Cultivating social capital in diverse, low-income neighborhoods

OPEN ACCESS

Title:
Cultivating social capital in diverse, low-income neighborhoods: The value of parks for parents with young children

Authors:
Lauren E. MULLENBACH[1]*, lauren.mullenbach@ou.edu
Lincoln R. LARSON[2], lrlarson@ncsu.edu
Myron F. FLOYD[2], mffloyd@ncsu.edu
Oriol MARQUET[3], oriol.marquet@uab.cat
Jing-Huei HUANG[2,4], jhuang32@ncsu.edu
Claudia ALBERICO[2,4], coalberi@ncsu.edu
S. Scott OGLETREE[5], scott.ogletree@ed.ac.uk
J. Aaron HIPP[2,4], jahipp@ncsu.edu

Affiliations:
[1]Department of Geography and Environmental Sustainability, University of Oklahoma
[2]Department of Parks, Recreation, and Tourism Management, North Carolina State University
[3]Geography Department, Autonomous University of Barcelona
[4]Center for Geospatial Analytics, North Carolina State University
[5]OPENSpace Research Centre, School of Architecture and Landscape Architecture, University of Edinburgh

*Corresponding author:
lauren.mullenbach@ou.edu, +1 (404) 414-7755, 100 E. Boyd St., Norman, OK 73019.

CRediT roles:
Conceptualization: LEM, LRL, JAH; Data curation: JAH, MFF, OM, JHH, CA, SSO; Formal analysis: LEM; Funding acquisition: JAH, MFF, OM, JHH, CA, SSO; Methodology: LEM, LRL, JAH; Writing – original draft: LEM, LRL, JAH; Writing – review & editing: all.

Abstract

Neighborhood built environment features, including parks, may contribute to social capital, but these relationships have not been adequately explored in communities of color. Our study focused on a specific subset of this population—a national sample of diverse, low-income parents with young children (n=1,611)—to assess relationships between social capital, parks (e.g., access, visit frequency, and satisfaction), and other aspects of the built environment (e.g., perceptions of neighborhood walkability, traffic, and crime). We found that park satisfaction (a measure of park quality) was strongly linked to social capital among low-income parents, but park use frequency and access (both related to park quantity) were not. Neighborhood walkability and safety from crime were also strong positive correlates of social capital. Despite social benefits of parks, moderate to low ratings of park satisfaction, neighborhood walkability, safety from crime, and social capital within our sample suggest that inequities in park and neighborhood quality may prevent families who might benefit the most from social capital (i.e., low-income minority populations) from enjoying key resources needed to cultivate it. Cities hoping to enhance social capital in vulnerable communities would be wise to invest in quality parks and built environment features that create opportunities for positive social interactions among low-income parents with young children.

Keywords: built environment, equity, social capital, structural equation modeling, urban parks

Highlights:

- National sample of low-income, racially diverse parents of young children were surveyed
- Park satisfaction strongly tied to social capital among low-income diverse parents
- Neighborhood walkability and safety from crime were also linked to social capital
- Access to and use of high-quality parks may be more important than proximity to parks

1. Introduction

Neighborhood social capital, broadly defined as the shared knowledge, norms, and ~~relationships~~ trust that facilitate collective experience within a neighborhood (Bourdieu, 1986; Vemuri et al., 2011), is recognized as a key attribute of healthy and sustainable communities, especially for marginalized populations (Holtan et al., 2015; Galindo et al., 2017). Numerous studies have documented the benefits of social capital for individual health promotion and overall quality of life (Mohnen et al., 2011; Maass et al., 2016; Ziersch et al., 2005). Fewer studies have examined how social capital within neighborhoods is created and sustained, especially through the use of urban parks. Even fewer studies have focused, within this scope, on marginalized populations, for whom social capital may buffer against the effects of marginalization and improve health outcomes (Versey, 2018).

A growing body of literature suggests that urban green space can enhance social cohesion and civic engagement—a commonly desired benefit of social capital—in multiple ways (Jennings & Bamkole, 2019; Jennings et al., 2016). For example, positive interactions with, and within, urban green spaces can create unique opportunities for social contact (Hartig et al., 2014), strengthen social ties and community networks (Peters et al., 2010), and cultivate a sense of collective efficacy among residents (Comstock et al., 2010). Each of these social factors helps to augment health outcomes—which is particularly important among low-income and non-white populations (Gilbert & Dean, 2013; Maas et al. 2009; Versey, 2018). However, the extent to which parks and green space fulfill this promise depends on a variety of socio-cultural and built environment factors (Jennings & Bamkole 2019; Peters et al. 2010). In some cases, inequitable access to high-quality parks and green spaces limit capacity for positive social exchange and reduces potential benefits of parks for historically marginalized groups and children (Nesbitt et

24 al., 2019; Rigolon, 2016; Rigolon et al., 2018). In others, characteristics of parks and adjacent

25 communities create unwelcoming environments and inaccessible transportation networks, raising

26 concerns about neighborhood safety and constraining opportunities to develop social capital

27 (Hong et al., 2018; Peters et al. 2010; Ward Thompson et al., 2016).

28   Efforts to bolster social capital are important in low-income communities of color, where

29 lack of resources (e.g., parks and green space) exacerbates inequality and health disparities (Kim

30 et al., 2020). Such disparities may impede formation of social capital in disadvantaged

31 neighborhoods, producing cascading effects which reduce resilience to disruptive events, such as

32 COVID-19 (Laurence, 2011; Pitas & Ehmer, 2020). Although the relationships between parks,

33 green space, and social capital have been the subject of increasing attention, variations of these

34 relationships across demographically diverse contexts have not been adequately investigated

35 (Jennings et al. 2016; Mowen & Rung, 2016). Furthermore, more research is needed to better

36 understand how intergenerational use of urban green space might influence broader benefits,

37 including social capital, across diverse populations (Kabisch et al., 2015; Larson et al., 2013).

38 For example, how might family park use, particularly those with young children, enhance social

39 capital, which is increasingly recognized as a critical asset for positive youth development

40 (Erbstein, 2013)? Our study explored how perceptions of parks and the built environment impact

41 perceptions of neighborhood social capital among parents of young children (aged 5-10 years) in

42 low-income communities of color.

43 *1.1. Neighborhood social capital*

44   Social capital has been described as "the value of one's social relationships," including

45 those associations that facilitate civic engagement, trust, and cooperative action among people

46 (Perkins et al., 2002, p. 36). Concepts such as social networks and social cohesion form key

47   building blocks of social capital, which manifest in multiple forms, including obligations and

48   expectations, information sharing, and norms and sanctions (Coleman, 1990, pp. 315-320;

49   Jennings & Bamkole 2019). Social capital is a key contributor to multiple dimensions of health

50   and well-being (Ziersch et al., 2005), and may be especially important in historically

51   marginalized communities (Hawkins & Maurer, 2010). Although social capital can be developed

52   and measured at different scales, social capital at the neighborhood level may be particularly

53   important for urban residents. A neighborhood with strong social capital is characterized by high

54   levels of trust among residents, mutual cooperation, and close neighborhood ties (Holtan et al.

55   2015; Vermuri et al. 2011). Social capital within neighborhoods is formed in myriad ways, and

56   may be related to social and built infrastructures, or "spheres of sociability," such as sidewalks,

57   libraries, parks, and other leisure spaces (Glover & Parry, 2008, pp. 222-223; Latham & Layton,

58   2019). Interactions in such spaces (e.g., waving, saying hello) and deeper connections (e.g.,

59   volunteering to clean up parks, neighborhood events) can foster development of social capital

60   and provide opportunity to maintain relationships within one's neighborhood (Glover & Parry,

61   2008, p. 223; Latham & Layton, 2019; Portes, 1998). As spheres of sociability (e.g., sidewalks,

62   parks) become sources of social capital and residents are encouraged to use such spaces, indirect

63   benefits of neighborhood social capital can manifest as higher levels of physical activity and

64   better physical and mental health (Lindstrom, 2011; Mowen & Rung, 2016). For all of these

65   reasons, understanding how social and environmental factors, including the physical form of an

66   urban community, are associated with neighborhood social capital is important—especially

67   within historically marginalized populations (Cattell, 2001; Holtan et al. 2015; Wood & Giles-

68   Corti, 2008).

69   *1.2. Parks and neighborhood social capital*

70   Public parks and green space can play a critical role in the development of neighborhood

71   social capital (Holtan et al. 2015; Jennings & Bamkole, 2019). Many researchers have linked

72   park use to enhanced social contacts and positive interactions (Dadvand et al., 2019; Jennings &

73   Bamkole, 2019). Some scholars have suggested that parks in diverse neighborhoods can facilitate

74   positive social interactions and strengthen interracial relations (Coutts & Miles, 2011). On the

75   other hand, neighborhoods which lack, or have poor quality, parks have relatively less social

76   capital, which itself has been linked to negative health outcomes, such as poor mental health and

77   compromised immune functioning (Kuo, 2015; Maas et al., 2009). In many cities the

78   neighborhoods lacking quality parks also have high proportions of low-income and people of

79   color (Rigolon et al., 2018). In some cases, urban green space and park development can also

80   fuel social tensions by propagating intimate segregation and gentrification (Harris et al., 2020).

81   How parks and urban green space foster (or hinder) development of various forms of

82   social capital has also been studied, yet the mechanisms linking parks to social capital remain a

83   subject of debate, especially for different sociodemographic groups (Mowen & Rung, 2016). The

84   mere presence of green space (e.g., urban tree canopy) may be correlated with neighborhood

85   social capital (Holtan et al. 2015; Valente et al., 2020). Broyles et al (2011) found strong

86   relationships between park use frequency, park-based activity levels, and social capital. Cattell

87   and colleagues (2008) found that frequent social interactions in public spaces (such as parks)

88   enhanced both a sense of community and social capital. Studies focused on place bonding

89   (Hammitt et al., 2006) and neighborhood social ties (Kazmierczak, 2013) also suggest a pathway

90   from park use to social capital. Other researchers have specifically noted how socializing within

91   parks can facilitate the weak ties that cultivate social capital (Barker et al., 2019; Baur et al.,

4

92 2013). Use of parks and recreational facilities or exposure to nature has also been associated with

93 collective action, such as participation in community groups (Ziersch et al., 2011).

94 Less clear, however, are the specific attributes of parks linked to social capital, and how

95 (or if) these benefits are realized across diverse populations (Francis et al., 2012; Kazmierczak,

96 2013). Park features can play a specific role, though satisfaction with the quality of such features

97 is critical (Veitch et al., 2021). For example, some studies suggest that built features of parks and

98 green spaces, such as sidewalks, open spaces, playgrounds, and organized activities, may

99 facilitate social cohesion, a ~~form~~ source of social capital (Bennet et al., 2012; Fan et al., 2011;

100 Peters et al., 2010). However, social capital may be differentially accrued by different

101 demographics (Mowen & Rung, 2016). For instance, ethnoracial minorities and lower

102 socioeconomic groups tend to live in neighborhoods with fewer resources to support social

103 capital accumulation, such as quality parks (Curley, 2010). Even when resources do exist,

104 different groups might experience the benefits of parks differently (Peters et al., 2010). Specific

105 park attributes (e.g., playgrounds) may play a particularly important role in the formation of

106 social capital among certain subgroups of users. For instance, playgrounds promote positive

107 social interactions among parents with young children, and especially those living in low-income

108 neighborhoods (Bennet et al. 2012). Despite these patterns, the relationships between park use,

109 park satisfaction, and socioeconomic variables that collectively influence social capital formation

110 remain poorly understood (Roberts et al., 2019). More research is needed to understand how

111 social capital development is linked to parks, which may ameliorate, or exacerbate, health

112 disparities across diverse communities (Jennings et al. 2016).

113 *1.3. Other built environment and contextual factors and neighborhood social capital*

114   Neighborhoods surrounding parks, including transportation options and safe walking

115   environments, can also influence formation of social capital (Fan et al., 2011; French et al.,

116   2014). Walkable, mixed-used neighborhoods, in which businesses and housing are interspersed,

117   are associated with higher levels of neighborhood social capital and cohesion (Leyden, 2003;

118   Rogers et al., 2010). Urban environments with more sidewalks also support park use (Moran et

119   al., 2020) and sense of community (French et al., 2014). Additionally, safer neighborhoods, in

120   terms of crime and traffic, see more park use and higher levels of social capital (Huang et al.,

121   2020; Koohsari et al., 2012; Marquet et al., 2019). The reverse is also true: less safe

122   neighborhoods see less park use (Hipp et al., 2013; Hong et al., 2018; Marquet et al., 2020).

123   Even perceptions of the built environment can be important factors influencing use of public

124   space, sense of community, and social capital (Comstock et al., 2010; Won & Lee, 2020).

125   The presence of an environment conducive to social interactions is not a guarantee that

126   social capital will be formed (Falk & Kilpatrick, 2000; Mohnen et al., 2015), though certain

127   social and bureaucratic structures can facilitate these social benefits (Pretty & Smith, 2004).

128   Thus, a built environment conducive to social interactions—such as a walkable and safe

129   neighborhood—must also be well-maintained and well-funded, with equitable access to

130   opportunity, if social capital is to be established and maintained (Campbell et al., 2021;

131   Kazmierczak, 2013). Equitable social systems that support public spaces and safe transportation

132   options go hand in hand with social activity (Falk & Kilpatrick, 2000; Pretty & Smith, 2004),

133   ultimately helping vulnerable communities become more cohesive, resilient, and healthy (Cattell,

134   2001; Hutch et al., 2011; Poortinga, 2012). Similarly, parks that are accessible, well-funded and

135   maintained, with high-quality features and programming may also yield more social capital than

136   parks that lack these attributes—extending the social infrastructure that could improve the health

137 of vulnerable groups (Francis et al., 2012; Huang et al., 2020; Kazmierczak 2013; Latham &

138 Layton, 2019; Mowen & Rung, 2016).

139 *1.4. Hypotheses*

140   Although many studies have examined connections between public parks, social

141 cohesion, and neighborhood social capital (Jennings & Bamkole, 2019), few have assessed

142 interactions among park use and built environment features within a diverse, low-income

143 population. Even fewer have focused on a particular subgroup within this population: parents

144 with young children. This oversight is particularly alarming given the influence of family-based

145 leisure time on the health and well-being of adults and youth (Rhodes et al., 2020) and the

146 critical role that family plays in the creation of social capital (Bubolz, 2001) and subsequent

147 positive youth development (Erbstein, 2013). Placing a novel focus on parents of young children

148 within diverse, low-income communities, we tested the following hypotheses:

149   1. Park use frequency and park satisfaction will positively influence social capital

150   2. Built environment factors, including perceived walkability, perceived safety from crime,

151   perceived traffic issues, and presence of a park within a ten-minute walk, will positively

152   influence park use frequency and park satisfaction, with indirect and direct effects on

153   social capital.

154 Figure 1 depicts the conceptual model guiding the study.

155   <Insert Figure 1 about here>

156   **2. Methods**

157   We collected and analyzed data from a national web-based survey of low-income parents

158 in the United States. We used a two-step analysis involving confirmatory factor analysis and

159 structural equation modeling to test the hypotheses described above and detect key correlates of

160 neighborhood social capital perceived by individuals in our sample.

161 *2.1. Sampling and survey administration*

162   Our research team worked with Qualtrics XM to recruit a sample of diverse, low-income

163 parents of young children from their panel members. Sampling efforts targeted parents across the

164 U.S. whose income was 80% or less of the federal median household income (≤$42,786), per the

165 Housing and Urban Development definition of low-income (HUD, 2019). Furthermore,

166 individuals who were Black/African American, Asian, Latino, or multiple races/ethnicities, and

167 who had at least one child aged 5-10 years old were sought until 80% of the sample was non-

168 white.

169   The survey was administered over a period of 50 days in September to November 2018.

170 Qualtrics continued sampling until a total sample of N=1600 was reached. The median response

171 time was about 8 minutes. Qualtrics staff ensured response quality by employing a data

172 scrubbing technique, which involved excluding responses that did not meet their quality criteria.

173 These exclusion criteria included deletion of responses that were below one-third of the median

174 response time, that used a "straight-line" through batteries of items, and that featured

175 incomprehensible text as part of open-ended responses (Qualtrics, n.d.). Prior research using

176 Qualtrics XM panels and similar checks to data quality have been shown to be a valid form of

177 data collection (Boas et al., 2020; Harlan et al., 2019; Miller et al., 2020).

178 *2.2. Survey instrument*

179   The survey contained questions adopted or slightly modified from established metrics

180 used in prior studies. These included items and scales related to neighborhood social capital, park

181 visitation frequency, satisfaction with prior park visits, and perceptions of the built environment.

182   Measuring the complex concept of social capital is inherently challenging (Van Deth,

183   2003). To assess neighborhood social capital, we used items from the Los Angeles Family and

184   Neighborhood Survey, which measure multiple dimensions of social capital—i.e., social

185   cohesion, social support, and informal social control—and have been previously validated

186   (Broyles et al., 2011; Carpiano, 2007). Five statements followed the prompt, "How much do you

187   agree with the following statements regarding the neighborhood around the park you usually go

188   to?" with response options on a scale from 1 "strongly disagree," to 4 "strongly agree." Example

189   statements include "People get along with each other," and "People share the same values."

190   We assessed park visitation frequency with a single question asking respondents how

191   often they visit a park with their child, with the response options "daily," "weekly," "monthly,"

192   "occasionally," and "never." This item was adapted from a prior study (Schipperijn et al., 2010)

193   by removing a "several times per week" category. We focused on park visits that included

194   parents and children, as well as park satisfaction, because of the critical role these play in leisure

195   experiences and the development of social capital (Bubolz, 2001; Hipp et al., 2013; Roberts et

196   al., 2013). We measured park satisfaction using a series of items pertaining to the respondents'

197   satisfaction with a variety of park features and experiences following their most recent park visit,

198   all rated on a three-point scale from not satisfied to extremely satisfied. This battery was adapted

199   from Moore et al (2009), who had previously tested the instrument in multiple settings. Example

200   park features included facilities, availability of open spaces, and cleanliness.

201   We assessed respondents' perceptions of several key aspects of the built environment that

202   might influence both park use and social capital. Because safety and walkability have been

203   associated with park use and neighborhood social ties (Hipp et al., 2013; Huang et al., 2020;

204   Koohsari et al., 2012; Marquet et al., 2019), we included items relating to four aspects of the

205   built environment: perceived walkability, perceived traffic issues, perceived safety from crime,

206   and presence of a park within a ten-minute walk of the respondents' home. We adopted groups

207   of items related to our constructs of interest from Millstein et al (2011) and Cerin et al (2009),

208   who previously demonstrated effective reliability. Three aspects of the built environment—

209   walkability, traffic issues, and safety from crime—were assessed with scales of three items each,

210   followed by response options on a Likert-type scale from 1 "strongly disagree" to 4 "strongly

211   agree". Walkability assessed perceptions of the feasibility of walking around one's neighborhood

212   with items such as "there are walkways that connect streets to other streets, trails, or cul-de-

213   sacs." Perceived traffic issues assessed perceptions of onerous traffic while walking in one's

214   neighborhood, with items such as "There is so much traffic that it makes it difficult or unpleasant

215   to walk." Perceived safety from crime assessed perceptions of safety from crime while walking

216   through one's neighborhood, with items such as "streets are well-lit at night." The final question

217   in this section asked respondents whether there is a park within a ten-minute walk of their

218   residents, with the response options "yes," "no," or "unsure/don't know."

219   Respondents also provided demographic information including household income

220   (dichotomous: less than $25,000 or $25,001-42,786), gender, race/ethnicity, age, employment

221   status, home ownership (rent or own), tenure in current residence, education, native language,

222   and household size. Given that many socioeconomic conditions (e.g., income, education,

223   employment) in the U.S. are tied to race/ethnicity, the demographic information used in analyses

224   for this study was limited to race/ethnicity (Chetty et al., 2020). Each ethnoracial category was

225   given a dummy variable for analysis, with white as the reference group.

226   *2.3. Data analysis*

227   First, we obtained descriptive statistics and frequencies for all variables. We then

228   employed a two-step modeling approach, including confirmatory factor analysis (CFA) and

229   structural equation modeling (SEM), using R version 3.6.2. A CFA was conducted on the latent

230   variables only, which in this study included items measuring neighborhood social capital,

231   walkability, traffic issues, crime safety, and park satisfaction. Single item indicators (e.g., park

232   use frequency) were excluded from the CFA. Acceptable fit criteria were consulted as a

233   guideline, but were not used as cutoff criteria, per recommendations from the literature (Kline,

234   2016). Model fit statistic values used as guidelines included robust CFI ($\geq$.95), robust RMSEA

235   ($\leq$.08), and SRMR (as close to .07 as possible). We used full information maximum likelihood

236   estimation with a scaled Chi-square to correct for non-normal data, as is conventional with

237   survey data (Yuan & Bentler, 2000). Modification indices guided model trimming in pursuit of

238   parsimony, and model trimming was kept to a minimum. Following the acceptance of a final

239   measurement model, SEM commenced with all variables, including confounding variables, to

240   test hypothesized pathways in the conceptual model depicted in Figure 1. After CFA and SEM

241   were complete, we conducted analysis of variance (ANOVA) to examine differences among

242   ethnoracial groups for park satisfaction, given differing experiences with park quality and

243   satisfaction among ethnoracial groups (Hughey et al., 2016). Post-hoc tests using Tukey HSD

244   were used to identify differences among specific ethnoracial groups.

3. Results

3.1. Sample characteristics

247   A total of 1,611 survey responses comprised the final sample. The two income categories

248   were relatively evenly split, with 46% of respondents reporting an income of less than $25,000

249   and the remaining 54% under $42,786, confirming that our sample consisted of predominantly

250 low-income parents. A large majority of the sample was female (85%, n=1374), and only 20%

251 were white (n=317). Sample demographics are displayed in Table 1.

252   \<Table 1 here\>

253 *3.2. Descriptive and summary statistics*

254   Levels of neighborhood social capital reported by respondents were moderate, with a

255 mean of 2.8 out of 4 (SD=0.83). Park use frequency was moderately high, with 57% of

256 respondents reporting they visit parks either daily or weekly (n=926). Mean park satisfaction was

257 2.4 (SD=0.62) out of 3, indicating respondents are moderately satisfied with park features and

258 experiences; only 19% of respondents were extremely satisfied (i.e., gave a score of 3 for all

259 park features) with their most recent park visit. Mean perceived walkability was 2.8 (SD=0.7),

260 indicating somewhat low perceptions of neighborhood walkability. Mean perceived traffic issues

261 was 2.6 (SD=0.7), and mean perceived safety from crime was 2.7 (SD=0.7), each out of 4,

262 indicating respondents view their neighborhood's levels of crime and traffic as somewhat unsafe.

263 About 40% of the sample reported having a park within a ten-minute walk of their residence.

264 Full descriptive and frequency statistics are displayed in Table 2.

265   \<Table 2 here\>

266 *3.3. Measurement model results*

267   The first model had good fit, but modification indices indicated that allowing two pairs of

268 items to co-vary would reduce the model test statistic (i.e., chi-square) and improve model fit, so

269 two social capital items and two satisfaction items were allowed to co-vary. Following this

270 change, model fit indices and modification indices indicated no further modifications were

271 necessary. Reliability was assessed with omega (Hayes & Coutts, 2020), and latent variables

272 were found to have adequate reliability (i.e., ~ 0.7; Lance et al., 2006). The final measurement

273 model is presented in Table 3.

274   <Table 3 here>

275 *3.4. Structural model results*

276   After our measurement model was finalized, SEM commenced with the inclusion of all

277 latent variables and the measured variables according to the conceptual model (Figure 1). The

278 first model did not have a good model fit. Modification indices indicated that allowing

279 walkability and crime safety to co-vary would improve the model test chi-square. Following this,

280 model fit statistics met acceptable criteria, so the model was retained. Final SEM results are

281 displayed in Table 4 and Figure 2.

282   <Table 4 here>

283   <Figure 2 here>

284   Our first hypothesis was partially supported. Park use frequency was not related to social

285 capital (B=.01, SE=.01, *p*=.33), but park satisfaction (a proxy for park quality) was significantly

286 and positively related to social capital (B=.51, SE=.05, *p*<.001). Higher levels of park

287 satisfaction were related to higher perceived neighborhood social capital.

288   Our second hypothesis was partially supported. All built environment factors were

289 significantly related to park satisfaction. However, only park proximity and crime safety were

290 related to park use frequency. Walkability and crime safety were positively and directly related

291 to social capital. Regression weights are presented in Table 4.

292 *3.5. ANOVA test results*

293   For the ANOVA test, few differences in park satisfaction ratings among ethnoracial

294 groups were significant, with exceptions being presence of other kids, friendliness of other park

295　visitors, and restrooms. Black respondents indicated lower park satisfaction than white

296　respondents regarding "presence of other kids." Black respondents reported lower park

297　satisfaction than Latino respondents and respondents of two or more races/ethnicities in regard to

298　"friendliness of other park visitors." Respondents of two or more races/ethnicities reported lower

299　park satisfaction than white and Asian respondents regarding "fountains, restrooms, and other

300　services." Summary tables of these significant ANOVA results are available in the

301　Supplementary Material. Furthermore, small effect sizes (i.e., partial eta-squared values) indicate

302　that the practical significance of these differences may be minimal.

4. Discussion

304　　　　This study revealed different ways that built environment features can enhance

305　neighborhood social capital among low-income and ethnoracially diverse parents with young

306　children. Although many respondents in our sample reported visiting local parks on a regular

307　basis, we did not find strong support for a positive association between park use frequency and

308　social capital. This finding was surprising considering established connections between park

309　visits, social relationships, social cohesion, and social capital (Broyles et al. 2011; Cattell et al.

310　2008; Jennings & Bamkole 2019; Mowen & Rung, 2016; Peters et al. 2010). However, many of

311　these studies have also noted heterogeneity in park-mediated social capital across diverse

312　populations and neighborhoods (Mowen & Rung 2016), and our study specifically focused on a

313　group that has rarely been the subject of previous research: low-income parents. For this

314　population, our results suggest that park visit frequency and access may be less important than

315　park quality when it comes to cultivation of neighborhood social capital.

316　　　　The strongest correlate of social capital in our sample was park satisfaction, which we

317　operationalized as the perceived quality of specific features at parents' most recently visited

318   park. The parks most likely to bolster social capital were those with desirable amenities (e.g.,

319   playgrounds, friendly park staff, and open space) that are well maintained. Such amenities have

320   boosted park vitality in other contexts (Banchiero et al., 2020), and they may be particularly

321   important for parents who visit parks with their children in search of specific activities and

322   experiences (Boxberger & Reimers, 2019; Larson et al., 2013). Previous research has shown that,

323   for adults and youth, park amenities and programming are positively associated with park-based

324   physical activity (Baran et al., 2014). In fact, features related to park quality may be more

325   important than park quantity or proximity when it comes to promoting active park use (Huang et

326   al. 2020; Kaczynski et al., 2008). Other studies have shown that, relative to park quantity or

327   proximity, park and green space quality may be more strongly associated with improved mental

328   health and sense of community (Francis et al. 2012), as well as neighborhood social ties

329   (Kazmierczak 2013) and neighborhood satisfaction (Kweon et al., 2010; Lee et al., 2017). People

330   are more likely to stay longer at high quality parks with desirable amenities and engage with

331   more park activities and other park visitors (Chen et al., 2020), leading to numerous health

332   benefits (Grilli et al., 2020). Thus, investing in parks and green spaces may facilitate formation

333   of social capital and ultimately improve health (Pitas et al., 2021), especially among parents in

334   low-income communities of color (Galindo et al., 2017).

335   We also observed indirect effects of the neighborhood built environment on social capital

336   through park satisfaction. When parents with young children feel safe walking to their

337   neighborhood park, they may experience more positive social interactions (including with other

338   families) and feel more satisfied (Hur & Morrow-Jones, 2008). Our results support previous

339   studies showing that children can be active agents in the development and maintenance of social

340   capital at the family and neighborhood level, and that park visits may play an important role in

341   that process (Weller & Bruegel, 2009). Again, this connection between quality social and built

342   infrastructure and social capital appears to be particularly important for the ethnoracially diverse

343   and low-income populations that were the focus of this study (Versey, 2018).

344   However, the critical contribution of park satisfaction and perceived park quality to

345   neighborhood social capital underlines existing inequities. Despite decades of effort to address

346   distributional injustices in park distribution and access (Rigolon, 2016), attempts to address

347   inequities in park quality have been less successful (Boone et al., 2009). Across the United

348   States, low-income communities of color tend to have lower quality parks (Rigolon et al., 2018).

349   Our study suggests such disparities in park quality, which reduce park satisfaction, may impede

350   vulnerable populations' ability to accumulate valuable social capital. Considering links between

351   social capital, social mobility, and community development (Agnitsch et al. 2006; Harrison et al.

352   2016), these gaps may exacerbate wealth, health, and quality-of-life disparities in low-income

353   minority neighborhoods.

354   Outside of park experiences, perceptions of walkability and perceived safety from crime

355   were directly related to social capital. These results support other studies documenting positive

356   associations between neighborhoods conducive to walking, social capital, and quality of life

357   (French et al. 2014; Leyden 2003; Rogers et al. 2010; Won & Lee, 2020). Although we did not

358   find the strong links between walkability and park use frequency that have been observed in

359   other studies (Moran et al. 2020), walkability appeared to bolster social capital by boosting park

360   satisfaction. We also found strong positive associations between perceived safety from crime and

361   neighborhood social capital, mirroring patterns in other studies focused on connections between

362   perceived crime and park use (Marquet et al. 2019, Koohsari et al. 2012, Hipp et al., 2013) and

363   social capital (Hong et al. 2018). Perceptions of safety may be important for parents who are

364   concerned about the independent mobility of their children, with respect to park use (Veitch et

365   al., 2014). Collectively, our results build on previous research to illustrate the prominent role that

366   the built environment plays in park use and development of social capital, especially in low-

367   income communities.

368   Yet our findings also reveal a potential problem. Perceived walkability and safety from

369   crime reported by parents in our sample were low, which suggests the presence of injustices with

370   respect to neighborhood built environments. Similar built environment disparities have been

371   previously documented in vulnerable communities of color (Hutch et al. 2011). Efforts to

372   address these issues by making neighborhoods safe and more walkable with greater access to

373   high quality parks could help enhance social capital and build resilience within diverse, low-

374   income communities (Kazmierczak 2013; Poortinga 2012).

375   *4.1. Limitations and future research*

376   Our research was novel because it focused on a historically understudied sample: low-

377   income parents with young children. Our results therefore yield unique insights about the

378   importance of parks and built environment factors on neighborhood social capital in these family

379   groups. While other studies have examined park use correlates for parents and children (Ogletree

380   et al., 2020), few have focused on social capital specifically. Because reaching a nationally

381   representative sample of low-income parents is a challenging endeavor, we opted to use a

382   Qualtrics panel survey to connect with potential participants. There is ongoing debate about the

383   validity and generalizability of online panels in survey research, but a growing number of studies

384   are endorsing this approach (Boas et al., 2020; Lowry et al., 2016). Future research could attempt

385   to replicate these findings with a larger national sample or a series of deeper, more localized

386   investigations that account for specific neighborhood context and more diverse populations (i.e.,

387   not just parents) across the rural to urban gradient.

388   Despite our use of SEM, cross-sectional data limited our ability to draw causal inferences

389   about the role of parks and built environment features in the creation of social capital. Our

390   measures were intentionally generic given the coarse and non-contextualized nature of the

391   national sample. For example, we assessed individual-level perceived social capital, rather than

392   multilevel social capital. Additionally, we only assessed visitation frequency at respondents'

393   usual park, and we only asked about satisfaction with different features and amenities during

394   respondents' most recent park visit. This approach likely minimized recall bias, similar to past

395   studies (Kaczynski et al., 2014; Mowen et al., 2007), but also restricted our ability to account for

396   other impacts of park experiences. Additionally, our analysis did not account for the duration or

397   intensity of park visits, social activity at the parks, or participation in specific park-based

398   activities. Research has shown that health benefits of nature and park visits may depend on

399   dosage (Shanahan et al., 2016), and research could explore how dosage impact might extend to

400   social capital. Future studies could also use more comprehensive measures of park quality that

401   extend beyond satisfaction (e.g., ParkIndex; Kaczynski et al., 2020). Finally, to more effectively

402   assess causality, researchers could employ longitudinal designs to assess shifts in park-based

403   social interactions and social capital following renovations and quality improvements, similar to

404   research that has been done on park-based physical activity (Cohen et al., 2019).

405   Because we did not have information about respondents' precise location in this study,

406   we were not able to derive spatial estimates of neighborhood attributes, such as walkability and

407   safety from crime. Instead, we relied on their perceptions of the built environment. Though

408   subjective, perceptions are often important factors influencing sense of community and behaviors

409   including use of public space (Comstock et al., 2010). However, future research might also

410   compare perceptions with overt measures and secondary data on park quantity and quality, as

411   well as built environment features (including crime, traffic, and transportation infrastructure).

412   **5. Conclusion**

413   Parks are important resources for all communities, but may confer particularly important

414   social benefits in low-income, ethnoracially diverse neighborhoods. This study illuminated the

415   potential for high-quality parks and safe, walkable, built environments to enhance neighborhood

416   social capital within diverse communities—particularly among parents with young children. We

417   found park quality to be a more important correlate of social capital than either park visit

418   frequency or accessibility, though each aspect likely plays a role (Jennings & Bamkole 2019).

419   Although substantial research has highlighted links between park access and benefits to well-

420   being, comparatively little research has demonstrated the influence of park quality on similar

421   outcomes. By contributing to social capital, parks and the built environment have the capacity to

422   bolster social mobility and health across diverse populations. Still, our results highlight serious

423   environmental justice concerns stemming from persistent inequities in park quality,

424   neighborhood walkability, and safety from crime (Rigolon, 2017). Cities hoping to enhance

425   social capital in vulnerable communities would be wise to engage in more inclusive planning and

426   development processes (Smiley et al., 2016) and invest in quality parks and built environment

427   features that create opportunities for positive social interactions among all populations,

428   especially low-income parents with young children.

References

1. Agnitsch, K., Flora, J., & Ryan, V. (2006). Bonding and bridging social capital: The interactive effects on community action. *Community Development*, *37*(1), 36-51.
2. Banchiero, F., Blečić, I., Saiu, V., & Trunfio, G. A. (2020). Neighbourhood park vitality potential: From Jane Jacobs's theory to evaluation model. *Sustainability*, *12*(15). doi: 10.3390/su12155881
3. Baran, P. K., Smith, W. R., Moore, R. C., Floyd, M. F., Bocarro, J. N., Cosco, N. G., & Danninger, T. M. (2014). Park use among youth and adults: examination of individual, social, and urban form factors. Environment and Behavior, 46(6), 768-800.
4. Barker, A., Crawford, A., Booth, N., & Churchill, D. (2019). Everyday encounters with difference in urban parks: Forging 'openness to otherness' in segmenting cities. *International Journal of Law in Context*, *15*(4), 495-514.
5. Baur, J. W., Gómez, E., & Tynon, J. F. (2013). Urban nature parks and neighborhood social health in Portland, Oregon. *Journal of Park & Recreation Administration*, *31*(4), 23-44.
6. Bennet, S. A., Yiannakoulias, N., Williams, A. M., & Kitchen, P. (2012). Playground accessibility and neighbourhood social interaction among parents. *Social Indicators Research*, *108*(2), 199-213.
7. Boas, T. C., Christenson, D. P., & Glick, D. M. (2020). Recruiting large online samples in the United States and India: Facebook, Mechanical Turk, and Qualtrics. *Political Science Research and Methods*, *8*(2), 232-250.
8. Boone, C. G., Buckley, G. L., Grove, J. M., & Sister, C. (2009). Parks and people: An environmental justice inquiry in Baltimore, Maryland. Annals of the Association of American Geographers, 99(4), 767-787.
9. Bourdieu, P. (1986). The forms of capital. In I. Szeman and T. Kaposy (Eds.) *Cultural theory: An anthology* (pp. 81-93). Wiley & Sons.
10. Boxberger, K., & Reimers, A. K. (2019). Parental correlates of outdoor play in boys and girls aged 0 to 12—A systematic review. International journal of environmental research and public health, 16(2), 190.
11. Broyles, S. T., Mowen, A. J., Theall, K. P., Gustat, J., & Rung, A. L. (2011). Integrating social capital into a park-use and active-living framework. American Journal of Preventive Medicine, 40(5), 522-529.
12. Bubolz, M. M. (2001). Family as source, user, and builder of social capital. The Journal of socio-economics, 30(2), 129-131.
13. Campbell, L. K., Svendsen, E., Johnson, M., & Landau, L. (2021). Activating urban environments as social infrastructure through civic stewardship. *Urban Geography*, 1-22.
14. Cattell, V. (2001). Poor people, poor places, and poor health: The mediating role of social networks and social capital. *Social Science & Medicine, 52*(10), 1501-1516.

14.15.   Cattell, V., Dines, N., Gesler, W., & Curtis, S. (2008). Mingling, observing, and lingering: Everyday public spaces and their implications for well-being and social relations. *Health & Place*, *14*(3), 544-561.

15.16.   Cerin, E., Conway, T. L., Saelens, B. E., Frank, L. D., & Sallis, J. F. (2009). Cross-validation of the factorial structure of the Neighborhood Environment Walkability Scale (NEWS) and its abbreviated form (NEWS-A). *International Journal of Behavioral Nutrition and Physical Activity*, *6*(1), 1-10.

16.17.   Chen, C., Luo, W., Li, H., Zhang, D., Kang, N., Yang, X., & Xia, Y. (2020). Impact of perception of green space for health promotion on willingness to use parks and actual use among young urban residents. International journal of environmental research and public health, 17(15), 5560.

17.18.   Chetty, R., Hendren, N., Jones, M. R., & Porter, S. R. (2020). Race and economic opportunity in the United States: An intergenerational perspective. *The Quarterly Journal of Economics*, *135*(2), 711-783. doi: 10.1093/qje/qjz042

18.19.   Cohen, D. A., Han, B., Isacoff, J., Shulaker, B., & Williamson, S. (2019). Renovations of neighbourhood parks: long-term outcomes on physical activity. J Epidemiol Community Health, 73(3), 214-218.

19.20.   Coleman, J. S. (1990). Social capital. In J. S. Coleman *Foundations of Social Theory* (pp. 310-331). Belknap Press.

20.21.   Comstock, N., Dickinson, L. M., Marshall, J. A., Soobader, M. J., Turbin, M. S., Buchenau, M., & Litt, J. S. (2010). Neighborhood attachment and its correlates: Exploring neighborhood conditions, collective efficacy, and gardening. *Journal of Environmental Psychology*, *30*(4), 435-442.

21.22.   Coutts, C., & Miles, R. (2011). Greenways as green magnets: The relationship between the race of greenway users and race in proximal neighborhoods. Journal of leisure research, 43(3), 317-333.

22.23.   Curley, A. M. (2010). Relocating the poor: Social capital and neighborhood resources. *Journal of Urban Affairs*, *32*(1), 79-103.

23.24.   Dadvand, P., Hariri, S., Abbasi, B., Heshmat, R., Qorbani, M., Motlagh, M. E., ... & Kelishadi, R. (2019). Use of green spaces, self-satisfaction and social contacts in adolescents: a population-based CASPIAN-V study. Environmental research, 168, 171-177.

24.25.   Department of Housing and Urban Development (HUD) (2019). Methodology for determining Section 8 income limits. Available at https://www.huduser.gov/portal/datasets/il/il19/IncomeLimitsMethodology-FY19.pdf

25.26.   Erbstein, N. (2013). Engaging underrepresented youth populations in community youth development: Tapping social capital as a critical resource. *New Directions for Youth Development*, *2013*(138), 109-124. doi: 10.1002/yd.20061

26.27.   Falk, I., & Kilpatrick, S. (2000). What is social capital? A study of interaction in a rural community. *Sociologia Ruralis*, *40*(1), 87-110.

27 28.　　Fan, Y., Das, K. V., & Chen, Q. (2011). Neighborhood green, social support, physical activity, and stress: Assessing the cumulative impact. *Health & Place*, *17*(6), 1202-1211.

28 29.　　Francis, J., Giles-Corti, B., Wood, L., & Knuiman, M. (2012). Creating sense of community: The role of public space. *Journal of Environmental Psychology*, *32*(4), 401-409.

29 30.　　French, S., Wood, L., Foster, S. A., Giles-Corti, B., Frank, L., & Learnihan, V. (2014). Sense of community and its association with the neighborhood built environment. *Environment and Behavior*, *46*(6), 677-697.

30 31.　　Galindo, C., Sanders, M., & Abel, Y. (2017). Transforming educational experiences in low-income communities: A qualitative case study of social capital in a full-service community school. *American Educational Research Journal, 54*(Sl), 140S-163S.

31 32.　　Gilbert, K., & Dean, L. (2013). Social capital, social policy, and health disparities: A legacy of political advocacy in African-American communities. In I. Kawachi et al. (Eds.) *Global perspectives on social capital and health* (pp. 307-322). Springer.

32 33.　　Glover, T. D., & Parry, D. C. (2008). Friendships developed subsequent to a stressful life event: The interplay of leisure, social capital, and health. *Journal of Leisure Research, 40*(2), 208-230.

33 34.　　Grilli, G., Mohan, G., & Curtis, J. (2020). Public park attributes, park visits, and associated health status. Landscape and Urban Planning, 199, 103814.

34 35.　　Hammitt, W. E., Backlund, E. A., & Bixler, R. D. (2006). Place bonding for recreation places: Conceptual and empirical development. Leisure studies, 25(1), 17-41.

35 36.　　Harlan, S. L., Sarango, M. J., Mack, E. A., & Stephens, T. A. (2019). A survey-based assessment of perceived flood risk in urban areas of the United States. Anthropocene, 28, 100217.

36 37.　　Harris, B., Schmalz, D., Larson, L., Fernandez, M., & Griffin, S. (2019). Contested Spaces: Intimate Segregation and Environmental Gentrification on Chicago's 606 Trail. City & Community.

37 38.　　Harrison, J. L., Montgomery, C. A., & Bliss, J. C. (2016). Beyond the monolith: the role of bonding, bridging, and linking social capital in the cycle of adaptive capacity. Society & Natural Resources, 29(5), 525-539.

38 39.　　Hartig, T., Mitchell, R., De Vries, S., & Frumkin, H. (2014). Nature and health. Annual review of public health, 35, 207-228.

39 40.　　Hawkins, R. L., & Maurer, K. (2010). Bonding, bridging and linking: How social capital operated in New Orleans following Hurricane Katrina. British Journal of Social Work, 40(6), 1777-1793.

40 41.　　Hayes, A. F., & Coutts, J. J. (2020). Use omega rather than Cronbach's alpha for estimating reliability. But…. *Communication Methods and Measures*, *14*(1), 1-24.

41.42.   Hero, R. E. (2003). Social capital and racial inequality in America. Perspectives on Politics, 1(1), 113-122.

42.43.   Hipp, J. A., Adlakha, D., & Chockalingam, R. (2013). *Social ecological constraints to park use in communities with proximate park access*. Center for Social Development. CSD Working Paper No. 11-36. Washington University, St. Louis.

43.44.   Holtan, M. T., Dieterlen, S. L., & Sullivan, W. C. (2015). Social life under cover: tree canopy and social capital in Baltimore, Maryland. Environment and behavior, 47(5), 502-525.

44.45.   Hong, A., Sallis, J. F., King, A. C., Conway, T. L., Saelens, B., Cain, K. L., ... & Frank, L. D. (2018). Linking green space to neighborhood social capital in older adults: The role of perceived safety. Social Science & Medicine, 207, 38-45.

45.46.   Huang, J. H., Hipp, J. A., Marquet, O., Alberico, C., Fry, D., Mazak, E., ... & Floyd, M. F. (2020). Neighborhood characteristics associated with park use and park-based physical activity among children in low-income diverse neighborhoods in New York City. *Preventive Medicine*, *131*. doi: 10.1016/j.ypmed.2019.105948

46.47.   Hughey, S. M., Walsemann, K. M., Child, S., Powers, A., Reed, J. A., & Kaczynski, A. T. (2016). Using an environmental justice approach to examine the relationships between park availability and quality indicators, neighborhood disadvantage, and racial/ethnic composition. *Landscape and Urban Planning, 148,* 159-169. doi: 10.1016/j.landurbplan.2015.12.016

47.48.   Hur, M., & Morrow-Jones, H. (2008). Factors that influence residents' satisfaction with neighborhoods. *Environment and Behavior*, *40*(5), 619-635. doi: 10.1177/0013916507307483

48.49.   Hutch, D. J., Bouye, K. E., Skillen, E., Lee, C., Whitehead, L., & Rashid, J. R. (2011). Potential strategies to eliminate built environment disparities for disadvantaged and vulnerable communities. American journal of public health, 101(4), 587-595.

49.50.   Jennings, V., & Bamkole, O. (2019). The relationship between social cohesion and urban green space: An avenue for health promotion. International journal of environmental research and public health, 16(3), 452.

50.51.   Jennings, V., Larson, L., & Yun, J. (2016). Advancing sustainability through urban green space: Cultural ecosystem services, equity, and social determinants of health. International Journal of environmental research and public health, 13(2), 196.

51.52.   Kabisch, N., Qureshi, S., & Haase, D. (2015). Human–environment interactions in urban green spaces—A systematic review of contemporary issues and prospects for future research. Environmental Impact Assessment Review, 50, 25-34.

52.53.   Kaczynski, A. T., Besenyi, G. M., Stanis, S. A. W., Koohsari, M. J., Oestman, K. B., Bergstrom, R., ... & Reis, R. S. (2014). Are park proximity and park features related to park use and park-based physical activity among adults? Variations by multiple socio-demographic characteristics. International Journal of Behavioral Nutrition and Physical Activity, 11(1), 146.

53 54.   Kaczynski, A. T., Hughey, S. M., Stowe, E. W., Wende, M. E., Hipp, J. A., Oliphant, E. L., & Schipperijn, J. (2020). ParkIndex: Validation and application of a pragmatic measure of park access and use. Preventive Medicine Reports, 101218.

54 55.   Kaczynski, A. T., Potwarka, L. R., & Saelens, B. E. (2008). Association of park size, distance, and features with physical activity in neighborhood parks. American journal of public health, 98(8), 1451-1456.

55 56.   Kaźmierczak, A. (2013). The contribution of local parks to neighbourhood social ties. *Landscape and Urban Planning*, *109*(1), 31-44.

56 57.   Kim, M. S., Kim, D., & Altema McNeely, N. (2020). Race, inequality, and social capital in the US counties. The Social Science Journal, 1-19.

57 58.   Kline, R. (2016). *Principles and practice of structural equation modeling*. New York, NY: Guilford Press.

58 59.   Koohsari, M. J., Karakiewicz, J. A., & Kaczynski, A. T. (2013). Public open space and walking: The role of proximity, perceptual qualities of the surrounding built environment, and street configuration. *Environment and Behavior*, *45*(6), 706-736.

59 60.   Kuo, M. (2015). How might contact with nature promote human health? Promising mechanisms and a possible central pathway. Frontiers in psychology, 6, 1093.

60 61.   Kweon, B. S., Ellis, C. D., Leiva, P. I., & Rogers, G. O. (2010). Landscape components, land use, and neighborhood satisfaction. *Environment and Planning B: Planning and Design*, *37*(3), 500-517. doi: 10.1068/b35059

61 62.   Lance, C. E., Butts, M. M., & Michels, L. C. (2006). The sources of four commonly reported cutoff criteria: What did they really say?. *Organizational Research Methods*, *9*(2), 202-220.

62 63.   Larson, L. R., Whiting, J. W., & Green, G. T. (2013). Young people's outdoor recreation and state park use: Perceived benefits from the parent/guardian perspective. Children Youth and Environments, 23(3), 89-118.

64. Latham, A., & Layton, J. (2019). Social infrastructure and the public life of cities: Studying urban sociality and public spaces. *Geography Compass*, *13*(7), 1-15.

63 65.   Laurence, J. (2011). The effect of ethnic diversity and community disadvantage on social cohesion: A multi-level analysis of social capital and interethnic relations in UK communities. *European Sociological Review*, *27*(1), 70-89. doi: 10.1093/esr/jcp057

64 66.   Lee, S. M., Conway, T. L., Frank, L. D., Saelens, B. E., Cain, K. L., & Sallis, J. F. (2017). The relation of perceived and objective environment attributes to neighborhood satisfaction. *Environment and Behavior*, *49*(2), 136-160. doi: 10.1177/0013916515623823

65 67.   Leyden, K. M. (2003). Social capital and the built environment: The importance of walkable neighborhoods. *American Journal of Public Health*, *93*(9), 1546-1551.

66 68.   Lindström, M. (2011). Social capital, desire to increase physical activity and leisure-time physical activity: a population-based study. Public health, 125(7), 442-447.

67 69.   Lowry, P. B., D'Arcy, J., Hammer, B., & Moody, G. D. (2016). "Cargo Cult" science in traditional organization and information systems survey research: A case for using nontraditional methods of data collection, including Mechanical Turk and online panels. The Journal of Strategic Information Systems, 25(3), 232-240.

68 70.   Maas, J., Van Dillen, S. M., Verheij, R. A., & Groenewegen, P. P. (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health & Place*, *15*(2), 586-595. doi: 10.1016/j.healthplace.2008.09.006

69 71.   Maass, R., Kloeckner, C. A., Lindstrøm, B., & Lillefjell, M. (2016). The impact of neighborhood social capital on life satisfaction and self-rated health: A possible pathway for health promotion?. Health & place, 42, 120-128.

70 72.   Marquet, O., Hipp, J. A., Alberico, C., Huang, J. H., Fry, D., Mazak, E., ... & Floyd, M. F. (2019). Short-term associations between objective crime, park-use, and park-based physical activity in low-income neighborhoods. *Preventive Medicine*, *126*. doi: 10.1016/j.ypmed.2019.05.023.

71 73.   Marquet, O., Ogletree, S. S., Hipp, J. A., Suau, L. J., Horvath, C. B., Sinykin, A., & Floyd, M. F. (2020). Effects of crime type and location on park use behavior. *Preventing Chronic Disease*, *17*(E73), 1-11. doi: 10.5888/pcd17.190434

72 74.   Miller, C. A., Guidry, J. P., Dahman, B., & Thomson, M. D. (2020). A tale of two diverse Qualtrics samples: information for online survey researchers.

73 75.   Millstein, R. A., Strobel, J., Kerr, J., Sallis, J. F., Norman, G. J., Durant, N., ... & Saelens, B. E. (2011). Home, school, and neighborhood environment factors and youth physical activity. *Pediatric Exercise Science*, *23*(4), 487-503.

74 76.   Mohnen, S. M., Groenewegen, P. P., Völker, B., & Flap, H. (2011). Neighborhood social capital and individual health. Social science & medicine, 72(5), 660-667.

75 77.   Mohnen, S. M., Völker, B., Flap, H., Subramanian, S. V., & Groenewegen, P. P. (2015). The influence of social capital on individual health: is it the neighbourhood or the network? *Social Indicators Research*, *121*(1), 195-214. doi: 10.1007/sl 1205-014-0632-8

76 78.   Moore, S. A., Crilley, G., Darcy, S., Griffin, T., Taplin, R., Tonge, J., Wegner, A., & Smith, A. (2009). *Designing and testing a park-based visitor survey*. Gold Coast, Queensland, Australia: CRC for Sustainable Tourism Pty Ltd.

77 79.   Moran, M. R., Rodríguez, D. A., Cotinez-O'Ryan, A., & Miranda, J. J. (2020). Park use, perceived park proximity, and neighborhood characteristics: Evidence from 11 cities in Latin America. *Cities*, *105*. doi: 10.1016/j.cities.2020.102817.

78 80.   Mowen, A. J., & Rung, A. L. (2016). Park-based social capital: Are there variations across visitors with different socio-demographic characteristics and behaviours? *Leisure/Loisir*, *40*(3), 297-324.

79 81.   Mowen, A., Orsega-Smith, E., Payne, L., Ainsworth, B., & Godbey, G. (2007). The role of park proximity and social support in shaping park visitation, physical activity,

and perceived health among older adults. Journal of Physical Activity and Health, 4(2), 167-179.

80 82.   Nesbitt, L., Meitner, M. J., Girling, C., Sheppard, S. R., & Lu, Y. (2019). Who has access to urban vegetation? A spatial analysis of distributional green equity in 10 US cities. *Landscape and Urban Planning*, *181*, 51-79. doi: 10.1016/j.landurbplan.2018.08.007

81 83.   Ogletree, S. S., Huang, J. H., Alberico, C., Marquet, O., Floyd, M. F., & Hipp, J. A. (2020). Parental preference for park attributes related to children's use of parks in low-income, racial/ethnic diverse neighborhoods. *Journal of Healthy Eating and Active Living*, *1*(1), 6-15. doi: 10.51250/jheal.v1i1.6

82 84.   Perkins, D. D., Hughey, J., & Speer, P. W. (2002). Community psychology perspectives on social capital theory and community development practice. *Community Development*, *33*(1), 33-52.

83 85.   Peters, K., Elands, B., & Buijs, A. (2010). Social interactions in urban parks: Stimulating social cohesion? *Urban Forestry & Urban Greening*, *9*(2), 93-100.

84 86.   Pitas, N., & Ehmer, C. (2020). Social Capital in the Response to COVID-19. *American Journal of Health Promotion*, *34*(8), 942-944.

85 87.   Pitas, N. A., Mowen, A. J., & Powers, S. L. (2021). Person-place relationships, social capital, and health outcomes at a nonprofit community wellness center. *Journal of Leisure Research*, *52*(2), 247-264.

86 88.   Poortinga, W. (2012). Community resilience and health: The role of bonding, bridging, and linking aspects of social capital. Health & place, 18(2), 286-295.

87 89.   Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology, 24*,1-24.

88 90.   Pretty, J., & Smith, D. (2004). Social capital in biodiversity conservation and management. *Conservation Biology*, *18*(3), 631-638.

89 91.   Rhodes, R. E., Guerrero, M. D., Vanderloo, L. M., Barbeau, K., Birken, C. S., Chaput, J. P., ... & McHugh, T. L. (2020). Development of a consensus statement on the role of the family in the physical activity, sedentary, and sleep behaviours of children and youth. International Journal of Behavioral Nutrition and Physical Activity, 17(1), 1-31.

90 92.   Rigolon, A. (2016). A complex landscape of inequity in access to urban parks: A literature review. Landscape and Urban Planning, 153, 160-169.

91 93.   Rigolon, A. (2017). Parks and young people: An environmental justice study of park proximity, acreage, and quality in Denver, Colorado. Landscape and Urban Planning, 165, 73-83.

92 94.   Rigolon, A., Browning, M., & Jennings, V. (2018). Inequities in the quality of urban park systems: An environmental justice investigation of cities in the United States. Landscape and Urban Planning, 178, 156-169.

93 95.   Roberts, H., Kellar, I., Conner, M., Gidlow, C., Kelly, B., Nieuwenhuijsen, M., & McEachan, R. (2019). Associations between park features, park satisfaction and park use in a multi-ethnic deprived urban area. Urban Forestry & Urban Greening, 46, 126485.

94 96.   Rogers, S. H., Halstead, J. M., Gardner, K. H., & Carlson, C. H. (2010). Examining walkability and social capital as indicators of quality of life at the municipal and neighborhood scales. Applied Research Quality of Life, 6, 201-213. doi:10.1007/s11482-010-9132-4

95 97.   Schipperijn, J., Ekholm, O., Stigsdotter, U. K., Toftager, M., Bentsen, P., Kamper-Jørgensen, F., & Randrup, T. B. (2010). Factors influencing the use of green space: Results from a Danish national representative survey. Landscape and urban planning, 95(3), 130-137.

96 98.   Shanahan, D. F., Bush, R., Gaston, K. J., Lin, B. B., Dean, J., Barber, E., & Fuller, R. A. (2016). Health benefits from nature experiences depend on dose. Scientific reports, 6, 28551.

97 99.   Smiley, K. T., Sharma, T., Steinberg, A., Hodges-Copple, S., Jacobson, E., & Matveeva, L. (2016). More inclusive parks planning: Park quality and preferences for park access and amenities. Environmental Justice, 9(1), 1-7.

98 100.   Thompson, M. (2018). Social capital, innovation and economic growth. *Journal of Behavioral and Experimental Economics*, *73*, 46-52. doi: 10.1016/j.socec.2018.01.005

99 101.   Valente, D., Pasimeni, M. R., & Petrosillo, I. (2020). The role of green infrastructures in Italian cities by linking natural and social capital. Ecological Indicators, 108, 105694.

100 102.   Van Deth, J. W. (2003). Measuring social capital: Orthodoxies and continuing controversies. *International Journal of Social Research Methodology*, *6*(1), 79-92. doi: 10.1080/13645570305057

101 103.   Veitch, J., Carver, A., Hume, C., Crawford, D., Timperio, A., Ball, K., & Salmon, J. (2014). Are independent mobility and territorial range associated with park visitation among youth?. International journal of behavioral nutrition and physical activity, 11(1), 73.

102 104.   Veitch, J., Rodwell, L., Abbott, G., Carver, A., Flowers, E., & Crawford, D. (2021). Are park availability and satisfaction with neighbourhood parks associated with physical activity and time spent outdoors? *BMC Public Health*, *21*(1), 1-10. doi: 10.1186/s12889-021-10339-1

103 105.   Vemuri, A. W., Morgan Grove, J., Wilson, M. A., & Burch Jr, W. R. (2011). A tale of two scales: Evaluating the relationship among life satisfaction, social capital, income, and the natural environment at individual and neighborhood levels in metropolitan Baltimore. Environment and Behavior, 43(1), 3-25.

104 106.   Versey, H. S. (2018). A tale of two Harlems: Gentrification, social capital, and implications for aging in place. *Social Science & Medicine, 214*, 1-11.

105.107.   Ward Thompson, C., Aspinall, P., Roe, J., Robertson, L., & Miller, D. (2016). Mitigating stress and supporting health in deprived urban communities: the importance of green space and the social environment. International journal of environmental research and public health, 13(4), 440.

106.108.   Weller, S., & Bruegel, I. (2009). Children's 'place' in the development of neighbourhood social capital. *Urban Studies*, *46*(3), 629-643. doi: 10.1177/0042098008100998

107.109.   Won, J., & Lee, J. S. (2020). Impact of residential environments on social capital and health outcomes among public rental housing residents in Seoul, South Korea. Landscape and Urban Planning, 203, 1-11. doi: 10.1016/j.landurbplan.2020.103882

108.110.   Wood, L., & Giles-Corti, B. (2008). Is there a place for social capital in the psychology of health and place?. Journal of environmental psychology, 28(2), 154-163.

109.111.   Yuan, K. H., & Bentler, P. M. (2000). Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociological Methodology*, *30*(1), 165-200.

110.112.   Ziersch, A. M., Baum, F. E., MacDougall, C., & Putland, C. (2005). Neighbourhood life and social capital: The implications for health. *Social Science & Medicine*, *60*(1), 71-86. doi: 10.1016/j.socscimed.2004.04.027

111.113.   Ziersch, A., Osborne, K., & Baum, F. (2011). Local community group participation: Who participates and what aspects of neighbourhood matter? *Urban Policy and Research*, *29*(4), 381-399.

List of Tables

Table 1. Sociodemographic attributes of sample of ethnoracially diverse, low-income parents across the United States.

	N	%
Household income		
< $25,000	740	46%
$25,001-42,786	871	54%
Gender		
Female	1374	85%
Male	226	14%
Age	M = 33.2	SD = 6.4
Race		
White	317	20%
Black	566	35%
Asian	112	7%
Latino	392	24%
Other	57	4%
Two or more races/ethnicities	167	35%
Total	1,611	

Table 2. Frequencies, descriptive statistics for park use, perceived neighborhood built environment, and social capital reported by sample of ethnoracially diverse, low-income parents across the United States.

	N	%
Park within a ten minute walk from home		
Yes	627	40%
No	955	60%
Visits park…		
Daily	147	9%
Weekly	779	48%
Monthly	276	17%
Occasionally	380	24%
Never	28	2%

Table 3. Measurement model for items describing social capital, park satisfaction, and perceived neighborhood built environment.

Item	Mean	SD	B	SE
aSocial capital (ω = .82)				
People get along with each other	3.04	0.81	1	
People share the same values	2.88	0.79	1.17	.05
In general, people are willing to help other people	2.86	0.77	1.32	.06
You can count on adults to watch out that children are safe and do not get into trouble	2.65	0.91	1.41	.08
People can be trusted	2.61	0.89	1.48	.08
Total	**2.81**	**0.83**		
bPark satisfaction (ω = .83)				
Availability of open spaces	2.59	0.56	.91	.04
Green space	2.55	0.61	.90	.05
Facilities and playing equipment for kids	2.49	0.59	1	
Presence of other kids	2.45	0.58	1.01	.05
Friendliness of other park users	2.44	0.60	1.18	.05
General cleanliness	2.38	0.65	1.23	.05
Fountains, restrooms, and other services	2.15	0.75	1.24	.06
Total	**2.44**	**0.62**		

Table 3 cont. Measurement model for items describing social capital, park satisfaction, and perceived neighborhood built environment.

Item	Mean	SD	B	SE
[a]*Crime safety (ω = .72)*				
I see and speak to other people when I am walking	2.8	0.9	.66	.04
Walkers and bikers can be easily seen by people in their homes	2.7	0.9	.96	.04
Streets are well lit at night	2.6	1.0	1	
[a]*Walkability (ω = .68)*				
There are many alternative routes for getting from place to place. (I don't have to go the same way every time.)	2.9	0.9	.79	.05
There are walkways that connect streets to other streets, trails, or cul-de-sacs	2.8	1.0	1	
The distance between intersections is usually short (100 yards or less; the length of a football field or less)	2.8	0.9	.88	.05
[a]*Traffic issues (ω = .64)*				
Most drivers exceed the posted speed limits	2.9	0.9	.72	.07
There is so much traffic that it makes it difficult or unpleasant to walk	2.4	1.0	1	
When walking, there is a lot of exhaust fumes (such as from cars, buses)	2.4	1.0	.78	.07

[a]Items measured on the following scale: 1=Strongly disagree, 2=Somewhat disagree, 3=Somewhat agree, 4=Strongly agree
[b]Items measured on the following scale: 1=Not satisfied, 2=Somewhat satisfied, 3=Extremely satisfied.
Prompts: Social capital: How much do you agree with the following statements regarding the neighborhood around the park you usually go to? Park satisfaction: How satisfied were you following your most recent park visit, regarding each of the following? Crime safety: How much do you agree with the following statements regarding safety from crime in your neighborhood? Walkability: How much do you agree with the following statements regarding streets in your neighborhood? Traffic issues: How much do you agree with the following statements regarding safety from traffic in your neighborhood? Model fit statistics: χ^2=640.91, df=177, p<.001, CFI=.950, RMSEA=.043, SRMR=.036.

Table 4. Results of structural model exploring relationships among perceptions of the built environment, park use frequency and satisfaction, and social capital, and including effects of racial confounders.

Variable	Predicted by	B	SE	Z	p
Park Satisfaction	**Ten minute walk**	**-.11**	**.02**	**-5.28**	**<.001**
	Crime safety	**.14**	**.03**	**5.31**	**<.001**
	Traffic issues	**-.05**	**.02**	**-2.34**	**.02**
	Walkability	**.09**	**.03**	**3.25**	**.001**
Park Use Frequency	**Ten minute walk**	**.27**	**.05**	**5.00**	**<.001**
	Walkability	-.08	.07	-1.23	.22
	Crime safety	**.32**	**.06**	**4.95**	**<.001**
	Traffic issues	.06	.04	1.42	.15
Social capital	Park Use Frequency	.01	.01	.98	.33
	Park satisfaction	**.51**	**.05**	**10.42**	**<.001**
	Walkability	**.17**	**.04**	**4.60**	**<.001**
	Crime safety	**.08**	**.03**	**2.66**	**.01**
	Traffic issues	-.03	.02	-1.68	.09
	Ten minute walk	.01	.02	.41	.69
Confounding variables		B	SE	Z	p
Ten minute walk	**Asian**	**.14**	**.05**	**2.54**	**.01**
	Latinx	**.12**	**.04**	**3.25**	**.001**
	Other race/ethnicity	.01	.07	.09	.93
	Two or more races/ethnicities	**.10**	**.05**	**2.05**	**.04**
	Black	**.10**	**.03**	**3.03**	**.002**
Crime safety	Asian	.14	.08	1.70	.09
	Latinx	-.06	.06	-.88	.38
	Other race/ethnicity	.002	.12	.02	.99
	Two or more races/ethnicities	-.11	.08	-1.33	.18
	Black	**.14**	**.06**	**2.33**	**.02**

Table 4 cont. Results of structural model exploring relationships among perceptions of the built environment, park use frequency and satisfaction, and social capital, and including effects of racial confounders.

Variable	Predicted by	B	SE	Z	p
Traffic issues	Asian	.13	.10	1.35	.18
	Latinx	.03	.07	.48	.63
	Other race/ethnicity	.003	.10	.03	.98
	Two or more races/ethnicities	.01	.08	.16	.87
	Black	.03	.06	.48	.63
Walkability	**Asian**	**.23**	**.09**	**2.70**	**.01**
	Latinx	**.15**	**.06**	**2.40**	**.02**
	Other race/ethnicity	.08	.13	.63	.53
	Two or more races/ethnicities	.08	.08	.99	.32
	Black	**.23**	**.06**	**3.74**	**<.001**
Social capital	Asian	.02	.04	.44	.66
	Latinx	**-.12**	**.03**	**-3.51**	**<.001**
	Other race/ethnicity	-.10	.06	-1.83	.07
	Two or more races/ethnicities	-.07	.04	-1.73	.08
	Black	**-.09**	**.03**	**-3.00**	**.003**

Model fit statistics: χ^2=1150.83, df=309, p<.001, robust CFI=.917, robust RMSEA=.043, SRMR=.063
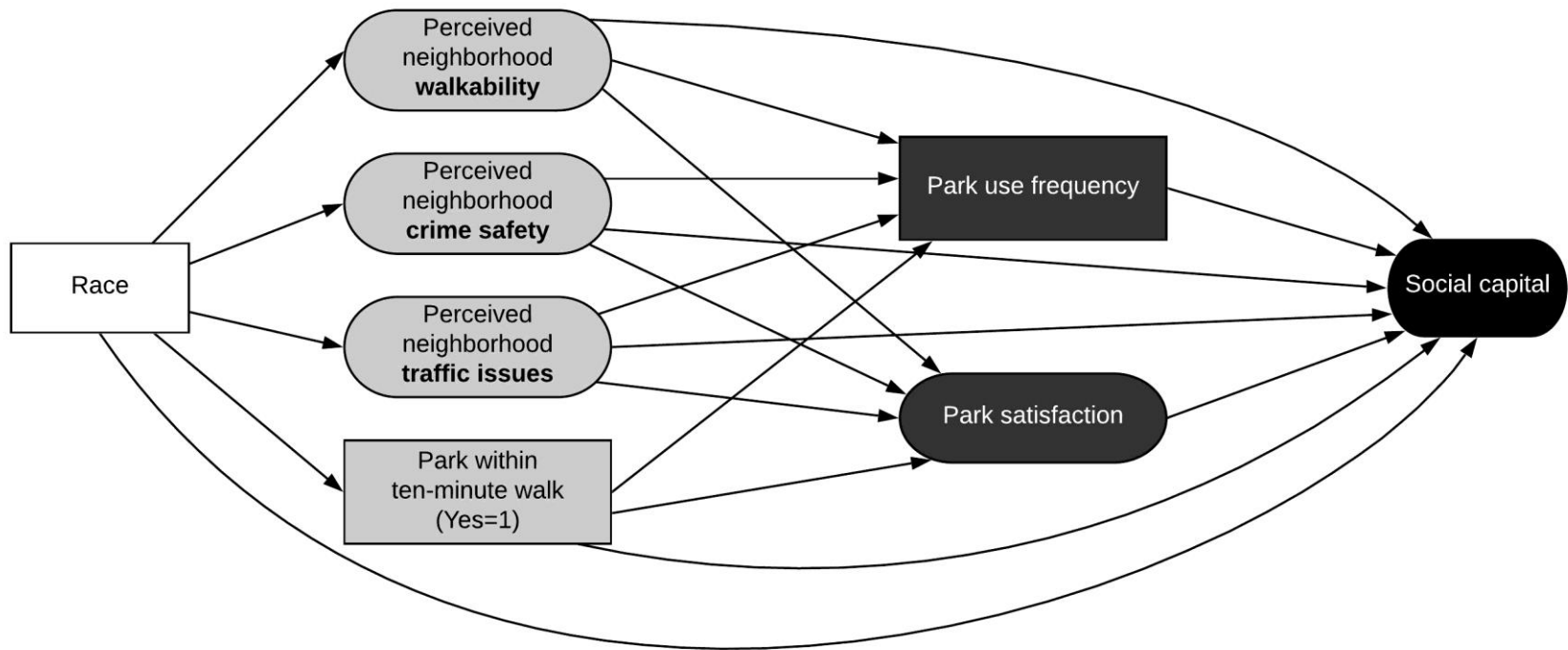
List of Figures

Figure 1. Conceptual model depicting influence of built environment factors, park satisfaction, and park use frequency on social capital for diverse, low-income parents across the United States, with race as a confounding variable

Figure 2. Graphical summary of structural model results examining effects of diverse, low-income parents' built environment perceptions on park use frequency, park satisfaction, and social capital

Figure 1. Conceptual model depicting influence of built environment factors, park satisfaction, and park use frequency on social capital for diverse, low-income parents across the United States, with race as a confounding variable. Note: Racial reference group=white; latent variables signified with ovals, measured variables signified with boxes.
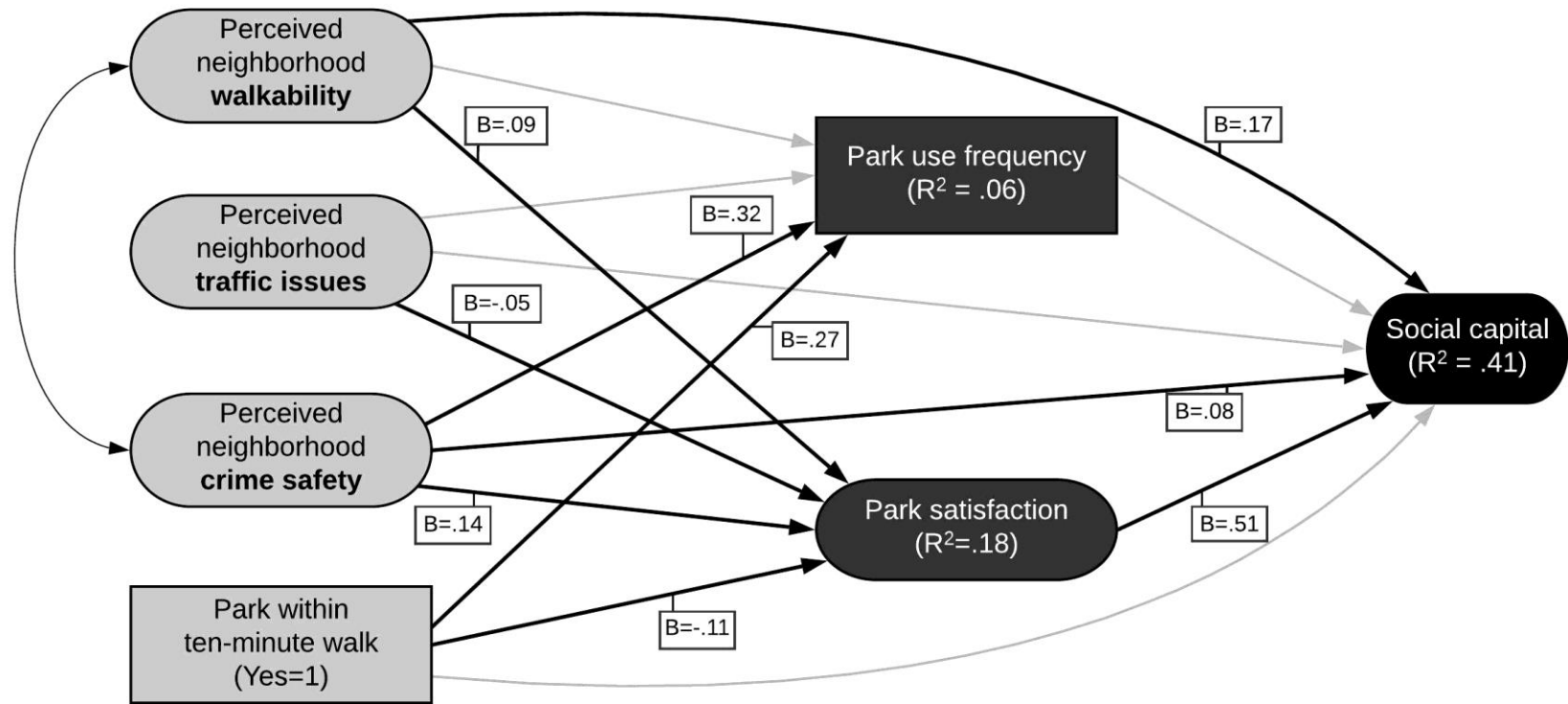
Figure 2. Graphical summary of structural model results examining effects of diverse, low-income parents' built environment perceptions on park use frequency, park satisfaction, and social capital. Non-significant paths are grayed out in the figure. Race not included in figure for simplicity of presentation. Latent variables signified with ovals, measured variables signified with boxes.

CReDIT Author contributions

Conceptualization – All authors; Data curation – JAH, MFF, SSO, OM, JHH, CA; Formal analysis – LEM, Funding acquisition – JAH, MFF; Methodology – all authors; Writing – original draft: LEM, LRL; Writing – review & editing: all authors.