

Happiness in Rotterdam an Analysis of 7 City Surveys

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Abstract: Rotterdam is a big city in the Netherlands, characterized by an economic focus on its port and industry, and by the large share of migrants and blue-collar workers in its population. Every two years a survey is conducted on the Rotterdam population and they are asked a wide variety of questions, including a question on their happiness. In this paper, we use the data on happiness to answer the following questions:

- 1) How happy are people in Rotterdam?
- 2) How happy are Rotterdammers compared to people living in other places?
- 3) Has happiness in Rotterdam changed in the past decade?
- 4) Does happiness differ across districts in Rotterdam?
- 5) What drives the differences in happiness found between different Rotterdam districts?

We find that inhabitants of Rotterdam are fairly happy on average, but somewhat less happy than people in other places in the Netherlands. Average happiness increased slightly between 1997 and 2009, varying with the economic tide. There are substantial differences in happiness across districts in Rotterdam, these are largely due to composition of the population. Rotterdam has attracted relatively many not too happy people, more of whom live in some districts than in others.

Keywords: life-satisfaction, urban environment, trend, local differences.

1. INTRODUCTION

The city of Rotterdam:

Rotterdam is, with more than 600.000 inhabitants, the second largest city of the Netherlands. Over the past decades, major changes have taken place in the composition and size of the population of Rotterdam. The city has been an immigrant town since the beginning of the Industrial Revolution, and has attracted new waves of immigrants since the 1960s. Rotterdam has changed from a white working-class town to a multi-ethnic city. As in many other European cities, many of the more prosperous citizens have moved to neighboring suburbs, leaving the city with an overrepresentation of less advantaged people. Politically this has given rise to a shift from left-wing socialist to right-wing populist vote among the autochthonous population.

Concern about livability:

'Livability' is a common issue in local policy, in Rotterdam this topic is even found in the name of a major political party: 'Livable Rotterdam' (in Dutch: Leefbaar Rotterdam). Discussions on what will make a city more livable typically draw on beliefs, such as, that life is better the smaller the place and the greener. Political debates focus on whether we can pay for such things, rather than on whether provisions of such amenities will promote a better life.

Such beliefs can be wrong, even if widely shared. Living in high-rise housing was deemed bad in the 1950s and associated with 'flat-neurosis' housing, but later research has not revealed adverse effects on health and happiness. Likewise, several objective characteristics of the environment seen as livability factors, appear only weakly related to

subjective wellbeing (e.g. Okulics-Kozarin 2013). Hence, it makes sense to investigate how well people actually thrive and in which conditions they thrive best. Veenhoven (2005) calls this ‘apparent livability’ (how well people actually thrive), which he contrasts with ‘assumed livability’ (conditions believed to make for a good life).

One of the ways in which apparent livability of cities can be assessed, is to measure the happiness of the people who live in that city, in our case Rotterdam.

Happiness:

Following Veenhoven (1984), we define happiness as the subjective enjoyment of one’s life as a whole”, in other words, as ‘life-satisfaction’. Thus defined, happiness is something that people have in mind and consequently it can be measured using questions. In the Rotterdam surveys people were asked: “Taking all things together, how happy would you say you are - very happy, happy, not too happy or not happy at all?”¹

Validation studies have revealed that the answers to such questions adequately reflect how much people like the life they live. The question is well understood; typically, less than 1% of the respondents tick the option ‘don’t know’. Correlational analysis shows good correspondence with ratings by others and with conditions that are likely to add to happiness, such as good health and social support. Happiness appears to be predictive of health and longevity (see for example Veenhoven 2014).

Yet the reliability (precision) of the resulting data is to be questioned, since distinguishing between ‘very happy’ and ‘happy’ from respondent to respondent is not easy and because responses can be biased by things such as the place of the item in the questionnaire and the weather on the day of the interview. With a large sample, such biases are balanced out and in our case the data samples were large enough to obtain reliable data (see Table 1).

Research questions:

In this paper, we provide a descriptive account of happiness in Rotterdam, answering the following questions:

- 1) How happy are people in Rotterdam?
- 2) How happy are Rotterdammers compared to other places?
- 3) Has happiness in Rotterdam changed in the past decade?
- 4) Does happiness differ across districts in Rotterdam?
- 5) What drives the differences in happiness found between Rotterdam districts?

Questions 1 and 2 are answered in section 3 of this paper, the answer to question 3 is presented and discussed in section 4, the answer to question 5 is split in two parts. In the first part, in section 5, a presentation is given of the geographical differences in happiness compared to the percentage of natives.

The second part involves an analysis of the determinants of these differences. This is explored in two ways: a) by assessing the degree to which the happiness of inhabitants depends on personal characteristics, such as income and health and b) assess the effect of district characteristics on happiness, such as the degree of deprivation.

Our aim was to arrange for basic information about the apparent livability of Rotterdam, to provide policy makers with the data they can use to improve livability within the city across districts.

2. DATA

We used survey data collected at intervals of two years by the Research Institute of the Community of Rotterdam (OBI). Respondents were interviewed face-to-face about their leisure activities and their opinions about the livability of Rotterdam. Demographic and socio-economic data taken from the Rotterdam population registry were added to the database.

¹ Andrews and Withey (1976)

Sampling:

Stratified area samples were drawn from all inhabitants of Rotterdam aged 13–75 and an extra sample was drawn of people aged 75 or more. All potential respondents, before the written questionnaire was sent to them, received an announcement signed by the mayor of Rotterdam.

The samples were proportionally stratified by determining a fixed number of respondents by neighbourhood to reflect the population of the respective neighbourhoods. Within each neighbourhood, the sample selection was a-select. This basic sample had a non-western immigrant component (Surinam, Antilleans, Turks, Moroccans and Cape Verdians). These groups were sent a questionnaire and were also interviewed in an extra face-to-face sample. This means that relatively more non-western immigrants responded than might have done without the face-to-face fieldwork. These groups have a lower response rate than other groups and the expectation was that using face-to-face interviews would have a favourable outcome for the final composition of the sample. Despite this in some years, an extra sample had to be drawn because of the disappointing response rate in those groups.

Response:

Over the years, the sample sizes for the OBI surveys have been increased to provide samples that are more robust and to be able to differentiate between subgroups (see Appendix 1).

The survey was done as a paper survey until 2009. In 2009, the survey was moved to an internet format, and this was probably the cause for the low response rate that year.

In the OBI survey part of the low response rate can be attributed to forms that were returned empty, for example sent back from addresses where people had moved out or died. Overall, the response rate is not bad for a city like Rotterdam². The Dutch national survey organization CBS for instance has to contend with a worse and more selective response in big cities.

For this analysis, the 7-year samples were pooled. This provides a dataset of 21,091 cases giving a sample size that would allow a statistically significant comparison of the 32 districts in Rotterdam.

Representativeness:

Representativeness was achieved by comparing a number of demographic characteristics of the sample with those of the population. An extra weight factor was added to correct the skew distribution by borough and age to the population distribution. After weighing, the sample formed a good reflection of the Rotterdam population. Although women, 45+ and natives are a little overrepresented and men, youngsters and some specific ethnic groups somewhat underrepresented. Further, the response of immigrants from poor countries was somewhat lower than their population share.

3. HOW HAPPY ARE INHABITANTS OF ROTTERDAM?

Happiness question:

All waves involved the following question: “Taking all things together, how happy would you say you are? Are you: very happy, happy, not too happy or not happy at all?”. We assigned numerical values to these verbal response options, 4 for ‘very happy’, 3 for ‘happy’, 2 for ‘not too happy’ and 1 for ‘not happy at all’.

Distribution of responses:

On average, the Rotterdammers feel reasonably happy. The average happiness level in 2009 was 3.12, keeping in mind that a score of 3 corresponds to ‘happy’. This was also the modal answer; more than 64% of the Rotterdammers report they were ‘happy’, and more than 24% of the sample was ‘very happy’, while 10% was ‘not too happy’. A relatively small portion of the sample, 1.3%, indicated that they were ‘unhappy’. Also across time, the picture is similar: In general, inhabitants from Rotterdam are fairly happy.

²For the response rates of questionnaires see f.e. Kaplowitz et al. (2004) and DeLeeuw and Hox (1997)

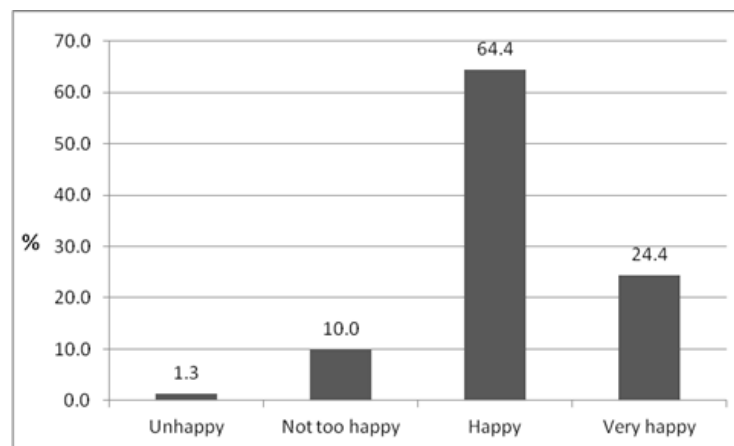


Figure 1: Distribution of happiness in Rotterdam 2009

How happy relatively, compared to the rest of the Netherlands?

Could the happiness of the Rotterdammers be better? To answer to that question, we compared Rotterdam happiness to happiness in the rest of the Netherlands and to the happiness in other big cities. For this purpose, another database was used with a slightly different happiness question and a 5-point rating:

To what extent do you consider yourself a happy person....?

5 very happy

4 happy

3 neither happy nor unhappy

2 not very happy

1 unhappy

When compared to the rest of the Netherlands the Rotterdam score of 3.92 is significantly³ lower than the Dutch average of 4.10. This difference is also seen in the percentage of happy people. While in Rotterdam 80% of the population is happy, in the rest of the Netherlands 89% is happy.

Is this specific for the case of Rotterdam or has it to do with big city problems in general? To examine this, the average happiness scores of the other three large Dutch cities, Amsterdam, The Hague, and Utrecht, were compared with those of Rotterdam (see fig. 2). As can be seen the inhabitants of Amsterdam, Rotterdam and The Hague report very similar happiness levels. Only Utrecht stands out with a mean happiness score of 4.05, this university town differs markedly from Amsterdam, Rotterdam and The Hague in its demographic composition.

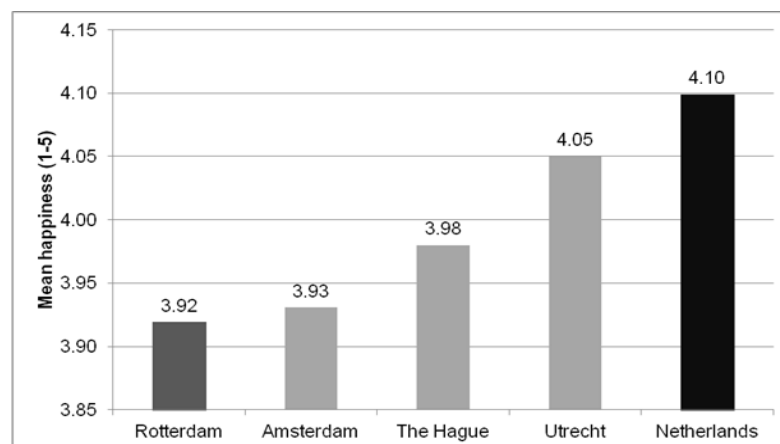


Figure 2: Populations of the 4 largest cities less happy than the Netherlands at large

³ p<.05

This is not an exceptional finding. Studies in other countries also show slightly lower happiness in big cities than in the national population, see e.g. Okulicz-Kozarin (2015) and Berry (2009).

4. HAS HAPPINESS CHANGED IN ROTTERDAM?

Average happiness in Rotterdam increased slightly between 1997 and 2009, be it with ups-and-downs. See the bold line in Figure 3.

In search of an explanation for the variations, we inspected the co-variance of happiness in Rotterdam with economic tide, which we measured using the unemployment percentage for Rotterdam. Prior to 1999, the unemployment rates fell and happiness rose, from 1999 onwards to 2005 average happiness level slowly fell while from 2001 on the unemployment rate began to rise sharply from 6 % to 10.6% in 2005. Then it fell from 10.6 % to 7.2 % in 2007. In the same period, happiness showed an upward tendency. After the economic crash of 2008, unemployment levels again began to rise, however, happiness remained constant until 2009. Note: due to the limited number of data years available the correlation of $r = -0.73$ ($p < .01$) between unemployment and mean happiness should be considered only indicative.

Using necessary caution, one can draw the conclusion that happiness is affected by changes in the economic tide. It is likely that individual happiness is directly influenced by developments such as growing unemployment and job insecurity (for effects of unemployment see also Ouweneel 2002).

Other factors besides economic tide may affect an individuals' happiness, i.e. world events of a completely different nature such as terrorist threats leading to general insecurity after the terrorist attack of September 11th 2001 may have influenced the average level of happiness.



Figure 3: Happiness and economic tide through time in Rotterdam

5. DOES HAPPINESS DIFFER ACROSS DISTRICTS IN ROTTERDAM?

Do happiness levels differ within the city of Rotterdam? Are some areas happier than others? The ideal situation would be that the Rotterdammers are happy, and that this happiness is distributed equally across the various districts of the city. Is this so? No, the gap between this ideal and reality is shown in figure 4.

In the older 19th century public housing areas around the center of the city, people are on average the least happy, while the happiest districts are to be found in Rotterdam suburbs.

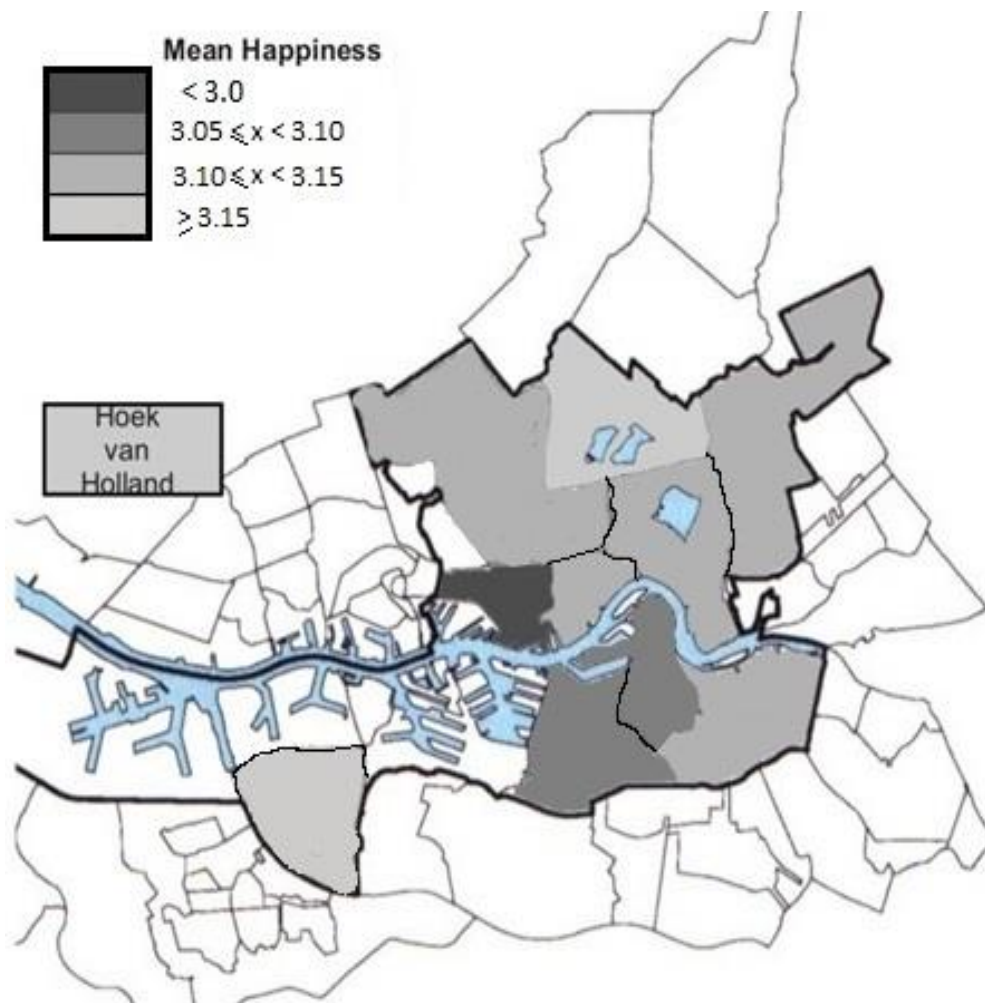


Figure 4: The happiest and unhappiest districts in Rotterdam

The happiest neighborhoods Nesselande, Kralingen-Oost and Terbregge are also the wealthiest neighborhoods of Rotterdam and are mainly located in the outskirts of Rotterdam. The average happiness of the wealthiest neighborhoods is 3.35, while the average in the unhappiest neighborhoods Oud Crooswijk, Tussendijken and Bospolder is 2.95, these are also the poorest neighborhoods located in a 19th century ring around the center of town. The inequality in happiness in these neighborhoods is also larger than found in the happiest and more homogenous neighborhoods.

Why these differences? Two factors stand out: the ethnic composition of a neighborhood and related differences in average standards of living.

6. ENVIRONMENTAL CONDITIONS AND HAPPINESS ACROSS DISTRICTS

Ethnic composition:

In general immigrants are less happy than native-born Rotterdammer. On a 1-4 scale, mean happiness of all immigrants is 2.99 while natives score significantly higher, with an average of 3.14. Happiness is geographically unequally distributed over Rotterdam, in the old housing areas around the centre of Rotterdam people are the least happy, these cheap housing districts are also those with the highest number of nonwestern immigrants.

To explore these differences in more detail, the percentage of native Dutch in the various Rotterdam neighborhoods was calculated (see fig. 5). When this map is compared with that of the distribution of happiness in Rotterdam (fig. 4) it is striking that the district with the lowest percentage of Dutch natives is also the least happy in Rotterdam.

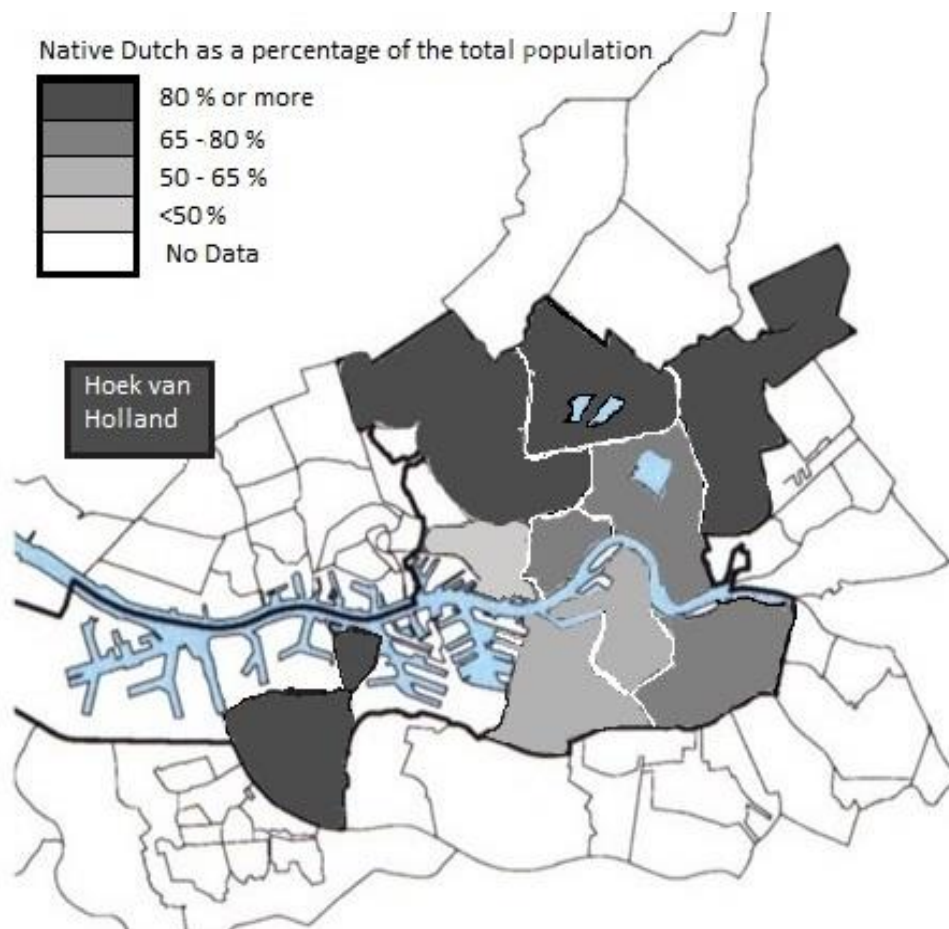


Figure 5: Ethnic composition in city districts

One might expect that the few remaining native Dutch Rotterdammers in these high immigrant districts would be more likely to be less happy than natives elsewhere in Rotterdam are. This argument is however not confirmed by the data. In the largely black community of Spangenen the remaining native population is, with an average of 3.18, relatively happy, both compared to their fellow citizens in other parts of town, and also to the other ethnic groups in Spangenen. The question of to what extent the various ethnic groups differ in average happiness is discussed in section 7.1 of this paper.

Standard of living:

Are inhabitants of the deprived quarters of the city less happy than citizens who live in the more exclusive residential areas? One of the causes of the difference in levels of happiness could be the less favorable characteristics and circumstances of people living in a specific neighborhood.

To find answers to this question we used data from the deprivation index developed by the Rotterdam municipality. This index is constructed on a neighborhood level from 1) the average education level of people, 2) the percentage of people living on social security, 3) geographic mobility, 4) mean income, 5) the mean housing value, 6) the mortality rate and 7) the unemployment rate. Neighborhoods were grouped in four levels of deprivation: those with a high level of deprivation, neighborhoods with some deprivation, neighborhoods with more favorable conditions and neighborhoods with the highest level of favorable conditions. This distribution was based on averages, indicating that it is quite possible that in the most deprived neighborhoods there will be people living at a high prosperity level and in the neighborhoods with a high prosperity level there will be individuals living with a high deprivation score.

What is the relation between the deprivation score and the average happiness level of a neighborhood? Computing average levels of happiness corresponding to the four deprivation levels gives us figure 6. As can be seen, happiness is lowest in the neighborhoods with a high deprivation level, averaging 2.92. The happiest neighborhoods are those with the lowest level of deprivation, i.e. a high level of prosperity gives a happiness average of 3.17.

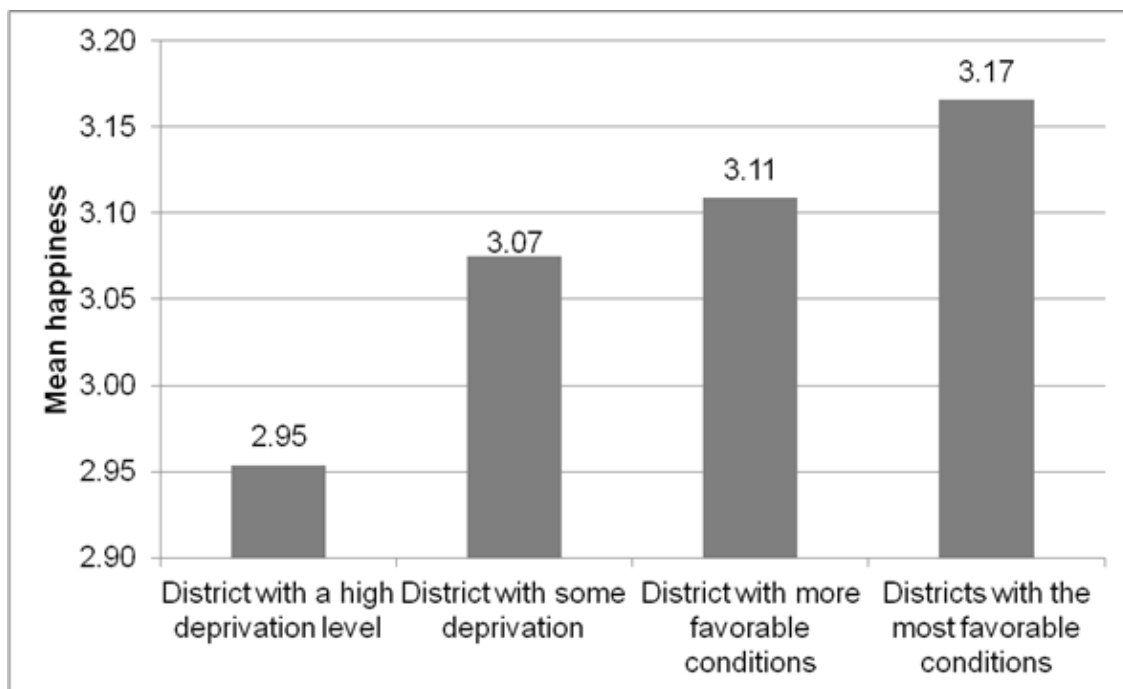


Figure 6: Mean happiness and deprivation level of the neighborhood⁴

When we consider the levels between lowest and highest levels of deprivation, the law of the diminishing returns comes into play: the difference in happiness between neighborhoods with high deprivation and low deprivation is 0.12, while the differences in happiness between the following deprivation levels get smaller and smaller. The Pearson correlation between happiness and deprivation is only -0.03 and not significant, partly because the relationship as described is nonlinear, but also because there is a difference between aggregated data and individual data.

7. INDIVIDUAL DIFFERENCES IN HAPPINESS

In the case of Rotterdam, as in other cities (see POLS 2009 and 2010), the lower happiness in some districts of Rotterdam may be largely due to the tendency for less happy people to settle in less livable districts. This begs the question of who are these less happy people. What are their characteristics? Are these characteristics typical to Rotterdam or similar to the personal correlates of happiness observed in studies elsewhere?

7.1 Happiness of migrants:

The Rotterdam population consists of people from 160 nations, with immigrants comprising nearly half of the total population, most of whom immigrated to Rotterdam or the Netherlands less than three decades ago. Of the non-western immigrants, six ethnic groups predominate by number: Turks, Surinamese, Moroccans, Antilleans, Cape Verdians and Southern Europeans. The Surinamese and Antilleans originate from the (former) Dutch colonies in Latin America. The first of the Turks and Moroccans, and the Southern Europeans (Spaniards, Italians, and Greeks) arrived in the sixties and seventies of the twentieth century when the demand for industrial laborers was higher than the native population could supply.

In the research literature on happiness, immigrants always appear to be less happy than a native population (see references below). Most of the differences can be accounted for by the lower socio-economic status of immigrants. For instance, Cummins (2003) reported slightly lower wellbeing levels for Australian immigrants compared to those born Australians. In Beals (1985) and Stutzer (2003) the differences between immigrants and natives almost disappeared when controlled for socio-economic variables, but Hendriks (2018) found that some difference remains after controlling for socio-economic status and that this difference hardly changes over time. Knies (2014) also reports lower life satisfaction among immigrants in Germany, and shows that area concentration is associated with higher life satisfaction for certain groups

⁴ Aggregated file 1997-2005

To verify whether the same trend could be observed among the Rotterdam population, we split our data sample into the six major different immigrant groups and then compared these data to the Dutch native Rotterdammers, see figure 6. The difference with respect to happiness between the ethnic groups is striking. All immigrant groups are on average less happy than the native Dutch are. Most outstanding are migrants from the North-Mediterranean countries (Greece, Spain, and Italy) and the Antilleans, who score around 2.91 and 2.93 on the 1-4 happiness scale compared to 3.15 for the Dutch native Rotterdammers, however, coincidence or not, the Antilleans are also the most problematic ethnic group in the Rotterdam community, e.g. with a higher unemployment rate and a higher crime rate than any other ethnic group. We do not yet understand how and if low happiness and high crime rate in a neighborhood are related. Though less happy than Dutch native inhabitants of Rotterdam, these migrants are happier than average in their mother-country. The conditions for happiness differ across countries of origin and settlement (e.g. Eren 2016).

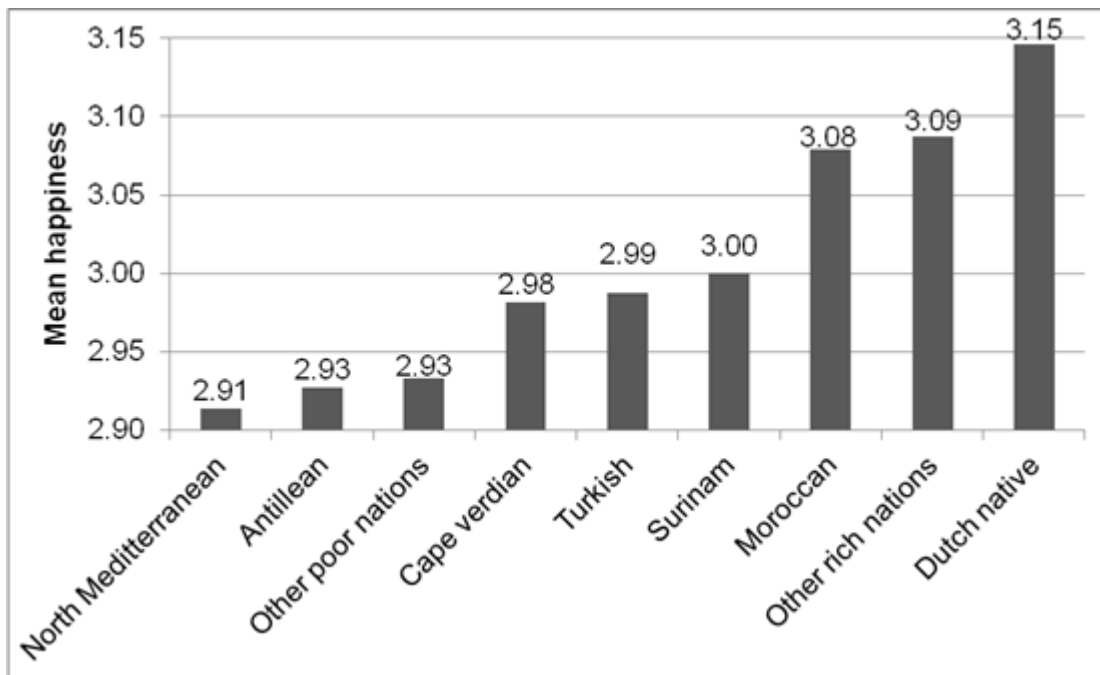


Figure 7: Happiness and ethnicity in Rotterdam

Does income explain these differences? We explored this by executing an ANCOVA and saving the adjusted happiness means controlling income differences. The result is shown in Table 1.

Table 1: Mean happiness of ethnic groups controlling income

Ethnicity	Adjusted means	Difference with Native Dutch*	S.e.
Native Dutch	3.20	-	0.006
Moroccan	3.16	-0.04	0.021
Surinam	3.05	-0.15	0.017
Turkish	3.04	-0.16	0.019
North Meditterranien	3.00	-0.20	0.049
Cape Verdian	3.00	-0.20	0.028
Antillean	2.96	-0.24	0.030

*All differences with native Dutch significant ($p < .01$) except for Moroccans.

It is evident that the differences in average happiness between ethnic groups remain when income is kept constant. Differences in socio-economic status do not explain the differences in happiness between ethnic groups: immigrants are less happy than indigenous Rotterdammers. Is it inherent to their culture that they are less happy than others are? Do cultural characteristics contribute to happiness differences?

There is a large literature on cultural differences and happiness. From several studies, we know that cultural differences have their impact on happiness (e.g. Beals 1985, Arrindell 1997, Dezhu Ye 2015 and Jun 2015). These differences still appear to affect the happiness of later generations of migrants. For example, Beals has shown that migrants from Southern

European nations in the USA are less happy than those originating from North Western-Europe. There is still a difference among third generation migrants. This suggests, as do our data, that there is a cultural component in the explanation of ethnic happiness differences. For some of the immigrant groups who come from rural communities with strong social cohesion the transfer to an anonymous city life might explain the lower happiness levels: however, in other studies (e.g. Cantril 1965, Moller 1983, Ormel 1980) no relation has been found between happiness and urban vs. rural dwelling.

Could integration and acculturation problems account for the lesser happiness of non-western immigrants⁵? Our first results point in that direction (see figure 8). The average happiness of western immigrants with fewer cultural differences is much higher than that of non-western immigrants, and second-generation nonwestern immigrants are in general happier than first-generation immigrants; they are about as equally happy as north-western immigrants.

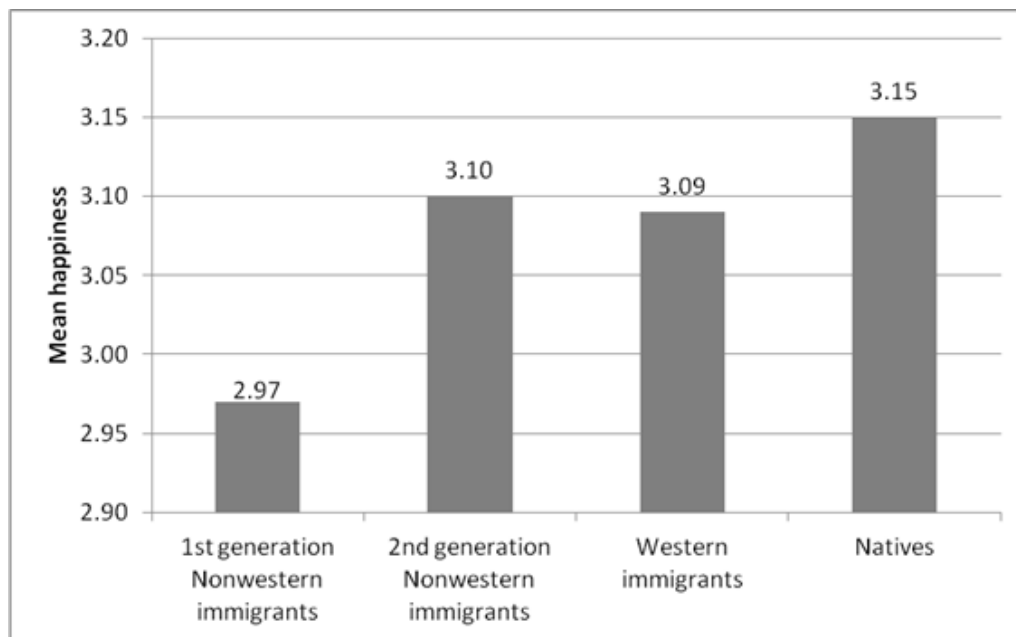


Figure 8: Happiness of 1st and 2nd generation nonwestern immigrants compared

7.2 Happiness and work:

Rotterdam has a reputation for work mindedness. How does work affect the happiness of its inhabitants?

Happiness and unemployment:

Previous research suggests that happiness is much reduced by unemployment (see for example Stutzer and Frey 2010, Kassenboehmer and Haisken-DeNew 2009, Boehnke and Kohler 2007 and DiTella, MacCullough and Oswald 2001). These findings are confirmed by the Rotterdam surveys. In Rotterdam, the average happiness of respondents with a job is 3.16 compared to 2.18 for those unemployed. Note: the category unemployed respondents excluded homemakers, students and pensioners.

Happiness and kind of work:

Paid work is important in our lives, not only because we spent a lot of our time at work but also because work adds meaning to life, however, some people are happier at work than other. In addition, it appears that some jobs give more satisfaction than others do. Warr (2007) argues, "People at work are happier if their jobs contain features that are generally desirable". In other research (e.g. Wood 2008), support is found for the idea that well-being is positively related to job control. The lower on the socio-economic ladder a job is the less job-control a worker has and the less desirable most of this type of work is.

⁵ Non-western immigrants: Turks, Moroccans, Antilleans, Surinam, Cape Verdians

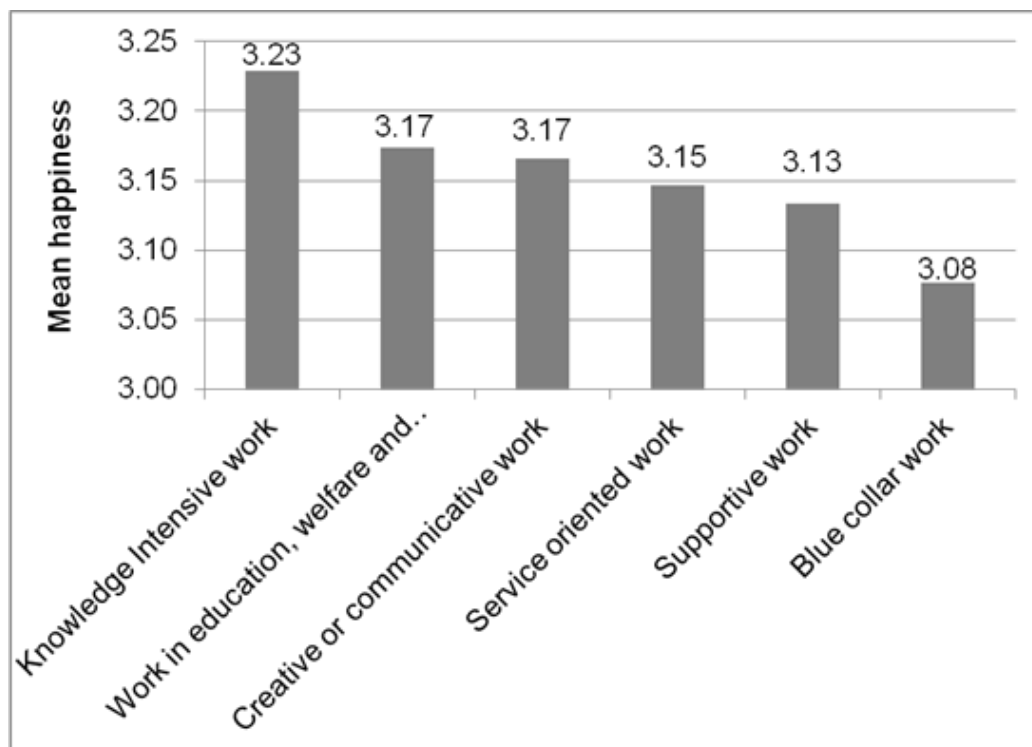


Figure 9: Mean happiness and kind of work

In the present survey, this is confirmed when the level of happiness is linked to the kind of work respondents have, see figure 9. One of the Rotterdam survey questions was “What kind of work do you have?” With six possible answer categories: 1. Knowledge intensive work, 2. Work in education, welfare and health care, 3. Creative or communicative work, 4. Service oriented work, 5. Supportive work and 6. Blue-collar work. The happiest respondents were those who have knowledge intensive work, where one can exploit one’s talents to a maximum and where one has in general most job control. The least happy respondents were those with blue-collar jobs that generally do not have ‘desirable characteristics’ and give the worker least autonomy. Another possible explanation is that these differences are mainly an income effect. We explored this by executing a co-variance analysis. The for income adjusted means are shown in table 2

Table 2: Income adjusted means of happiness by kind of work

Ethnicity	Adjusted means	Difference with Native Dutch*	S.e.
Knowledge intensive work	3.22	-	0.014
Work in education, welfare and health care	3.17	-0.05	0.016
Creative and communicative work	3.15	-0.07	0.024
Service oriented work	3.15	-0.07	0.014
Supportive work	3.13	-0.09	0.019
Blue collar work	3.10	-0.12	0.017

*Significant ($p < .01$)

As can be seen the differences remain when income is controlled. Especially in the lower paid jobs the differences in happiness with knowledge intensive work are significant. So, income does not have the expected influence.

Happiness and hours of work:

Research on happiness and work hours has produced mixed results. Some studies have found greater happiness among part-time workers and other studies among full-time workers (Veenhoven 2016b). What are the findings in Rotterdam? In this city, as can be seen from figure 10, more work hours per week coincide with greater happiness.

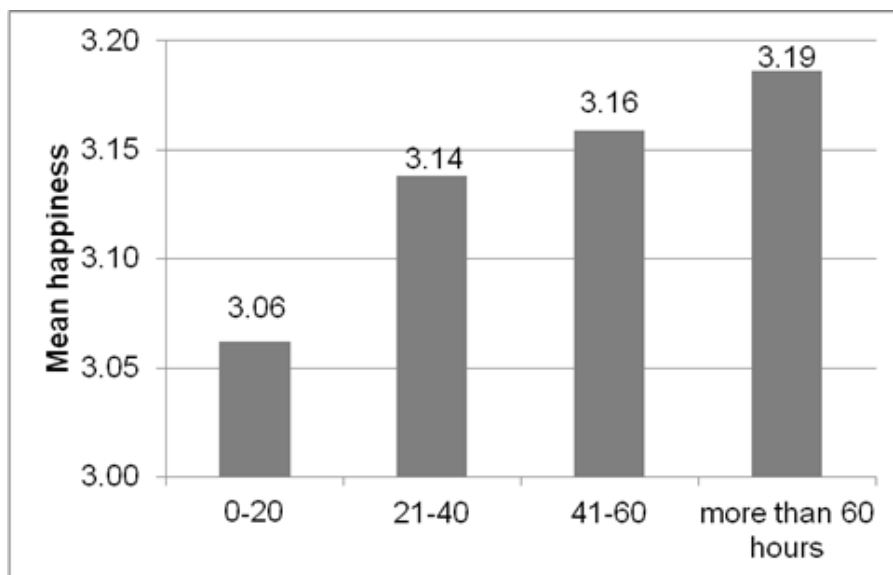


Figure 10: Mean happiness and work hours per week in Rotterdam

7.3 Happiness and health:

Healthy people are happy and happy people are healthy, or so goes common wisdom. In the Rotterdam survey, self-perceived health was measured using two survey questions. The first of these reads: “How do you experience your health?” with 5 answering categories: 1) bad, 2) moderate, 3) good, 4) very good, 5) excellent. For this question, the correlation with happiness was moderate with $r = +.31$ ($p < .001$). The five health categories and average happiness levels found in Rotterdam are presented in figure 11.

The second survey-item reads: “My health is excellent”. The five ratings varied from ‘completely wrong’ via ‘don’t know’ to ‘completely right’. The correlation with happiness was in the same range as for the previous question with $r = +.35$ ($p < .001$). The correlation between the two health items was strong with $r = +.60$ ($p < .01$).

We find similar results reported in other studies on health and happiness, for instance a national sample of the Netherlands gives exactly the same correlation between health and happiness of $r = +.31$ as that found in our study (see Boelhouwer 2002). In a sample of 18 nations, Ball and Chernova (2008) found a beta (standardized regression coefficient) of $+0.32$, controlling various social and demographic indicators. Thus, the Rotterdam data are similar to the findings of other studies.

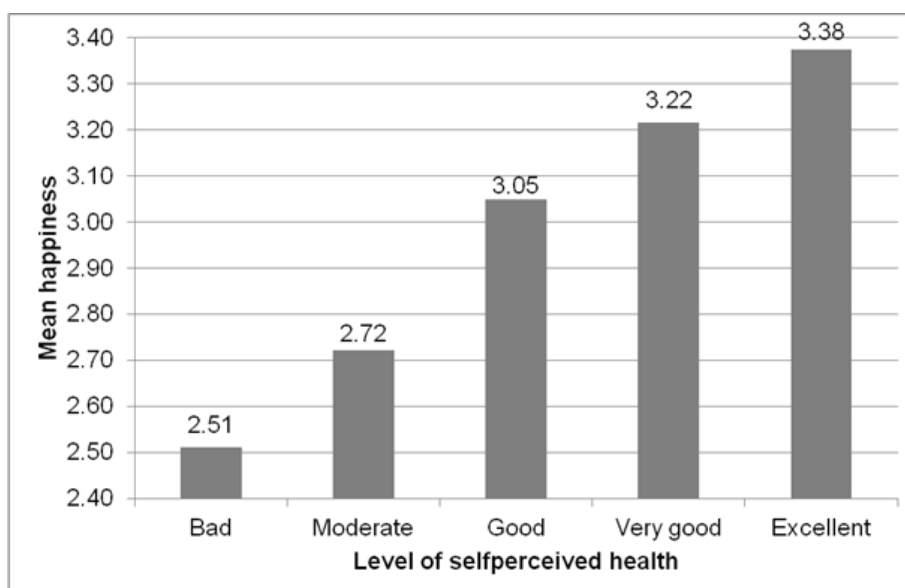


Figure 11: Mean happiness and self-perceived health level

Although the correlation between health and happiness may be moderate, the average happiness of respondents reporting 'excellent health' was at 3.38, approaching 1 point higher on a scale of 1-4 than the score for those reporting their health to be bad.

The ratings of the second health item with their correspondent happiness levels are presented in figure 12, as can be seen the results are very similar to those shown in figure 11, the happiness difference between the lowest health rating and the highest health rating is more than 2 points.

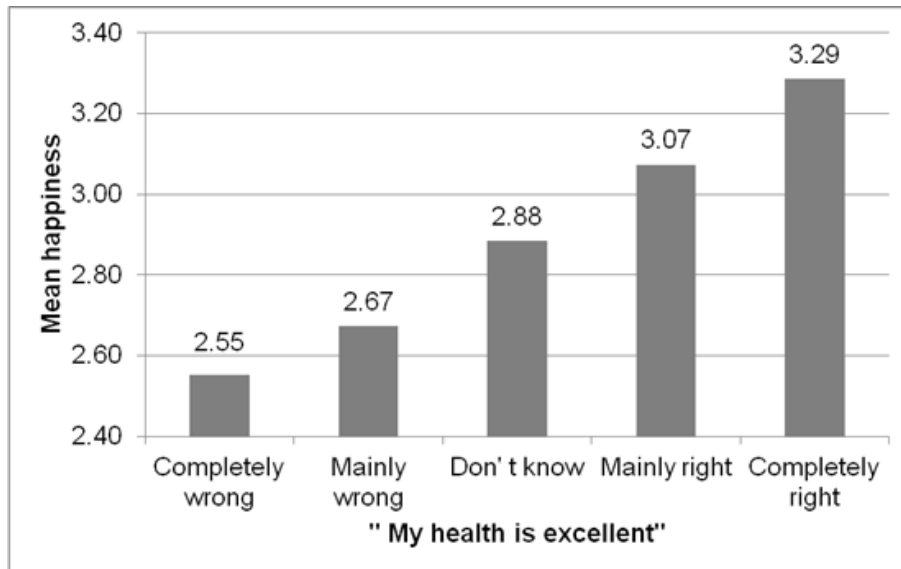


Figure 12: Mean happiness and subjective health

7.4 Happiness and income:

Can money buy happiness? Though the relationship between having money and happiness may not demonstrate a one-way causality, on average people in the highest income class are happier than those in all other income classes. The largest difference is between respondents living on the social minimum and those one-step higher: the last category is 0,11 point happier on a 1-4 scale. The effect of higher income on happiness decreases with each income step higher, however, when looking at the Pearson's correlation, no relation is found between happiness and income, $r=+0.01$ (ns), see figure 13.

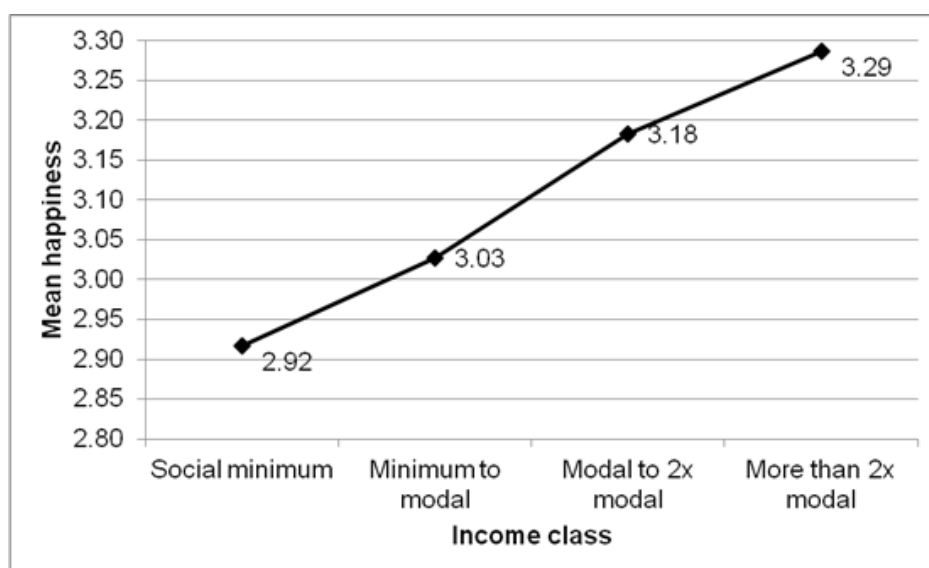


Figure 13: Happiness and household income

Difference of means T-test significance $p<.001$

7.5 Happiness and education:

There is a high level of collinearity between education level and income and the effect of education level on happiness is similar to that of the effect of income level, see fig.14.

The biggest difference in happiness is found between the two lowest education levels, however, when looking at the Pearson's correlation, there is no relation between happiness and education level, $r = -0.01$ (ns).

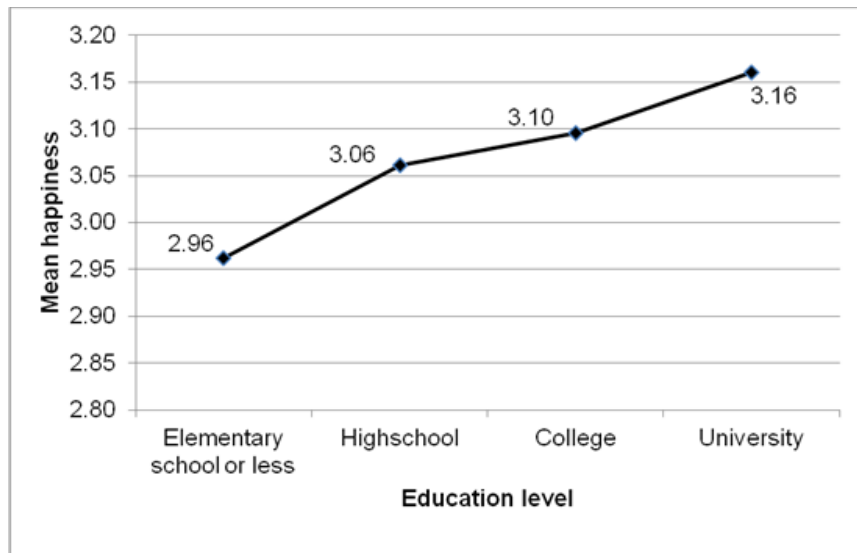


Figure 14: Happiness and education level

Difference of means T-test significance $p < .001$

7.6 Happiness and length of residence:

The longer respondents lived in their neighborhood the happier they were generally, see fig.15. Although the differences were small, they are significant. One explanation could be that the longer one lives in an area close to ones' social relations, the stronger ones' social bond with the area will be. Another explanation is that people that like their neighborhood are not apt to move to another district, however, when looking at the Pearson's correlation, there was no relation between happiness and length of residence, $r = +0.02$ (ns). The length of time someone has lived in Rotterdam has no relation with happiness; no consistent pattern was observed.

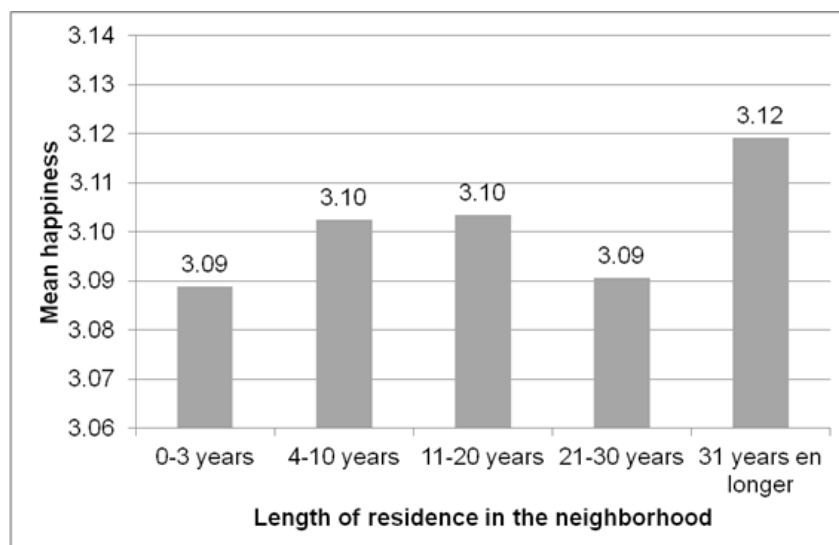


Figure 15: Happiness and length of residence in a neighborhood

Difference of means T-test significance $p < .001$

7.7 Happiness and household size:

In our survey heads of the household were interviewed to determine Rotterdam household sizes. Looking at figure 16 one might conclude that there is no consistent relation between household size and happiness, however, it is clear that Rotterdammers living in one-person households, singles, are significantly unhappier with an average of 2.90 than individuals living in all other household sizes. Further, those living in 2-person households, mostly couples without children, are most happy with an average of 3.18. Remarkably, 3-person households, on average are less happy than 4-person households, i.e. families with one child are less happy than families with two children. Finally, as households become larger than five persons individuals in such households become less happy, with happiness diminishing with each extra member of the household, see figure 16.

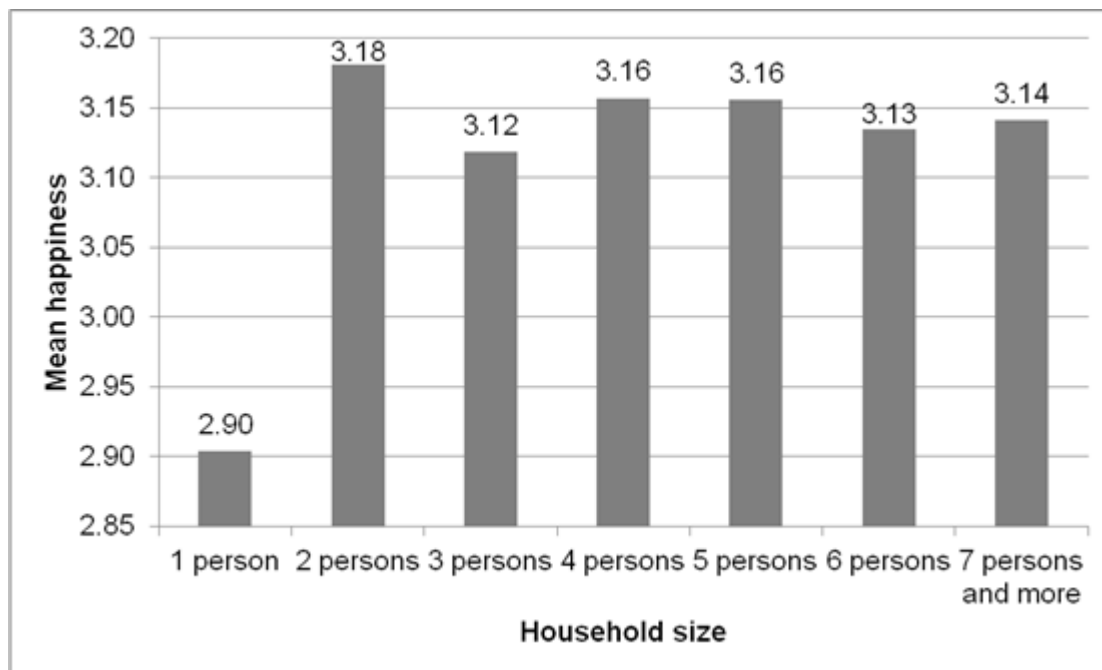


Figure 16: Happiness and household size

8. A MULTIPLE REGRESSION ANALYSIS

What drives the differences found for average happiness across districts in Rotterdam, described in section 5? To what extent are these differences due to the environmental conditions presented in section 6 of this paper and the individual differences presented in section 7? Further, which of the individual characteristics affects happiness most? Since all these variables are much intertwined, the size of the separate bi-variate correlations can be misleading, their relative impact can be better estimated using multiple regression analysis, though this method also has limitations.

Our analysis suggests that the observed differences in average happiness across districts in Rotterdam is mainly a matter of the individual characteristics of those living in a neighborhood and in particular of their health and income. The other variables in the regression were not significant and close to zero. This was also the case for our (imperfect) indicator of the quality of living conditions in districts, the deprivation index was also unrelated to happiness, see table 3. Details of the analysis are available on request.

Even in the case of health and income we cannot be sure that they drive the difference in happiness, since reverse causation can be involved, such as happiness affecting health (Veenhoven 2008). Cause and effect cannot be distinguished in this cross-sectional analysis.

Table 3: Regression analysis, individual happiness dependent

	Beta
<i>Individual characteristics</i>	
Unemployment	0
Health (self-perceived)	+ *

Income (net household)	+ *
Education level	0
Household size	0
Immigrant (nonwestern)	0
<i>Environmental conditions</i>	
District deprivation	0
*p<.001	

9. DISCUSSION

Findings:

What do our data tell us about the livability of Rotterdam city? Firstly, there seems room for improvement, the inhabitants of Rotterdam are less happy than the average Dutch citizens are and are less happy than inhabitants of other comparable large Dutch cities. Most of the difference is due to differences in the composition of the Rotterdam population, but compared to other cities some part the differences are probably also due to less favorable living conditions. Using our data, we could not assess the size of this environmental effect and nor was it possible to establish which urban conditions are the most important for happiness.

We observed substantial differences in average happiness across districts in Rotterdam, however, we could not attribute these differences to clear environmental factors. What holds for Rotterdam as a whole, also holds for its districts; most of the differences in average happiness were due to individual characteristics of the inhabitants and we could not identify whether and if so to what extent environmental conditions affect happiness at the district level.

Implications:

The observed differences in happiness across the individual citizens of Rotterdam do support some policy suggestions. As discussed in section 8, the happiness differences root largely in health and income. This means that happiness in Rotterdam can be raised by investing in health promotion and employment, topics which are already high on the local political agenda already. The data presented in this paper mean that Rotterdam is on the right track.

Further research:

So far, this study shows us that we need more sensitive research methods to identify the drivers of local livability. What could such methods be?

First, we need more detailed information about environmental conditions in districts and to assess these objectively, rather than using perceptions of inhabitants, since their perceptions are typically colored by their subjective wellbeing. Examples of such indicators are air pollution and housing quality. Studies in other cities have shown that such things matter for happiness. An overview of this kind of research is available in the World Database of Happiness (Veenhoven 2016c).

A step further is to tackle the problem of separating cause and effect of urban dwelling on happiness. One way to do that would be to follow people who move from one district to another and compare their happiness before and after the move. This is easier said than done and reasons for moving will blur the view of its effect on happiness; e.g. in the case of a move to a more family friendly district an eventual change in happiness is more likely to be caused by the family situation than by the local living conditions. It is also difficult to measure happiness before people move and this is possible only as part of a large-scale follow-up study, such as the German Socio-Economic Panel (GSOEP). An example of this approach on the regional level can be found in Fasshauer and Redanz (2015).

The causation problem can be better addressed experimentally by allotting people randomly to a certain district. This may be possible in the case of subsidized housing schemes. In this approach, it is not required that happiness is compared before the move if large numbers can be generated. See Ludwig et al. (2012) for a study of this kind in the USA.

All the methods mentioned so far measure happiness using a single question about global life-satisfaction. Happiness can also be measured using multiple-moment assessment methods, such as the Experience Sampling Method (ESM)⁶ and the

⁶ See Larson 1983

Day Reconstruction Method (DRM)⁷. These methods assess the affective component of happiness, that is, how well people feel most of the time, which may be more indicative of livability of a district than the usual questions on life-satisfaction in which cognitive comparison with common standards plays a greater role. Another advantage of multiple-moment assessments is that it allows comparison between how the same person feels when in the district and when elsewhere. This within-person comparison will free us from the selection problem. In this context, a suitable ESM tool would be ‘Mappiness’, which uses the GPS function in mobile telephones, while a suitable DRM tool would be the ‘Happiness Indicator’, which involves completing an online ‘Happiness Diary’ (Bakker et. al 2016).

10. CONCLUSIONS

Inhabitants of Rotterdam are fairly happy, yet they are not as happy as the average inhabitant of the Netherlands is and happiness differs substantially across districts in Rotterdam. Most of these differences are due to composition of the population; Rotterdam has attracted relatively many not too happy people and more of these came to live in some districts of the city than in others. It is yet unclear to what extent elements in the urban environment are responsible for the lower level of happiness in Rotterdam.

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⁷ See Kahneman 2004

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APPENDIX - 1

Sample and response of 7 city surveys in Rotterdam:

Year	N	Response rate
1997	1338	33%
1999	1665	33%
2001	1567	43%
2003	1698	28%
2005	2962	48%
2007	7339	44%
2009	4522	20%
Total	21091	33%

APPENDIX - 2

Average happiness by district:

District	Average happiness	N
Delfshaven	3,01	1782
Feyenoord	3,06	2306
Charlois	3,06	2243
Noord	3,10	1480
Overschie	3,10	1436
IJsselmonde	3,10	1639
Kralingen-Crooswijk	3,11	1467
Stadscentrum	3,12	1149
Prins Alexander	3,13	1886
Hoogvliet	3,15	1070
Hillegersberg-Schiebroek	3,16	1310
Hoek van Holland	3,17	1392
Pernis	3,18	340