

Does urban green add to happiness?

A research synthesis using an online finding archive

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ABSTRACT

Background: There is a high demand for the greening of urban areas and one of the drivers of this demand is the biophilia theory which holds that we feel better in a green environment.

Question: Does the provision of urban greenery really add to the happiness of city dwellers? If so, by how much and does the effect differ across people and situations?

Approach: We summarized the available research findings on the relation between happiness and urban greenery considering both outdoor and indoor green spaces.

Method: We draw on the Word Database of Happiness, in which we found 38 research findings on the relationship between happiness and urban greenery, reported in 13 publications. These findings are presented in two tabular schemes that include links to further online details.

Results: The provision of urban greenery tends to go together with greater happiness of locals, both outdoor and indoor greenery. The size of the effect is small. Fear of crime reduces the effect of outdoor greenery on happiness.

Keywords: biophilia theory, happiness, urban greenery, World Database of Happiness, research synthesis

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1 INTRODUCTION

During the last few centuries, a process of urbanization has been taking place all over the world. Today, more than half of the global population, live in urban areas and we are seeing an increasing number of high-density cities. This growth in urban residency is expected to increase (Ritchie and Rosa, 2018), with fewer people living in (shrinking) rural areas throughout the world. Urbanization is part of a wider process of societal modernization, which also involves industrialization, institutional specialization and mental individualization.

1.1 Qualms about urban life

Social developments are typically attended with traditionalist counter thinking, and urbanization is no exception to this. There have always been misgivings about urban life, in the past these have primarily been about the moral climate, such as illustrated in the Biblical case of Sodom and Gomorra. Today, we pay more attention to the livability of urban environments. Illustrative topics in the current discourse about urban living are: pollution, crime, loneliness and mental stress.

These reservations have caused urban authorities to incorporate rural elements in their urban environments, such as when new build city quarters are modelled architecturally as urban villages. The furthering of urban greenery is part of this movement and involves such things as the building of public parks, planting trees in streets and sowing wild flowers in open spaces.

Biophilia theory

The call for urban greenery has recently been strengthened by bringing into the force the theory that humans have an innate need for contact with nature and in particular with other forms of life (Wilson 1984). A variant of this theory hold that we feel better in the type of vegetated environments in which the human species developed (Rogers 2019) and it is this theory that has inspired a movement in 'biophilic urban design, a recent overview of which can be found in Beatley (2017).

An indication for the innate nature of this preference for greenery in humans is seen in the existence of the *biophobic* tendencies some of us exhibit, such as an aversion for spiders and snakes. Such primal fears are is likely to have involved better survival chances for our early forefathers.

Yet, this innate need does not necessarily give rise to us having a conscious preference for green environments. Cultural influences may make us sniff at nature but they cannot prevent us feeling less well without some contact with nature. It is these theories that are used to legitimate biophilic policies for sake of the public good, even if bringing in nature has not been specifically demanded. Fostering urban greenery is one of the policies in this context.

Theoretically the biophilia theory goes against the view that that evolution of the human kind involved the loss of instinctual stimulus response reactions, since our species has specialized in adaptation to different environments, using our more flexible cognition enabled biologically by the development of the neo-cortex (Wentholt 1989). From this perspective, we can live just as well in a concrete and brick city as

in a green village.

Empirical evidence for the biophilia theory is mixed. Confirmation is seen in a study that found patients to recover faster when situated in a hospital room with an outlook on a park than those in rooms with an outlook on a parking lot (Ulrich 1984). Though widely cited, this study has not been replicated to our knowledge. The beneficial effects of pet ownership on health (Anderson et al 1992) have also been mentioned as a proof for the biophilia theory, but can also be explained otherwise. Likewise, the self-reported gain in happiness and health of voluntary participants in organized walks in the wild (Richardson et al 2016) may be due to other causes than just meeting of an innate need for contact with nature. Similarly, the observation of Cheng et al (2020) that users of social media share more pictures of nature in relation to leisure and vacation activities, does not prove biophilia theory. A detailed critical review of the biophilia theory is given in Joyce & DeBlock (2011).

Other possible effects of urban green on happiness

Even if the biophilia theory does not apply, urban greenery can add to happiness in other ways. For instance, urban green will help to improve air quality and trees and their shade reduce effects of hot summers, which is likely to add to our happiness through effects on our health. Likewise, urban parks provide opportunities for us to take outdoor leisure time. Urban greenery may further attract richer residents, bringing in their wake such things as good restaurants.

Urban greenery can however also affect happiness negatively. Urban greenery is costly to keep up and this cost comes from local taxes. Further, housing prices will tend to get up in response to the green amenities available in the area. Urban greenery can also attract unwelcome animals, such as snakes and monkeys and create unsafe places after dark.

1.2 Research questions

The balance of all these effects is likely to vary across persons and situations. In this context we seek answers to the following questions:

1. Does urban greenery typically add to happiness? If so, to how much?
2. Is the effect of urban greenery on happiness similar for everybody?
If not, what kind of people benefit from urban greenery and what kind of people do not?
3. What kinds of greenery will add most to happiness in urban areas?
4. Does urban greenery add more to the affective component of happiness, i.e. how well one feels most of the time, than to the cognitive component, i.e. perception of getting what one wants?

Social relevance

The answers to questions 1, 2 and 3 will be relevant for urban policy makers who are faced with demands for more parks and trees in the streets and wonder whether this will really add to the happiness of citizens, what kind of greenery will add to most benefit, and whether investing in greenery is worth the cost. The information is also

useful for individual citizens who are considering to buy a house and wonder whether buying a more expensive house in a green environment will make them happier, or if they will be equally happy in a cheaper more concrete based environment. Since we are typically unaware of what we need to be happy, it is worth finding out how urban greenery has affected the happiness of other people, people like us in particular

Scientific relevance

An affirmative answer to question 4 would support biophilia theory. According to Veenhoven (2009), gratification of innate *needs* will manifest primarily in affective experience, while realizing culture specific *wants* will result in cognitive contentment. This theoretical question is also of practical relevance for policymakers, who prefer to invest in enduring sources of happiness over putting money into time bound cultural preference.

1.3 Approach

We answer these questions by taking stock of the available empirical research findings on happiness and urban greenery. To that end, we will first define the concepts of happiness and urban greenery and select acceptable operationalizations on this basis. We next describe how the findings were selected and entered in an online finding archive, the World Database of Happiness. Then we will then consider the research questions outlined above.

2 CONCEPTS AND MEASURES

2.1 Happiness

In classical philosophy, the word happiness is used to denote a 'good life' and is as such synonymous with the terms of 'wellbeing' and 'quality of life'. In contemporary social sciences, the word is mostly used in the more limited sense of 'satisfaction with life' and is also denoted as 'subjective wellbeing'. In this chapter we follow this latter meaning and define happiness as the degree to which individuals judge the overall quality of their life-as-a-whole favourably, or in other words: how much one likes the life one leads (Veenhoven 1984). Another term for happiness is 'life satisfaction'.

Components of happiness

One's overall evaluation of life draws on two different sources of information, regarded as 'components' of happiness. The *affective component* is how well one feels most of the time and is called 'hedonic level of affect. The *cognitive component* is to what extent one perceives one gets from life what one wants from it and is called 'contentment'. Veenhoven's (2009) theory of how we assess how happy we are, holds that the affective component reflects the degree to which universal human needs are met, while the cognitive component reflects the meeting of culturally relative aspirations (Kainulainen et. al 2018). If so, the biophilia theory would predict a stronger correlation with the affective component of happiness than with the cognitive component and less cultural variation in correlation with the affective component than with the cognitive component.

Measures of happiness

Since happiness is defined as a mental state of which we are aware, it can be measured by asking people how much they like the life they live. Some illustrative questions are:

- *Question on overall happiness:*
 - Taking all together, how satisfied or dissatisfied are you with your life-as-a-whole these days?
- *Questions on hedonic level of affect:*
 - Would you say that you are usually cheerful or dejected?
 - How is your mood today? Note: this question should be repeated over several days.
- *Question on contentment:*

Here is a picture of a ladder. Suppose we say that the top of the ladder represents the best possible life for you and the bottom represents the worst possible life for you.

Where on the ladder do you feel you personally stand at the present time?

A review of strengths and weaknesses of measures of happiness and their applicability in different contexts is available in Veenhoven (2017).

2.2 Urban greenery

Urban green spaces are “areas with vegetation within or partly embraced by urban fabric ..., which usually has a recreational or ornamental character and is usually accessible to the public” (Copernicus Europe’s eyes on earth, 2020).

Kinds of urban green

There is greenery within the built urban environment, such as parks and greenery outside urban boundaries, such as woods, which are often designed to be well accessible to urbanites. Within the built environment there is further a difference between outside greenery, such as trees in streets and inside greenery, such as plants in homes and workplaces. A further difference can be found in the kinds of vegetation, such as grass fields and bushes and landscapes such as hills or water features such as ponds and lakes.

Measurement of urban greenery

The occurrence of urban greenery is assessed in the studies investigated in objective and subjective ways. An objective way to assess the amount of greenery present is use satellite pictures, a subjective way is to ask locals about their perceived access to green spaces. A question of this kind reads:

- How many of the native bush, forest, nature reserves or open green spaces in your local can you easily get to? “All of them”, “most of them”, “some of them”, “only a few of them”, “none of them”, “never want or need to go to any of them”, “do not know or “refused” (Ambrey *et al.*, 2014)

3 METHOD

As noted above, we sought answers to our research questions by taking stock of the available research findings. This is called 'research synthesis' and for this purpose we use an existing finding archive, the [World Database of Happiness](#).

3.1 Technique of a finding archive

This database is a collection of research findings on happiness defined in the sense of life-satisfaction. It contains both *distributional findings* on how happy people are in different times and places and *correlational findings* on things that go together with more or less happiness. These findings are described on electronic *finding pages* in a standard format using a standard terminology. Each finding page has a unique internet address. An example of a finding page is presented in Figure 1

Finding pages are sorted by subject in *collections*. For this study we use the collections of correlational findings on happiness and [local nature](#) and [time spend in nature](#).

This technique is described in more detail in Veenhoven (2020).

Studies included

At 1-6-2020 the World Database of Happiness held 17 empirical studies in which a relation between happiness and urban greenery had been assessed. These studies are listed in Table 1. Together, these studies yielded 38 correlational findings which are presented on Table 2.

All these studies were published between 2004 and 2018. Data were gathered in the following countries New Zealand, Austria, United Kingdom, Japan, The Netherlands, Uruguay, Germany, Finland, Hungary, Italy and China. In total, the 17 studies cover responses from 126,321 people.

3.2 Presentation of findings

The use of an online finding archive allows for a new way of presenting research findings in a review paper. Since this display will be unusual for most readers, the following explanation will be helpful.

Links to online finding pages

Each of the 38 research findings is described in detail in the World Database of Happiness on a finding page with a unique internet address. In our presentation of these findings on table 2 we use a sign that denotes the observed direction of correlation (-/0/+), with each sign hyperlinked to an online finding page. This allows a condensed presentation of the main trends in the findings while providing the reader with access to full detail. Unlike traditional review papers, we need not describe all the findings in this text and bypass the problem that page limitation typically does not allow findings to be presented in sufficient detail. Note: this technique works only for electronic texts.

We have coloured findings obtained using an objective measure of urban happiness **red** and finding obtained with a subjective measure **blue** in table 2

Notation of statistical relationships

We present the observed direction of correlation using (+) and (–) signs in table 2. Statistical significance is indicated using **bold**. We present the 21 findings that were expressed in a comparable effect size in table 3. In this case a standardized regression coefficient (Beta) with a theoretical range between -1 to +1.

Format of result table

We present the observed correlations by research method used in table 2 and 3. We distinguish between a) *cross-sectional* studies which assess same-time correlation, b: *longitudinal* studies which assess over-time correlation and c: *experimental* studies which assess over-time change in happiness after induced change in contact with urban green. For each of these research methods, we distinguish between 1) 'raw' *zero-order* correlations and 2) *partial* correlations, in which the effect of possible intervening variables is filtered away. Such control procedures are meant to weed out spurious correlation but can also remove mediating effects and as such can throw the baby away with the bathwater.

4 RESULTS

We will now answer the research questions outlined in section 1.2

4.1 Does urban greenery add to happiness?

Looking at Table 2, we see mainly + signs, which means that more contact with urban greenery tends to go with greater happiness. This holds for “green space”, “access to greenery”, “proximity to greenery”, “closeness to greenery”, “parks”, “time spent in greenery”. Note that about half (17) of the 38 correlations are statistically significant. All the significant correlations were obtained with objective measures of urban greenery and are marked **red**. The correlations may denote an effect of urban greenery on happiness, but can also reflect an effect of happiness on greenery related behaviours (cf. section 5)

If so, how much?

Of the 38 studies in table 2, only 21 express this correlation as a comparable effect size, mostly standardized regression coefficients. These effect sizes are reported in Table 3. The correlations with objective measures of contact with urban greenery are quite small. The only sizable correlation is with self-reported time spent in nature and may say more about the respondent’s leisure preferences than about benefits of coming into contact with urban greenery.

4.2 Is the effect of urban greenery on happiness similar for everybody? If not, what kind of people benefit from urban greenery and what kind of people do not?

As yet only two differentiating personal characteristics have been considered. The studies by Ambrey *et al.* (2014) and Fleming *et al.* (2016) in Australia and New Zealand observed a negative correlation with closeness to urban green among urbanites who fear crime and therefore see parks as unsafe places. The study by Tsurumi & Managi in Japan found that people with a greater ‘affection for greenery’ benefit more from the green spaces than those without such preference. This latter difference can also result from effects of happiness on preference for greenery, as we note in section 5.

4.3 What sort of greenery will add most to happiness?

We can see in Table 2 that three *kinds of urban greenery* have been considered, of which only one (parks) correlated significantly with happiness. Table 3 provides us with no further information about the link between sorts of urban green and happiness. There is more data on *closeness to urban greenery*. The coefficients in Table 3 do not support the intuition that the effect of urban greenery will be greater, the smaller the distance from one’s home, but it does reveal a slightly stronger correlation with urban greenery if the distance was between 100 to 1000 meter from the respondent’s home.

At the bottom of Table 2 the reader can see a study on the relationship between *indoor greenery* and happiness. This experimental study was strong in

design but met with several practical problems which resulted in the loss of most of its participants, and consequently, in statistically insignificant observed changes in the happiness of the remaining participants.

4.4 Does urban greenery relate more to the affective component of happiness than to the cognitive component?

The study on distance to urban greenery by Tsurumi et al (2018) used three measures of happiness, covering overall happiness and its two components. The affective component was measured using a balance score of positive and negative affects experienced by the respondent in the previous day. The cognitive component was measured using Cantril's (1965) Ladder of Life question on which people rate their present life on a ladder scale ranging from the 'best possible' to the 'worst possible life'.

We can see from Table 3 that closeness to urban greenery correlates significantly with how well one feels affectively (coloured red), but not with how close one thinks to be to leading the best possible life (coloured blue). This difference is in line with the biophilia theory (cf. section 1.2).

5 DISCUSSION

The available research on presence of outdoor and indoor greenery in urban areas shows small positive correlations with the happiness of people who live there. It is not clear to what extent this correlation results from an effect of contact with the greenery on happiness or from effects of happiness, such as a greater inclination to work and live in a green environment. The observed support for biophilia theory implies that there is at least some effect of greenery on happiness.

Most of the correlations are obtained with objective measures of urban greenery, such as the percentage of greenery in the respondent's neighbourhood. As such, the results cannot be explained by bias on subjective reports of contact with urban greenery, such as a tendency for happy people to see more greenery in their environment or as a tendency of unhappy people to seek a cause for their misery in a lack of greenery. The few subjective measures of urban green show no relation with happiness.

The available data provide us with little to answer the question of what kind of people benefit more or less from urban greenery happiness wise: e.g., children or elderly? As yet, we neither know what kind of outdoor urban greenery adds most to happiness, for instance private gardens, public parks, concentrated greenery in parks or dispersed trees on streets, or open grasslands? Answers to these questions are essential any municipal party seeking to set out an effective greening policy

The evidence base is small as yet and smaller than one might expect given the political prominence of the issue and the interest of the greenery sector. This illustrates that urban greening policy is driven by ideology in the first place rather than by scientific evidence. Most of the 13 studies reviewed in this paper are recent and this promises more studies in the near future. The format used in this paper can be used to make periodical updates.

6 CONCLUSIONS

To date (June 2020) there has not been much empirical research into the relationship between urban greenery and the happiness of urbanites. The few available findings suggest a small positive effect on happiness of having access to greenery but leave us largely in the dark about causality, mediators and moderators.

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Table 1
Studies in which the relationship between urban green and happiness was examined

Source	N, people, place, time	Measure(s) of urban green	Measure(s) of happiness: Question on
Ambrey 2016	6,082; Australia; 2013	Greenspace, including cemeteries and sports fields	Life satisfaction
Ambrey et al. 2014	15,118; New Zealand; 2008 and 2010	Perceived access to greenspace	Life-satisfaction
Aussen et al. 2008	4,420; Netherlands, 2007 – 2008	Perceived nature facilities	Happiness
Ferre 2008	801; Uruguay, 2007 – 2008	Perceived access to nature	Happiness
Fleming et al. 2016	22,727; New Zealand; 2008 - 2012	Perceived access to nature	Life satisfaction
Hermans et al 2019	?? Office workers Netherland	Plants places in office (vs not)	Affect Balance
Mollenkopf et al. 2004	2,432; elderly, Netherlands, Hungary, Germany, Italy, Finland; 2000	Perceived access to greenery	Life satisfaction
Sabatini 2011	4,130; Italy, 2008	Public parks and gardens as a percentage of the regional surface	Happiness
Smyth et al. 2008	8,890; China, 2003	Green area per capita in city	Life satisfaction
Tsurumi and Managi 2015	2158; Japan; 2012	Distance to green spaces from home	Happiness
Tsurumi et al. 2018	2,758; Japan, 2014	Distance to green spaces from home	Affect Balance Contentment Life satisfaction
Ward et al. 2016	108; New Zealand; 2014	Time in green space as % of total time	Happiness
White et al. 2013	10,000; United Kingdom; 1991 - 2008	greenspace as % of local area	Life satisfaction

Table 2

Overview of observed correlations between Urban green and Happiness: Direction and significance

ASPECTS OF URBAN GREEN	RESEARCH METHODS					
	Cross-sectional		Longitudinal		Experimental	
	Zero-order	Partial	Zero-order	Partial	Zero-order	Partial
Outdoor green						
<i>Presence of green</i>						
Green space		++		+		
Access to green		+				
Proximity to green						
- 0-100		+/+/+				
- 100-500		+/+/+				
- 500-1000		+/+/+				
- 1000-1500		+/+/+				
- 0-100		-				
- 100-300		+				
- 300-500		+				
- 500-1000		+				
- 1000-1500		+				
- 1500-2000		+				
Number of green facilities	+	+ 0 0 0 0 0				
<i>Kind of green</i>						
Trees in block		-				

Water surface		+				
Parks		+ +				
<i>Use of greenery</i>						
Visits to green spots	+	+				
Time spend in green		+/+				
Indoor green						
Plants in office						0

Signs link to finding page in [World Database of Happiness](#). Use control click to view the page.

- +** = Positive correlation, significant (bold print)
- +** = Positive correlation, not significant
- 0** = No correlation or direction not reported and not significant
- = Negative correlation, not significant
- = Negative correlation, significant (bold print)
- /+** = Positive and negative correlations with different sets of control variables

Measure of urban green: **objective** (not assessed by respondent), **subjective** (self-report of access)

Table 3

Overview of observed correlations between Urban green and Happiness: effect sizes in

ASPECTS OF URBAN GREEN	RESEARCH METHODS					
	Cross-sectional		Longitudinal		Experimental	
	Zero-order <i>r</i>	Partial <i>r</i> _{pc} or Beta	Zero-order	Partial Beta	Zero-order	Partial
Outdoor green						
<i>Presence of green</i>						
Green space				+0.03		
Access to green						
Proximity to green in meters						
- 0-100		+0.02 / +0.00 / +0.01				
- 100-500		+0.04 / +0.00 / +0.00				
- 500-1000		+0.04 / +0.00 / +0.01				
- 1000-1500		+0.03 / +0.00 / +0.00				
- 0-100		-0.02				
- 100-300		+0.01				
- 300-500		+0.13				
- 500-1000		+0.06				
- 1000-1500		+0.01				
- 1500-2000						
Number of green facilities	+0.01	+0.01				
<i>Kind of green</i>						
Trees in block						

Water surface		+01				
Parks						
<i>Use of greenery</i>						
Visits to green spots	+01	+01				
Time spend in green		+44/+36				
Indoor green						
Plants in office						0

Happiness variant: Hedonic level of affect (affective component), contentment (cognitive component), overall happiness

