



Practical tips to adopt active lifestyle for university students during pandemic life: a narrative review

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ABSTRACT

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The Covid-19 pandemic worsened the physical inactivity pandemic and also increased sedentary behavior across the population, including university students. While physical inactivity and sedentary behavior are detrimental to health and academic performance, there is an urgent need to help university students to adopt an active lifestyle during post-pandemic life. This narrative review discussed current physical activity (PA) and sedentary behavior recommendations, practical tips for adopting an active lifestyle by applying PA doses using the frequency, intensity, time, and type (FITT) principle, and behavioral strategies to adopt and maintain an active lifestyle. Finally, several considerations related to the PA-related musculoskeletal injury and cardiovascular events risks were also discussed with examples from interventions during the pandemic in university settings.

ABSTRAK

Keywords:
physical activity;
university students;
exercise;
academic performance;
Covid-19

Pandemi Covid-19 memperburuk prevalensi inaktivitas fisik dan juga meningkatkan perilaku sedenter semua populasi, termasuk mahasiswa. Oleh karena itu, ada kebutuhan mendesak untuk membantu mahasiswa mengadopsi gaya hidup aktif selama kehidupan pandemi untuk menurunkan dampak buruk akibat inaktivitas fisik maupun perilaku sedenter. Tinjauan naratif ini akan membahas rekomendasi terkini aktivitas fisik dan perilaku sedenter, tips praktis untuk mengadopsi gaya hidup aktif dengan menerapkan dosis aktivitas fisik menggunakan prinsip frekuensi, intensitas, waktu, dan tipe aktivitas fisik, serta strategi perilaku untuk mengadopsi dan mempertahankan gaya hidup aktif. Terakhir, beberapa pertimbangan terkait dengan cedera muskuloskeletal terkait aktivitas fisik dan risiko kejadian kardiovaskular juga dibahas dengan contoh intervensi selama pandemi di lingkungan universitas.

INTRODUCTION

Physical activity (PA), defined as any bodily movement produced by skeletal muscles that require energy expenditure, is essential in preventing and managing cardiovascular diseases, metabolic diseases, certain cancers, mental health, and general well-being.¹ However, physical inactivity, defined as not meeting the global recommendation on PA for health, persists as a global

pandemic that resulted in more than two-thirds of all-cause and cardiovascular disease mortality attributable to physical inactivity. Moreover, almost two-fourths of cardiovascular disease mortality attributable to physical inactivity occur in middle-income countries.²

In addition to the pandemic of physical inactivity, technological innovations contribute to increased sedentary behavior across the world. Sedentary behavior is defined as any

waking behavior characterized by an energy expenditure ≤ 1.5 metabolic equivalents (METs) while in a sitting, reclining, or lying posture.³ Sedentary behavior leads to detrimental health effects through distinct mechanisms than physical inactivity.⁴ Thus, the World Health Organization (WHO) 2020 also released recommendations to increase PA and limit sedentary behavior.⁵

The Covid-19 pandemic led more than 100 countries to enforce containment measures resulting in increased physical inactivity and sedentary behavior across the population, including university students in Indonesia.^{6,7} Reduction of PA during the pandemic could be detrimental to pandemic control since the evidence showed the benefits of regular physical activities in reducing infection mortality, enhancing the first-line defense of the immune system, and improving the potency of vaccination.^{8,9} Since physical inactivity and sedentary behavior could also negatively affect students' learning achievement and mental health, which were also affected by the pandemic situations,¹⁰⁻¹² it is crucial to implement strategies for increasing PA and limiting sedentary behavior to improve university students' physical health, mood enhancement, and academic performance during post-pandemic life.^{13,14} In addition, college-age is a crucial phase in which current lifestyle could be adopted into later life and could affect future health condition.¹⁵ In this narrative article, we discussed current recommendations on PA and sedentary behavior for health, then practical tips for university students to adopt the recommendations. We also discussed several risks associated with PA, with the examples of PA intervention conducted in university settings during the pandemic.

MATERIALS AND METHODS

Three important topics following the

Scale for the Assessment of Narrative Review (SANRA) guidelines were narratively reviewed.¹⁶ 1). Current guidelines on PA and sedentary behavior; The two latest guidelines on PA and sedentary behavior were reviewed, the 2020 WHO guidelines⁵ and the 11th of the American College of Sports Medicine (ACSM) guidelines.¹⁷ 2). Practical tips for adopting an active lifestyle; The strongest evidence available related to the practical tips mentioned in the 11th edition of the ACSM guidelines was manually searched. The WHO 2020 Guidelines were not reviewed because they do not provide detailed implementation guidelines. 3). Benefits vs. risks associated with PA; Manual searching was conducted for the most robust evidence available related to the benefits and risks associated with PA from the 11th edition ACSM guidelines.¹⁷ The evidence on benefits of PA was used from the 2020 WHO guidelines since they have already conducted umbrella reviews to search for the best available evidence.⁵ To provide examples from interventions conducted during the pandemic, a database search was conducted on Pubmed on June 15, 2022 using the following search strategy: ((“physical activity” OR exercise) AND university students AND (2020/3:3000/12/12[pdat])) AND (((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR drug therapy[sh] OR randomly[tiab] OR trial[tiab] OR groups[tiab] NOT (animals [mh] NOT humans [mh]))) OR (((nonequivalent or non equivalent) adj3 control\$) or posttest\$ or post test\$ or pre test\$ or pretest\$ or quasi experiment\$ or quasiexperiment\$ or timeseries or time series).tw.)) OR ((nonequivalent control group or posttesting or pretesting or pretest posttest design or pretest posttest control group design or quasi experimental methods or quasi experimental study or time series or time series analysis).sh

AND (2020/3:3000/12/12[pat]))

We only included randomized controlled trials examining the effects of either supervised exercise intervention or behavioral intervention on either health or cognitive-related outcomes or PA behavior or risks/harms associated with PA. We only included studies conducted during the pandemic. We extracted the health, academic, and behavioral outcomes of the interventions as well as the adverse events or injuries related to the intervention to provide an example of risk-benefits assessment of PA intervention during the pandemic in university settings.

RESULTS

Current recommendations on physical activity and sedentary behavior for health

Almost five decades since the early guideline on PA for health was released in the 1970s, WHO released “The 2020 guidelines on PA and sedentary behavior”⁵. Having systematically reviewed evidence to assess the effect of PA and sedentary behavior on health outcomes, the WHO Guideline Development Group released several conclusions including, but not limited, to the following recommendations (TABLE 1)

TABLE 1. WHO physical activity and sedentary behaviour guideline for adults (18-64 years)

Recommendations	Explanation
Doing any amount of physical activity is better than doing none	Adults (18-64 years) who are inactive should start by engaging in small amounts of PA, then gradually increase the frequency, intensity, and duration over time. Doing any amount of PA can provide health benefits that are better than doing none.
Amount of aerobic physical activity for substantial health benefits	For substantial health benefits, adults should make a goal to do at least 150-300 min per wk of moderate-intensity aerobic PA or at least 75-150 min per wk of vigorous-intensity aerobic PA or an equivalent combination of moderate and vigorous-intensity aerobic PA, which could be spread throughout the wk.
Amount of muscle-strengthening activities for additional health benefits	For additional health benefits, adults should also do at least two days a wk of muscle-strengthening activities at a moderate or greater intensity that involve all major muscle groups.
Amount of sedentary behaviour and the benefits of any intensity of physical activity	To reduce the detrimental effects of sedentary behavior, adults should limit the amount of time being sedentary by replacing them with any intensity PA.
Amount of aerobic physical activity exceeding the recommended amount for substantial health benefits	Adults could still gain additional health benefits and reduce the detrimental effects of sedentary behavior by doing more than the equivalent of 300 min/wk of moderate-intensity aerobic PA.

By aiming to do the recommended amount of PA, adults, including university students, could get several long-term benefits, such as reducing all-cause and cardiovascular mortality as well as the reducing incidence of hypertension, certain cancers, type-2 diabetes, and also short-term benefits, such as reducing anxiety and depressive symptoms, improving cognition, sleep, and body composition as well as improving academic achievement.^{5,13,14}

Practical tips to adopt active lifestyle

Having known the recommended amount of PA for health is not yet sufficient to help individuals to adopt and maintain an active lifestyle. In addition to providing knowledge of PA doses, evidence suggests that providing practical tips based on behavioral strategies should be used to assist individuals in adopting and maintaining an active lifestyle.¹⁷

Physical activity doses

Physical activity recommendations allow for flexibility in the different combinations of frequency, intensity, time, and type (FITT) principles.¹⁷ It is crucial to understand the impact of FITT variations to achieve an active lifestyle.

Frequency and time

There is no difference in PA adherence between the different combinations of frequency and time to achieve the total amount of PA.¹⁸ It could be suggested that individuals could self-select frequency and time/duration to fulfill their autonomy which could improve their adherence to PA.¹⁹ Spreading the PA sessions across 3 to 5 days per week may suit most individuals.¹⁷ Performing once or twice per week PA sessions could also be adopted since they also bring substantial

health and fitness benefits.^{5,17} Individuals may also select their preferred duration of each PA session since the accumulation of PA bouts provides health and fitness benefits regardless of the duration.¹⁷

Intensity

Individuals who are more active and have higher fitness levels will be more likely to adhere to higher intensity PA. In contrast, less active individuals will prefer to perform lower-intensity PA since they will feel an unpleasant affective response to higher intensity.²⁰ However, the evidence consistently showed that individuals who can self-select their preferable PA intensity would be more likely to adhere to the PA.^{18,20} While the evidence showed that PA conducted in any intensity could provide health benefits, PA recommendations allow flexibility in selecting the range of moderate-vigorous intensity physical activities for the healthy adult population.¹⁷ Talk test, a valid and reliable measure of PA intensity, is a recommended effective primary method for prescribing and monitoring PA intensity.¹⁷ Using this test, individuals can determine that they are performing a light intensity PA if they still can sing during a session. Individuals who performing a moderate PA session cannot sing but are still able to talk. When the individuals can not talk anymore, they perform a vigorous PA session. Heart rate reserve (HRR) calculated from obtained or predicted maximal heart rate and resting heart rate and VO_2 reserve can also be used to prescribe PA intensity, especially in individuals with cardiovascular diseases.¹⁷ While PA prescribed using a talk test could provide similar benefits to PA prescribed using HRR, a talk test could be suggested to be implemented in PA prescription since it is easier and simpler to be implemented.²¹

Type

Type of PA refers to mode or kind of PA and program/delivery type of PA.¹⁷ There are several kinds of aerobic PA, such as walking, cycling, and swimming. The available evidence found trivial effects of the PA mode on adherence.¹⁸ Self-preference, environmental and socioeconomic may have greater effects on adherence.¹⁸ Thus, individuals could self-select aerobic activity based on their physical condition, preference, and environmental and socioeconomic factors.

The delivery of the PA program also influences adherence. For certain populations, such as patients in cardiac rehabilitation and older adults, home-based or lifestyle programs that include remotely delivered support resulted in a greater adherence than structured or center-based programs.^{22,23} PA programs delivered through the web or app also hold promising results, especially for the populations who are already familiar with technology.²⁴ Individuals could select technology-delivered PA programs which contain self-monitoring with a combination of intention formation, goal-setting, providing feedback, or providing reviews of PA goals.²⁵

Application of behavioral strategies

Enhancing self-efficacy

To successfully adopt and maintain an active lifestyle, individuals must be confident in their ability to perform their PA dose and goal.²⁶ It can be achieved by setting realistic goals, watching others with similar backgrounds performing the similar PA dose and reaching the similar goals, getting encouragement telling them can be successful in reaching their goals, and getting pleasurable physiological feedback by choosing the

pleasurable type and intensity of PA or using music and scenery to make PA pleasurable.¹⁷

Adequate and positive perception

Accurate and broad knowledge and understanding regarding the benefits of physical activity, in particular, can further encourage awareness and the urge to be physically active.²⁷ Identifying misperceptions and reducing barriers will increase the motivation to make behavioral changes.²⁸ Consistent exposure to information and being involved in a community that actively shares information are needed to maintain positive perceptive growth.

Self-monitoring

Self-monitoring is one of the most important factors associated with a successful PA program when combined with other strategies such as goal setting.²⁵ Individuals can use a paper-and-pencil log or technology devices and apps to self-monitor their PA dose and goals.¹⁷ Several apps that provide self-monitoring and goal setting could adopt and maintain an active lifestyle.²⁹ In addition to monitoring PA progress (e.g., amount of PA, distance traveled, step counts), individuals could also monitor the effect of increased PA, such as cardiorespiratory fitness, body composition, or other health-related outcomes.

Goal setting

Setting short- and long-term goals are essential for initiating and maintaining an active lifestyle. Individuals can use the specific, measurable, action-oriented, realistic, timely, and self-determined (SMARTS) principle to guide effective goal setting (TABLE 2).¹⁷

TABLE 2. SMARTS principle to guide effective goal setting

Principle	Explanation
Specific	Individuals should set precise amounts of PA based on the FITT principle as their goals
Measurable	Individuals should set quantifiable amounts of PA based on the FITT principle as their goals
Action-oriented	Individuals should determine what needs to be done to achieve the goals
Realistic	Individuals should set achievable goals
Timely	Individuals should set a specific and realistic time frame
Self-determined	Individuals should develop their goals primarily by themselves.

It is also crucial to regularly monitor the progress, get feedback, and review success and struggles while achieving the goals. Therefore, the goals can also be reviewed and revised consistently to provide some directions to individuals' efforts, enhance persistence, and learn new strategies for achieving them.

Rewards

Individuals should reward themselves for meeting their PA goals.³⁰ The rewards can be extrinsic rewards or intrinsic rewards. Extrinsic rewards, such as money, medal, new shirts, or praises, could be beneficial to initiate an active lifestyle.³⁰ However, intrinsic rewards are crucial for maintaining an active lifestyle over the long term.¹⁹ Intrinsic rewards can be provided by building feelings of autonomy, competence, and relatedness.¹⁹

Social support

Social support, which can come from family members, friends, instructors, neighbors, or exercise and health professionals, is a powerful motivator to an active lifestyle for many individuals.¹⁷ It can provide encouragement and

figures for increasing self-efficacy. By having social support, individuals can also get feedback and discussion to help them achieve their goals. The feeling of being a part of a group also fulfills the needs of relatedness, which could provide intrinsic rewards.

Benefits versus risks associated with PA

There are concerns regarding the increasing risk for musculoskeletal injury and potential cardiovascular complications associated with PA.¹⁷ However, the benefits of regular PA far outweigh the risks.²⁸ In addition to prevention of certain non-communicable diseases in later life, sufficient PA also provides benefits for improving mental health and academic performance among university students.^{5,13,14} The risk of musculoskeletal injury is associated with the increasing PA intensity, the nature of the activity, and the previous level of PA.^{17, 32}

The risk of musculoskeletal injury (MSI) is very low for walking and other low-moderate intensity physical activities. In contrast, high-intensity PAs such as running or competitive sports is associated with a higher risk

of injury.¹⁷ The risk of MSI is also higher during direct contact PA between participants or with the ground (e.g., football, basketball, martial arts) than PA conducted without or with minimal direct contact (e.g., baseball, swimming, walking). Adults who were previously not met the recommended amount of PA have a higher risk of MSI than their more active counterparts.³³ Therefore, it is crucial for physically inactive adults to start by doing a small amount of PA and gradually increasing the frequency, intensity, and duration.

In general, PA does not elicit cardiovascular events in healthy individuals with a normal cardiovascular system.³³ The most concerning PA-related cardiovascular events are sudden cardiac death and acute myocardial infarction. The annual risk of PA-related sudden cardiac death among young adults is low (1 per 133,000 men athletes, 1 per 769,000 women athletes, 1 per 1.5 million episodes of vigorous physical exertion in men, 1 per 36.5 million hours of moderate to vigorous exertion in women) and indicated that it is caused by congenital and hereditary abnormalities. There is a transient increase in the risk of acute myocardial infarction while performing vigorous-intensity exercise in individuals with diagnosed or occult cardiovascular diseases. However, individuals who regularly performed vigorous exercise had 50 times higher protection from the risk of acute myocardial infarction (AMI) during or immediately following vigorous-intensity exercise compared to their habitually inactive counterparts. It

reinforced the importance of initiating an active lifestyle by starting with a small amount of physical activities and gradually increasing the dose over time. To reduce excessive screening, which could result in unnecessary barriers to adopting an active lifestyle, pre-participation should only be conducted for individuals at risks, such as individuals with known cardiovascular, metabolic, or renal diseases who are going to engage in competitive sports or vigorous PA.³⁴⁻³⁶

From 1995 search results, we found seven published studies examining PA interventions in university settings (TABLE 1). Four of them examined exercise intervention³⁷⁻⁴⁰ and the leftovers examined behavioral intervention.⁴¹⁻⁴³ All studies that examined health outcomes reported PA benefits, including improved cardiorespiratory fitness, body composition, lipid profile, mood, mental health, and sleep quality. Among 296 participants receiving supervised exercise intervention, only 1 participant reported tibial pain.⁴⁰ None of the participants receiving behavioral intervention reported any injury or adverse event. It can be concluded that the risk of musculoskeletal injury associated with PA intervention during the pandemic in university settings was also very low (less than 2 per 1000 participants). Health benefits resulting from the PA intervention conducted in university settings also outweighed the risk. It strengthens current recommendations and advocacy on PA promotion in university settings.

TABLE 3. List of physical activity intervention studies in university settings during the pandemic

Author	Description of intervention	Intervention	Control	Outcome	Adverse event
Wu <i>et al.</i> ³⁷	3 times a week, 30 min of exercise in adventure mode using a Nintendo Switch game, 4-6 METs	40	40	Improved running speed, mood, and sleep quality	No injury was reported
Li <i>et al.</i> ³⁸	Supervised Baduanjin exercise, 5 times a week, 45 min for 1 week, and unsupervised >5 times a week 45 min/session for 11 week, unmeasured intensity	195	192	Improved Covid-19 anxiety score, psychological well-being, and low back pain	No injury was reported
Hu <i>et al.</i> ³⁹	Supervised 5 times a week, 30 min interval training sessions (3 sets of 9 min circuit training at 90% maximum heart rate followed by 1 min rest), 4 week	17	13	Improved body composition and lipid profile, decreased resting heart rate	No injury was reported
Lan <i>et al.</i> ⁴⁰	Supervised 3 times a week, either low intensity with blood flow restriction, moderate-intensity continuous training, or high-intensity interval training, 8 week	44	12	Improved cardiorespiratory fitness and body composition	1 participant reported tibial pain
Muntaner-Mas <i>et al.</i> ⁴¹	Behavioral intervention comprises self-monitoring of behavior, action planning, review of behavioral goals, providing feedback on performance, provide instruction, and demonstration on how to perform the behavior	35	31	Improved cardiorespiratory fitness	No injury was reported
Dost <i>et al.</i> ⁴²	Behavioral intervention using Pender's health promotion model	110 (total)	Unknown	Improved body composition and physical activity	No injury was reported
Blow <i>et al.</i> ⁴³	Behavioral intervention comprises self-monitoring of behavior, action planning, review of behavioral goals, providing feedback on performance, provide instruction and demonstration on how to perform the behavior, feedback, and goal setting	145	122	Improved perceived competence of PA and movement through the stage of change	No injury was reported

CONCLUSION

University students as adult populations should aim to initiate and maintain performing PA at least 150 min of moderate-intensity aerobic PA per week and limit their sedentary time, which is beneficial for their physical and mental health as well as cognitive performance. Physical activity doses and behavioral regulation could be

implemented to initiate and maintain an active lifestyle. While the benefits of PA outweigh the risk, pre-participation health screening and exercise testing during PA interventions in university settings should only be considered for individuals at risk who are going to engage in competitive sports or vigorous PA to reduce excessive screening and unnecessary barriers to PA adoption.

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