Does urban green add to happiness?

A research synthesis using an online finding archive

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Tables 1 and 2 are disfunctional in the book version of this paper.

1 INTRODUCTION

During the last centuries a process of urbanization is taking place all over the world, Today, more than half of the global population, live in urban areas with an increase in high-dense cities. This share of urban residence is expected to increase (Ritchie and Rosa, 2018). 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 currents and urbanization is no exception to that. There have always been misgivings about urban life, in the past primarily about its moral climate, such as in the Biblical case of Sodom and Gomorra, and today in the first place about the livability of urban environments. Illustrative topics in the current discourse about urban living are: pollution, crime, loneliness and mental disorder.

These reservations have instigated efforts to incorporate rural elements in urban environments, such as when new build city quarters were modelled architecturally as urban villages. The furthering of urban green is part of that movement and involved the building of public parks and planting trees in streets.

Biophilia theory
The call for urban green was recently strengthened by 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 vegetated environments in which the human species developed (Rogers 2019). This theory has

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inspired a movement in biophilic urban design, a recent overview of which is found in Beatley (2017).

An indication for the innate nature of this preference is seen in the existence of biophobic tendencies in humans, such as an aversion for spiders and snakes, which is likely to have involved better survival chances for our early forefathers.

This innate need does not necessarily give rise to a conscious preference for green environments. Cultural influences may make us sniff at nature but cannot prevent that we feel less well without. Hence the theory legitimates biophilic policies for sake of the public good, even if not demanded. Fostering urban green is one of these policies.

Theoretically the biophilia theory goes against the view that that evolution of the human kind involved the vanishing of instinctual stimulus response reactions, since we specialized in adaptation to different environments, using the more flexible cognition enabled biologically by the development of the neo-cortex (Wentholt 1989). In that view, we can live as well in a stony city, though the newly developed cognitive capacities may set their own demands for visual stimulation (Wentholt 1969).

Empirical evidence for the biophilia theory is mixed. Confirmation is seen in a study that found faster recovery of patients situated in a hospital room with an outlook on a park than in rooms with outlook on a parking lot (Ulrich 1984). Though wildly cited, this study has not been replicated to our knowledge. Beneficial effects of pet ownership on health (Anderson at 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) can be due to other causes than meeting of an innate needs for contact with nature. Similarly, the observation by 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 more 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 green can add to happiness in other ways. For instance, urban green will improve air quality and reduce effects of hot summers, which is likely to add to happiness through effects on health. Likewise, urban parks provide opportunities for outdoor leisure. Urban green may further attract richer residents and add as such to local amenities.

However, urban green can also affect happiness negatively. Urban green is costly and its price is paid in local tax and housing prices. Urban green can also attract unwelcome animals, such as snakes, and create unsafe places.

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

1. Does urban greenery typically add to happiness? If so, how much?
2. Is the effect of urban green on happiness similar for everybody?

> If not, what kind of people benefit from urban green and what kind of people do not?
> **3.** What kind of greenery will add most to happiness?
> **4.** Does urban greenery add more to the affective component of happiness (how well one feels most of the time) than to the cognitive component (perception of getting what one wants)?

Social relevance

Answers to the 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 most and whether investing in greenery is worth the cost. The information is also useful for individual citizens who consider buying a house and wonder whether buying a more expensive house in a green environment will make them happier, or that they will be equally happy in a cheaper stony environment. Though people are typically aware of what they want, they are often unaware of what they need. Observed effects of urban green on happiness denote a link with general human needs.

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, mood level in particular, while realizing culture specific *wants* will rather 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 in time bound cultural preference.

1.3 Approach

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

2 CONCEPTS AND MEASURES

2.1 Happiness

In classic philosophy, the word 'happiness' is used to denote a 'good life' and is as such synonymous with the contemporary 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. In other words: how much

one likes the life one leads (Veenhoven 1984). Another term for happiness is 'life satisfaction'.

Components of happiness
The 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 to get 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 rather 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 variability in correlation across cultures.

Measures of happiness
Since happiness is defined as a mental state of which we are aware, it can be measured by asking people. 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? (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 green

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

Kinds of urban green
There is green within the build urban environment, such as parks and green outside urban boundaries, such as woods, which are well accessible for urbanites. Within the build environment there is further a difference between outside green, such as trees in streets and inside green, such as plants in homes and workplaces. A further difference is between kinds of vegetation, such as grass fields and bushes and landscapes such as hills or water parties.

Measurement of urban green
The occurrence of urban green is assessed in the investigated studies in objective and subjective ways. An objective way is assessment by satellites, a subjective way is the respondent's perception of their access to green spaces. A question of this kind reads:

o How many of the native bush, forest, nature reserve 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 seek answers to our research questions by raking stock of the available research findings. This is called 'research synthesis'. For this purpose, we use an existing findings archive, the World Database of Happiness.

3.1 Technique of a findings archive
This database is a collection of research findings on happiness 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 of less happiness. These findings are described on electronic *finding pages* in a standard format and terminology, each with a unique internet address. An example of a finding page is presented on 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 green was assessed. These studies are listed in Table 1. Together, these studies yielded 38 correlational findings which are presented on Table 2.

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. Together, the 17 studies cover responses of 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 suffice with 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 trend 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 to present these in sufficient detail. This technique works only for electronic texts.

Notation of statistical relationships

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

Format of result table

On Tables 2 and 3, we present the observed correlations by research method used. 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 throw the baby away with the bathwater.

4 RESULTS

We will now answer the research questions mentioned in section 1.2

4.1 Does urban greenery add to happiness?

On Table 2, we see mainly + signs, which means that more contact with urban green tends to go with greater happiness. This hold for "green space", "access to green", "proximity to green", "closeness to green", "parks", "time spend in green". Note that about half (17) of the 38 correlations are statistically significant. All the significant correlations are obtained with objective measures of urban green and are printed

thick.

4.2   If so, how much?
Of the 38 studies in Table 2, only 21 express this correlation in a comparable effect size, mostly standardized regression coefficients. These effect sizes are reported on Table 3. The correlations with objective measures of contact with urban green are quite small. The only sizable correlation is with self-reported time spent in nature and may say more about leisure preference than about benefits of contact with urban green.

4.3   Is the effect of urban green on happiness similar for everybody? If not, what kind of people benefit from urban green and what kind of people do not?
As yet only two differentiating personal characteristics has 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.

4.4   What sort of greenery will add most to happiness?
On Table 2 we can see that three *kinds of urban green* have been considered, of which only one (parks) correlated significantly with happiness. Table 3 provides no further information about relative addition to happiness. There is more data on *closeness to urban green.* The coefficients in Table 3 do not support the intuition that the effect of urban green will greater, the smaller the distance from one's home but reveal a slightly stronger correlation with urban green at distances of 100 to 1000 meter from home.

So far about *outdoor green*. At the bottom of Table 2 The reader can also see a study on the relation between *indoor green* and happiness. This experimental study is strong in design but met several practical problems which resulted in the loss of most participants and consequently in statistical insignificance of observed changes in happiness.

4.5   Does urban greenery relate more to the affective component of happiness than to the cognitive component?
The study on distance to urban green 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 in the previous day. The cognitive component was measured using the Cantril (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.

In Table 3 we can see that closeness to urban green correlates significantly

with how well one feels affectively, but not with how well one thinks to be to the ideal life, This difference is in line with the biophilia theory (cf. section 1.2).

5 DISCUSSION

The available research shows small positive correlations between greenery in urban areas and the happiness of people who live there. It is not clear to what extend this correlation results from an effect of contact with green on happiness or from an effect of happiness on choice for greener environment. The observed support for biophilia theory implies that there is at least some effect of greenery on happiness.

Possibly, the real-life effects of urban green are stronger than the observed correlation coefficients suggest. Correlations are diluted in several ways, such as by measurement error. It is a task for future research to consider that problem.

A possible objection to the observed correlations could be that they stem from a tendency of happy people to see more greenery in their environment, while unhappy people rather perceive less green in the same environment, especially when seeking external causes for their misery. In this context it is worth noting that most of the correlations are obtained with objective measures of urban green, such as the percent of green surface in the respondent's neighbourhood. Anyway, the few subjective measures of urban green show no relation with happiness.

The available data provide little answer to the question of what kind of people benefit more or less from urban green happiness wise: e.g., children or elderly? As yet, we neither know what kind of outdoor urban green adds most to happiness, for instance private gardens, public parks, concentrated green in parks or dispersed in streets, trees or grasslands etc.? Answers to these questions are essential for 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 from recent dates and that promises more studies in the near future. The format used in this paper can then be used for periodical updates.

6 CONCLUSION

To date (June 2021) there is not much empirical research on the relationship between urban green and the happiness or urbanites. The few available findings suggest a small positive effect but leave us largely in the blind 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
Observed correlations between Urban green and Happiness: <u>Direction and significance</u>

ASPECTS OF URBAN GREEN	RESEARCH METHODS						Assessment of urban green
	Cross−sectional		Longitudinal		Experimental		
	Zero order	*Partial*	*Zero order*	*Partial*	*Zero order*	*Partial*	
Outdoor green							
Presence of green							
Green space		+ +		+			objective
Access to green		+					subjective
Proximity to green - 0-100 - 100-500 - 500-1000 - 1000-1500 - 0-100 - 100-300 - 300-500 - 500-1000 - 1000-1500 - 1500-2000		+/+/+ +/+/+ +/+/+ +/+/+ - + + + + +					objective
Number of green facilities	+	+ 0 0 0 0 0					objective subjective
Kind of green							
Trees in block		–					subjective

Water surface		**+**					objective
Parks		**+ +**					objective
Use of greenery							
Visits to green spots	**+**	**+**					subjective
Time spend in green		**+/+**					objective
Indoor green							
Plants in office						**+/0**	objective

Signs link to finding page in <u>World Database of Happiness</u>. 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
Source: <u>https://worlddatabaseofhappiness.eur.nl/search-the-database/correlational-findings/#id=9P-zuY8BOFteH-QN9l65</u>

Table 3
Observed correlations between Urban green and Happiness: <u>effect sizes</u>

ASPECTS OF URBAN GREEN	RESEARCH METHODS						Measure of happiness
	Cross−sectional		Longitudinal		Experimental		
	Zero order	*Partial*	*Zero order*	*Partial*	*Zero order*	*Partial*	
Outdoor green							
Presence of green							
Green space				**+.03**			overall
Access to green							
Proximity to green in meters - 0 -100 - 100-500 - 500-1000 - 1000-1500 - 0-100 - 100-300 - 300-500 - 500-1000 - 1000-1500 - 1500-2000		**+.02**/+.00/+.01 **+.04**/+.00/**+.00** **+.04**/+.00/**+.01** **+.03**/+.00/+.00 -.02 **+.01** **+.13** **+.06** +.01					overall
Number of green facilities	+.01	+.01					overall
Kind of green							
Trees in block							

Water surface		+.01					overall
Parks							
Use of greenery							
Visits to green spots	+.01	+.01					overall
Time spend in green		**+.44/+.36**					overall
Indoor green							
Plants in office							hedonic level overall

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Figure 1
Example of a finding page

WORLD DATABASE OF HAPPINESS
ARCHIVE OF RESEARCH FINDINGS ON SUBJECTIVE ENJOYMENT OF LIFE

▸ This database ▸ Collections ▸ Search ▸ Reports ▸ Related ▸ Research Field ▸ FAQs ▸ About us ▸ Join us

🖶 print

Ambrey (2016): study AU 2001

Publication

Author(s):	Ambrey, C.L.
Title:	An Investigation into the Synergistic Wellbeing Benefits of Greenspace and Physical Activity: Moving beyond the Mean.
Source:	Urban Forestry & Urban Greening, 2016 Vol. 19, 7 - 12

Investigation

Public:	15+ aged, general public, Australia, 2001 - 2013
Survey name:	AU-HILDA combined waves
Sample:	Probability multi-stage random
Respondents:	N = 6082
Non Response:	
Assessment:	Interview: face-to-face

Happiness Measure(s) and Distributional Findings

Full text:	Selfreport on single question: All things considered, how satisfied are you with your life? Again, pick a number between 0 and 10 to indicate how satisfied you are. 0 totally dissatisfied 1 2 3 4 5 6 7 8 9 10 totally satisfied
Classification:	O-SLW-u-sq-n-11-d
Author's label:	Life Satisfaction
Remarks:	Distribution in quartiles: 0-7: 25%; 8: 25%; 9: 25%; 10: 25%.
Page in publication:	8
Observed distribution	
Frequencies	**1**: 0%, **2**: 0%, **3**: 0%, **4**: 0%, **5**: 0%, **6**: 0%, **7**: 0%, **8**: 0%, **9**: 0%, **10**: 0%, **11**: 0%
Summary Statistics	On original range 0 - 10 On range 0-10
Mean:	7.90
SD:	1.40

Correlational Findings

Author's label	Subject Description	Finding
Local greenspace	Local nature	📄
Physical activity	Physical activity	📄