Walkable Neighborhoods: Linkages Between Place, Health, and Happiness in Younger and Older Adults

Link to publication record in Ulster University Research Portal

Document Version
Author Accepted version

1   **Walkable Neighborhoods: Linkages Between Place, Health, and Happiness in Younger and Older**

2   **Adults**

3

4   **Introduction**

5   Does living in a walkable neighborhood make us happier? This study examines whether

6   the design of the places where people reside in Dublin, Ireland affects their happiness,

7   controlling for traditional predictors. Findings suggest that the urban environment does

8   indeed affect happiness; people living in and around Dublin who could walk to attain most of

9   their daily needs were happier all other things being equal. In finding that urban design

10   matters for the happiness of residents, we hope to contribute to the call for urban planners,

11   engineers, developers and politicians to recognize that the way they choose to plan cities and

12   suburbs has effects on well-being. The current study also finds that the effect of walkability

13   on happiness differs when we compare younger and older adults. In general, the walkability

14   of the place one lives has a direct effect on happiness for younger people, especially those

15   who are in the 36 to 45 year-old age range. However, the effect of walkability on the

16   happiness of adults aged 45 years and older is indirect and mediated by the positive effects of

17   walkability on health, trust in others, and levels of satisfaction with the appearance of their

18   neighborhoods. In other words, for older adults the walkability of their neighborhood has

19   positive effects on health, trust in others, and satisfaction with neighborhood appearance, and

20   these variables in turn predict happiness.

21   The findings reported in this article build upon a growing body of research which

22   suggests that urban planning and the design of the built environment matter for human health

23   and wellbeing (Frumkin et al., 2004; Saelens and Handy, 2008; Brown, et al., 2008; Sallis, et

24   al., 2011; Mueller, et al. 2015; Krefis, et al., 2018; Mouratidis, 2021). People living in

25   walkable areas of cities and suburbs are more likely to walk to destinations and thus meet

26   recommended daily physical activity guidelines, which is important to maintain physical

27   health across the lifespan (Foster and Giles-Corti, 2008; Forsyth, et al., 2008; Sallis and

28   Bowles, et al., 2009; Brownson, et al., 2009; Feng, et al., 2010; Durand, et al., 2011).

29   Moreover, walking can also reduce stress and anxiety and thus help to support mental health

30   (Martin, et al., 2014; Eibich et al., 2016; Beemer, et al., 2021). In addition to physical and

31   mental health, living in a walkable neighborhood has also been found to enhance social

32   connections, neighborhood ties, and social capital (Freeman, 2001; Leyden, 2003; Wood et

1

33 al., 2008; Rogers and Sukolratanametee, 2009; Richard, et al., 2009; Rogers, et al., 2010)

34 and decrease the likelihood of social isolation (Nasar and Julian, 1995; Mathis, et al., 2016).

35 Access to green space – local parks for example, often found in walkable places – appear to

36 also contribute to physical health, social connections and well-being (Sugiyama, et al., 2008;

37 Ward Thompson, et al., 2016; Pfeiffer & Cloutier, 2016; Larson, et al., 2016; Houlden, et al.,

38 2017; Pope, et al. 2018; Hunter, et al., 2019; Wang, et al., 2019). The current study builds

39 upon work in the area by examining the relationship between neighborhood walkability and a

40 different dependent variable: happiness.

Understanding Happiness: The Traditional Predictors of Happiness

42 This study focuses on the happiness of urban residents, using data from Dublin city,

43 Ireland and its suburbs. Why happiness? Social scientists and political thinkers increasingly

44 argue that, beyond GDP, a nation's welfare is best judged by its ability to make people happy

45 (Layard, 2005; Stiglitz, Sen, and Fitoussi, 2009). Others have proposed that policymakers and

46 the planning professions should focus more on making cities happier and more liveable

47 places (Glaeser, 2011; Florida, et al., 2013; Montgomery, 2013). This focus upon happiness

48 is not simply a contemporary phenomenon: it has important historical precedent. Aristotle

49 argued that the "best form of government is that under which the body politics is happiest"

50 (Aristotle, 1996, pp. 177-78); and "the idea of enabling the pursuit of happiness is intertwined

51 with the foundation of the American republic" (Leyden, et al., 2011, p. 863; Maier, 1997).

52 There is an expansive literature on the predictors of happiness. The traditional literature

53 focuses mainly on individual level factors. Higher personal income, for example, is typically

54 positively related to happiness but there is a diminishing return once incomes are above

55 median levels in OECD countries (Frank, 2005).[1] Relatedly, being unemployed predicts

56 lower happiness (Kent, et al., 2017) and likely also leads to stress, disconnection with

57 workplace social connections and a loss of self-esteem (Helliwell and Putnam, 2005). A

58 person's health and social connections also matter (Layard, 2005). Higher self-assessed

59 health is significantly and consistently positively associated with happiness (Leyden, et al

60 2011; Frey and Stutzer, 2002; Marks and Shah, 2005). Positive effects of social relationships

61 on happiness are also consistently observed, be they within families, among friends or among

62 neighbors. Married people tend to report being happier and people who report having higher

63 levels of social support or social connections or frequent interactions with friends and

64 neighbors also report feeling happier (Putnam, 2000; Helliwell and Putnam, 2005). The same

is true for people who feel more trusting of other people. These social connections and trust as well as community involvement are key components of social capital, defined as the degree to which people feel connected to others and within their community. Individuals who report higher levels of social capital have been found to report higher levels of well-being (Putnam, 2000; Kent, et al, 2017).

Happiness and the Built Environment

The current study examines the degree to which variables related to the built environment contribute to the happiness of city residents. The key independent variable related to the built environment is a measure of neighborhood walkability. We conceive of a walkable neighborhood as a place that is designed with the pedestrian in mind. It is a place where residents can easily attain their daily needs on foot by walking to local shops, cafes, parks, and pubs, and where children can walk to school. Typically, public transportation is easy to access. Such places often have a unique, village-like, sense of place (See Talen and Koschinsky, 2013, for a discussion). Walkable neighborhoods are not places where residents feel dependent upon cars; they are not associated with malls, strip-malls, wide roads, and large parking lots.

We argue that walkability is an important predictor of happiness for city residents and we put this hypothesis to the test by examining the effects of walkability over-and-above the effects of other traditional predictors of happiness and other aspects of the city environment.

The Existing Literature

The existing literature is not easily summarized in part because it tends to focus on different aspects of wellbeing (e.g., happiness or life satisfaction) and the built environment (e.g., walkability or green space). Study variables are often measured in different ways. What is interesting, however, is that all of the existing studies suggest some aspect of the built environment matters for wellbeing or happiness no matter how these outcomes are measured. Where these studies tend to disagree is on what aspects of the built environment matter most.

Leyden and colleagues (2011) for example, found that while holding traditional predictors of happiness constant, aspects of the built environment such as access to cultural amenities, good public transportation and whether residents felt their city was beautiful impacted self-reported happiness in ten international cities. Xiong and Zhang (2016) found that young adults living in Japan reported higher life satisfaction and happiness if they lived in a

96 metropolitan area as opposed to a non-metropolitan area. According to Xiong and Zhang

97 (2016), younger adults feel cities offer more employment opportunities, more housing choice

98 and residential environments "with good walkability", access to viable public transportation

99 and more opportunities to be social and to participate "in leisure activities, learning activities,

100 and community activities" (p. 46). Other studies have reported similar linkages between

101 aspects of the built environment and well-being (Jaśkiewicz and Besta 2014; Cao, 2016;

102 Wang and Wang, 2016; Liu, et al., 2017; and Dong and Qin, 2017).

103   The work of Ettema and Schekkerman (2016), Kent et al. (2017), Hart et al. (2018), and

104 Pfeiffer et al. (2020) are particularly relevant and insightful for the purposes of the current

105 study. Each study examined effects of the built environment on happiness and/or life

106 satisfaction while also statistically controlling for the influence of other traditional predictors

107 of wellbeing. All of these studies suggest that aspects of the built environment matter for

108 wellbeing but the pathways and relationships are not always consistent. Ettema and

109 Schekkerman (2016), using data from the Netherlands, found that two subjective perceptions

110 of the built environment –perceived attractiveness and perceived safety of neighborhoods –

111 were related to self-reported life satisfaction. Using data collected in Sydney, Australia, Kent

112 et al. (2017) found that subjective ratings of the built environment matter more consistently

113 than objective measures of the built environment for well-being. More specifically,

114 controlling for traditional predictors of well-being such as being unemployed or married,

115 Kent et al. found that living in a walkable neighborhood – measured both objectively and

116 subjectively – impact a respondent's self-reported life satisfaction. However, when they

117 examined happiness, only subjective measures of neighborhood walkability were significant.

118 For both life satisfaction and happiness, subjective measures of neighborhood attractiveness

119 (i.e., how aesthetically pleasing the neighborhood is) were also significant. At the same time,

120 objectively measured access to green space did not predict either happiness or life

121 satisfaction.

122   A comprehensive study by Hart et al. (2018) examined how objective and subjective

123 physical and social neighborhood characteristics affect happiness in cities and suburbs in five

124 European countries. They examined the relationships between fourteen independent variables

125 and happiness in a series of models that included other variables as moderators (e.g., age,

126 children in the household, education, and employment status, among others). Across these

127 separate models, they found a range of effects, including higher happiness levels for people

128 living in neighborhoods that were cleaner, perceived to be safer, more aesthetic, had more

4

129   water and green spaces, and places with more social contacts, and where neighbors were

130   trusted. Surprisingly, they also found negative associations between the perceived number of

131   destinations and happiness. Similar to Kent et al. (2017), Pfeiffer et al. (2020) model effects

132   on life satisfaction and examine both objective and subjective measures of neighborhood

133   walkability, and access to public transport and parks along with a comprehensive list of

134   control variables. Pfeiffer and colleagues found that perceived but not objective

135   neighborhood park access was related to greater life satisfaction, whereas objectively

136   measured but not perceived neighborhood walkability was related to life satisfaction.

137   In summary, research across different countries suggests that aspects of the built

138   environment such as walkability, access to quality parks, and neighborhoods that are

139   aesthetically pleasing, more socially connected and safe influence self-reported well-being of

140   residents. At the same time, questions remain as to the relative influence on happiness of

141   different subjective perceptions or objective measures of the city environment, how well

142   these effects replicate across different cities, how robust effects are when other predictors of

143   happiness are statistically controlled for, and whether these effects vary across different

144   groups in the larger population of city residents.

145   **The Current Study: What is our contribution to the literature**?

146   Our purpose here is to complement and extend the existing scholarly literature on the

147   ways that the built environment affects happiness, with a primary focus on the effects of

148   walkability. We add a new city and country as a focus of enquiry, Dublin, Ireland. We

149   attempt to model happiness in a rigorous way as we control for variables such as self-reported

150   health (not commonly included in studies to date) and other important predictors of happiness

151   (e.g., employment and marriage). While focusing on walkability, we also control for the

152   effects of other aspects of the city environment (e.g., access to neighborhood sites such as

153   green spaces and perceived attractiveness of neighborhoods), along with feelings of trust and

154   perceptions of crime. Controlling for the effects of other potential predictors of happiness is

155   important. For example, studies reporting that green spaces affect happiness do not always

156   control for neighborhood social connections or feelings of trust in others. When positive

157   effects of green spaces on happiness are reported in these studies, researchers will naturally

158   question if it is the green spaces affecting happiness or if it is the social connections and

159   feelings of trust occurring in green spaces that matter (Maas et al., 2009a). It is also

160   important to control for the perception of crime; walkable areas with high crime can depress

161   everything from the likelihood of walking to feelings of trust in others. Mouratidis (2019), for

162   example, finds that people living in compact and potentially more walkable neighborhoods

163   report having a higher life satisfaction only after statistically controlling for neighborhood

164   quality as measured by perceived safety, noise, and cleanliness. In other words, some

165   walkable neighborhoods enable social interactions and walking because crime is perceived to

166   be low and they are more pleasant to be in. It is important to try to untangle the direct and

167   indirect effects of various control and built environment effects on happiness, which we work

168   to achieve here. Finally, we introduce a lifespan and developmental perspective by focusing

169   explicitly on the effects of walkability on the happiness of younger and older adults.

170   **The Importance of Age, Place, and Happiness**

171   Lifespan developmental science includes a focus on how the city environment can affect

172   well-being across the adult lifespan. Although ecological models of aging emerged in the

173   formative years of lifespan science (Lawton and Nahemow, 1973), and argued, for example,

174   that the physical (or built) environment may influence the well-being of older adults,

175   empirical analysis of these relationships were largely ignored by researchers for decades

176   (Wahl, et al., 2012). More recent work indicates that older adults value places that facilitate

177   autonomy, mobility, emotional attachment, social participation, and a sense of belonging

178   (Taylor, 2001; Plouffe & Kalache, 2010; Rosso, et al., 2011; Wahl, et al., 2012). When it

179   comes to the design of neighborhoods for older adults, this entails consideration of the

180   walkability of neighborhoods, access to transportation, access to amenities that facilitate

181   physical activity, and social and cultural engagement (Liu, et al., 2009).

182   From a lifespan developmental science perspective, comparing the effects of walkability

183   on groups of younger and older adults living in the same city is valuable. Do aspects of the

184   built environment affect the happiness of older adults, as hypothesized in early ecological

185   models of aging? And to what degree does the built environment affect the happiness of

186   younger adults? Richard Florida (2017), for example, has long proposed that cities must

187   compete to attract younger, highly educated and creative people, in part through the

188   promotion of vibrant walkable neighborhoods with good public transportation and easy

189   access to cafes, green spaces, sports and cultural amenities, and nightlife. Notably, very few

190   studies have addressed the differential effects of the built environment on younger and older

191   adults.

192   One line of empirical work by Leyden and colleagues on the relationship between the city

193   environment and the happiness of residents highlights a distinction between the role of place

194   and performance variables (Leyden, et al, 2011; Goldberg, et al., 2012). Place variables

195   include residents' ratings of how beautiful their city is, how proud they are to live there, and

196   how easy it is to access shops, cultural and sports amenities, green spaces, and public

197   transportation. Performance variables include residents' ratings of the city's basic services

198   such as good schools, the quality of healthcare facilities, safety from crime (from good

199   policing), and facilities serving the disadvantaged. Findings indicate that, even after

200   controlling for traditional predictors of happiness such as self-rated health status and social

201   relations, both place and performance variables predict residents' happiness. Interestingly, in

202   a study of younger and older adults living in Berlin, London, New York, Paris, and Toronto,

203   Hogan and colleagues (2016) found that the happiness of younger city residents was strongly

204   predicted by place variables whereas for older residents, performance variables were more

205   important for happiness.

206   At the nexus of performance and place constructs, the walkability of neighborhoods may

207   have both a performance aspect (i.e., walkability supports access to needed services such as

208   doctors' offices) and a place aspect (i.e., walkability supports access to cultural places,

209   shopping and cafes). From this perspective, we would predict strong effects of walkability on

210   happiness, consistent with previous research. At the same time, the effects of walkability on

211   happiness may also be different for younger and older adults. As noted above, research

212   suggests that autonomy and a sense of belonging, and an environment that supports these,

213   may be critical for the well-being of older adults. Living in a walkable neighborhood may

214   support these feelings and affect happiness in older adults. Also, assuming feelings of

215   autonomy and belonging become increasingly important for older adults, the effects of

216   walkability on happiness may become increasingly mediated by other variables related to

217   autonomy and belonging. For example, living in a walkable neighborhood may enhance

218   feelings of trust because such places allow one to move freely and connect socially with

219   others at local destinations such as coffee shops or parks. These feelings of trust may then

220   predict higher levels of happiness. Also, given the importance of physical and cognitive

221   activity and engagement for maintaining health and wellbeing as we grow older (Hogan et al.,

222   2005; Staff et al., 2018), the effects of walkability on happiness may be increasingly

223   mediated by health and the extent to which walkability prompts satisfaction within one's

224   neighborhood. Conversely, the effects of walkability on the happiness of younger adults may

225 be more direct in the sense that walkability is important for everyday life including work
226 activities, access to local cultural and shopping amenities, access to transportation links and
227 social engagement, but less strongly mediated by satisfaction with neighborhood appearance,
228 feelings of trust in others, or the effects of walkability on health.

229 **Our Study: The effects of living in a walkable neighborhood on happiness**

230   We seek to replicate and build upon existing research and examine the effects of both the
231 built and social environment on the happiness of younger and older adults. We hypothesize
232 that living in a walkable neighbourhood has both direct effects on happiness as well as effects
233 that are mediated by perceptions of the social environment (i.e., feelings of trust in others),
234 health, and satisfaction with the appearance of local neighborhoods. We hypothesize that
235 these mediational effects are stronger among older adults when compared with younger
236 adults.

237   Consistent with the approach of similar studies, when examining the effects of
238 walkability on happiness we control for a variety of traditional predictors, including marital
239 and employment status, health, and education. We also control for other features of the urban
240 environment including the availability of attractive sites nearby (such as greenspaces),
241 satisfaction with neighborhood appearance, and perceptions of crime. We use multi-group
242 structural equation modelling to examine differences in the effects of neighborhood
243 walkability on happiness across four age-groups. Our structural model is presented below
244 (see Figure 1).

245
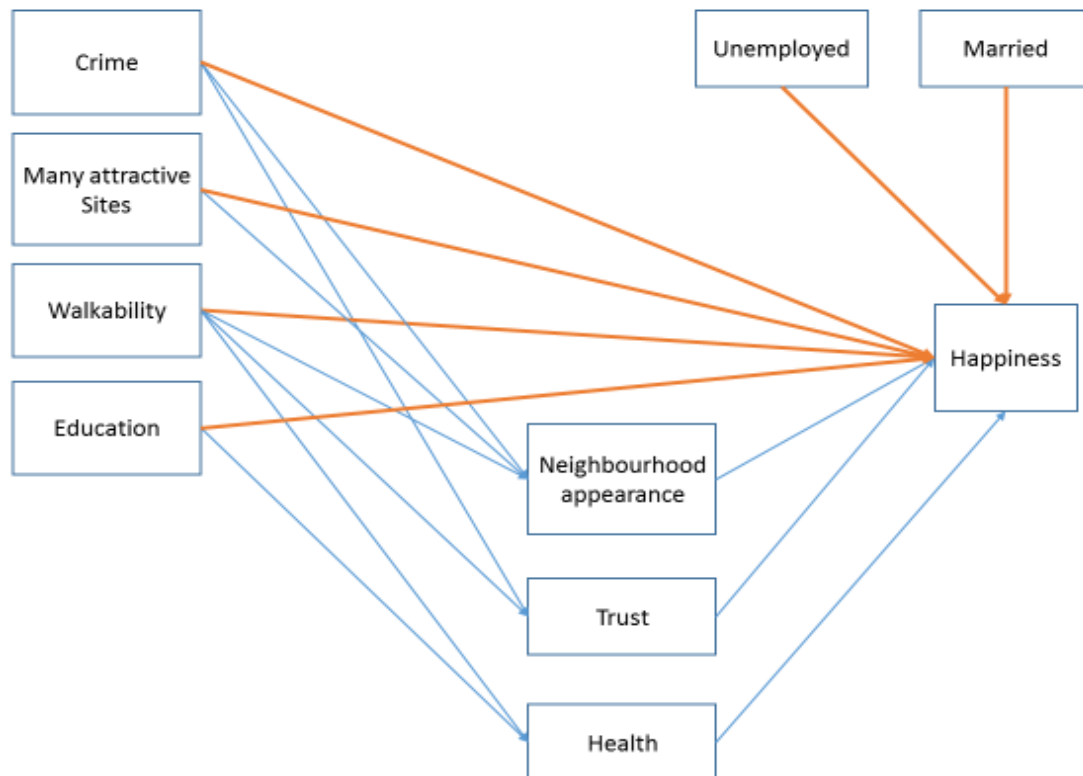
Figure 1. Structural model tested simultaneously across four age groups, describing direct and indirect effects of walkability and other control variables on happiness. Direct effects are indicated using orange lines and indirect, mediated pathways are indicated using blue lines.

Method

The data for this study comes from (Anonymous). A comprehensive household population survey of 1064 adults living in Dublin City and its suburbs was developed using the insights of professionals working in transport, planning, health, architecture, and geography and from public representatives from the Dublin Area. The complete survey can be accessed via (Provide live link).

LORRIANE TO ADD (Please add to this section of the paper. 90 percent of what you have to say about how neighborhoods were selected, the household sampling process, and the sources of the variables and their reliability *should be in the Technical Appendix*. Here we only provide a few sentences on these matters and refer them to the Technical Appendix for detail.

The survey was carried out from July to September 2011. With the aid of professionals who participated in the study's focus groups, 16 neighborhoods or local areas were selected

262 and an adult living in sampled households within these neighborhoods were surveyed. The 16

263 neighborhoods were identified as being either high or low in terms of walkability based upon

264 an approach that utilized focus groups, existing census and city-level data, and the input of

265 experts using….LORRAINE to add

266   The study also sought to include some neighborhoods categorized as being economically

267 deprived based upon census data. The goal was to attain respondents from a mix of

268 neighborhood types - some in the historic inner-city core, the outer city developed primarily

269 in the 20th Century, and the newer city suburbs. Additional information about how the

270 neighborhoods were chosen is in our Technical Appendix.

271   Did the process we used to choose high walkable and low walkable places actually

272 work? Table 1 suggests it did. Our survey included a range of questions that asked

273 respondents to assess many aspects of their neighbourhood. The variables highlighted in

274 Table 1 strongly suggest that residents in walkable places reported different transport

275 experiences and clearly perceived their neighborhoods differently than those living in less

276 walkable places.

277   ------------------------------------

278   Insert Table 1 around here

279   ------------------------------------

280 Examining mean differences (using Independent Samples t-tests) of these variables indicate

281 that surveyed respondents living in low walkable neighboroods tended to report public

282 transportation as difficult to use in their neighborhoods; they also reported owning more cars

283 and spending more on gasoline/fuel for their cars. As expected, people living in high

284 walkable neighborhoods reported finding that there were "many different routes for walking

285 from place to place" and more pedestrian friendly crosswalks. Residents of the two

286 neighbourhood types also reported living in built environments that were distinctly different

287 in other ways. Residents living in low walkable places reported that they were more likely to

288 live in places with large parking lots in front of shops and businesses, whereas residents of

289 high walkable neighborhoods were more likely to report living in places with a lot of

290 "inviting local shops" within a context that had "a village feel to it" with lots of people

291 "shopping or visiting restaurants and pubs nearby." Likewise, those living in areas identified

292 as highly walkable tended to see the places they lived as being more "unique with personality

293 and character." At the neighbourhood level of analysis, both expert-rated walkability and

294 deprivation level (coded as high and low using the Hassee index) were also related to the

295 happiness of residents across city regions. Specifically a 2 (high, low walkability) x 2 (high,

296 low deprivation) ANOVA revealed effects on happiness of both walkability, $F(1,1) = 11.02$,

297 $p < .001$, and deprivation, $F(1,1) = 11.02$, p. $< .001$. There was also a significant interaction

298 effect, $F(1,1) = 9.18$, p. $< .005$, with higher happiness reported at the aggregate level in high

299 walkable, low deprivation neigborhoods ($M = 4.34$) compared with low walkable, low

300 deprivation neighborhoods ($M = 4.00$, $p < .001$). However, there was no significant

301 difference in happiness levels when high walkable, high deprivation ($M = 3.80$) and low

302 walkable, high deprivation ($M = 3.79$) neighborhoods were compared.

303 In the next phase of analysis, we examined the direct and indirect effects of walkability

304 on happiness ratings of individual city residents while controlling for a range factors known

305 to influence happiness (see Figure 1). We present the key variables included in the structural

306 model in Table 2.

307 ------------------------------------

308 Insert Table 2 around here

309 ------------------------------------

310 Two key variables are worthy of discussion at this point. Our dependent variable is a self-

311 reported measure of happiness. A common way of measuring happiness is to ask survey

312 respondents to self-report their levels of happiness or subjective well-being, often using a single

313 question as we have done in our study (Kalmijn and Veenhoven 2005; Weimann et al. 2015).

314 These single-item measures tend to use variations on the following types of statements: "all in

315 all, how satisfied are you with your life at the moment?" (Weimann et al. 2015, p. 89), or

316 "taking all together, how satisfied or dissatisfied are you currently with your life as a whole?"

317 (Kalmijn and Veenhoven 2005, p. 359). The question we use—"all things considered, how

318 happy are you right now?''—draws on this established approach.[2]

319 Our key independent variable is our measure of perceived walkability of neighborhoods

320 which has been used in previous studies (e.g., see Leyden, 2003; Rohrer, et al., 2004; Rogers,

321 et al., 2010; Kwon, et al., 2019). Its reliability was most thoroughly examined by Bias et al.

322 (2010) where it was compared to other established items. The measure's reliability was

323 assessed again for this study (see Technical Appendix). Our walkability measure asks

324 respondents to indicate the number of local destinations they can walk to without too much
325 trouble, using a list of destinations as prompts. It is therefore a subjective measure and one
326 that does not measure multiple aspect of walkability such as the ability to walk comfortably for
327 recreation. Importantly, the measure taps into our operational definition of a walkable
328 neighbourhood that enables residents to walk to and meet at local destinations such as parks,
329 shops, community centers, and cafes among other places.

330 Our Technical Appendix provides additional information on the source of all variables used
331 in this study as well as the reliability of each measure.

Limitations

333 Our research has several limitations. Our data is from Dublin, Ireland, which conceivably
334 affects its generalizability to other countries. We only use subjective measures in this study
335 and thus, unlike some of the prior studies in the area (e.g., Kent et al., 2017; Pfeiffer et al.,
336 2020), we are not examining the effects of both objective and subjective predictors of
337 happiness. Our measure of walkability is a subjective measure of how many destinations a
338 respondent feels they could walk to in their neighbourhood without too much difficulty. At
339 first glance, the use of a subjective measure may appear concerning, as planners do not plan
340 perceived communities; they plan real ones. However, it is also important to note that
341 perception of reality influence key aspects of behaviour and experience and this is true for
342 research in many social science disciplines. For example, many political scientists have
343 found that it is not just the objective performance of the economy that matters to voters, but
344 voters' perceptions of economic performance. (Kevin add CITATIONS)

345 Finally, our data is from 2011. This is older than we would have preferred but we have
346 no reason to suspect this fact undermines our findings[3]. Caution is also warranted given the
347 correlational nature of the findings reported here; and while our central hypothesis is that
348 walkability influences happiness, the correlational nature of findings do not allow a causal
349 relationship or the direction of any such causal relationship to be inferred.

Results

351 Means and standard deviations for all variables in the model across the four adult groups
352 are presented in Table 3. Prior to running our structural equation models, we examined these
353 variables using one-way analysis of variance, correcting for multiple comparisons (i.e., $p <$
354 .0125). Mean level differences (not shown) were found for a number of variables across age

355 groups. For example, although there were no differences across age-groups in self-reported

356 happiness, self-reported health scores were significantly lower for the groups aged 46 – 60

357 years and 60+ years when compared to adults aged 18 – 35 years (p < .01), and adults aged

358 60+ years also reported lower health when compared with adults aged 36 – 45 years (p < 01).

359

360 ----------------------------------

361 Insert Table 3 around here

362 ----------------------------------

363 In relation to trust, in comparison with adults aged 18 – 35 years, adults aged 60+ were

364 more likely to report that other people try to be helpful in general. However, there were no

365 age-group differences in feelings of safety from crime. Adults aged 46 – 60 years reported

366 that their neighborhoods were more walkable when compared with adults aged 18– 35 and 36

367 – 45 years (p < .01).[4] Also, when compared with adults aged 18– 35 and 36 – 45 years, there

368 was a trend for adults aged 46 – 60 years to report that there were more attractive sites to visit

369 in their area (p < .05). However, there was no difference across age-groups in levels of

370 satisfaction with the appearance of the neighborhoods in which they lived. Finally, as

371 expected given rising levels of third level education in Ireland over recent decades, levels of

372 education were higher in adults aged 18 – 35 and 36 – 45 years when compared with adults

373 aged 46 – 60 years and 60+ years (p < .01).

374 **Structural Equation Models**

375 The multigroup model in Figure 1, where all structural relations other than the direct and

376 indirect effects of walkability were constrained to be invariant across age-groups, provided a

377 good fit to the data (see Technical Appendix, part B). A number of significant effects on

378 happiness were observed that were common across all four age-groups (see Table 4).

379 ----------------------------------

380 Insert Table 4 around here

381 ----------------------------------

382 Similar to previous studies (e.g., see Layard, 2005; Leyden, et al., 2011; Hogan et al.,

383 2016), being married was associated with higher levels of happiness, and being unemployed

was associated with lower levels of happiness. Likewise, higher self-reported health was also associated with higher happiness. Feelings of safety in relation to crime also predicted higher levels of happiness. Having less trust in others - specifically, reporting that people are out for themselves rather than being helpful - predicted lower levels of happiness. Finally, for adults across all age-groups, higher levels of satisfaction with neighborhood appearance predicted higher levels of happiness.

The effects of walkability on happiness differed across the four age groups in a number of ways. For adults aged 18 – 35 years, the effects of walkability were limited. The direct effect of walkability on happiness for this age group, although positive, was not statistically significant; there was no effect of walkability on health or trust in others; however, higher levels of walkability did predict greater satisfaction with neighborhood appearance, which in turn predicted higher happiness. Importantly, for adults aged 36 – 45 years higher levels of walkability were directly positively related to higher levels of happiness (p = .001). Notably, the total effect of neighbourhood walkability on happiness in this group was 0.077. Walkability was measured on a 17 point scale (0 – 16); therefore, a person with a maximum score on the measure of walkability could be expected to have, on average, a 1.3 higher score on happiness compared to a person with a minimum score on walkability, that is, a 25% increase in their overall rating of happiness. An increase of 5 points in perceived walkability equates to an increase of approximately 8% in happiness.

For adults aged 46 – 60, there was no direct effect of walkability on happiness; instead and as hypothesized, the effects of walkability on happiness were mediated by health and trust in others. In particular, higher levels of neighborhood walkability were positively associated with health and trust, and higher levels of health and trust in turn predicted higher happiness in this age-group. Finally, for adults aged 60+ years the effects of walkability on happiness were strongly mediated by the positive effects of walkability on health (p = .001) and also by weaker effects of walkability on satisfaction with neighborhood appearance (p = .056), both of which had strong positive effects on happiness. Notably, these effects of walkability on health and happiness across age-groups were observed even after the inclusion of the additional control variable to the structural model of regional deprivation.

Discussion

This study examined the happiness of residents living in Dublin and its suburbs. We find evidence that living in a walkable neighborhood has direct and indirect effects on happiness.

416 We controlled for individual-level factors that are known to affect happiness, including
417 marital and employment status, trust, health and education, as well as city-level factors
418 including the availability of attractive sites nearby (including green spaces), satisfaction with
419 neighborhood appearance, and perceptions of crime.

420 As we discussed in our review of the literature, people living in walkable areas of cities
421 are more likely to walk to more destinations, and this activity is important for maintaining
422 health and for enhancing social connections. Previous research has also found significant
423 linkages between measures of walkability and either life satisfaction or happiness. Our work
424 here adds to these previous findings. In addition, we examine how the effects of walkability
425 on happiness is impacted by age, which had not been fully investigated previously.

426 **Walkability, Age, and Happiness**

427 We found that the direct and indirect effects of walkability on happiness differed across
428 the four age groups we examined in a number of ways. Consistent with our hypothesis, we
429 found that, for adults aged 60+ years the effects of walkability on happiness were strongly
430 mediated by their perceived health and to a lesser extent by satisfaction with neighborhood
431 appearance, both of which had strong positive effects on happiness. In other words,
432 neighborhood walkability had a positive effect on ratings of health and satisfaction with
433 neighborhood appearance, and higher levels of health and satisfaction with neighborhood
434 appearance in turn predicted higher happiness in this age-group. Similarly, for adults aged 46
435 – 60 years, the effects of walkability on happiness were mediated by health and trust in
436 others. As such, for our two older cohorts, the positive influences of living in a walkable
437 neighborhood on health, feelings of trust in relation to others, and satisfaction with one's
438 neighborhood, were all important for understanding the effects of walkability on happiness.

439 Interestingly, for younger adults aged 18 – 35 years, the effects of walkability were
440 weaker, perhaps suggesting that other factors outweigh the influence of walkable
441 neighborhoods in predicting the happiness for our youngest age grouping. While the direct
442 effects of walkability on happiness were positive and significant in the context of a one-tailed
443 hypothesis (i.e., < .10), the effect was not strong (p = .07). Furthermore, there was no effect
444 of walkability on health or trust among the younger adults aged 18 – 35 years. But
445 walkability did predict satisfaction with neighborhood appearance in this younger group,
446 which in turn predicted their happiness levels.

In terms of strong, direct, and unmediated effects of walkability on happiness, most noteworthy is our finding that the direct effect of walkability is highly significant for adults aged 36 – 45 years ($p = .001$). This may reflect a certain quality of engagement with walkable neighborhoods that occurs among adults in this age-group. This could be linked, for example, to particularly salient activities with children (e.g., walking to school or going to parks) or engagement linked to recreational, fitness, and social outings with family and friends. Further qualitative research might explore the activities that best account for the strong link between walkability and happiness in this age-group.

Our findings build upon the work of others who have found important connections between the built environment and either happiness or life satisfaction (e.g., Leyden et al. 2011; Ettema and Schekkerman, 2016; Kent et al. 2017; Hart et al., 2018, and Pfeiffer et al. 2020.). As noted, a truly comprehensive understanding of the relative effects of objective and subjective built environment measures on happiness remains uncertain. This, however, is the nature of scientific enquiry; empirical evidence builds overtime. The current findings build upon a body of evidence and suggests a need for an ongoing dialogue about the effects of planning decisions on the well-being.

Why plan and build walkable neighborhoods?

Of what relevance are these findings for planners and other professionals who shape the places we live? At a minimum, our results suggest that a significant number of people are happier if they live in attractive, walkable places that enable social connections and trust in others. Many people appear to benefit from living in walkable places where residents can walk to attain their daily needs in local shops, cafes, schools, parks, and places for social, leisure, and worship activities. These walkable places are good for health because residents have an opportunity to be physically and socially active. While some of the linkages we find are indirect, for some age groups they are clearly direct. We find that Dublin residents aged 36 – 45 are clearly happier if they live in a walkable neighborhood. Curiously, it is this same age group that is most frequently interested in first-time home ownership. In many municipalities in the United States and Ireland (and elsewhere) planning and engineering regulations and traditions, zoning codes, and the expectations of developers, financial institutions and even customers can have the – perhaps unintentional – effect of biasing development toward car-oriented suburbs. This means that this age group is likely to find a

478   shortage of available and affordable homes in mixed-use, pedestrian-oriented developments

479   in cities or suburbs.

480   We would suggest that the exiting literature and our findings here point to a need to have

481   an ongoing dialogue and rethink about the types of places we plan and build. What would it

482   take to make living in a walkable neighborhood a viable option for more people? We need to

483   know far more about planning, commercial, cost, and engineering barriers to planning and

484   building more walkable neighborhoods. Is there a strong demand for living in walkable

485   neighborhoods (urban and suburban) where children can walk to school and where residents

486   can walk to locally-owned shops and cafes located within a transit-oriented village network?

487   Would people actually prefer a different way of living that did not revolve around the car and

488   big-box retail stores and associated chain restaurants?   Levine (2006) has previously shown

489   how planning and commercial biases produce places that many potential homebuyers do not

490   desire to live in. For example, using a comprehensive survey of residents of Atlanta and its

491   suburbs, Levine (2006) finds that a significant percentage of Atlantans would prefer to live in

492   more "transit- and pedestrian- friendly zones" (or walkable neighborhoods) even if they

493   already own a home in a car-dependent area[5]. The demand for more walkable communities

494   may very well be just under the surface and the fact that there is far more discussion about

495   walkability and transit-oriented development currently suggests change is already occurring.[6]

496   **Conclusion**

497   In this study we find that living in a walkable neighborhood has direct and indirect effects

498   on the happiness of people living in and around Dublin, Ireland. The effect of living in

499   walkable area is directly linked to the happiness of people aged 36 to 45 (p= .001) and to a

500   lesser extent those aged 18-35 years of age (p=.07). For older adults, walkable places matter

501   for happiness as well because they enhance other aspects of older adults' lives related to

502   happiness such as being healthier from walking or more socially connected or more trusting.

503   This research builds upon previous research that suggests walkable built environments appear

504   to be good for human beings; they enhance their happiness and enhance other predictors that

505   enhance happiness like social capital and health. While more research is needed to untangle

506   the best ways to measure walkability and its effects, we urge planners, engineers, politicians,

507   developers, financial institutions, and related professions to have an open dialogue about the

508   barriers to building new walkable neighborhoods that enable social connections, better health

509   and a better quality of daily living. These same professions should also explore ways of

510 retrofitting existing car-dependent places (Dunham-Jones and Williamson, 2008), or building

511 new transit-oriented developments (Cervero, et al. 2017). It is our contention that people

512 should have a greater range of choices about where they decide to live and that walkable

513 neighborhoods be made a viable option for more people. We suspect exploring new ways of

514 planning walkable places would lead to happier, more connected communities that are better

515 for the health and well-being of people and the planet.

516

---

[1] As Helliwell and Putnam (2005) remark: "for the relative poor, money can buy happiness, but for the relative well-off, more money does not typically mean more happiness" (p. 446).

[2] The measure of happiness we use was originally developed in the context of a ten nation study organized by The National Academy of Sciences in the Republic of Korea and the Global Metropolitan Forum of Seoul and has been used in several previous studies, including Leyden et al. (2011) and Hogan et al (2016), among others. There is a considerable scholarly literature on the measurement of subjective happiness, satisfaction with life, and wellbeing. For overviews of this research, see Diener et al. (2009), OECD (2013), and Weimann et al. (2015).

[3] The structure of the neighbourhoods in this study have changed very little in the ten years since the data were collected. Since the survey was conducted most development in Dublin has been in green field suburban sites or brownfield sites from vacated industrial units. One low walkable area surveyed now has a pedestrian access route to the LUAS light rail system, and one high walkable deprived area in the city centre has had some student accommodation and build-to-rent properties built, but little has changed in the streetscapes and other measured criteria. We strongly suspect the same types of relationships between the built environment and happiness would be found if we were to replicate the study in Dublin again.

[4] The fact that adults aged 46 – 60 years reported that their neighborhoods were more walkable could suggest that this age group is self-selecting into more walkable neighborhoods. We feel this would be an interesting subject for future research in Dublin and elsewhere. Furthermore, future longitudinal studies can examine if self-selection and relocation effect changes in wellbeing and happiness across the lifespan.

[5] Levine also surveyed a national sample of developers and found a significant proportion expressed frustration with local regulatory biases that undermine their ability to provide "alternative developments" that were more mixed-use and pedestrian-oriented with access to a range of transportation modes (Levine, 2006, p. 126).

[6] There are other benefits to living in a walkable neighborhood not examined here. In many cities and suburbs around the world the car has become an essential part of life and needed to go almost anywhere. This car-dependency can pose significant burdens on individuals, families, and society as a whole. Car-dependency is associated with a greater likelihood of death or injury from car crashes (Frumkin, et al., 2004; Ewing, et al., 2016) and car-dependent cities and suburbs also have higher carbon footprints (Kahn, 2007; Glaeser & Kahn, 2010).   In 2019, the typical new car cost Americans $9,282 a year or $773.50 a month (American Automobile Association, 2020). This puts a significant financial burden on most family budgets especially considering a large proportion of American homes have two or more cars. Furthermore, car-dependent urban places may restrict the movement of people who cannot afford a car or who are unable to drive. This may become a more significant problem for older adults, who often have a reduced income in retirement and possibly physical or cognitive conditions that limit their ability to drive. If we are to plan cities and suburbs in ways that are responsive to the needs of citizens, we need to consider carefully how different aspects of city infrastructure, amenities, and aesthetics influence health and well-being across the lifespan.