

Park Rx Infographic Sources:

Research Compiled by NEEF (Seth + Jane Chang)

Mental Health

- *Moving from urban to greener areas was linked to improved mental health.*
 - On moving from urban to greener areas: “mental health improved within a year and stayed approximately the same for the following two years.”
 - Alcock I., White MP., Wheeler BW., Fleming LE., Depledge MH. Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas. *Environmental Science & Technology* 1247-1255.
- *Spending time in nature is linked with decreased anxiety, rumination, and negative affect.*
 - “Compared to urban experience, nature experience led to greater decreases in anxiety, rumination, and negative affect. Nature experience also maintained positive affect, compared to the drop in positive affect that resulted from urban experience.”
 - Bratman, G. N., Daily, G. C., Levy, B. J., & Gross, J. J. (2015). The benefits of nature experience: Improved affect and cognition. *Landscape and Urban Planning*, 138, 41-50.
<http://dx.doi.org/10.1016/j.landurbplan.2015.02.005>
- *Nature reduced rumination and subgenual prefrontal cortex activation.*
 - “Nature experience reduced rumination and [subgenual prefrontal cortex] activation. Participants who went on a 90-min nature walk showed reductions in self-reported rumination and decreases in sgPFC activity, whereas those who went on an urban walk did not show these effects.”
 - Article states that “the sgPFC has been shown to display increased activity during sadness and the behavioral withdrawal and negative self-reflective processes tied to rumination in health and depressed individuals,” which is why the sgPFC is being referenced here
 - Bratman, G. N., Hamilton, J. P., Hahn, K. S., Daily, G. C., & Gross, J. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences of the United States of America*, 112(28), 8567-8572.
<http://dx.doi.org/10.1073/pnas.1510459112>
- *Green spaces are restorative and boost attention, while viewing concrete worsens attention during tasks.*

- “The green roof scene was perceived by participants as more restorative, as well as boosting their attention compared to participants viewing the concrete scene, who showed worsening attention over the course of the task.”
 - Study had participants look at nature for 40 seconds and attention boosts were measured
 - Lee, K. E., Williams, K. J.H., Sargent, L. D., Williams, N. S.G., & Johnson, K. A. (2015). 40-second green roof views sustain attention: The role of micro-breaks in attention restoration. *Journal of Environmental Psychology*, 42, 182-189. <http://dx.doi.org/10.1016/j.jenvp.2015.04.003>
- *Group walks in nature are significantly associated with lower levels of depression.*
 - “Controlling for other significant predictors, group walks in nature were significantly associated with lower depression.
 - Marselle Melissa R., Irvine Katherine N., and Warber Sara L. Examining Group Walks in Nature and Multiple Aspects of Well-Being: A Large-Scale Study. *Ecopsychology*, September 2014 DOI: 10.1089/eco.2014.0027
- *Group walks in nature are associated with lower levels of stress and negative affect.*
 - “Group walks in nature were significantly associated with less perceived stress and less negative affect.”
 - Marselle Melissa R., Irvine Katherine N., and Warber Sara L. Examining Group Walks in Nature and Multiple Aspects of Well-Being: A Large-Scale Study. *Ecopsychology*, September 2014 DOI: 10.1089/eco.2014.0027
- *Longer distances to green areas are associated with higher levels of stress.*
 - “A stronger positive correlation between stress and distances to green areas is found when the distance is measured within the largest cities.”
 - Study measured amount of stress and BMI in relation to green space
 - Nielsen TS, Hansen KB. (2007). Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health and Place*, 13(4):839-50.
- *Walking in parks improved focus in children with attention deficits.*
 - “Children with attention deficits concentrated better after walking in a park than after either of two other settings. The effect of a dose of green was substantial—roughly as large as the deficit due to ADHD and roughly as large as the peak effect of extended-release methylphenidate. Children’s experience of the three settings showed the same pattern as their attention performance afterward.”
 - Taylor AF, Kuo FE. Children with attention deficits concentrate better after walk in the park. *J Atten Disord* 2009;12:402.

Hypertension

- *Viewing and spending time in green spaces lowers cortisol levels and blood pressure.*
 - “Viewing forest landscapes leads to lower concentrations of cortisol, lower pulse rate, lower blood pressure, enhanced HF components of HRV, and lower LF/HF. These results strongly support the findings of indoor research using heart rate and blood pressure on the effects of viewing a forest scene on recovery from stress.”
 - Study had participants viewing forest landscapes, both real “forest bathing” and artificial by viewing pictures
 - Park B, et al. (2009). The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventative Medicine*, 15:18–26.
- *Forest environments are shown to decrease cortisol levels, blood pressure, and sympathetic nervous system activity.*
 - “Forest environments could lower concentrations of cortisol, lower pulse rate, lower blood pressure, increase parasympathetic nerve activity, and lower sympathetic nerve activity compared with city settings.”
 - Study had participants viewing forest landscapes, both real “forest bathing” and artificial by viewing pictures
 - Park B, et al. (2009). The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventative Medicine*, 15:18–26.
- *Viewing pleasant rural scenes has been shown to reduce blood pressure measures.*
 - “Only those subjects viewing rural pleasant scenes experiences significant reductions in all three measures of blood pressure (systolic, diastolic, and MAP).”
 - Subjects showed scenes of rural and urban scenes, both pleasant and unpleasant
 - Pretty J, et al. (2005). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, 15(5):319-37.
- *Viewing pleasant rural scenes is linked to a decline in blood pressure is more effective at reducing blood pressure than viewing urban or unpleasant scenes.*
 - “Of all subjects, 70% experienced a decline in blood pressure, with the greatest proportion in the rural pleasant category. All subjects in the rural pleasant category experienced a decline in blood pressure, whereas only 60% of subjects experienced such declines in all other treatments.”
 - Subjects showed scenes of rural and urban scenes, both pleasant and unpleasant

- Pretty J, et al. (2005). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, 15(5):319-37.
- *Forest bathing, or immersing oneself in nature for an extended period, leads to a decline in blood pressure.*
 - “The data obtained in this study suggest that forest bathing had a positive effect on therapy for essential hypertension in elders. The RAS plays an important role in the regulation of BP. Angiotensin-converting enzyme (ACE) inhibitors (ACEI) and Ang II receptor blockers (ARB) are used to inhibit the activation of RAS thus resulting in a decline in BP.”
 - Mao G, et al. (2012). Therapeutic effect of forest bathing on human hypertension in the elderly. *Journal of Cardiology*, 60(6): 495-502.
- *Higher blood pressure is linked with farther distance to green spaces.*
 - “In univariate analysis (crude OR), distance to green spaces was positively related to the normal blood pressure category, compared to the reference category (optimal blood pressure <120/80 mm Hg). With increasing distance to city parks, the increase in the odds ratio for high-normal blood pressure was statistically significant.”
 - Grazuleviciene, R., Dedele, A., Danileviciute, A., Vencloviene, J., Grazulevicius, T., Andrusaityte, S., Uzdanaviciute, I., Nieuwenhuijsen, M. J. (2014). The Influence of Proximity to City Parks on Blood Pressure in Early Pregnancy. *International Journal of Environmental Research and Public Health*. <http://dx.doi.org/10.3390/ijerph110302958>

Obesity

- *Distance to publicly accessible green spaces is associated with being overweight and experiencing higher levels of stress.*
 - “Controlling for differences stemming from level of education, urbanity, gender, age, employment, second home ownership and bicycling to work, the results of the analysis suggests that there is a geography of overweight (BMI > 27.5) and experienced stress in relation to distance to publicly accessible green areas – as well as access to a private garden or a shared green area at the dwelling.”
 - Nielsen TS, Hansen KB. (2007). Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health and Place*, 13(4):839-50.
- *Living in a more walkable area is associated with higher likelihood to visit green spaces and meet activity guidelines, and lower likelihood to be overweight or obese.*
 - “The associations for green space use, physical activity and bodyweight are generally in the direction expected with residents of more walkable and less socio-economically deprived neighbourhoods being more likely to visit green spaces, more likely to meet physical activity guidelines, and less likely to be overweight or obese.”
 - Coombes E, et al. (2009). The relationship of physical activity and overweight to objectively measured green space accessibility and use. *Social Science & Medicine*. 2010 Mar;70(6):816-22.
- *Green space use is associated with being more physically active and less overweight/obese (, even when walkability of neighborhood is adjusted for).*
 - “Respondents living further from green spaces were also less likely to meet guideline physical activity levels and more likely to be overweight or obese, even after adjustment for the walkability of respondent’s neighbourhoods, their socioeconomic status, and area deprivation. Importantly, when the outcomes were examined against frequency of green space use, trends were apparently whereby more frequent green space users were more physically active and less likely to be overweight or obese.”
 - Coombes E, et al. (2009). The relationship of physical activity and overweight to objectively measured green space accessibility and use. *Social Science & Medicine*. 2010 Mar;70(6):816-22.
- *People living in urban environments are more likely to be obese than their rural counterparts.*
 - “Men living in cities were more likely to be obese (39.4%) than suburban men (35.5%). Similarly, in women 20.6% were obese versus 19.1% in the urban and rural areas, respectively”

- Pasala, S. K., Rao, A. A., & Sridhar, G. R. (2010). Built environment and diabetes. *International Journal of Diabetes in Developing Countries*, 30(2). <http://dx.doi.org/10.4103/0973-3930.62594>
- *Access to parks reduce risk of being overweight and obese.*
 - “Access to both parkland and recreation programs reduce risk of overweight and obesity as measured by BMI attained at age 18.”
 - Wolch, J., Jerrett, M., Reynolds, K., McConnell, R., Chang, R., Dahmann, N., et al. (2011). Childhood Obesity and Proximity to Urban Parks and Recreational Resources: A Longitudinal Cohort Study. *Health & Place*, 17(1), 207-214. <http://dx.doi.org/10.1016/j.healthplace.2010.10.001>
- *Proximity to parks and recreational programs is estimated to cause significant decreases in weight among children.*
 - “Researchers estimated that if all children in the study had matching recreational programs near their homes, up to 9.5 percent would move from overweight to normal and approximately 2 percent would move from obese to overweight – a noteworthy result for children’s health.”
 - Wolch, J., Jerrett, M., Reynolds, K., McConnell, R., Chang, R., Dahmann, N., et al. (2011). Childhood Obesity and Proximity to Urban Parks and Recreational Resources: A Longitudinal Cohort Study. *Health & Place*, 17(1), 207-214. <http://dx.doi.org/10.1016/j.healthplace.2010.10.001>

Diabetes

- *15 minutes of walking following a meal was found to increase glycemic control among the elderly.*
 - “We observed that 15 min of walking performed 30 min after each meal was equally effective as 45 min of sustained morning walking in significantly improving 24-h glycemic control in older people at risk for impaired glucose tolerance.”
 - DiPietro, L., Gribok, A., Stevens, M. S., Hamm, L. F., & Rumpler, W. (2013).
Three 15-min Bouts of Moderate Postmeal Walking Significantly Improves 24-h Glycemic Control in Older People at Risk for Impaired Glucose Tolerance.
Diabetes Care, 3262-3268. <http://dx.doi.org/10.2337/dc13-0084>
- *Moderate exercise is associated with increased blood glucose utilization and lower blood glucose levels.*
 - “In individuals with type 2 diabetes performing moderate exercise, BG utilization by muscles usually rises more than hepatic glucose production, and BG levels tend to decline. Plasma insulin levels normally fall, however, making the risk of exercise-induced hypoglycemia in anyone not taking insulin or insulin secretagogues very minimal, even with prolonged PA.”
 - Colberg, S. R., Sigal, R. J., Fernhall, B., Regensteiner, J. G., Blissmer, B. J., Rubin, R. R., . . . Braun, B. (2010). Exercise and Type 2 Diabetes. Diabetes Care. <http://dx.doi.org/10.2337/dc10-9990>
- *Increased physical activity resources have been linked to lower rates of Type 2 Diabetes, especially for people with higher incomes.*
 - “The inverse association between neighborhood PA resources and T2DM was stronger in participants with higher incomes ($P = 0.07$ and $P = 0.04$ for multiplicative and additive interaction, respectively). Neighborhood social environment was inversely associated with T2DM in women but not men and in low-income but not high-income participants ($P \leq 0.07$ for multiplicative and additive interaction).”
 - Christine, P. J., Auchincloss, A. H., Bertoni, A. G., Carnethon, M. R., Sánchez, B. N., Moore, K., Adar, S. D., Horowich, Diez Roux, A. V. (2015). Longitudinal Associations Between Neighborhood Physical and Social Environments and

Incident Type 2

Diabetes Mellitus The Multi-Ethnic Study of Atherosclerosis (MESA).

JAMA

Internal Medicine, 25(8), 1311-1320. <http://dx.doi.org/10.1001/jamainternmed.2015.2691>

- *Living in a neighborhood with more opportunities for physical activity is associated with lower risks of Type 2 Diabetes.*
 - “Other studies have found that residential relocation to neighborhoods more supportive of PA is associated with increased levels of PA, independently of reasons for relocation. Our study suggests that such neighborhood associations with PA behavior may translate to reduced risk of T2DM.”
 - Other studies referenced are:
 - Ranchod YK, Diez Roux AV, Evenson KR, Sánchez BN, Moore K. Longitudinal associations between neighborhood recreational facilities and change in recreational physical activity in the Multi-Ethnic Study of Atherosclerosis, 2000-2007. *Am J Epidemiol.* 2014;179(3):335-343.
 - Giles-Corti B, Bull F, Knuiiman M, et al. The influence of urban design on neighbourhood walking following residential relocation: longitudinal results from the RESIDE Study. *Soc Sci Med.* 2013;77:20-30.
 - Christine, P. J., Auchincloss, A. H., Bertoni, A. G., Carnethon, M. R., Sánchez, B. N., Moore, K., Adar, S. D., Horowich, Diez Roux, A. V. (2015). Longitudinal Associations Between Neighborhood Physical and Social Environments and Incident Type 2 Diabetes Mellitus The Multi-Ethnic Study of Atherosclerosis (MESA). *JAMA* Internal Medicine, 25(8), 1311-1320. <http://dx.doi.org/10.1001/jamainternmed.2015.2691>

Asthma

- *High levels of physical activity have been associated with poorer asthma control in females, but not males.*
 - “High levels of physical activity were associated with poor asthma control as judged by the ACT in females, but not in males”
 - Lövström, L., Emtner, M., Alving, K., Nordvall, L., Borres, M. P., Janson, C., & Malinowski, A. (2015). High levels of physical activity are associated with poorer asthma control in young females but not in males. *Respirology*. <http://dx.doi.org/10.1111/resp.12671>
- *Asthma disproportionately affects minority and low-income groups, especially African American and Latino children, due to increased exposure to asthma allergens in poor housing.*
 - “Asthma continues to disproportionately affect minority and low-income groups, with African American and Latino children who live in low-socioeconomic-status urban environments experiencing higher asthma morbidity and mortality than white children. This uneven burden in asthma morbidity has been ever increasing despite medical advancement. Many factors have contributed to these disparities in the areas of health care inequities, which result in inadequate treatment; poor housing, which leads to increased exposure to asthma allergens; and social and psychosocial stressors, which are often unappreciated.”
 - Bryant-Stephens T. Asthma disparities in urban environments. *J Allergy Clin Immunol* 2009;123:1199-206.
- *Spending time watching television is associated with higher rates of asthma.*
 - “Increased TV viewing at 3.5 years was associated with increased prevalence of asthma at 11.5 years of age (p for linear trend = 0.0003). Children who watched television for >2 h/day were almost twice as likely to develop asthma by 11.5 years of age as those watching TV for 1–2 h/day.”
 - Sheriff A, Maitra A, Ness AR, Mattocks C, Riddoch C, Reilly JJ. Association of duration of television viewing in early childhood with the subsequent development of asthma. *Thorax* 2009;64:321-5.

General Health

- *Living near green space is associated with lower prevalence of cardiovascular, musculoskeletal, mental, respiratory, neurological, digestive, and miscellaneous diseases.*
 - “For 15 of the 24 disease clusters the annual prevalence rate was lower in living environments with a higher percentage of green space in a 1 km radius. This relation is apparent for diseases in all seven disease categories. It is strongest for anxiety disorders and depression. The relationship is negative for none of the disease clusters.”
 - Relevant disease clusters: cardiovascular, musculoskeletal, mental, respiratory, neurological, digestive, miscellaneous
 - Maas J, et al. (2009). Morbidity is related to a green living environment. *Journal of Epidemiology and Community Health*, 63(12):967-973
- *Access to green space has been shown to attenuate higher mortality rates for low-income populations.*
 - “Figure 2 shows the classic income-related gradient in mortality; populations living in areas of successively worse income deprivation had increasingly high rates of mortality. We recorded this gradient within each of the groups for exposure to green space. However, the steepness of the gradient, and thus the degree of inequality in mortality related to income deprivation, was lower for the populations with greater exposure to green space than for those with less exposure to such areas. When we compared IRR for income-deprivation quartile 2 across groups of exposure to green space, we noted little difference; however, the magnitude of the IRR for income-deprivation quartiles 3, and particularly 4, was more reduced in populations who were exposed to more green space.”
 - Mitchell R, Popham F. (2008). Effect of exposure to natural environment on health inequalities. *Lancet*, 372(9650):1655-1660.
- *Exposure to green space decreases all-cause and circulatory disease mortality in low-income populations.*
 - “The inequality in all-cause and circulatory disease mortality related to income deprivation is lower in populations who live in the greenest areas than in those who have less exposure to green space.”
 - Mitchell R, Popham F. (2008). Effect of exposure to natural environment on health inequalities. *Lancet*, 372(9650):1655-1660.
- *Living near green spaces reduces mortality in adults.*
 - “Fig. 1 shows that adults who lived in areas with more green space had reduced mortality.”

- Villeneuve PJ, et al. (2012). A cohort study relating urban green space with mortality in Ontario, Canada. *Environmental Research.*, 115:51-8.
- *Living near green spaces reduces mortality even when sociodemographic factors are adjusted for.*
 - “The inverse associations between green space and mortality persisted after adjusting for a variety of sociodemographic and neighborhood characteristics measured at study entry. The associations should be interpreted cautiously as residual confounding by sociodemographic characteristics may have contributed to the observed associations, particularly, changes in these characteristics that occurred over the nearly two decade follow-up.
 - Villeneuve PJ, et al. (2012). A cohort study relating urban green space with mortality in Ontario, Canada. *Environmental Research.*, 115:51-8.
- *Forest bathing increases Natural killer cell activity; these cells kill tumors and virus-infected cells.*
 - “There were significant differences in NK activity (Fig. 1a) and in the numbers of NK cells (Fig. 1b) both before and after the trip and between days 1 and 2, indicating that the forest bathing trip significantly increased NK activity (Fig. 1a) and the numbers of NK cells (Fig. 1b). It has been reported that NK cells kill tumor or virus-infected cells through the release of perforin, granzymes, and GRN via the granule exocytosis pathway. In order to explore the mechanism of enhancement of NK activity induced by forest bathing, the effect of forest bathing on the intracellular levels of perforin, GRN, and GrA/B in PBL was investigated. The results showed that the forest bathing trip also significantly increased the numbers of intracellular perforin-, GRN-, and GrA/B-expressing lymphocytes (Fig. 2). Taken together, these findings indicate that a forest bathing trip can increase NK activity and that this effect might be at least partially mediated by increasing the number of NK cells and by the induction of intracellular perforin, GRN, and GrA/B.”
 - Li Q. (2010). Effect of forest bathing trips on human immune function. *Environmental Health and Preventive Medicine*, 15:9-17.
- *Volunteering more than 200 hours in a year is associated with lower likelihood of developing hypertension.*
 - “Those who had volunteered at least 200 hours in the past 12 months were less likely to develop hypertension than nonvolunteers”
 - Sneed, R. S., & Cohen, S. (2013). A Prospective Study of Volunteerism and Hypertension Risk in Older Adults. *Psychology and Aging*, 28(2), 578-586.
<http://dx.doi.org/10.1037/a0032718>

- *Spending time in nature is associated with a sense of pleasure, connect with other people, and experience cognitive stimulation.*
 - “The most important benefits gained from using Lincoln Park were an immediate sense of pleasure and an opportunity to engage in simple, nonchallenging activities without extensive planning or the necessity of a long-term commitment. This was true whether the interviewee used the park on weekdays, weekends, or both weekdays and weekends. The park users also valued the opportunity to be with other people, get vigorous physical exercise, escape feelings of obligation, follow a familiar routine, have experiences that are missing from their typical daily life, experience cognitive or aesthetic stimulation, and encourage/help others.”
 - Tinsley, H. E. A., Tinsley, D. J., & Croskeys, C. E. (2002). Park Usage, Social Milieu, and Psychosocial Benefits of Park Use Reported by Older Urban Park Users from Four Ethnic Groups. *Leisure Sciences*, 24, 199-218.

General Statistics about Park Usage

- *The closer a person lives to a park, the more likely they are to utilize it.*
 - “Among observed park users, 43% lived within 0.25 mile, and another 21% lived between 0.25 and 0.5 mile of the park. Only 13% of park users lived more than 1 mile from the park.”
 - 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).
- *Residents who live closer to parks are shown to exercise 5 or more times per week more than those living more than 1 mile away from parks.*
 - “More residents living within 0.5 miles of the park reported leisurely exercising 5 or more times per week more than those living more than 1 mile away.”
 - 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).
- *Being young, being male, and living less than a mile from a park are all positively associated with increased park usage.*
- *Living less than a mile from a park were four times as likely to visit a park weekly and exercised 38% more than those living further away.*
 - “Age (being younger), gender (being male), and distance (living within 1 mile of a park) were positively associated with park use and the frequency of leisure exercise. People who lived within 1 mile of the park were 4 times as likely to visit the park once a week or more had an average of 38% more exercise sessions per week than those living further away.”
 - Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., & Lurie, N. (3). Contribution of Public Parks to Physical Activity. *American Journal of Public Health, 2007*(97).
- *Low income is associated with less park us.*
- *Park users are less likely to be female, older adults, black, and having achieved a low level of education.*
 - “Those with low incomes were three times more likely than those with high incomes to be non-users. Low levels of park visitation were also evident among females, older adults, Blacks, and individuals with lower levels of education.”
 - Scott, D., & Munson, W. (1994). Perceived Constraints to Park Usage Among Individuals With Low Incomes. *Journal of Park and Recreation Administration, 12*(4).
- *Having access to a safe park has been shown to increase likelihood of regular physical activity.*

- “Stratified analyses revealed that access to a safe park was positively associated with regular activity and negatively associated with inactivity for adolescents in urban areas, but not rural areas.”
 - Babey SH, Haster TA, Yu H, Brown R. Physical activity among adolescents: When do parks matter? *American Journal of Preventive Medicine* 2008; 34(4):345-348.

Minorities/Disparities

- *Non-Hispanic whites visit parks at disproportionately high amounts, while African Americans and Hispanic Americans are under-represented in park use.*
 - “Non-Hispanic whites were “over-represented” among visitors by about the same degree in both survey years. That is, they constituted roughly eight or nine percentage points more of the visitors than their share of the sample as a whole. This is consistent with research reviewed above showing that non-Hispanic whites tend to participate more frequently than members of other race/ethnic groups in a range of outdoor activities, including visits to national parks. African Americans were the most “under-represented” visitor group in both years, making up 11% and 12% of the sample in CSAP1 and CSAP2, but only four and seven percent of the visitors. The degree of under-representation (a seven percentage point difference in 2000 and five points in 2008-09) declined slightly between the two surveys. The change might reflect an increase in visitation by African Americans, but it is small enough that chance variation between the two samples cannot be ruled out. A third iteration of the national survey will be needed to establish a trend.
 - Hispanic Americans also were under-represented among visitors, by two percentage points in 2000 and four points in 2008-09. This apparent change may suggest that individuals who could only be interviewed in Spanish (included in CSAP2, but excluded from CSAP1) are less inclined to visit national park sites than are Hispanic Americans who could be interviewed in English. We explore that interpretation further in Table 5, below.
 - Finally, in both survey years, Asian Americans and American Indians/Alaska Natives are each represented among visitors in about the same proportion as their small fraction of the sample as a whole.”
 - Report numbers based on 08-09, and are compared to an earlier report from 2000
 - Taylor, Patricia A., Burke D. Grandjean, and James H. Gramann. 2011. National Park Service comprehensive survey of the American public, 2008–2009: Racial and ethnic diversity of National Park System visitors and non-visitors. Natural Resource Report NPS/NRSS/SSD/NRR—2011432. National Park Service, Fort Collins, Colorado.
- *Non-Hispanic white park visitors tend to view their park experiences more positively than African American and Hispanic park visitors, who are more likely to view the parks as unsafe or unpleasant.*
 - “As shown in the table, white non-Hispanic visitors tended to be more positive about their park experiences than visitors in other race/ethnic groups. Hispanic

visitors had higher percentages of agreement, and therefore more negative opinions, than non-Hispanic whites on all 13 items. For African American and Asian visitors, the comparison is 10 of 13, while for American Indians it is seven of 13.

Relatively high levels of agreement with statements about a lack of park knowledge and park information suggest that for visitors other than whites, the park experience was not as familiar. In addition, both African American and Hispanic visitors were more likely than non-Hispanic whites to perceive the parks as unsafe or unpleasant and to believe that NPS personnel give poor service, although the percentage of visitors agreeing with any of those three viewpoints was small.

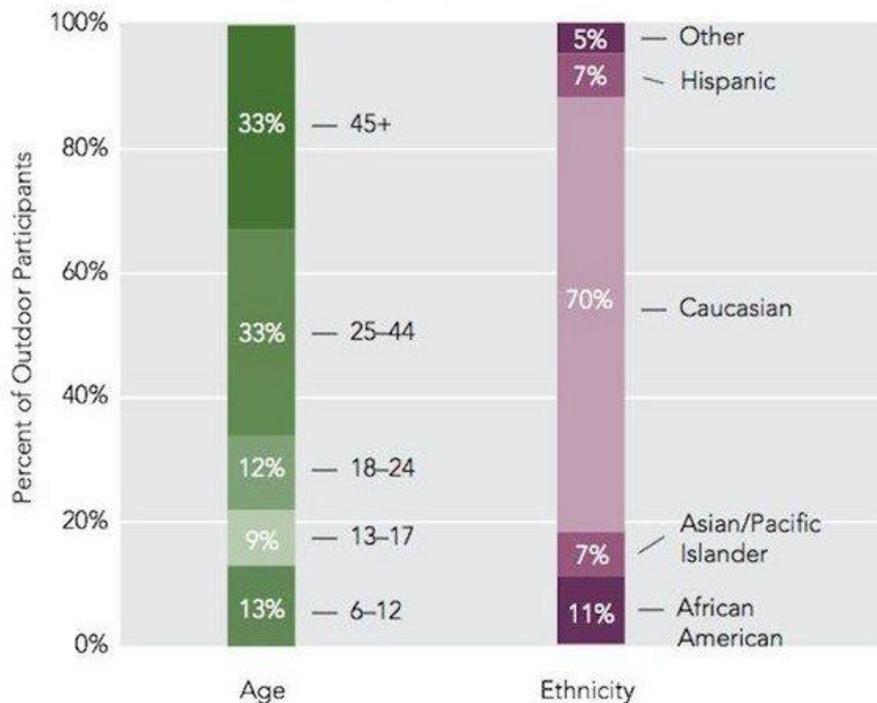
For all but two of the statements in Table 3, differences across the three largest race/ethnic categories easily surpassed the conventional criterion for statistical significance ($p < .05$). Because of small cell sizes, the results for Asian Americans and American Indians/Alaska Natives are not considered in these tests.”

- Report numbers based on 08-09, and are compared to an earlier report from 2000
- Taylor, Patricia A., Burke D. Grandjean, and James H. Gramann. 2011. National Park Service comprehensive survey of the American public, 2008–2009: Racial and ethnic diversity of National Park System visitors and non-visitors. Natural Resource Report NPS/NRSS/SSD/NRR—2011432. National Park Service, Fort Collins, Colorado.
- *Outdoor recreation among adolescent girls reached an all-time low in 2013.*
 - “Outdoor participation rates declined among adolescent girls. With just over half of adolescent girls participating in outdoor recreation, the participation rate is the lowest recorded since this report began in 2006.”
 - The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.
- *Children who do not participate in outdoor activities do not do so because of lack of interest, young adults do not participate in outdoor activities due to lack of time.*
 - “Youth who do not participate in outdoor activities say they are not interested in the outdoors. For young adults, lack of time is a bigger barrier than lack of interest.”
 - The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.

- *Introducing outdoor recreation early in life fosters lifelong outdoor activity participation and enjoyment.*
 - “Introducing outdoor recreation and physical activities early in life has a lasting effect. Among adults who are current outdoor participants, 75 percent had physical education and 42 percent enjoyed outdoor activities in elementary school.”
 - The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.
- *Caucasian populations participate in outdoor activities at the highest rate, while African Americans do so at the lowest rate.*
 - “Outdoor participation is highest among Caucasians and lowest among African Americans.”
 - The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.
- *Hispanic Americans who do participate in outdoor activities do so as often as Caucasians.*
 - “Although Hispanic Americans have one of the lowest outdoor participation rates, those who do participate go outside as often as Caucasians, who have the highest participation rate.”
 - The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.
- *Higher levels of income tend to be associated with higher levels of outdoor participation.*
 - “40 percent of outdoor participants are from households with incomes of \$75,000 or more.”
 - The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.
- *About two-thirds of outdoor activity participants are at least 25 years old, and 70% of outdoor activity participants are white.*

Participation in Outdoor Activities by Demographic

Outdoor Participants, Ages 6+



- The Outdoor Foundation. (2013). Outdoor Participation Report. Boulder, CO:
Author.
- *Lack of access to recreational facilities results in low levels of park visitation among minorities, especially African Americans.*
 - “Substantial research has shown that the low participation of minorities, and particularly African Americans, in employment or in visits to local parks results from their lower level of access to those jobs or recreational facilities.”
 - Weber, J., & Sultana, S. (2012). Why Do So Few Minority People Visit National Parks? Visitation and the Accessibility of “America's Best Idea”. *Annals of the Association of American Geographers*, 1-28.
<http://dx.doi.org/10.1080/00045608.2012.689240>
- *Caucasian park users visited the park a few times a week, while Asian park users visited the park between once a week and once a month, and African-American and Hispanic park users reported using the park about once a month.*
 - The Caucasian park users visited the park significantly more often than the other groups ($F(3, 432) D 13.20, p < :000$), which did not differ significantly from each other (Table 2). The Caucasian park users visited the park less than three or four

times a week and more than once a week. The Asian park users visited the park, on average, between once a week and once a month, and the African-American and Hispanic park users reported that they averaged one visit a month to the park. All four groups of park users reported that they would like to be able to visit Lincoln Park more frequently (i.e., approximately three or four times a week).”

- Tinsley, H. E. A., Tinsley, D. J., & Croskeys, C. E. (2002). Park Usage, Social Milieu, and Psychosocial Benefits of Park Use Reported by Older Urban Park Users from Four Ethnic Groups. *Leisure Sciences*, 24, 199-218.

Left-sided one-liners on chronic disease

CHD

- In the United States, coronary heart disease is a leading cause of death for both men and women.
 - Source: NHLBI, website: <http://www.nhlbi.nih.gov/health/health-topics/topics/cad/atrisk> accessed on Jan 18, 2016
- Each year, about 370,000 Americans die from coronary heart disease.
 - Source: NHLBI, website: <http://www.nhlbi.nih.gov/health/health-topics/topics/cad/atrisk> accessed on Jan 18, 2016

Stroke

- Stroke kills almost 130,000 Americans each year—that's 1 out of every 20 deaths.
 - Source: CDC, NCHS. Underlying Cause of Death 1999-2013 on [CDC WONDER Online Database](#), released 2015. Data are from the Multiple Cause of Death Files, 1999-2013, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed Feb. 3, 2015.
- On average, one American dies from stroke every 4 minutes.
 - Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics—2015 update: a report from the American Heart Association. *Circulation*. 2015 ;e29-322.
- Stroke costs the United States an estimated \$34 billion each year.
 - Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics—2015 update: a report from the American Heart Association. *Circulation*. 2015 ;e29-322.

High blood Pressure

- About 70 million American adults (29%) have high blood pressure—that's 1 of every 3 adults.
 - Source: Nwankwo T, Yoon SS, Burt V, Gu Q. Hypertension among adults in the US: National Health and Nutrition Examination Survey, 2011-2012. NCHS Data Brief, No. 133. Hyattsville, MD: National Center for Health Statistics, Centers for Disease Control and Prevention, US Dept of Health and Human Services, 2013.
- High blood pressure costs the nation \$46 billion each year
 - Mozaffarian D, Benjamin EJ, Go AS, et al. Heart Disease and Stroke Statistics-2015 Update: a report from the American Heart Association. *Circulation*. 2015;e29-322.

Diabetes

- 29.1 million people or 9.3% of the U.S. population have diabetes.
 - Source: National Diabetes Statistics Report, 2014 website: <http://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf> accessed on Jan18, 2016
- Diabetes is associated with heart disease and stroke, blindness, kidney failure, and lower-limb amputation.
 - Source: National Diabetes Statistics Report, 2014 website: <http://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf> accessed on Jan18, 2016
- \$245 Billion annually on medical expenses and lost productivity
- source: CDC website: <http://www.cdc.gov/diabetes/data/statistics/2014statisticsreport.html> accessed on Jan 18, 2016

Asthma

- 22.5 million Americans suffer from asthma (6 million of whom are children)
 - source: CDC website: http://www.cdc.gov/asthma/most_recent_data.htm accessed on January 18, 2016
- Asthma cost the US about \$56 billion in medical costs, lost school and work days, and early deaths in 2007.
 - Source: CDC website: <http://www.cdc.gov/vitalsigns/asthma/> accessed January 18, 2016

Obesity

- 12 million children and 78 million adults are obese
- source: CDC website: <http://www.cdc.gov/obesity/data/childhood.html> accessed Jan 18, 2016
- The estimated annual medical cost of obesity in the U.S. was \$147 billion in 2008 U.S. dollars
- Source: CDC website <http://www.cdc.gov/obesity/data/adult.html> accessed January 18, 2016

Mental Health

- In 2014, an estimated 15.7 million adults aged 18 or older in the United States. had at least one major depressive episode in the past year
 - Source: NIMH/NIH website: <http://www.nimh.nih.gov/health/statistics/prevalence/major-depression-among-adults.shtml> accessed on January 19, 2016

- 6.4 million children 4-17 years of age have been diagnosed with ADHD as of 2011
 - CDC website <http://www.cdc.gov/ncbddd/adhd/data.html> accessed on January 18, 2016
- There were 41,149 suicides in 2013 in the United States—a rate of 12.6 per 100,000 is equal to 113 suicides each day or one every 13 minutes.
 - Source: Centers for Disease Control and Prevention (CDC). Web-based Injury Statistics Query and Reporting System (WISQARS) [Online]. (2013, 2011) National Center for Injury Prevention and Control, CDC (producer). Available from <http://www.cdc.gov/injury/wisqars/index.html>.
- In 2014, there were an estimated 9.8 million adults aged 18 or older in the United States with SMI. This number represented 4.2% of all U.S. adults.
 - Source: NIMH website <http://www.nimh.nih.gov/health/statistics/prevalence/serious-mental-illness-smi-among-us-adults.shtml> accessed January 19, 2016
- 18% of US adults suffer from anxiety disorder
 - source: Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). Archives of General Psychiatry, 2005 Jun;62(6):617-27.