorities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The study is of low-risk nature in several aspects such as psychological, social, economic, privacy/confidentiality, and legal.
- The methods and tools that will be used in the study are standardized and supported by literature to be valid and reliable.
- The study will be conducted solely within Metro Manila, which may limit the generalizability of the findings to other regions in the country with different geographical, seasonal, socio-economic, or cultural contexts.
- The study focuses exclusively on senior high school students from the University of Santo Tomas, which may not fully represent the variability in other populations.

- The study will not account for other factors that could influence physical activity and the mode of transportation, such as infrastructures, access to transportation, neighborhood, seasonal and weather variability, screen time, diet, and socioeconomic factors.

Keywords: Transport, Physical Activity, High School

Word count: 4189

INTRODUCTION

Background

As of 2022, the World Health Organization (WHO) reports that more than 80% of teenagers fail to meet the required physical activity standards.[1] The significant level of inactivity is partly attributed to sedentary lifestyles at school and home and inactivity during leisure.[2] Moreover, in a publication by Yeung and Johnston, specific attention has been drawn to the countries in Asia, namely the Philippines, Malaysia, Singapore, Japan, South Korea, India, Pakistan, and several Pacific nations, which exhibit the highest proportions of inactive populations in the region.[3] In the local setting, the Food and Nutrition Research Institute states that 84.5% of Filipino youth aged 10 to 17 fall short of meeting the recommended level of PA.[4]

WHO defines physical activity as body movements driven by skeletal muscles necessitating energy expenditure.[1] On the other hand, an active lifestyle is characterized by regular PA, while sedentary behavior is associated with low energy expenditure, such as TV viewing.[5,6] The enhancement of one's PA depends on the consideration of both invariable and modifiable factors. Invariable factors include age, gender, race, and ethnicity. According to Kretschmer et al. study, boys have a higher moderate to vigorous PA than girls, and is supported by Espada et al. which also reports that women have lower levels of PA than men.[7,8] In addition, a study conducted by Goel et al. mentions that females are more likely to walk and use public transport while males tend to use bicycles instead.[9] Likewise, a the study of Lejsková et al states that men would often use cars as drivers, train, bus and bicycle while women tend to use cars as passengers, public transport and walk.[10] Conversely, modifiable elements include environmental circumstances, community settings, and one's behavioral and personality characteristics.[11] Delving further, a 2022 assessment regarding the PA of children and adolescents in the Philippines encompassed ten indicators of PA, namely Overall Physical Activity, Organized Sport and Physical Activity, Active Play, Active Transportation, Sedentary Behaviors, Physical Fitness, Family and Peers, School, Community and Environment, and Government.[4] Evidently, a study by Khan et al. elucidates a positive correlation between active school transport and PA in adolescents, concurrent with a decrease in sedentary behavior. With this, it can be concluded that one's mode of transportation contributes to determining an individual's level of PA.[12]

An active mode of transport is defined as a way of traveling that entails energy expenditure, with walking and cycling as prominent examples. In contrast, passive transport is attributed to using motorized transportation, such as cars, buses, and trains, requiring no physical exertion or energy expenditure.[13] When both modes are employed in combination, it is referred to as mixed transport. Considering such, recent studies have investigated the factors contributing to the choice of transportation mode. In a student setting, an increase in active transport has been associated with the proximity of house to school, social support from peers, parental active

transport, and access to services.[14] In the Philippines, the Asian Development Bank reports that urban transportation has been dominated by public utility vehicles such as jeepneys, taxis, tricycles, and pedicabs.[15] Given its extensive usage, passive transportation can be inferred to be the most common transport mode in the country. Correspondingly, Cagas et al. document that only 29.5% of Filipino schoolchildren utilize active transportation to school at least five days a week.[4]

To advance the use of active transportation in adolescents, physical therapists play an imperative role in primary health promotion and in addressing the sedentary lifestyle of individuals, starting with assessment. In rehabilitation, the level of PA is evaluated through functional assessment using outcome measure tools called the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ). The IPAQ is primarily intended for adult population surveillance, as it has been created and tested for use by those aged 15 to 69. Furthermore, the questionnaire evaluates PA across various domains, including leisure, domestic and gardening activities, and work-related and transportation-related activities.[16] On the other hand, the GPAQ assesses PA in relation to occupation, transport, and leisure.[17] In a study conducted by Herrmann et al., the GPAQ version 2 validity has shown low to moderately high validity (r = 0.25 to 0.63) against measures of physical fitness, body composition, and objective (accelerometer, pedometer) and subjective measures of PA (IPAQ). The questionnaire has shown overall strong reliability. It presented that GPAQ, including its domains such as occupation, transportation, and leisure, provided acceptable short-term reliability (all > 0.80). However, the long-term reliability of reporting moderate intensity activity for recreation, work, and travel was low (< 0.70). In their summary, they also mentioned that GPAQ has also “showed acceptable evidence of short- and long-term test-retest reliability by activity category and modest validity evidence.”[18]

Another significant contribution that physical therapy offers within the domain of transport and health is the emerging discipline of environmental physiotherapy (EPT), an expansion in the profession with inherent benefits for both the patients and the environment. This evolving domain, propelled by the increased number of consumers and the consequential depletion of natural resources, confronts the ensuing adverse environmental impacts.[19] With this, the study will also introduce EPT by promoting active transportation. If EPT is widely practiced in the country, then it could increase the number of teenage groups that would opt for active transportation. This not only encourages people to go for active transportation, but it will also help improve the condition of the environment, specifically reducing gas emissions. In addition, practicing active transport contributes to the pursuit of Sustainable Development Goals (SDG) 3 (Good Health), 11 (Sustainable Cities and Communities), and 13 (Climate Action).

The University of Santo Tomas Senior High School (UST SHS) was established in 2016 and houses six strands namely: Science, Technology, Engineering, and Mathematics Strand (STEM), Accountancy and Business Management Strand (ABM), General Academic Strand - Health-Allied

(GA-HA), Humanities and Social Sciences Strand (HUMSS), Music, Arts, and Design Strand (MAD), and the Physical Education and Sports Track (PES). The study on the topic is to be piloted at the UST SHS as it fits the age criteria of the population and is accessible to the researchers due to their affiliation with the university.[20]

Knowledge Gap

The continuous decline in physical activity (PA) levels among school-going adolescents[21] has underscored the need for further investigation into the relationship between modes of transport and PA levels. Active transport has shown promise in increasing PA levels due to its easy integration into daily routines,[22] though its relationship remains inconclusive as it relies solely on cross-sectional data. [23] This limitation warrants attention for the current study. Additionally, in exploring the relationship between mode of transport and PA levels, the roles of passive and mixed transports remain understudied compared to active transportation. Other notable gaps include the absence of input from physical therapists and limited research conducted in the Philippine context, which fails to consider environmental differences influencing transport choices and, consequently, PA levels. Evans et al. suggest that multiple factors, including individual, social, and environmental aspects, should be taken into account when monitoring PA levels to maximize effectiveness.[24] Given the differences in geographic locations and environmental conditions, data from the current study is likely to differ from previous findings, considering the routes taken by UST SHS students in Manila to which Leather et al. note that regions beyond the Central Business Districts in Manila lack sufficient facilities for pedestrians and cyclists to travel safely.[25] Addressing infrastructure disparities is vital in the exploration of the relationship between the modes of transportation and PA levels of UST SHS Students.

Objective

The primary aim of this study is to explore the relationship between the types of transport and the physical activity levels of senior high school students from UST. To achieve the primary objective, the following are the secondary aims of the study:

1. To determine the level of physical activity of UST SHS Students.
2. To compare the level of physical activity to the modes of transportation.
3. To correlate the level of physical activity to the modes of transportation.
4. To correlate the level of physical activity to the anthropometric measurements of UST SHS students.

Significance

The study's findings hold significant importance in public health as it can raise awareness about the impact of transportation on PA, enabling targeted health interventions for primary care. The study may also promote PA within educational institutions, fostering healthier student

environments. Moreover, the study can provide empirical evidence to inform policy decisions related to PA. This paves the way for future research into health, environment, and SDGs, offering a comprehensive understanding of transportation's effects on individuals and the community.

Delimitation

Based on the study's objective, an observational cross-sectional study design will be implemented in the academic year 2024 to 2025. The study will highlight UST SHS students' PA based on their transportation mode, and participants will include UST SHS Students aged 16 to 18 years old. The study will examine the following factors influencing students' PA: Active, Passive, and Mixed Transportation. The study will not include other PA factors, such as screen time and physical/social environments.

METHODS

Design

This research will utilize an observational, cross-sectional analytic study design to explore the relationship between active, passive, & mixed modes of transportation and physical activity. Moreover, this study will be reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[26]

Participants

Participants in the study are students recruited from UST SHS and officially enrolled in all strands of the eleventh to twelfth grade aged 16-18 years old and above. However, people with mobility-related health issues, such as arthritis, osteoporosis, musculoskeletal disorders, neurological disorders, balance disorders, severe cardiopulmonary diseases, and so forth, that might affect the mode of transportation or commute used, are ineligible to participate. Approximately 373 students will be invited to participate, as estimated from the current 148 classes of the academic year (A.Y.) 2023 - 2024 with approximately 38 students per class, calculated using Slovin's formula $n=N/(1+Ne^2)$ wherein n is the sample size, N is the population size, and e is the acceptable margin of error. with a confidence level of 95%. The registration form will be generated using Google Forms. The link to the forms and publication materials will be sent to the student council for dissemination to the class presidents of each class at UST SHS, who will share it with the rest of their classmates. To address non-response bias per strand, the strand societies' will be informed about this study via email of important links and information for dissemination. To address non-response bias per year level, the researchers will ask the senior high school administration to reserve rooms in different floors of the Frassati building during the data collection for ensured accessibility of different year levels. Those who completed the applications and signed up, provided that they fit the inclusion criteria, will be eligible to participate in the study. Moreover, the study will employ stratified random sampling to recruit the students, wherein the participants will be stratified based on their strand. The percentage of their strand population to the total population will be determined. Following that, the sample per strand will be calculated. With this, the sample will represent the population with respect to the different grade levels. Moreover, the characteristics of each stratum may also be established separately.[27] The specific sampling frame cannot be obtained as of the moment due to data privacy matters. However, the exact number of members in the population will be obtained once the enrollment period for A.Y. 2024-2025 concludes. To further clarify our recruitment criteria, similar to the recruitment criteria of Mendoza, participants in "The Walking School Bus and Children's Physical Activity: A Pilot Cluster Randomized Controlled Trial" were eligible if they were enrolled in fourth grade and had no health limitations that prevented them from walking to school.[28] This supports the study's inclusion criteria, which state that only students enrolled in the eleventh to twelfth grade of UST SHS and free of mobility-related health concerns are eligible to participate.

Setting

The study will take place at the UST SHS and Blessed Giorgio Frassati Building from August 2025 to October 2025. Specifically, the data gathering will be implemented to further investigate the level of physical activity of students who utilize active, passive, and mixed modes of transportation. In order to magnify the recruitment process, the team will execute an educational seminar following the data gathering process.

Tools

Two screening tools will be utilized to gather data regarding the participants' physical activity levels: the IPAQ (International Physical Activity Questionnaire) and the GPAQ (Global Physical Activity Questionnaire). The IPAQ is a self-report, seven-item questionnaire that assesses the types of intensity of physical activity and sitting time that an individual does.[29] The questionnaire contains open-ended questions regarding one's physical activity over the last seven days and is proven to have good stability in test-retest reliability and high reliability (α <.80). Moreover, the screening tool was also tested valid in terms of predictive validity, concurrent validity, convergent validity, criterion validity, and discriminant validity.

On the other hand, the GPAQ is a self-report questionnaire consisting of 16 items developed by the World Health Organization (WHO) for physical activity surveillance. It contains questions about physical activity participation in three domains, namely activity at work (occupational), travel to and from places (transport-related), and recreational activities (leisure time). The screening tool's short-term and long-term test-retest reliability is measured as good to very good, while its concurrent validity is poor to fair. Moreover, it is also important to note that the second version of the GPAQ will be used in this study as advised by the GPAQ Analysis Guide. The first version of GPAQ initially contains 19 questions. However, the WHO excluded three items due to redundancy, leaving 16 questions in the second version.[17, 30]

Using the IPAQ and the GPAQ together offers significant strengths in assessing physical activity levels. Such that the high validity of both questionnaires ensures reliable cross-validation of results, while their coverage allows for a thorough understanding of activity across different domains. Additionally, this combination is cost-effective, enabling large-scale assessments without the need for expensive equipment.

The Detecto eye-level mechanical weigh beam and its stadiometer will be used to measure the weight and height for its precision and reliability.[31] Furthermore, the Detecto scale has both components established as the "gold standard" for measuring height and weight: a standing scale and a stadiometer, respectively[32]. Correspondingly, standardized nonstretch body tape measures will be used to assess the waist and hip circumferences of the participants, following Casadei and Kiel's recommendations.[33]

Procedures

The data gathering procedure will include two phases. Phase 1 involves obtaining approval from the Ethics Review Committee to ensure the study's ethical foundation. This phase would also include strategic planning, budgeting, and coordinating with the secretary general to be followed by the principal of the UST SHS department. Additionally, the group will organize a health promotion talk, conduct interest checks, and promote the study through the posting of publication materials on social media. These materials will outline the study's purpose, participation criteria, and associated components, such that:

1. Interested students must complete an informed consent form prior to participating.
2. The activity will entail the collection of their demographic information and presence of regular athletic activities, taking of their anthropometric measurement, and answering the IPAQ and GPAQ. Moreover, they will be asked to state their primary mode of transportation to and from school.
3. Participation will involve attending a talk on physical activity to educate participants about its importance.

Following Phase 2, participants will be recruited and asked to pre-register and fill out the ICF indicating their approval to participate in the study. The research group will be requesting UST SHS faculty members to serve as witnesses to the participant's completion of the ICF. Participants under the age of 18 will fill out a separate ICF cosigned with a parent or guardian, than those aged 18. Participants will also be provided a list of guidelines outlining expectations, such as the need to obtain their demographic information, strand, and anthropometric measurements, which include hip and waist circumferences, height, and weight, which will be taken individually in a typical classroom of the UST SHS Building by the research team. Included in the instructions prior to the assessment is the necessity to wear appropriate attire. During the anthropometric measurement, participants will be asked to don cycling shorts and a fitting shirt, standing erect with weight evenly distributed on both feet. Height and weight will be measured using the Detecto eye-level mechanical weigh beam while the participants are barefoot. Moreover, waist circumference will be measured around the midpoint of the lower ribs and iliac crest, while hip circumference will be assessed at the largest circumference around the buttocks using standardized tape measures.[34] The body mass index (BMI) and the waist-hip ratio will be calculated by the researchers afterward. Specifically, the BMI will be computed by dividing the weight in kilograms by the square of the height in meters (weight/height^2), and the waist-hip ratio will be computed by dividing the waist circumference by the hip circumference (waist circumference/hip circumference).[35, 36]

To assess the participants' level of physical activity, the IPAQ and GPAQ will be utilized and physically distributed by the research team after the measurements. In order to mitigate the effects of confounding variables, additional information will be gathered, including the athletic

activities of the participants, such as sports activities and gym memberships. Furthermore, to minimize potential selection bias, the team will be asking about the mode of transportation at the endmost part of the data collection. This approach will help ensure objectivity among researchers when collecting anthropometric measurements from participants, reducing the likelihood of disparities. The team will ensure that data confidentiality and security are upheld throughout the data collection.

Subsequently, a 30-minute talk will be conducted aimed at promoting and enhancing awareness of physical activity among the youth, designed to reinforce participants' knowledge. A licensed Physical Therapist will be present to supervise the whole process. Data analysis will follow thereafter. Figure 1 outlines the process of data gathering from phases 1 to 2 which will span from January 2024 to November 2024. Meanwhile, Figure 2 outlines the timeline of implementation on the day of data collection which includes the steps a participant may expect to take.

Data Analysis

Descriptive statistics will be utilized to describe the population using the frequency, proportion, mean, median, and standard deviation. This analysis will enable the categorization of participants into their modes of transportation: active, passive, and mixed transport groups. Furthermore, the participants' demographic information, anthropometric measures, programs, and levels of physical activity will also be characterized. Their physical activity levels will be determined through their computed responses to the IPAQ and GPAQ. The information on different modes of transportation and levels of physical activity will be analyzed using Spearman's Rho wherein Cohen's recommendation of interpretation of relationship is used where $|r|<0.10$ is considered a weak relationship, 0.30 $|r|$ 0.50 is considered a moderate relationship, and $|r|>0.50$ is considered a strong relationship. On the other hand, Kendall's Tau is undertaken to determine the relationship between the different modes of transportation and anthropometrics. Statistical significance is accepted at $p<0.05$. Should there be any missing data, a single imputation method will be utilized wherein a single estimated value will be used to fill in the missing data and standard statistical methods will be applied to complete the resulting data.[37] Additionally, visual sensitivity analysis will be used to give a representation of the relationships between the dependent variable with each of the independent variables.[38] All analysis will be done using IBM Statistical Packages for Social Sciences version 23 with the significant level set at alpha 0.05.

Patient and Public Involvement Statement

None

ETHICS AND DISSEMINATION

Ethical approval has been granted by the University of Santo Tomas - College of Rehabilitation Sciences Ethics Review Committee (UST-CRS ERC) and will comply with the principles of the

Declaration of Helsinki, Ethical Guidelines on Health-Related Social Research of the Philippine Health Research Ethics Board, and Data Privacy Act 2012. All data and information collected will be securely stored in a 10-character password-protected Google Drive folder, which will only be accessible to the researchers. Hard copies of the questionnaire will be safeguarded in the residence of the group's liaison officer. The data gathered will then be securely stored for the duration of the study, and it will be destroyed ten years after publication of results in accordance with the rules and provisions of RA 10173 or the Data Privacy Act. The results of the study will be disseminated to the participants and fellow SHS Students from UST. All results, regardless of outcome, whether positive or negative, will be accessible through publication or by reporting to the participant through email and other relevant authorities. A copy of the final manuscript will be submitted to the UST-CRS ERC. There are no conflicts of interest presumed to occur between researchers and participants of this study.

Participants will be asked to fill out informed consent forms (ICF) distinct to their age group: 18-year-old and 16- to below 18-year-old. These document will encompass information regarding their participation, including the scope of the study, expected procedures, and their rights. The ICF for participants below 18 years old will primarily be addressed to their parents or legally authorized representatives (LAR). The document, signed by the parent/LAR and cosigned by the participant, will be collected to confirm their consent for participation.

The study is of a low-risk nature in terms of psychological, social, economic, loss of privacy/confidentiality, and legal aspects drawn from the data-gathering of the participant's personal information and measurements, such that they may be effectively managed by the researchers. Meanwhile, the research will indirectly benefit the participants through knowledge transfer on the relationship between physical activity and mode of transport and through taking part in a study which will benefit various facets of society in terms of health awareness and promotion in facilitating lifestyle changes with regards to physical activity on a personal and societal scale. Despite the risks outweighing the benefits in number, such risks are modifiable and may be mitigated by the researchers. Managing the risks one by one would lead to a better methodology and assurance that the dignity and safety of the participants are prioritized. Thus, ultimately facilitating improvement in the quality of the study.

In response to the psychological risk of possible mental fatigue while answering the questionnaires, the researchers have given the participants the liberty to take breaks or withdraw their participation in the study at any moment. The researchers will also be the ones to privately take the participant's anthropometric measurements for concerns regarding body image. To address potential social risks, such as embarrassment about the participant's mode of transportation due to associated negative stigma, the researchers will strictly enforce privacy and confidentiality at all times. All collected information will remain confidential and be shared only between the researchers and the participants. To address legal concerns, parents or guardians of underaged participants will be notified via short messaging services (SMS) or email to ensure

the authenticity of consent forms and prevent any forgery of signatures with regard to the participation of their child in the study. Additionally, prior to scheduling the data collection, a survey will be conducted to determine the participants' preferred time and date to minimize disruptions of daily routines.

To ensure confidentiality and privacy, the researchers will thoroughly explain the protection and disclosure policies in place to safeguard each participant's rights and privacy. Protection policies include measures to minimize harm and protect personal information, wherein soft copies containing such data will be securely stored in a password-protected Google Drive folder with only the researchers having access. Moreover, hard copies of the answered questionnaires will be securely stored in the residence of the group liaison officer. Coded identifiers will also be implemented to protect participants' identities and information. All collected data will be kept at the said locations for 10 years after the publication of the results and will be destroyed and deleted after the set duration to ensure that no misuse occurs. Meanwhile, disclosure policies address how and when data may be shared with others. The completed paper will be disseminated to the participants via email and publicly shared through publications or conferences, and they may gain access to their own information upon request. To ensure data privacy, names of the participants will not be included in the data gathered, and coded identifiers will be used. The records will be securely stored for 10 years and the privacy of all participants will be maintained throughout the study.

AUTHORS' CONTRIBUTIONS

Contributors: Donald Manlapaz introduced the research concept and, alongside Zyra Mae Sicat, oversaw the drafting and revision of the proposal. April Alexandra Engbino, Nyl Eiller Israel Cervo, Jamil Daquiz, Dathan Nevin Leung, Iana Mikhela Luciano, and Arianne Ysabelle Wee conducted literature reviews, gathered references, and collaborated on writing the proposal, with guidance and input from Donald Manlapaz and Zyra Mae Sicat.

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COMPETING INTERESTS STATEMENT

We declare that we do not have any conflict of interests with regards to this research.

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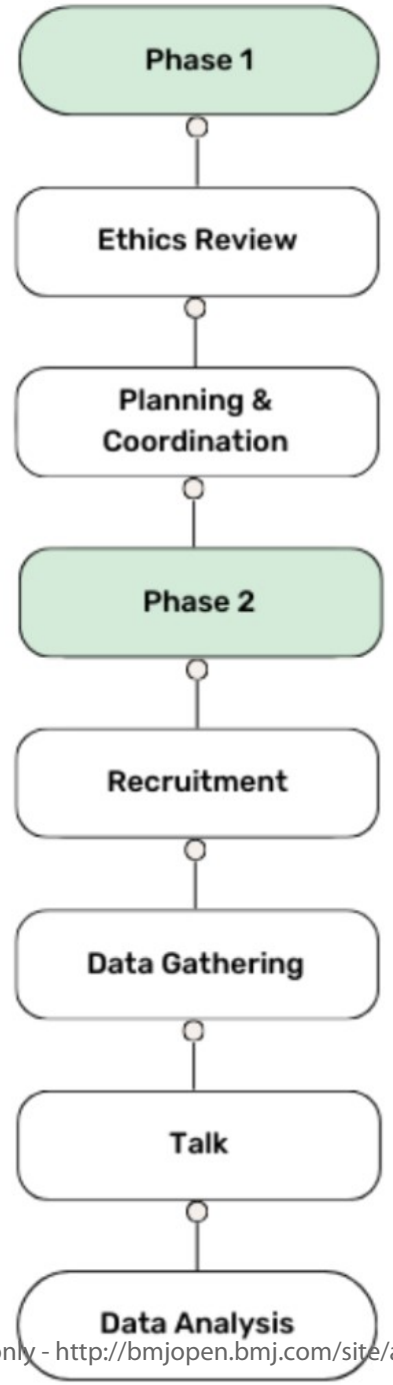
Figure 1. Data Gathering Procedure

Figure 2. Timeline of Data Gathering

DATA GATHERING PROCEDURE



TIMELINE OF IMPLEMENTATION