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Physical Literacy and Perceived Benefit of Quarantine Physical Activity among University Students

Sumona Hoque Mumu
University of Louisiana at Lafayette

Ismatara Reena
University of Louisiana at Lafayette

ABSTRACT

University students face unique stressor in the transitional phase of their life and are prone to physical inactivity. Physical literacy is knowledge, confidence, motivation, competence for sustainable physical activity. This study aims to assess whether physical literacy predicts the perceived benefits of alternative physical activity adopted during Covid 19 quarantine period among university students. Results indicated that physical literacy was a significant predictor of perceived usefulness of alternative physical activities adopted during pandemic isolation after controlling for individual factors ($p < 0.001$). This study contributes to the understanding of how physical literacy influences perceived benefits of engagement with alternative physical activities during the COVID-19 pandemic and has implications for health promotion strategies in restricted settings.

Keywords: Covid-19 Pandemic, perceived benefit of exercise, physical literacy; quarantine physical activity

INTRODUCTION

One of the most marked changes in the lives of university students brought about by the COVID-19 pandemic is the disruption of physical activity habits (Park et al., 2022). The imposed restriction for pandemic caused gyms and sports facilities shut their doors around the world and people needed to search for new methods to maintain fitness, including in home workouts, online fitness classes, and other forms of physical activity (Rodríguez-Larrad et al., 2021; Yaroshyk et al., 2021). Students have demonstrated variable levels of

adaptability to these alternatives; however, students who were accustomed to an adequate level of physical activity tended to maintain physical activity during the pandemic as well (López-Valenciano et al., 2021). Physical activity (PA) helps to prevent and treat COVID-19, boosts psychological well-being, aids in the recovery of physical function, and reduces post-acute COVID-19 syndrome. (Yang et al., 2022). How useful physical activities are perceived to be, or how beneficial individuals feel these activities are in maintaining physical and mental health, likely to play an important role in physical activity behavior, and any challenging events encountered in life. This is particularly true for university students who concurrently deal with academic as well as adaptive challenges during this transformative stage of their life (Liu et al., 2019).

Perceived usefulness of physical activity that an individual possesses is important driving factors for physical activity participation. A study conducted among Indonesian university students found that attitudes and feelings about PA were significant predictors of PA levels during the pandemic (Wibowo et al., 2022). Positive perception of physical activity is influenced by several factors, including self-efficacy, self-regulation, motivation, social engagement, and anticipated improvements in physical and mental functioning (Choi et al., 2017; Learmonth & Motl, 2015; Spence et al., 2020). The distinctive factors align within the framework of construct, physical literacy, which is the confidence, competence and motivation to engage in lifelong physical activities (Whitehead, 2001). Physical literacy is an emerging construct which is gaining global attention as a crucial factor for sustainable physical activity. This emphasis is supported by organizations such as UNESCO, the UN SDGs, and the WHO's Global Action Plan on physical activity (McLennan & Thompson, 2015; World Health Organization, 2018). People who are more physically literate are more likely to cultivate a sense of competence and engage in sustained physical activity that has the potential to recognize the optimum benefits of physical activity (S. M. Choi et al., 2018; Jiang et al., 2024). This can be particularly important in times when traditional physical activity is restricted and physical accessibility is limited such as COVID-19 pandemic era (Jang et al., 2021; Spence et al., 2020). Physical literacy relies on self-efficacy to engage in appropriately challenging activities, cope with adversity, and maintain positive health behaviors in difficult situations (Jefferies et al., 2019; Ma et al., 2021). Students with higher physical literacy are likely to engage, understand and internalize the benefits of physical activity under restricted conditions. Hence, physical literacy itself has substantial merit to be a potential predictor of perceived usefulness in the alternative physical activity adopted during pandemic by the university students.

This research can be discussed under the light of Social Cognitive Theory (SCT) (Bandura, 2004) which emphasizes the dynamic interplay between environmental and personal factors and individual behavior. The idea of self-efficacy, or a person's confidence in their capacity to complete tasks, is fundamental to SCT. Self-efficacy is reported to be the most important personal factor for physical activity (Choi et al., 2017). Self-efficacy and physical literacy are closely related (Leung et al., 2023). According to SCT, people with higher levels of self-efficacy are likely to be more assured of their capacity to complete tasks effectively, which could affect how beneficial they believe these activities to be. Within the SCT framework, physical literacy can be understood as an expression of self-efficacy in the physical domain. Students with higher self-efficacy are more confident in initiating and maintaining activity even when environmental support is limited. This

confidence reinforces adaptive coping, promoting the perception that alternative activities (e.g., home workouts) are beneficial. Thus, physical literacy serves as both a reflection and outcome of self-efficacy processes central to SCT, linking personal belief systems to behavioral persistence.

Despite the empirical evidence and theoretical perspectives discussed above, the relationship between physical literacy and the perceived usefulness of alternative physical activities during COVID-19 pandemic is substantially underexplored. This relationship has not been studied especially in the context of pandemics, and among university student's population. The current study aims to fill this gap by investigating if physical literacy can predict the perceived utility of alternative physical activities in university students during a time of enforced social isolation due to the COVID-19 pandemic. More specifically, this paper explores potential differences between students with higher and lower physical literacy levels in the usefulness of alternative physical activities during lockdown. It also controls for the influence of demographics (e.g., age, assigned sex, academic classification, and first-generation college student status) as potential predictors to assess if variability in student perception in usefulness of alternative adoption of physical activities is attributed to these factors.

Physical literacy makes individuals more informed, confident, capable, and motivated to engage in physical activity in a sustainable manner (Whitehead, 2001, 2019). It can be hypothesized that people with higher levels of physical literacy are more likely to rate alternative physical activities adopted as useful for health and well-being during periods of limited physical activity accessibility, such as the COVID-19 pandemic.

Hypotheses

The following hypotheses were proposed:

- H₁: higher levels of physical literacy will be positively associated with greater perceived usefulness of alternative physical activities, after controlling for sociodemographic factors such as age, assigned sex, academic classification, and first-generation college student status.

The results of this study have substantial implications for encouraging physical exercise among university students amid crisis or changes. This study can highlight the role of Physical literacy in shaping perceived usefulness of physical activity behavior during mobility restricted time or confined setting. Informed knowledge on how student's physical literacy levels affected perceptions of how useful alternative activities were during times of crisis may provide valuable insights into how to promote physical activity under similar circumstances. Public health campaigns could consider the role of physical literacy in designing public health resilience programs to optimize efficacy.

METHOD

A cross-sectional quantitative design was used to explore the relationships between perceived physical literacy and perceived usefulness of alternative physical activities adopted during the COVID-19 pandemic.

Participants

The study sample consisted of 104 non-athlete university students from a University of Southeastern US, all of whom were over 18 years of age and had experienced quarantine during the COVID-19 pandemic. These participants were recruited through an online survey carried out via Qualtrics. Incomplete responses were excluded. Among the 104 participants, 74 (71%) reported adopting alternative physical activities during the pandemic, such as home-based workouts and virtual fitness classes, while 30 (29%) did not adopt any alternative physical activities during the confinement period.

Procedure and Measurement

The survey was distributed during the Fall 2024 semester. The survey was divided into several sections. First, participants provided basic demographic information, including age, assigned sex at birth, whether they were first-generation college students, and their academic classification (Undergraduate or Graduate). Next, they were asked whether they had adopted alternative physical activities (e.g., home-based workouts, virtual fitness programs) when traditional options, such as gyms or sports facilities, were unavailable. The perceived usefulness of these activities was then assessed using a 5-point Likert scale, ranging from "Not at All Useful" (1) to "Extremely Useful" (5) among participants who adopted alternative physical activity. Finally, participants were asked to complete a 9-item Perceived Physical Literacy Instrument, which measured their current physical literacy self-assessment of confidence, competence, and motivation in physical activities using a 5-point Likert scale. Participants' responses were summed up to form a physical literacy score, with higher scores indicating higher levels of perceived physical literacy.

Data Analysis

Data analysis was conducted using SPSS version 26. The first step involved calculating descriptive statistics for the key variables, stratified by participants who adopted alternative physical activities and who did not. An ordinal logistic regression model examined how current physical literacy predicted the perceived usefulness of these activities during the pandemic. The dependent variable, perceived usefulness, was treated as an ordinal variable, and physical literacy was entered as the independent variable.

Ethical Considerations

The study adhered to ethical guidelines as set by the University of Louisiana at Lafayette Institutional Review Board (IRB). Informed consent was obtained from all participants prior to their participation. Participants were assured that their responses would remain confidential, and that participation was voluntary. No personal identifying information was collected, and data was stored anonymously.

RESULTS

Descriptive statistics for the participants who adopted and did not adopt alternative physical activities during the COVID-19 pandemic are presented in Table 1. Of the 104 participants, 74 (71.2%) reported adopting alternative physical activities, such as home-based workouts or virtual exercise programs, and 30 (28.8%) did not adopt these activities..

Participants who adopted alternative physical activities had a mean age of 20.81 years (SD = 2.298), whereas those who did not adopt alternative activities had a higher mean age of 22.83 years (SD = 5.790). The group that adopted alternative activities reported a higher mean physical literacy level (37.61, SD = 5.036) compared to the non-adopters, who had a mean of 34.83 (SD = 5.408). Regarding assigned sex at birth, among the adopters, 73% were female, and 27% were male.

Table 1: Descriptive Statistics of Participants by Alternative Physical Activity Adoption During the COVID-19 Pandemic

| Variable | Adopted (N = 74) | Non- Adopted (N = 30) | Total (N = 104) |
|---|-----------------------------|--------------------------------------|------------------------|
| Age | 20.81 (2.298) | 22.83 (5.790) | 21.47 (4.065) |
| Physical Literacy Level | 37.61 (5.036) | 34.83 (5.408) | 36.43 (5.269) |
| Assigned Sex at Birth | | | |
| Female | 54 (73.0%) | 24 (80.0%) | 78 (75.0%) |
| Male | 20 (27.0%) | 6 (20.0%) | 26 (25.0%) |
| First-Generation College Student | | | |
| No | 54 (73.0%) | 20 (66.7%) | 74 (71.2%) |
| Yes | 20 (27.0%) | 10 (33.3%) | 30 (28.8%) |
| Academic Classification | | | |
| Graduate | 9 (12.2%) | 9 (30.0%) | 18 (17.3%) |
| Masters | 8 (10.8%) | 6 (20.0%) | 14 (13.5%) |
| Doctoral | 1 (1.4%) | 3 (10.0%) | 4 (3.8%) |
| Undergraduate | 65 (87.8%) | 21 (70.0%) | 86 (82.7%) |
| Undergraduate Classification | | | |
| Freshman | 13 (17.6%) | 7 (23.3%) | 20 (19.2%) |
| Sophomore | 7 (9.5%) | 1 (3.3%) | 8 (7.7%) |
| Junior | 19 (25.7%) | 5 (16.7%) | 24 (23.1%) |
| Senior | 26 (35.1%) | 8 (26.7%) | 34 (32.7%) |

Note. Mean (standard deviation); number (percentages) are reported for continuous and categorical variables respectively.

In contrast, among the non-adopters, 80% were female, and 20% were male. As for first-generation college student status, 27% of the adopters identified as first-generation students, while 33.3% of the non-adopters were first-generation college students. In terms of academic classification, the majority of adopters were undergraduates (87.8%), with only 12.2% being graduate students. Among non-adopters, 70% were undergraduates, while 30% were graduate students. Among the graduate students, adopters had a slightly higher proportion of master's students (10.8%) compared to the non-adopters (20%). The classification of undergraduates was further broken down as follows: 17.6% of adopters were freshmen, 9.5% were sophomores, 25.7% were juniors, and 35.1% were seniors. For the non-adopters, 23.3% were freshmen, 3.3% were sophomores, 16.7% were juniors, and 26.7% were seniors.

The perceived usefulness of alternative physical activities during the COVID-19 pandemic, as reported by participants, is demonstrated in Figure 1. Among the 74 participants who adopted alternative physical activities, the majority (43%) rated the activities as moderately useful, followed by 24% who found them very useful. A smaller proportion of participants rated the activities as slightly useful (15%) or extremely useful (15%). Only 3% of participants considered the activities not at all useful.

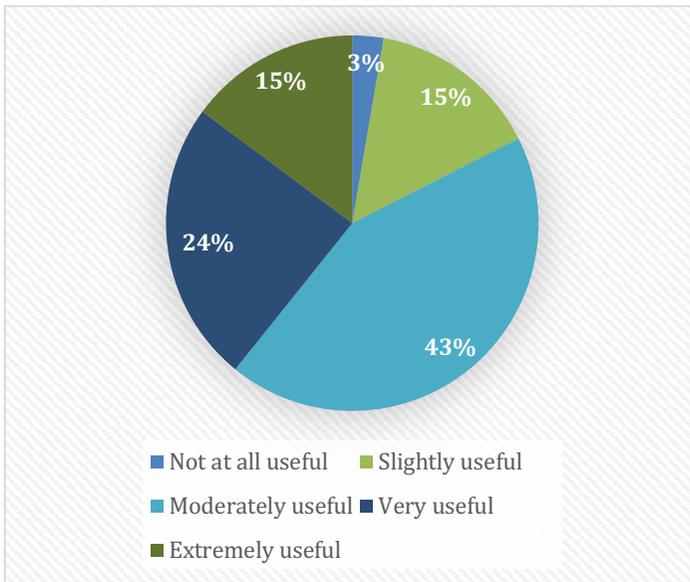


Figure 1: Perceived Usefulness of Alternative Physical Activities During the COVID-19 Pandemics

An ordinal logistic regression was conducted to examine whether current physical literacy predicted the perceived usefulness of alternative physical activities during the COVID-19 pandemic (Table 2). The model was significant ($\chi^2(5) = 14.211, p = .014$), and the inclusion of predictors improved the overall model fit. The goodness-of-fit tests showed no evidence of poor fit (Pearson $\chi^2 = 277.355, p = .161$). The assumption of parallel lines was tested and met, as indicated by the Test of Parallel Lines, which showed no significant

violation ($\chi^2(15)=23.325, p=.077$). The model explained a modest amount of the variance in perceived usefulness, as indicated by the pseudo-R-squared values: Cox and Snell $R^2=0.171$, Nagelkerke $R^2=0.182$, and McFadden $R^2=0.068$.

Table 2: Ordinal Logistic Regression for Perceived Usefulness of Alternative Physical Activities (N = 74)

| Predictor | Estimate | Std. Error | Wald | df | Sig. | Odds Ratio (OR) | 95% CI for OR |
|--|----------|------------|--------|----|-------|-----------------|---------------|
| Physical Literacy (PL_Total) | 0.166 | 0.047 | 12.633 | 1 | <.001 | 1.181 | 1.078, 1.293 |
| Age | -0.031 | 0.045 | 0.464 | 1 | .496 | 0.970 | 0.912, 1.031 |
| Assigned Sex (Male = 0, Female = 1) | 0.804 | 0.505 | 2.533 | 1 | .111 | 2.235 | 0.828, 5.960 |
| First-Generation College Student (Yes = 1) | -0.196 | 0.473 | 0.171 | 1 | .679 | 0.822 | 0.305, 2.212 |
| Academic Class (Graduate = 0, Undergrad = 1) | 0.312 | 0.662 | 0.222 | 1 | .637 | 1.366 | 0.415, 4.468 |
| Predictor | Estimate | Std. Error | Wald | df | Sig. | Odds Ratio (OR) | 95% CI for OR |

Note. Confidence intervals (CI) for odds ratios are reported at the 95% level.

Among the predictors, current physical literacy was found to be a significant predictor of perceived usefulness, with a positive relationship ($\beta=0.166, p<.001$). This indicates that for each unit an increase in physical literacy, participants were more likely to rate alternative physical activities as useful. However, other demographic variables, such as age ($\beta=-0.031, p=.496$), assigned sex ($\beta=0.804, p=.111$), first-generation college student status ($\beta=-0.196, p=.679$), and academic classification ($\beta=0.312, p=.637$), did not significantly predict perceived usefulness.

DISCUSSION

The primary aim of this study was to explore whether physical literacy could predict the perceived usefulness of alternative physical activities adopted by university students during the COVID-19 pandemic, particularly under the context of restricted access to traditional physical activity options like gyms and sports facilities. The findings of this study add to the growing body of work on physical literacy and its impact on health behaviors, particularly during periods of limited mobility, such as the COVID-19 pandemic. To the best of our knowledge, very little research has empirically examined whether physical literacy can predict university students' perceptions of the usefulness of alternative physical activities like home workout or virtual fitness training which were adopted during COVID-19-induced social isolation. There is one study that measured perceived benefits of exercise behavior and physical activity among undergraduate college students of united states from a pre-Covid time in 2018 (Frederick et al., 2020), and this study did not measure the influence of physical literacy on perceived benefits.

This study shows that physical literacy predicts the perceived utility of alternative physical activities (such as home-based workouts and virtual fitness programs) among university students. Our study results align with prior conceptual research that emphasizes the role of physical literacy in fostering adaptive behaviors and sustained engagement in physical activity under challenging circumstances (Jurbala, 2015; Whitehead, 2019). Moreover, pilot interventions centered on physical literacy have demonstrated that physical literacy, along with its fundamental components such as confidence, motivation, knowledge, and physical competence, exerts a significant influence on the physical activity behaviors of university students (Carl et al., 2022; Kwan et al., 2019, 2020). However, literature on how physical literacy influences the physical activity perception during covid 19 confinement is limited.

The female participants had a pronounced majority in our study sample (73%). Similar distribution is observed in a study adopting online survey method among US college students (83%) (Frederick et al., 2020). None of the demographic variables (age, assigned sex, first-generation college student status, or academic classification) significantly predicted perceived usefulness in this study and regardless of these factors, Physical literacy predicted how students evaluate the usefulness of alternative physical activities. This aligns with the existing cross sectional digital survey research conducted among 862 undergraduate students from southeastern US which reported sex and school year being non-significant mediator for any perceived benefits of physical exercise. Another research conducted among US undergraduate college students reported male having better perceived competence in physical activity with age having no significant effect (Guan et al., 2023). Again, our finding contrast with research among Spanish university students which reported women had better physical activity adaptation during pandemic confinement (Rodríguez-Larrad et al., 2021). Another possible explanation for these findings is that our sample university students are from a single university, and as a group, they may share certain lifestyle factors that reduce the variability in how age or sex influence their perception of alternative physical activities. Moreover, the shift to home-based exercise options during the pandemic may have leveled the playing field for students from different demographic backgrounds, leading to similar perceptions of alternative physical activities across groups.

Implications

The study's findings are in line with Social Cognitive Theory (Bandura, 2004), which emphasizes the importance of self-efficacy in shaping behavior and beliefs about the benefits of a given activity. As individuals with higher physical literacy are more confident in their ability to perform physical tasks and overcome challenges, they are more likely to perceive these activities as beneficial for both their physical and mental health. The findings of this study have important implications for public health initiatives, especially in encouraging university students to remain physically active during emergencies or periods of restricted mobility. University marks a critical transitional phase marked by increased responsibility across academic, personal, and social domains, during which a decline in physical activity behavior is observed (Winpenney et al., 2020). Physical literacy intervention has been shown to have a significant effect on physical activity behavior among university students (Kwan et al., 2019, 2020). This research has the merit to inform the stakeholders about the role of physical literacy in promoting positive utility perception towards physical activity, the role of physical literacy in enabling individuals to perform physical activity to a meaningful extent even under constraints. Educational institutions and public health organizations can improve students' perceptions of and participation in alternative physical activities that promote mental and physical well-being by fostering greater physical literacy. This study emphasizes the potential of physical literacy as a tool for helping students navigate challenges, whether related to public health emergencies or other hurdles, since the epidemic has highlighted the need for adaptive methods to preserve health.

Beyond pandemic-related contexts, these findings have implications for ongoing university health promotion. Integrating physical literacy assessments into student wellness screenings or orientation programs could help identify those at risk for inactivity. Universities may also incorporate physical literacy-based training modules into recreational programs to enhance students' confidence and motivation. At the policy level, public health agencies can use these insights to inform resilience-based frameworks for promoting physical activity during future disruptions—such as remote learning periods, natural disasters, or public health crises.

Limitations and Future Research

While the study provides valuable insights, it is not without its limitations. The sample size was small (N=104), and participants are limited to a single university, which may affect the generalizability of the findings to other populations or institutions. Additionally, the data collected on the usefulness of alternative physical activities adopted are self-reported and retrospective in nature which may introduce potential biases recall bias. The sample are skewed towards predominance of female students; the results should therefore be interpreted accordingly. The small, disproportionate sample can be explained with the nature of the study. We have conducted a web-based survey research and women are more likely to participate in an online survey than men, and the overall response rate of online survey research are mostly low (Wu et al., 2022). The sizable percentage of women (73%) in our study merits several contributions in physical literacy research (National Center for Education Statistics, 2022) given that there are more female post-secondary students on

both bachelor or post-bachelor level in the USA than male students. Moreover, the prevalence of inactivity was higher among women than among men (Guan et al., 2023; Pontes et al., 2021). Finally, the cross-sectional nature of the study limits the casual inferences of the variables in the study. Future research could explore the perception of different types of alternative physical activities in depth and compare the perceived effectiveness.

CONCLUSION

In conclusion, the current study highlights the importance of physical literacy in shaping university students' perceptions of the usefulness of alternative physical activities during a time of crisis. Students with higher levels of physical literacy are more likely to view home-based and virtual physical activities as valuable for maintaining health and well-being. These findings suggest that promoting physical literacy may be an effective strategy for encouraging sustained physical activity, particularly when traditional exercise options are unavailable. By focusing on developing physical literacy, universities and public health campaigns can help students navigate challenges to physical activity engagement and foster lifelong habits of physical well-being.

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Author bios

SUMONA HOQUE MUMU¹, MS, is an Adjunct Faculty in the School of Kinesiology (Health Promotion and Wellness) at University of Louisiana at Lafayette, USA. Her primary research interests include youth wellness, Impact of Stress, Health Equity, and Substance Abuse. Email: sumona-hoque.mumu1@louisiana.edu

ISMATARA REENA², EdD, is an Assistant Professor in the School of Kinesiology (Health Promotion and Wellness) at University of Louisiana at Lafayette, USA. Her primary research interests include college students' health and wellness, mental health, mental health literacy, health and eHealth literacy, physical activities, breastfeeding, international students, childhood obesity, COVID-19, health disparities, and underserve population. Email: ismatara.reena@louisiana.edu
