STUDY PROTOCOL

Association between physical activity and mental wellbeing amongst adults in the urban area of the Wardha District - A study protocol [version 1; peer review: 1 not approved]

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Abstract

Introduction: Severe mental illness is a pressing social issue that needs to be immediately addressed in India and globally. Unfortunately, the mental health of many adults in India and other countries has been declining. Fortunately, physical activity has proven to be an effective way to address this issue and provides many beneficial effects. Thus, mental wellbeing stipulates how the person feels when all the associated elements are considered.

Objectives: The objective of this study is to determine the relationship between physical activity and adult mental health.

Methods: This study will be conducted online using cross-sectional methods. Data will be collected using four validated questionnaires, the Short-form International Physical Activity Questionnaire (IPAQ) version 2.0, the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), the Pemberton Happiness Index (PHI), and the Patient Health Questionnaire (PHQ-9), all in English.

Study implications: The motive of this study is to explore any connections that might lie between physical activity and emotional health. The study will specifically focus on the intensity by which physical activity is done, ranging from lower to higher, and how it affects mental illness symptoms and general mental health.

Keywords
mental health, mental wellbeing, mental illness, physical activity
This article is included in the Datta Meghe Institute of Higher Education and Research collection.

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Introduction

Background

The World Health Organization defines health as a state of complete physical, mental, and social wellbeing rather than just the absence of disease or impairment. There is a lot of zeal for promoting mental health, eliminating prejudice, and ensuring that mental and physical health are held to the same standards. Yet, it is not always easy to understand what “mental health” means in these contexts or if a single, unified definition ties them all together.1–2

In recent years, young people’s mental health has become increasingly focused, especially due to its importance in helping them successfully transition into adulthood. Statistics from high-income countries show that mental health among adults is worsening, reflected in more mental disorders being diagnosed and treated compared to a few decades ago.3 Given that sedentary behavior has been linked to serious health risks like cardiovascular disease, type 2 diabetes, high blood pressure, and colon and prostate cancer, it is imperative to support interventions that encourage physical activity and discourage sedentary behavior. Most people’s physical activity was reduced during the COVID-19 pandemic, specifically those with chronic health conditions like diabetes, heart disease and cancer suffered a lot. Public health professionals must develop strategies to support people in continuing to exercise at their normal levels.4–6

It has been confirmed that a significant connection exists between participating in physical activity and experiencing an enhanced mental and physical health state. Research has demonstrated that the biological changes that occur due to exercise can positively impact mental wellbeing. Physical exercise is thought to be among the most potent stimulators of neurogenesis, with a range of peripheral factors activated by physical activity. Serotonin, β-endorphin, and adiponectin are particularly known to increase hippocampal proliferation, which could have a pragmatic impact on one’s mood.7 Mental wellbeing is when an individual can reach their full potential, handle daily stresses, be productive, and positively impact their surroundings.7,8

In recent years, the prevalence of stress among adults has been on the rise, prompting the need for more research on how physical activity can help reduce this stress. Studies indicate that a decrease in physical activity may lead to worsened mental health, potentially resulting in greater levels of anxiety and depression.5 The literature on physical activity has seen an upward trend in the last decade, reaching a peak in 2021. Recent research has shown an increased focus on the potential connection between physical activity and mental wellbeing in adults, regardless of whether or not they have a mental illness. Research has also displayed that physical activity has numerous positive impacts on people who suffer from mental health issues. Still, it has yet to be sufficiently studied for its effects on those with no mental illness.9

Rationale

The association between physical activity and mental health in adults must be carefully considered because this is the age group when the majority of mental illnesses manifest and when physical activity levels decline. This study aims to investigate this connection. This study will determine the mental health symptoms and happiness index amongst adults residing in the Wardha urban area as well as the relationship between physical activity and mental health. More research needs to be done on the relationship between these two in India, so this study is planned to fill that gap.

Aim

To determine the association between physical activity and mental wellbeing of adults in the urban area of Wardha district.

Objectives

- To assess the nature and intensity of physical activity performed by adults using the International Physical Activity Questionnaire (IPAQ).

- To assess the mental wellbeing of adults using the Warwick-Edinburgh Mental Wellbeing Scale short form (SWEMWBS) and Pemberton Happiness Index (PHI).

- To determine the mental health symptoms of adults using the Patient Health Questionnaire (PHQ-9).

- To determine the association between physical activity and mental wellbeing amongst adults.

Methods

Study design

The present study will be a cross-sectional study.
**Study place/setting**
The online questionnaire will be available to all adults in the urban area of the Wardha district who have access to the internet.

**Study participants/population**
People aged between 18 and 40 years in the urban area of Wardha district will be asked to fill out an online questionnaire. The participants will be invited to be part of the study via social media platforms (Facebook, WhatsApp). The online link of the questionnaire will be made available to them. There won’t be any paper version of the survey. Furthermore, it will only be available in English.

The inclusion criteria for being part of this study are that individuals must be between 18 and 40 years of age, have a good command of the English language, and be currently residing in India. No other criteria were stated for being excluded from the study.

**Sample size**
The number of participants (“N”), the normal deviation for a two-tailed alternative hypothesis at a level of significance (“Z/2”), the standard deviation (“s”), and the extent to which the mean can be estimated (“d”) are all taken into account when determining the sample size for the study.

The “s” was collected from a prior study involving 469 adults because this research was unprecedented and was looking at the relationship between physical activity and sedentary behavior and happiness and mental health. To gauge the degree of subjective wellbeing, the Pemberton Happiness Index (PHI) was used.

In the mentioned study, the mean ± SD of the overall PHI mean scores was 5.83 ± 1.69. Taking into account a “Z/2” of 1.96 (which translates to an error rate of 0.05%) and an arbitrary “d” of 0.29 (5% of the mean of 5.83), the estimated sample size was calculated to be N = (1.96)^2 (1.69)^2 / (0.29)^2 = 137 participants. Considering the potential for 20% of the data to be missing or have errors in data entry, the revised sample size was 165 adults.

**Sampling method**
People taking part in the online survey will be chosen using a convenience sampling method.

**Variables**
For this study, variables associated with demographic information, levels of physical activity, and psychological characteristics will be examined.

This survey aims to collect information on demographic factors and physical activity habits. Participants will be asked about their age, gender, marital status, household’s yearly income, employment status, smoking and alcohol status. To assess physical activity levels, the modified short form of the IPAQ will measure the duration and frequency of physical activity in the previous week, including time spent in vigorous, moderate, walking, and sitting activities.

The short form of the Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS), the Pemberton Happiness Index (PHI), and the PHQ-9 will be used in the study to assess mental health and psychological factors. According to the SWEMWBS, mental health will be divided into four categories: probable depression (scores 7–17), possible depression (scores 18–20), average mental health (scores 21–27), and high mental health (scores 28–35). The PHI scale will use a yes/no response to evaluate subjective wellbeing. The PHQ-9 uses a 4-point Likert scale response format to measure mental health symptoms like insomnia, fatigue, dietary changes, difficulties with concentration, suicidal thoughts, and restlessness (Table 1 describes the key study parameters, their variables and data source and collection method).

**Study/data tools**
The tool referred to will be an online questionnaire with a consent form. The questionnaire will be created using a Google Forms. This questionnaire will have two parts: the first part relates to the individual’s demographic profile. In contrast, the second part will be the short-form of the IPAQ version 2.0. The tool’s objective is to assess adults’ levels of physical activity. Individuals must fill out the appropriate form with their consent before participating. With established concurrent and criterion validity in different languages and test-retest reliability of 0.80 or higher, the IPAQ has been validated among people aged 15 to 69. The WEMWBS and the PHI will measure mental wellbeing. In Asian populations from China and Pakistan, the WEMWBS has undergone internal consistency, test-retest validity, and construct validity tests. Although India is culturally distinct from China and Pakistan, many sociocultural components that affect mental health are shared across the three countries. The WEMWBS has been used in Indian communities in the past. Mental health symptoms will be assessed using PHQ-9.
The online questionnaire will be shared. The study will be conducted electronically, on the participant’s own devices/phones, and will take approximately 10 min. The participants will fill out the online survey. Each survey will ensure anonymity and will consist of a page for consent and information about the study’s objectives. Those undertaking the survey using their devices/phones will have to tick the consent checkbox at the beginning.

Possible confounders
Numerous variables, such as age, gender, ethnicity, socioeconomic status, baseline symptoms of mental health disorders, sleep frequency, smoking, and alcohol consumption, may need to be considered when analyzing mental health symptoms. These variables will be analyzed and evaluated using the demographic profile and PHQ-9.

Bias
Due to the lack of an available sampling frame and the use of convenience sampling, the sample is likely to be unrepresentative of the population being studied, resulting in an inability to make generalizations. Furthermore, the survey could be subject to biases such as respondents providing answers they feel are socially acceptable rather than honest, an inability to accurately assess themselves, confusion around the interpretation of questions, the restriction of rating scales, and the responses being influenced by previous answers. Additionally, the people who complete the questionnaire may not be representative of the population being studied.

Ethical considerations
Ethical approval for this study (DMIHER (DU)/IEC/2023/633) was provided by the ethical committee of Datta Meghe Institute of Higher Education and Research (DMIHER) Sawangi (deemed to be University) on 11/Feb/2023.

The confidentiality of the participants will be respected and safeguarded throughout the research process, and their information will only be accessible to the researchers.

Data analysis plan & expected outcomes/results

Data analysis plan
The responses from the online questionnaire will be exported to a Microsoft Excel version 2305 file. Subsequently, this data will be encoded, entered, and processed through SPSS version 22 (RRID:SCR_002865). The data will be tabulated and visualized through tables and graphs. Chi-squared tests will be employed for categorical data, while the ANOVA test will be used to compare the mean of more than two groups of numerical data.

Expected outcomes/results
Among adults, there will be a direct correlation between the degree of physical activity and mental wellbeing, signifying that higher levels of physical activity could lead to more significant mental health benefits.

Discussion
The relationship between physical activity and psychological health among secondary school teachers in Almadina, Saudi Arabia, was examined in the article by Al-Johani. The goal of the study was to ascertain whether routine physical

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activity could enhance teachers’ mental health. Levels of physical activity and mental health were assessed using the IPAQ and the Mental Health Continuum-Short Form (MHC-SF), respectively. The study’s conclusions suggest that adding physical activity to Almadina City secondary school teachers’ daily schedules may enhance their mental health and job satisfaction. This study highlights the significance of encouraging physical activity among teachers to support their mental health and wellbeing.

Barth Vedy and teammates examined the connection between physical activity and adolescents’ mental health in Norway over the course of a three-year study. They collected information from more than 700 participants using objective measures of physical activity and self-reported measures of mental health. According to the findings, more physical activity is associated with better mental health outcomes, such as reduced anxiety and depressive symptoms. Furthermore, the study argues that physical activity and mental health are mutually reinforcing. This suggests that improvements in one area may eventually lead to improvements in the other. The study’s findings emphasize the significance of encouraging physical activity to enhance outcomes for adolescent mental health.

The study “Relationship between Sedentary Time and Physical Activity Behavioural Profile with Mental Health and Subjective Wellbeing in Chilean University Students amid the COVID-19 Pandemic” examines how sedentary behavior, physical activity, and mental health were related among Chilean university students at the time of the COVID-19 pandemic. According to the study, inactive students did not have as good mental health or subjective wellbeing as more physically active students did. Additionally, compared to students who only exercised at a moderate-to-vigorous intensity, those who exercised at both a light and moderate intensity had better mental health. The findings show that promoting physical activity while reducing sedentary behavior during the pandemic can benefit mental health.

The study done by Trabelsi K, et al. examines how older adults’ sleep, exercise, and mental health fared during the COVID-19 lockdown. An online survey was completed by senior citizens from various countries as part of the study. The results demonstrate that sleep hygiene and physical activity are significant indicators of older adults’ mental health during the pandemic. In order to improve mental health during trying times like COVID-19 lockdowns, the study emphasises the importance of maintaining a high level of sleep quality and engaging in physical activity.

The connection between college students’ socializing, perceived stress, mental health, and intense physical activity is examined in the article written by Vankim NA, et al. The study made use of a survey from an important Midwestern university in the United States. The results show that college students who exercise vigorously tend to have better mental health and report feeling less stressed. The study also found that while perceived stress is not protected by social interaction, mental health is. The findings emphasize the importance of promoting vigorous exercise and social interaction as components of college students’ mental health interventions.

Adolescent fitness, physical activity, body mass index (BMI), quality of life and mental health were all factors that were investigated in the study by Eddolls WTB, et al. The findings indicate that while higher levels of physical activity and fitness are linked to better mental wellbeing and quality of life, a higher BMI is associated with lower mental wellbeing and quality of life. The study highlights the importance of fitness and physical activity for enhancing adolescents’ mental health and quality of life.

The study done by Appelqvist-Schmidelehner K, et al. examined the relationships between various physical activities and adult men’s mental health. The findings indicate a strong link between higher levels of good mental health and recreational physical activity. However, active commuting and physical activity related to one’s job did not significantly predict mental health. Therefore, encouraging physical activity while having free time may be a useful tactic to enhance the positive mental health of young adult men.

An online survey was used by Van Berkel et al. to investigate the connections between physical activity, mental health, and job engagement among Dutch employees. According to the study’s results, more physical activity is associated with both improved mental health and higher levels of job engagement. The study found that employees who exercise more frequently are more likely to reap the benefits of exercise on their level of engagement at work and mental health. The study emphasises the value of physical activity in enhancing workers’ mental health and level of engagement at work in general.

Implications of the study
This study seeks to appraise the participant’s current health status, analyze the factors influencing their mental health, and provide advice on improving their overall wellbeing. Additionally, the data collected can be used for future research.
Through this study, it is possible to gain insight into the obstacles to mental health and ways to overcome them. Furthermore, it is essential to prioritize mental health in adults.

Limitations
The design and implementation of the study may be hampered by methodological shortcomings, such as a lack of precision when measuring physical activity. Additionally, those who lack the necessary resources, such as a mobile phone, internet access, and proficiency in English, may not be able to participate in the study.

Study status
IEC approval has been received and the data collection tool for the study has been prepared.

Data availability
No data are associated with this article.

References
Johnny Lo
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1. The literature review needs to be more comprehensive. Also, the relationship between exercise and mental wellbeing is well studied and I'm not sure if this research contributes any new knowledge. If this study was to expand beyond just the Wardha urban area, then there may be more appetite for this work from the wider research community. The discussion content needs reworkings. At the moment, it looks like a literature review.

2. The study is too localised and would be difficult to generalise any finding from this research. Even within the Wardha district, the author has hinted that the sample is likely to be under-represented. Also, the sample size calculation is unconvincing. There is no justification as to why it's based on PHI, and the formula used is inappropriate. Given that the objective is to study the 'relationship' between physical activity and mental well-being, the calculation should be one that's based on regression analysis, not on a single mean estimation.

3. More information is required regarding the administration of the questionnaire and what platform will be used. There is insufficient information in relation to the questionnaires being used, i.e. how each item is scored and how the overall score is computed, and whether there is any dichotimisation of the scores at the end, etc., although there were some of information were provided for SWEMWBS but not sufficiently so for the other tools. Likewise with covariates, e.g. demographic variables. Chi-squared test and ANOVAs were proposed, but they are too simplistic and would not allow one to adjust for demographic differences. The statistical plan needs to be more robust.

Is the rationale for, and objectives of, the study clearly described?
Partly

Is the study design appropriate for the research question?
Partly

Are sufficient details of the methods provided to allow replication by others?
No

**Are the datasets clearly presented in a useable and accessible format?**
Not applicable

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Applied statistics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

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