

SWACSM Abstract

COVID-19 Induced Changes in Physical Activity at Public Parks in Los Angeles County

BRENNA KNAPP, MARCELLA RANEY, PHD

Department of Kinesiology; Occidental College, Los Angeles, CA

Category: Undergraduate

Advisor / Mentor: Raney, Marcella (raney@oxy.edu)

ABSTRACT

There are many health benefits to outdoor physical activity (PA). However, the ability of public parks to provide PA options for those most vulnerable during pandemic-related public health restrictions is unknown. **PURPOSE:** To examine how COVID-19 has affected the use of public parks in Los Angeles and the resulting PA of park goers. **METHODS:** A total of 8 public parks (4 low income (LI), 2 medium income (MI), 2 high income (HI)) (N= 5864) were observed using the System for Observing Play and Recreation in Communities (SOPARC) tool between October 2020 and July 2021. Activity zones were assigned an activity score based on the number of park goers engaged in sedentary, moderate, or vigorous PA. Park goers were also surveyed about their PA habits (n=84). Data was combined with similar data collected during 2009 prior to analysis in SPSS to determine the impacts of pandemic stages on PA behaviors across demographics. **RESULTS:** Parks were visited more frequently in 2009 (3.2 ± 0.15 visits/week) and 2021 (3.2 ± 0.21) compared to 2020 (2.5 ± 0.23), $p < .05$. More children and teens were observed in larger and greener MI and HI compared to LI parks which were overrun by homeless encampments. An interaction effect between income, COVID-19 restrictions, and age-group was discovered for activity score ($p < .05$). Activity scores for all age-groups in MI and HI and for children in LI parks were highest during the peak of the pandemic. In LI parks, activity scores for adult and elderly park goers were not affected by changing restriction levels and were generally lower (adults: $1.5 \pm .03$; elderly: $1.4 \pm .04$) compared to MI (adults: $1.5 \pm .03$; elderly: $1.5 \pm .08$) and HI (adults: $1.6 \pm .04$; elderly: $1.8 \pm .08$) parks. In 2020, a higher percentage of MI (38.1%) and HI (29.2%) survey respondents reported meeting the ACSM PA guidelines than LI (13.9%) participants but were less reliant on public parks for accumulation of all daily MVPA minutes (LI: 77.8%, MI: 41.5%, HI: 14.9%). **CONCLUSION:** The results of this study support previous conclusions about income-based PA disparities. Results suggest that public parks in higher income neighborhoods continually provide residents with safe, health-promoting PA opportunities. However, during a public health crisis, PA inactivity levels are exacerbated in low income neighborhoods due, in-part, to park shortfalls.

EXPANDED ABSTRACT

Background

With the advent of COVID-19, and its associated restrictions, physical activity (PA) options for many have been largely limited (5,11). The closure of schools and restriction of activities outside of the home have particularly affected children. Increased screen time and reduced access to PA opportunities such as physical education classes or after school sport programs has been associated with an increase in sedentary behaviors (8). Physical inactivity is associated with obesity and poor cognitive development in children as well as an increased risk of high blood pressure, type 2 diabetes, depression, and even COVID-19 mortality in adults (2, 5, 11).

In parallel to a general decrease in PA, research shows that there is a higher COVID-19 infection rate in more racially diverse areas and a higher death rate in low-income areas (1,6). Prior to the pandemic, it was shown that outdoor exercise is associated with numerous health benefits including: stress reduction, mental fatigue restoration, and improvement of mood, self-esteem and perceived health (4). In the past several months, it has also been shown that PA in outdoor spaces helps to decrease the spread of the virus to vulnerable populations due to better air flow and dispersion of respiratory droplets that lead to infection (13). Additionally, simply spending time outdoors, also known as nature therapy, has been correlated with health-promoting responses of the nervous, endocrine, respiratory, and immune systems (7, 12).

There are significant disparities in access to safe outdoor spaces conducive to PA in Los Angeles (9). Parks located in low income and minority neighborhoods typically are smaller in size, lack well-maintained green open spaces, contain fewer park amenities, are located a greater distance from resident homes, and are for all these reasons more likely to be used for sedentary activity compared to parks located in high income neighborhoods (3, 9, 14, 15). We are not aware of any study that has examined the relative impact of public park resource inequities combined with social distancing and masking requirements and closures of schools during COVID-19 on PA behaviors. It is not clear if public health guidelines related to the utilization of public parks have exacerbated PA and health disparities in Los Angeles neighborhoods.

Purpose

Therefore, the purpose of this project was to examine the effects of the SARS-CoV-2 pandemic and subsequent public safety measures on the reliance and utilization of public parks for PA in Los Angeles.

The influence of public park access, amenities present in these recreational spaces as well as the socioeconomic and demographics of surrounding neighborhoods were considered independent variables during data analysis. By examining the alterations people have made in their park behaviors, it may be possible to provide evidence-based recommendations for future park design and amenity modifications.

Design/Methods

All methods received institutional IRB approval before study initiation (FA20-009=RAN). A multimethod longitudinal study was conducted in Los Angeles County. A total of 8 parks, 4 low income (LI: median household income = <\$60,000/year), 2 medium income (MI: median household income = \$60,000-\$100,000/year), and 2 high income (HI: median household income = >\$100,000/year), based on US Census data were divided into activity zones and observed using the validated System for Observing Play and Recreation in Communities (SOPARC) tool 1-4 different times between October 2020 and July 2021 (10). A total of 5864 (children: n=1443; teens: n=578; adults: n=3419; elderly: n=424) park goers were observed throughout the study.

SOPARC records park amenities, park user demographics, activity modes, and activity levels (sedentary, moderate, vigorous). An activity score was calculated for each activity zone at each park during each observation period by summing the number of park-goers engaged in sedentary, moderate, or vigorous activity multiplied by a code value and dividing by the total number of people in the zone $[S*1+M*2+V*3/(S+W+V)]$. The highest activity score possible is a value of 3. The data collected during the pandemic was combined with similar observation data (N =1084) collected during summer 2009 at the LI parks.

Adult and elderly park goers at each location were also surveyed about their own and their family's PA habits during COVID and more recently as restrictions have been lifted (N=84; women: n=56, men: n=28). In the survey, respondents were asked a series of questions about their weekly PA, their usage of public parks, and how their PA habits and comfort at parks has been impacted by COVID restrictions and closures.

Linear mixed model analysis, ANOVA, and nonparametric McNemar analyses at an alpha level of .05 was performed using SPSS to analyze the impacts of the stages of the pandemic on activity behaviors across demographics.

Results

Survey analysis showed that people visited parks more frequently during summer 2009 (3.2 +/- 0.15 visits/week) and 2021 (3.2 +/- 0.21 visits/week) compared to summer 2020 (2.5 +/- 0.23 visits/week), $p < .05$. It was also discovered that people were more likely to visit the park for picnicking, a sedentary activity, in May-June 2021 than May-June 2020 ($p < .05$). In 2021, 68.3% of survey respondents indicated that they felt more comfortable utilizing public parks after being vaccinated.

The closure of indoor gyms and other exercise locations during the pandemic was less likely to increase PA at public parks for LI and MI compared to HI park goers (Figure 1) as demonstrated by the % who disagree or strongly disagree to the Likert prompt. Additionally, the closure of schools was more likely to increase family use of public parks for HI park goers (Figure 2). In 2020, only 13.9% and in 2021, only 12.1% of adults surveyed in LI parks reported meeting ACSM PA guidelines (150 minutes moderate intensity aerobic activity/week + 2X per week muscle strengthening activity) and of those who did, 77.8% (2020) and 68.9% (2021) accumulated all MVPA minutes at public parks. In contrast, in 2020, 38.1% and 29.2% of individuals surveyed in MI and HI parks respectively reported meeting the PA guidelines. In 2021, these percentages were 50.0% (MI) and 26.1% (HI). In 2020, 41.5% of MI and 14.9% of HI participants met these guidelines through PA in public parks. In 2021, the percentages were 66.7% and 16.7% respectively.

Although park visits were lower during the most restrictive public health guidelines, in general, the activity score of MI and HI parks was highest during the peak of the pandemic (figure 3). While this pattern holds for children across income levels, changing restriction levels had no effect on the activity score of adults and elderly subjects in parks located in low-income neighborhoods (interaction effect: $F_{(12,1542)} = 2.757$, $p < .05$, figure 3). Activity scores for adults and elderly at LI parks were also consistently lower at all time periods compared to activity scores at MI and HI parks (figure 3). Across all observation periods, the percentage of sedentary park goers was lower at HI (42.7 +/- 2.1%) compared to both LI (56.1 +/- 1.7%) and MI (51.6 +/- 1.7%) parks and the percentage of park goers engaged in vigorous activity was lower at LI (9.6 +/- 0.9%) compared to both MI (14.9 +/- 1.2%) and HI (18.0 +/- 1.6%) parks, $p < .05$. Lastly, the biggest difference in activity scores across income levels was discovered in green space (e.g., open grass fields, grassy areas with tree coverage) activity zones.

Figure 1: Closure of indoor gyms and other exercise locations (due to COVID-19 restrictions) increased my physical activity levels at public parks.

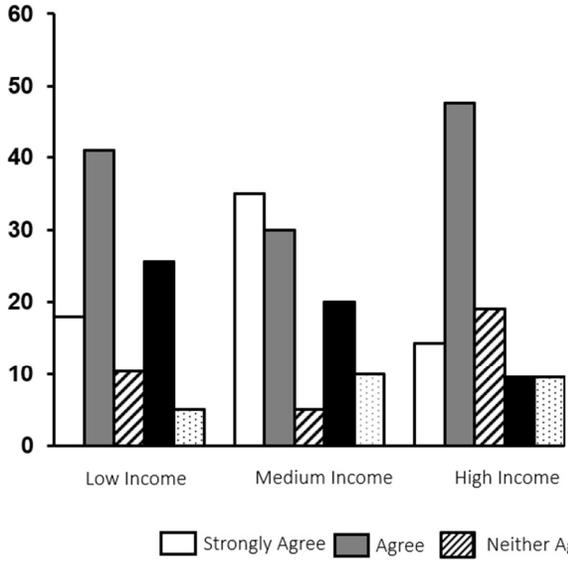


Figure 2: Likert Breakdown - Closure of my child's school (due to COVID-19 restrictions) increased our family's use of public parks.

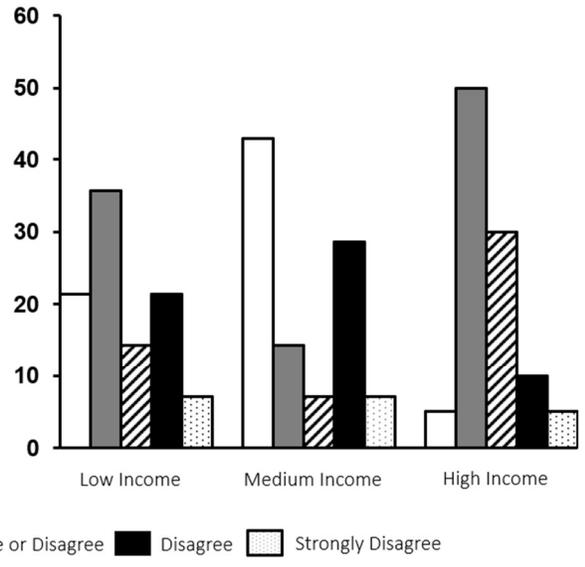
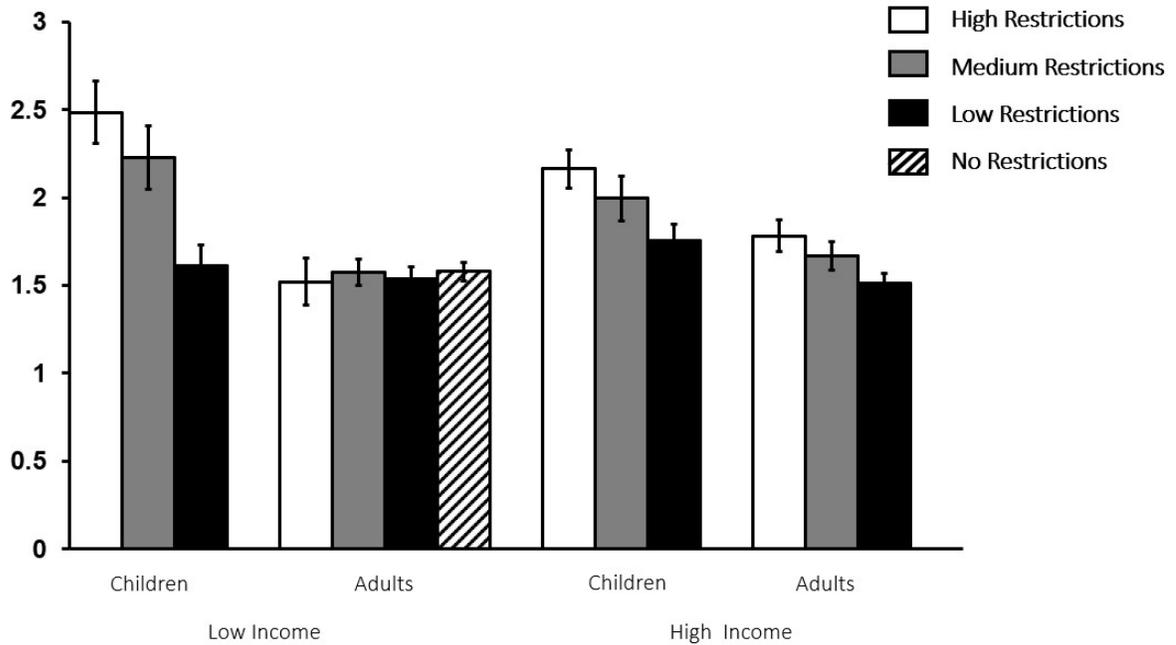


Figure 3: Effect of COVID-19 Restrictions on Public Park Activity

Score



Note: The summer 2009 (no COVID-19 restrictions) data only includes adult and elderly park goers in low income parks.

Discussion

Overall, the results suggest that the pandemic exacerbated pre-existing PA disparities between families in predominantly Latino/Hispanic and Black low-income and predominately non-Hispanic White high-income neighborhoods. In this study, LI parks included fewer amenities, were not well maintained, and had poor lighting. Specific to the pandemic, an increased number of homeless encampments were observed in LI parks. Homeless encampments acted as an additional deterrent to public park usage. Furthermore, low income individuals are less likely to belong to indoor gyms and in low income households, both parents are more likely to work jobs with less flexibility and thus may have had less time during the pandemic to increase park visits. Indeed, the average number of children and teens at HI parks was consistently greater than the number at LI parks. As a result, although child activity scores in LI parks were not different from MI and HI, fewer total children were accumulating MVPA minutes in LI neighborhoods. In addition to more diverse, well-maintained, and highly popular PA zones including walking paths and play structures in MI and HI parks which were lacking in LI parks in this study, MI and HI parks also had large well-maintained grassy areas well suited for PA. As noted by researchers, many of the above-mentioned park amenities in MI and HI parks were better suited for family-based PA. For instance, walking and biking paths were not located next to busy streets and playgrounds were gated to allow children to engage safely in PA.

Conclusion

While public parks have the ability to serve high income individuals even during a public health crisis when other PA spaces are inaccessible, results from this study show that public parks in low income areas do not provide a viable option for increasing PA and improving immune system health despite the heavy reliance of individuals living in low income neighborhoods to use public parks for PA. As a result, opportunities to decrease income-based health inequities are lost. Given the research related to the value of outdoor PA, it is recommended that activity zones better suited to family-based PA should be introduced into parks located in low-income neighborhoods. Furthermore, in conjunction with many other social and public health campaigns, this study emphasizes the importance of contributing resources to the homeless crisis. Lastly, it is recommended that efforts are made to increase accessibility to green space in public parks and/or other public spaces and awareness of the benefits of outdoor exercise in low-income areas.

References

1. Abedi, V., Olulana, O., Avula, V., Chaudhary, D., Khan, A., Shahjouei, S., Li, J., & Zand, R. (2020). Racial, Economic, and Health Inequality and COVID-19 Infection in the United States. *Journal of Racial and Ethnic Health Disparities*, 1–11. <https://doi.org/10.1007/s40615-020-00833-4>.
2. Chaddock-Heyman, L., Erickson, K. I., Kienzler, C., Drollette, E. S., Raine, L. B., Kao, S.-C., Bensken, J., Weissshappel, R., Castelli, D. M., Hillman, C. H., & Kramer, A. F. (2018). Physical Activity Increases White Matter Microstructure in Children. *Frontiers in Neuroscience*, 12. <https://doi.org/10.3389/fnins.2018.00950>.
3. Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., & Lurie, N. (2007). Contribution of Public Parks to Physical Activity. *American Journal of Public Health*, 97(3), 509–514. doi:10.2105/AJPH.2005.072447.
4. Gladwell, V. F., Brown, D. K., Wood, C., Sandercock, G. R., & Barton, J. L. (2013). The great outdoors: How a green exercise environment can benefit all. *Extreme Physiology & Medicine*, 2, 3. <https://doi.org/10.1186/2046-7648-2-3>.
5. Hall, G., Laddu, D. R., Phillips, S. A., Lavie, C. J., & Arena, R. (2020). A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another? *Progress in Cardiovascular Diseases*, S0033-0620(20)30077-3. doi:10.1016/j.pcad.2020.04.005.
6. Kim, C. (2020, March 13). Low-income immigrants are afraid to seek health care amid the Covid-19 pandemic. *Vox*. <https://www.vox.com/identities/2020/3/13/21173897/coronavirus-low-income-immigrants>.
7. Lanham-New, S. A., Webb, A. R., Cashman, K. D., Buttriss, J. L., Fallowfield, J. L., Masud, T., Hewison, M., Mathers, J. C., Kiely, M., Welch, A. A., Ward, K. A., Magee, P., Darling, A. L., Hill, T. R., Greig, C., Smith, C. P., Murphy, R., Leyland, S., Bouillon, R., ... Kohlmeier, M. (2020). Vitamin D and SARS-CoV-2 virus/COVID-19 disease. *BMJ Nutrition, Prevention & Health*, 3(1). <https://doi.org/10.1136/bmjnph-2020-000089>.

8. López-Bueno, R., López-Sánchez, G. F., Casajús, J. A., Calatayud, J., Tully, M. A., & Smith, L. (2021). Potential health-related behaviors for pre-school and school-aged children during COVID-19 lockdown: A narrative review. *Preventive Medicine*, 143, 106349. <https://doi.org/10.1016/j.ypmed.2020.106349>.
9. Los Angeles County Department of Public Health. (2017). Key Indicators of Health by Service Planning Area, 28.
10. McKenzie, T. L., Cohen, D. A., Sehgal, A., Williamson, S., & Golinelli, D. (2006). System for Observing Play and Recreation in Communities (SOPARC): Reliability and Feasibility Measures. *Journal of Physical Activity and Health*, 3(s1), S208–S222. <https://doi.org/10.1123/jpah.3.s1.s208>.
11. Ricci, F., Izzicupo, P., Moscucci, F., Sciomer, S., Maffei, S., Di Baldassarre, A., Mattioli, A. V., & Gallina, S. (2020). Recommendations for physical inactivity and sedentary behavior during the coronavirus disease (COVID-19) pandemic. *Frontiers in Public Health*, 8, 199. doi:10.3389/fpubh.2020.00199.
12. Song, C., Ikei, H., & Miyazaki, Y. (2016). Physiological Effects of Nature Therapy: A Review of the Research in Japan. *International Journal of Environmental Research and Public Health*, 13(8), 781. <https://doi.org/10.3390/ijerph13080781>.
13. Stay safe, have fun during the COVID-19 pandemic. (n.d.). Mayo Clinic. Retrieved January 11, 2021, from <https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/safe-activities-during-covid19/art-20489385>.
14. Van Hecke, L., Deforche, B., Van Dyck, D., De Bourdeaudhuij, I., Veitch, J., & Van Cauwenberg, J. (2016). Social and physical environmental factors influencing adolescents' physical activity in urban public open spaces: A qualitative study using walk-along interviews. *PLOS One*, 11(5), e0155686. doi:10.1371/journal.pone.0155686.
15. Wen, M., Zhang, X., Harris, C. D., Holt, J. B., & Croft, J. B. (2013). Spatial Disparities in the Distribution of Parks and Green Spaces in the USA. *Annals of Behavioral Medicine*, 45(Suppl 1), 18–27. <https://doi.org/10.1007/s12160-012-9426-x>.