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The Impact of Exposure to Other Countries on Life Satisfaction: An International Application of the Relative Income Hypothesis

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Abstract   The cause of international differences in life satisfaction is usually ascribed to differences in living standards. Yet, despite improving living standards in a lot of middle-income countries, significant differences in life satisfaction between middle- and high-income countries remain. This paper examines if there is an international comparison effect and assesses to what extent the relative income hypothesis can be applied to explain international differences in life satisfaction. We test this by analyzing how exposure to other countries impacts life satisfaction. It is hypothesized that higher exposure to other countries in low- and middle-income countries has a negative effect due to increased aspirations and relative deprivation, while the opposite holds true for rich countries. We draw on data from the World Value Survey, the World Bank and the KOF Globalization index to perform a multilevel analysis. The results suggest that an international comparison effect indeed exists and is capable of partially explaining international differences in life satisfaction. Additional analyses reveal that people in lower income classes, in all countries, are affected more by exposure to other countries, indicating that individual characteristics are important when assessing the impact of exposure on life satisfaction. We demonstrate the robustness of these findings by showing that both sub-indicators of exposure, informational flow and international contact, have an impact on life satisfaction that is similar to that of our overall exposure-index.

Keywords   Life satisfaction · Subjective well-being · Reference groups · Globalization · Relative income

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1 Introduction

A lot of research (e.g. Easterlin 1974; Fischer 2008; Kahneman and Deaton 2010) examines the link between income and life satisfaction, both at the individual level as at the country level. Comparison effects are important when addressing the link between personal income and life satisfaction (Senik 2009). When others experience an income raise, this has a direct detrimental effect on the satisfaction people draw from their own incomes (Clark et al. 2008). The group of people that have an indirect impact through comparison is called the reference group. Traditionally, people that live in immediate surroundings are selected as reference groups (e.g. Hou 2014). Although several authors (Clark and Senik 2011; Graham 2005) have suggested that globalization could have changed reference groups, relatively few papers (e.g. Becchetti et al. 2013) have tested the possibility that comparisons of income could also happen internationally. Becchetti et al. (2013) find that the GDI per capita of neighboring countries has a negative impact on life satisfaction in Europe. These results suggest that comparison effects are not limited to national boundaries. This paper adds to this research by testing if people are subject to an international comparison effect by analyzing how exposure to other countries has an impact on life satisfaction. Exposure to other countries is a necessary condition for an international comparison effect to occur. Because, as is often assumed (Jones and Wildman 2008), comparisons of living standards are to some extent subconsciously, we assume that when people are more exposed to people from other countries, international comparison effects will be more important. We measure exposure by creating an index based on two indicators: the amount of information sources available in a country and the number of international interactions in countries. This index-variable is used to test if higher international exposure has an influence on people's reference groups and aspirations. To check if these sub-indicators have a similar impact, their effects on life satisfaction are also tested separately. To examine if the impact of exposure depends on individual characteristics, we also test if this effect depends on income class. This study attempts to test the relative income hypothesis internationally. Analogous to an interpersonal comparison effect, it is hypothesized that rich countries benefit from increased exposure, while it negatively impacts life satisfaction in low- and middle-income countries. We expect a negative effect in middle-income countries based on the dominance of upward comparisons (Clark and Senik 2010). Furthermore, it is likely that middle-income countries are more exposed, for example through trade (e.g. Stoneman and Thompson 2007), to high-income countries than to low-income countries. The impact of exposure is tested by using indicators from the KOF globalization index[1] and the World Bank, combined with data from the World Value Survey (WVS) in a multilevel analysis. The paper is structured as followed: Sect. 2 discusses comparison effects in a globalized world. Section 3 describes the data and methods used. In Sect. 4 we present the results and we conclude in Sect. 5.

2 Comparison Effects in a Globalized World

2.1 The Importance of Relative Income

Striving for economic growth is not without criticism and a growing number of activists as well as researchers question the additional benefits it brings. Easterlin (1974) was amongst

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[1] KOF is a Swiss Economic Institute staffed mainly by academics. KOF is an acronym for the German word "Konjunkturforschungsstelle" (business cycle research institute). The index is described in the Sect. 3.

the first to discuss the relationship between economic growth and happiness in his famous article "Does economic growth improve the human lot? Some empirical evidence". His findings disputed that economic growth directly increases well-being. He observed a positive relationship between personal income and happiness; within a society, richer people are happier. However, he concluded that there was no substantial difference in average happiness between rich and poor countries nor did he find confirmation for an increase in happiness as a result of economic growth. These observations later came to be known as *the Easterlin Paradox*.

Easterlin's findings have been confirmed (e.g. Diener et al. 1999; Walsh 2012) as much as they have been criticized (e.g. Diener et al. 1993; Fischer 2008; Stevenson and Wolfers 2008).[2] Especially his findings about the effect of economic growth on happiness have been confirmed. But, in contrast with Easterlin's conclusion, several researchers have found a difference in happiness between poor and rich countries (e.g. Schyns 1998 and above cited authors). The difference in happiness between countries is commonly attributed to a difference in living standards. This explanation, however, is in contradiction with the limited impact of economic growth that Easterlin observed.

Concepts that explain the *Easterlin paradox* are typically situated within different sciences. Adaptation (also referred to as habituation) indicates that the effect of a stimulus will diminish over time; one will adapt to it and therefore the impact will only have a short-term effect. Brickman and Campbell introduced the concept of a 'hedonic treadmill' to illustrate this mechanism (see Bruni and Porta 2005). Even though a person is running, he will stay at the same spot. When a person becomes richer, his subjective well-being will not permanently increase. Aspirations influence life satisfaction by comparing one's own attainments with one's desired objectives. Life satisfaction is then determined by the degree to which the current situation coincides with the preferred situation. The closer to the optimal situation, the more satisfied a person is. According to Easterlin (1974) economic development is accompanied by an increase in material aspirations. When this change in aspirations applies to income it is sometimes referred to as 'preference drift' (see for instance Groot and van den Brink 2000). When the current situation improves, this also raises aspirations and thus life satisfaction will not increase. These aspirations are not purely individual characteristics, they are also subject to external factors.

In contrast to these psychological explanations, sociologists Stouffer et al. (1949) and Merton and Kitt (1950) use relative deprivation to explain differences in happiness. When an individual evaluates his own situation, he compares himself to others, to his reference group. When people are being outperformed in a certain area (e.g. income) by their reference group, they are considered relatively deprived. When people are outperforming others, this will have a positive effect on their life satisfaction. When this theory is applied to incomes it is pivotal to refer to Duesenberry's (1967) concept of relative income. He theorized, before Easterlin, that the link between income and happiness is not the result of absolute income, but rather follows from one's relative income. This is called the relative income hypothesis. Research (Graham 2011; McBride 2001) illustrates that when income rises the impact of relative income on well-being increases, while absolute income is more important at lower income levels. Several researchers suggest that once a certain income level is reached and basic needs are met, increasing absolute income will not result in higher subjective well-being (e.g. Layard 2005; Frey and Stutzer 2002). These results depend on how subjective well-being is operationalized. For instance, Kahneman and Deaton (2010)

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[2] Well-being research in general has been subject to several criticisms. We do not address these issues in detail here, but refer to the *Stiglitz Report* (Stiglitz et al. 2010) for a discussion on these matters.

make a distinction between emotional well-being and life evaluation as indicators of well-being and find that higher income does not improve emotional well-being past a certain income, while the positive effect of income on life evaluation shows no satiation point.

There is ample evidence that comparison with a reference group is important when estimating the satisfaction one draws from income (Helliwell et al. 2012). Ferrer-i-Carbonell (2005) indicates that there is no consensus about what constitutes a reference group and that authors have chosen a variety of groups to function as a standard for comparisons. Reference groups have been based on people who live in the same country, people who live in the same region, people within the same age range and people with similar socioeconomic characteristics. Furthermore, Diener and Lucas (1999) note that there is no such thing as a universal reference group. Individual characteristics determine the choice of which reference groups an individual compares himself to and whether he compares upwards or downwards. More recently, Clark and Senik (2010) asked respondents which reference group they think of as important. In their research they use several groups, including colleagues, friends and family members, of which they find colleagues to be indicated as the most important reference group when it comes to income. The explanation provided by the authors is that people compare themselves more with people they interact with more frequently. Becchetti et al. (2013) show that income comparisons also happen internationally by looking at the impact of GDI per capita of neighboring countries on life satisfaction. Furthermore they show that this relationship is dependent on exposure to media. Those who use media more often, are affected more strongly than others.

Research (Shrum et al. 2011; Krasnova et al. 2013) shows that media plays an important role in shaping perceptions of other people's living standards. For example, Sirgy et al. (1998) find that watching television decreases people's satisfaction with their standard of living, leading to dissatisfaction with life. More recently, Shrum et al. (2011) confirmed this finding by concluding that television viewing cultivates an emphasis on material values, which in turn reduces life satisfaction. Besides watching television, internet usage may also have an impact on life satisfaction. Gordon et al. (2007) show that this mostly depends on how internet is used and that different types of internet usage have a different effect on wellbeing. This is illustrated by Krasnova et al. (2013) who find that Facebook usage might induce comparison effects that have a negative effect on life satisfaction. Furthermore, Clark and Senik (2010) find that when people have no access to internet, they are less concerned about relative consumption.

2.2 International Comparisons

The world is becoming increasingly globalized, countries are opening up and frontiers are fading away in a big part of the world. This globalization process, guided by technological innovations, has changed social interactions. People are now able to interact at low or even zero cost with others all over the world. This increased international contact could have a significant effect on people's reference groups and aspirations and thus on their well-being. Several authors (Graham 2005; Friedman 2005; Clark and Senik 2011) have argued that technological advances could have changed the awareness of differences in international living standards. For example, Graham (2005, p. 5) writes that "The integration of global markets, meanwhile, has been accompanied by a marked increase in the availability of global information regarding living standards within poor countries and beyond their borders". Cantril (1965, as cited in Easterlin 1974, p. 104) writes: "There is, of course, every likelihood that once the boundaries of such a microcosm are penetrated by "advanced" cultures with the aspirations they intrude into people's minds, then the people within such a microcosm will

alter the standards by means of which they judge satisfaction". It is implied that if a poor closed society is not exposed to high-income countries, its average life satisfaction could be relatively high. When people from low-income countries are confronted with living standards in high-income countries, it is possible that their aspirations will rise and their life satisfaction will decrease. Zhang et al. (2009) illustrate the impact of globalization on tastes in China by looking at the increase of golfers in China. They argue that, as a consequence of globalization, foreign tastes have penetrated China and hereby changed lifestyles.

We assume that exposure to other countries increases over time as globalization progresses. If exposure to other countries has a significant impact on aspirations and on which groups are selected as reference groups, we can expect that, if exposure to other countries increases over time, this factor is becoming more important in predicting life satisfaction. An increase in exposure to living standards in other countries over the last decades could also explain why Easterlin (1974) concluded that there was little to no divergence in happiness between rich and poor countries, while subsequent research did report such a difference.

Studies that investigate the link between globalization and well-being are scarce. Most of these studies focus on the economic dimension of globalization (e.g. Bjørnskov et al. 2008; Dluhosch and Horgos 2013; Weisbrot et al. 2002; Xin and Smyth 2010) or use a very broad definition of globalization, combining several dimensions of globalization such as political, economic and social globalization (e.g. Hessami 2011; Sirgy et al. 2004). The link between a more social dimension of globalization and an indicator for well-being is the subject of only a few studies (e.g. Mukherjee and Krieckhaus 2012; Tsai 2007). None of these studies tests if an effect of this social dimension of globalization on well-being is dependent on the relative position of a country. For example,[3] Tsai (2007) explores the link between different types of globalization and quality of life, measured on a national level. Apart from economic globalization and political globalization he also tests the link with social globalization. The author uses the same database to obtain information about social globalization as used in this paper. Tsai reports that social globalization has no significant impact on well-being. There might be several reasons why Tsai does not find a significant effect. Firstly, 'social globalization' is measured based on several sub-indicators, which may affect well-being differently. Secondly, Tsai uses data collected over a longer period of time (from 1980 to 2000), assuming implicitly that the strength of the effects did not change over time. Another difference is that he uses quality of life as an indicator of well-being, while we use life satisfaction. Finally, and most importantly, he assumes that this variable has a similar effect on quality of life in all countries. We assume that international exposure in a country has a different impact on individual life satisfaction, depending on the country's wealth. In our analyses, we differentiate between low-, middle- and high-income countries and perform separate analyses. It is hypothesized that in high-income countries, higher exposure to other countries has a direct positive impact on life satisfaction. In low- and middle-income countries, we expect that higher exposure to other countries has a direct negative impact on life satisfaction.

3 Data and Methods

Typical for data with observations of people (level one variables) from different countries (level two variables) is that inhabitants of the same country tend to cluster together. This clustering tends to deflate standard errors resulting in overestimation of significance when

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[3] The other cited articles would be subject to similar remarks.

using OLS (Bafumi and Gelman 2006). Given that we focus on the effect of level two variables and on cross-level interactions, we opt for using a multilevel model. Differentiating between variance between countries and variance within countries (Cheah 2009), this method allows us to see how much variance has been explained at each level.[4] The basic model is shown in Eq. 1. In this model X_{ij} is a vector of individual level variables, Y_j is a vector of country level variables, u_j is the country level error term and e_{ij} is the individual level error term.

$$\text{Life satisfaction}_{ij} = \beta_0 + \beta_1 X_{ij} + \beta_2 Y_j + u_j + e_{ij} \qquad (1)$$

we estimate a random intercept model, allowing the intercept to vary for each country, corresponding to the term u_j in Eq. 1. We draw on the World Value Survey for all data at individual level, including the dependent variable life-satisfaction and several control variables. The most recent available wave of surveys, collected between 2003 and 2008, consists of 85,317 observations in 58 countries. This data is supplemented with data about national characteristics, coming from the World Bank and the KOF Globalization index. Taking into account missing values, our retained sample consists of 55,701 individuals in 44 countries.

Literature about well-being generally uses several concepts such as life satisfaction and happiness interchangeably (e.g. Easterlin 2001). The argument often used to justify this indiscriminate use is that these different well-being indicators are generally strongly correlated (Stevenson and Wolfers 2008). In the literature section we, too, discuss research findings on different indicators of well-being. Our research uses life satisfaction as the dependent variable because research (e.g. Stevenson and Wolfers 2008) shows that objective indicators, e.g. income, play a bigger role in determining life satisfaction than they do for happiness. Life satisfaction is operationalized by asking respondents to indicate how satisfied they are with their life as a whole these days on a scale from 1 to 10, where 1 stands for completely dissatisfied and 10 for completely satisfied. Income class is a variable that assesses household income using ten categories, where one stands for being in the lowest income decile of a country and ten for being in the highest income decile. Table 1 summarizes the individual level variables. In the analyses, age has been standardized around its sample mean. Since the relation between age and life satisfaction has been found to be non-linear (Blanchflower and Oswald 2008) a squared term for this age-variable is also included.

Our main variable of interest is exposure to other countries. To construct it, we use data from the KOF globalization index (Dreher 2006). This dataset measures *social globalization* based on three indicators: informational flow, international contact and cultural proximity. We select the first two indicators because we assume that international comparison effects are the result of (1) more information about other countries and (2) more interaction with people from other countries. Cultural proximity does not directly contribute to exposure to other countries, and is therefore not selected. The indicator 'informational flow' measures the presence of information channels in a country. Information about local reference groups such as neighbors, family and co-workers can be derived through direct contact, while information regarding people from other countries has to be

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[4] Research has shown that it is easier to explain variance at country level than at individual level. Compare for instance Engelbrecht (2009) who looks at country level determinants and Knight et al. (2009) who test the strength of individual level predictors. Engelbrecht finds a higher R^2 and is thus more capable of explaining differences between countries than Knight et al. (2009) are in explaining differences between individuals.

Table 1 Individual level characteristics

Variable	Minimum	Maximum	Mean	SD
Life satisfaction	1	10	6.87	2.27
Income class	1	10	4.60	2.32
Age	15	98	42.20	16.52
Health				
Very good	0	1	0.23	0.42
Good	0	1	0.45	0.5
Neutral	0	1	0.25	0.43
Poor or very poor	0	1	0.07	0.25
Marital status				
Having a partner	0	1	0.64	0.48
Divorced or widowed	0	1	0.12	0.32
Single	0	1	0.24	0.43
Dummy variables				
Male	0	1	0.48	0.50
Religious	0	1	0.68	0.47
Unemployed	0	1	0.09	0.29

inferred from sources like television and internet. This indicator is based on internet users per 1000 inhabitants, televisions per 1000 inhabitants and trade in newspapers as a percent of GDP. The indicator' international contact' measures how much international interactions citizens within a country have. This indicator is based on international telephone traffic, transfers as a percent of GDP, international tourism, foreign population as a percent of total population and the amount of international letters per capita. Our variable that measures exposure to other countries is the unweighted sum of these two indicators, each represented by a score on 100. On a scale between 0 and 200, we obtain values ranging from 41.02 to 183.19 with an average of 111.49. Countries with a lower rate of exposure can be considered to be rather 'closed' societies, while countries with a higher rate of exposure are labeled more 'open' societies. An overview of these exposure rates (as well as all other constructed level two variables) by country is provided in the "Appendix".

To differentiate between rich and poor countries, we use GNI per capita data at purchasing power parity. Based on Layard (2005), rich countries are defined as countries that have a GNI per capita of over 15,000$. To differentiate between low- and middle-income countries we set the cutoff point at 4000$. This cutoff point is based on the classification of the World Bank (2013). They classify countries with a GNI per capita above 4000$ as upper-middle-income or high-income countries. Apart from national income, several other national characteristics could explain why countries differ in average life satisfaction. For example, the unemployment rate (Clark et al. 2010; Di Tella et al. 2001; Schwarz 2012) is found to be an important societal characteristic that has a significant impact on life satisfaction. Becchetti et al. (2013) find that the GDP of neighboring countries has a negative impact on life satisfaction. To control for the possibility that international comparisons are mostly regional i.e. with neighboring countries, we also include a measure of regional relative income (see "Appendix" for country-specific values). This variable is constructed by dividing the GNI per capita by the regional GNI per capita based on regions defined by the World Bank. It indicates whether a country is richer (>1) or poorer (<1) than other countries in its region. Developed western countries were contrasted with the average GNI

per capita of high-income countries as defined by the World Bank. European countries that do not belong to the groups "high-income economies" or "Central Europe and the Baltics" are compared to the developing countries of Europe and Central Asia. Several papers (Abdallah et al. 2008; Rözer and Kraaykamp 2013; Diener and Suh 1999) have shown the importance of social and political capital in a society when predicting average life satisfaction. Rözer and Kraaykamp (2013) argue that social trust is an indicator for overall social ties and solidarity in a country and that trust in the government indicates that citizens perceive the government to be fair and well organized. In line with Rözer and Kraaykamp (2013), we have included the degree to which people trust each other and the government as level two control variables. Social trust is measured by the fraction of respondents in a country that answered the question "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" by indicating that you "need to be very careful". Similarly, trust in government is measured by taking the average of answers on a 4-point scale that measures how much confidence respondents have in their government, where 1 stands for "a great deal" of confidence and 4 stands for "none at all". Both variables are inverted as to make interpretation more straightforward: higher scores indicate higher rates of trust. The resulting rates of trust for each country are reported in the "Appendix". Finally, we have also included life expectancy (Deaton 2008) as a control variable. Table 2 shows the average of these national level variables in different income groups and the countries that belong to these groups. It also shows the average life satisfaction in each income group. The standard deviation shows that differences between countries in average life satisfaction tend to be smaller at a higher GNI per

Table 2 Mean (standard deviation) on national level variables by country income

	Low-income	Middle-income	High-income
Average life satisfaction	5.99 (0.94)	6.77 (0.94)	7.35 (0.43)
GNI per capita	2.27 (1.05)	9.44 (2.72)	33.84 (8.20)
Exposure	75.73 (21.71)	104.29 (20.66)	153.94 (21.77)
Unemployment	8.95 (5.77)	10.22 (6.09)	6.10 (2.16)
Social trust	0.26 (0.14)	0.19 (0.12)	0.37 (0.18)
Trust in government	2.66 (0.44)	2.45 (0.38)	2.30 (0.22)
Life expectancy	63.97 (7.41)	70.64 (6.59)	79.40 (2.80)
Regional relative income	0.73 (0.20)	2.17 (2.09)	1.83 (1.50)
N (country)	12	19	18
N (individual)	16,085	27,418	18,683
Countries	Burkina Faso, Ethiopia[a], Ghana[a], Guatemala, India[a], Indonesia, Iraq, Mali[a], Moldova, Morocco, Vietnam, Zambia[a]	Brazil, Bulgaria, Chile, China, Colombia, Georgia, Iran, Malaysia, Mexico, Peru, Poland, Romania, Russian Federation, Serbia, South Africa, Thailand, Turkey, Ukraine, Uruguay	Australia, Canada, Cyprus, Finland, France, Germany, Great Britain, Italy, Japan, Netherlands, Norway, Slovenia, South Korea, Spain, Sweden, Switzerland, Trinidad and Tobago, United States

[a] Missing data on unemployment rate

capita. The relative regional position is right-skewed, countries with a regional GNI per capita of twice the average will deviate further than countries with a GNI per capita of only half the average regional GNI per capita. To increase symmetry in this variable, we take its logarithm in the calculations, as we do for GNI per capita. All level two variables are standardized around their sample means, except for GNI per capita. We expect that our income variable will be more important when GNI per capita is low. Therefore we added a variable to control for the interaction between income and GNI per capita in all models.

Because Iraq was surveyed both in 2004 and 2006 and we only need one sample for each country, we selected only the most recent observations. Several countries had to be deleted because of missing information on control variables on a national level. African countries, and thus the low-income group, especially suffered from missing unemployment data. Therefore we decided to exclude this control variable in the low-income group specific analyses.

4 Results

4.1 Null and Base Models

Before the impact of exposure on separate income groups is analyzed, we perform a multilevel analysis on the entire dataset (see Table 3). The constant in our null model shows that the average life satisfaction in our unrestricted sample is 6.902. The intra-class coefficient is equal to 0.164,[5] indicating that 16.4 % of the variation in the dependent variable can be situated at country level. This illustrates that, as expected, the country in which a person lives has an impact on his life satisfaction.

Next, in model 1 control variables are added. At the individual level we introduce: age, sex, marital status, health, being unemployed, being religious and income class. We supplement these individual level variables with several national level control variables: the unemployment rate, social trust, trust in government, life expectancy and the regional relative income of a country. Results are shown in the second column of Table 3. All individual level variables introduced in the model, were found to be a significant improvement of the model when entered. These control variables confirmed findings in the literature (see Helliwell et al. 2012). In contrast, apart from GNI per capita, none of the level two control variables were found to be significant, although most variables did behave in the way expected.

The added interaction term between GNI per capita and income class was also found to be a valuable addition to the model. The negative sign of the interaction variable indicates that, as GNI per capita rises, the effect of being in a specific income category will be less strong. In our base model 1, increasing our GNI per capita coefficient with one unit will, on average, decrease the positive effect of relative income on life satisfaction with 0.081. In richer countries, income class will thus be less important for life satisfaction. In a country with a GNI per capita of 7500$ we can calculate that going up one income category is associated with an average rise of 0.213 in life satisfaction, while in a country with a GNI per capita of 20,000$ it will increase life satisfaction with only 0.133.

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[5] Calculated by dividing the country level variance by the total variance i.e. $0.830/(0.830 + 4.225) = 0.164$.

Table 3 Multi-level regression analyses on individual life satisfaction

	Model 0	Model 1	Model 2	Model 3
Intercept	6.902***	4.571***	3.911***	3.949***
Individual characteristics				
Age		0.002	0.002	0.002
Age^2		0.118***	0.118***	0.118***
Male		−0.108***	−0.108***	−0.108***
Religious		0.196***	0.196***	0.196***
Marital status[a]				
Divorced/widowed		−0.391***	−0.391***	−0.391***
Single		−0.313***	−0.313***	−0.313***
Subjective health[b]				
Poor/very poor		−1.680***	−1.679***	−1.679***
Neutral		−0.630***	−0.630***	−0.630***
Very good		0.582***	0.582***	0.582***
Unemployed[c]		−0.409***	−0.409***	−0.409***
Income class		0.376***	0.376***	0.376***
Country characteristics				
Unemployment		−0.193	−0.179	−0.133
Social trust		−0.051	−0.080	−0.154
Trust in government		0.108	0.082	0.044
Life expectancy		0.170	0.138	0.237
Regional relative income		0.180	0.068	0.158
GNI per capita[d] (log)		0.630***	0.941***	0.847**
× income class		−0.081***	−0.081***	−0.081***
Exposure			−0.329	−1.075*
× GNI per capita				0.284
σ_{u0}^2	0.830	0.520	0.498	0.471
σ_{e0}^2	4.225	3.613	3.613	3.613
−2log × likelihood	238,584.01	229,853.31	229,851.41	229,848.97
N (country)	44	44	44	44
N (individual)	55,701	55,701	55,701	55,701

[a] Having a partner, [b] good health, [c] not looking for or already have a job, [d] per 1000$ PPP

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$ (two-tailed)

Comparing model 1 with the null model, we observe that variance on level one has gone down considerably. This shows that the individual control variables explain an important part of variation at an individual level. Level two variance also decreased. Accounting for the composition of countries and the country level control variables can thus explain some of the differences between countries.

In model 2 we introduce 'exposure', our main variable of interest. We find that exposure, including all countries in the analysis, has no impact on average life satisfaction. However, at the same time, the coefficient of GNI per capita increases. In model 3, we also add an interaction effect to test whether the impact of exposure depends on GNI per capita or not. This model is compared to model 2 to see if adding this interaction effect increases

our model fit. Although the effect of exposure itself is negative in model 3, the interaction effect is not significant. Based on these analyses on all countries, we cannot conclude that the impact of exposure to other countries depends on GNI per capita.

4.2 The Exposure Effect

However, adding an interaction effect assumes linearity. This implies that effects are stronger at high and/or low values, while this might not necessarily be the case. In countries where basic needs are not always met, other factors such as food and shelter, may be a lot more important predictors of life satisfaction. In order to analyze these effects more accurately, separate analyses are performed on low-, middle- and high-income countries. This decreases the sample size, but increases interpretability as this will clarify the role of exposure. The results are found in Table 4.

Surprisingly, none of our level two control variables are significant in the model based on low-income countries. Furthermore, the coefficient for GNI per capita is not significant, indicating that differences in life satisfaction between countries with a GNI per capita of 1000$ and 4000$ are limited. The higher coefficient for income class in low-income countries indicates that in those countries life satisfaction might depend more on material conditions. When the interaction effect is taken into account, the predicted coefficient for income in middle-income countries is equal to 0.279 in the least developed country and is decreasing with increasing GNI per capita. Exposure is the only level two variable with a significant impact on life satisfaction in low-income countries. This confirms our hypothesis: low-income countries that are more exposed to other countries have lower life satisfaction. The results for the middle-income countries are similar: a higher exposure has a significant negative impact on life satisfaction. Scoring one standard deviation higher on the exposure scale (this is equal to 20.66 points, see Table 2) will decrease the expected average life satisfaction in a middle-income country by 0.56 points. We attribute this disparity between countries to a difference in relative deprivation. Living in a more open society in the middle or low-income country group will make people feel more deprived. High exposure to rich countries will raise aspirations and this, in turn, will decrease overall life satisfaction. Thus, our hypothesis about middle-income countries is also confirmed.

Finally, In countries with a GNI per capita over 15,000$, we find that higher exposure has a positive significant effect on life satisfaction. In contrast to low- and middle-income countries, exposure is positively related to life satisfaction. This is in line with what we expected, based on the relative income hypothesis. Once again, we explain this effect by a change in reference groups. Being more exposed to other, poorer, countries will result in feeling relatively less deprived and will result in higher life satisfaction. In high-income countries, higher social trust also correlates with increased life satisfaction. The surprising result of a negative coefficient for life expectancy is the result of an outlier.[6] The variable that measures regional relative income is also significant. This shows that citizens in countries that are richer than their neighboring countries are generally also more satisfied with their lives.

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[6] Trinidad and Tobago have an average life expectancy of only 69 years, while the rest of the sample has an average around 80. Additionally, Trinidad and Tobago have a relatively high average life satisfaction. This causes the model to predict a negative effect of life expectancy. Omitting this country from our model leads to the same conclusions as before, except that life expectancy no longer has a significant impact.

Table 4 Multi-level regression analyses on country group samples

	Low-income	Middle-income	High-income
Intercept	4.053***	3.102**	4.780***
Individual characteristics			
Age	0.020	−0.011	0.069***
Age^2	0.045***	0.112***	0.154***
Male	−0.121***	−0.125***	−0.079***
Religious	0.030	0.254***	0.214***
Marital status[a]			
Divorced/widowed	−0.115*	−0.406***	−0.442***
Single	−0.052	−0.319***	−0.412***
Subjective health[b]			
Poor/very poor	−1.192***	−1.845***	−1.871***
Neutral	−0.627***	−0.652***	−0.687***
Very good	0.771***	0.576***	0.605***
Unemployed[c]	−0.114**	−0.426***	−0.467***
Income class	0.284***	0.517***	0.478***
Country characteristics			
Unemployment		0.065	0.038
Social trust	−0.669	−0.023	0.231**
Trust in government	0.330	−0.104	0.023
Life expectancy	0.854	0.327	−0.121**
Regional relative income	0.690	0.333	0.181*
GNI per capita[d] (log)	0.990	1.411**	0.606
× income class	0.020	−0.154***	−0.108***
Exposure	−0.744*	−0.559***	0.335***
σ_{u0}^2	0.713	0.340	0.036
σ_{e0}^2	4.282	4.124	2.661
−2log × likelihood	69,104.80	116,742.41	71,350.38
N (country)	12	19	18
N (individual)	16,085	27,418	18,683

[a] Living together with a partner, [b] good health, [c] not looking for or already have a job, [d] per 1000$ PPP

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$ (two-tailed)

Being more exposed to other countries will alter aspirations in low- and middle-income countries making them less satisfied with life. In contrast, countries with a higher GNI per capita seem to benefit from higher exposure to other countries. Higher exposure makes inhabitants of these countries feel relatively better off, making them more satisfied with their lives. These significant effects of exposure imply that an effect, similar to that of individual relative income, may be in place internationally. This causes rich countries to have a higher average life satisfaction and low and middle-income countries to have a lower average life satisfaction.

In our analyses so far, we have assumed that exposure is a one-dimensional concept, all countries are exposed to other countries in the same way and all citizens from a country are

Table 5 Multilevel regression analyses on country group samples

	Low-income			Middle-income			High-income		
Intercept	3.923***	4.471***	3.569***	2.117*	4.202***	2.778*	5.241***	4.976***	4.139***
Country characteristics									
Unemployment	−0.681			0.088	0.010	0.037	0.036	0.044	0.011
Social trust	0.328	−0.502	−0.139	−0.008	−0.066	−0.029	0.229**	0.198**	0.251***
Trust in government	0.934	0.291	0.214	−0.121	−0.046	−0.073	−0.025	0.029	0.013
Life expectancy	0.754	0.724	0.332	0.343	0.285	0.337	−0.120**	−0.087	−0.168**
Regional relative income	1.215	0.643	0.403	0.348	0.488	0.169	0.181*	0.159	0.109
GNI per capita[a](log)	−0.031	0.349	1.647	1.830***	0.928	1.560*	0.477	0.547	0.788*
× income class		0.020		−0.252***	−0.154***	−0.154***	−0.084***	−0.108***	−0.107***
Exposure	−1.172**			−0.875***			0.410***		
× income class	0.083***			0.069***			−0.015**		
Personal contact		−0.490			−0.465**			0.302**	
Informational flow			−0.816*			−0.518**			0.298***
σ^2_{u0}	0.724	0.864	0.647	0.331	0.350	0.411	0.035	0.046	0.039
σ^2_{e0}	4.256	4.282	4.282	4.110	4.124	4.124	2.660	2.661	2.661
−2log × likelihood	69,008.17	69,107.10	69,103.66	116,651.10	116,742.99	116,746.00	71,344.17	71,354.60	71,351.44
N (country)	12	12	12	19	19	19	18	18	18
N (individual)	16,085	16,085	16,085	27,418	27,418	27,418	18,683	18,683	18,683

Individual control variables omitted from table

[a] Per 1000$ PPP

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$ (two-tailed)

affected equally by exposure. In order to evaluate these assumptions, additional analysis is performed of which the results are shown in Table 5. To examine if exposure has a diverging effect on different groups in society, we test for an interaction effect between exposure and income class. We assumed that the impact of exposure is equal for all citizens in a country. The results in Table 5 illustrate that this is not the case. We have tested, for illustrative purposes, how income class interacts with exposure and found that people in lower income classes, in all countries, are more affected by high exposure. There are other characteristics that might influence the impact of exposure on life satisfaction as well. Further analysis of which characteristics are important could be the subject of future research. Furthermore, the way in which countries are exposed to other countries might differ from country to country. The exposure index consists of two parts: direct personal international contact and indirect informational contact, whose impact is not necessarily similar. To test for differences in how these indicators impact life satisfaction, we test the impact of the separate indicators, instead of using the aggregate index. All the coefficients of the components of our exposure-index have a significant negative effect, except personal international contact in low-income countries. These results are in line with our earlier findings and suggest that both indicators have a similar impact, illustrating the robustness of our findings. Of the two indicators, informational flow seems to have a bigger impact, although by a small margin. Since both sub-indicators have a somewhat equal effect on life satisfaction, aggregating both indicators into one variable appears to be a valid approach.

5 Conclusion

This paper illustrates the importance of including an international component in reference group theory by examining the impact of exposure to other countries on individual life satisfaction using multilevel analysis. We test if the relative income hypothesis can be applied to explain differences between countries, focusing on the direct effect of exposure in low, middle and high-income countries, by performing separate analyses on these country groups. Our results show that people in rich, open countries are generally more satisfied with their lives than people in rich, closed countries. The opposite holds true for low and middle-income countries. Closed low- and middle-income countries generally have a higher life satisfaction than their open counterparts. Since we have assumed dominance of upward comparison for middle-income countries, these results confirm our hypotheses. We explain the effect of exposure by pointing at an international comparison effect.

Exposure is a very broad concept and how countries are exposed to other countries might differ from country to country. To see if different types of exposure have a diverging impact on life satisfaction, we provided separate analyses for both international contact and informational flow. The results show that both sub-indicators have a similar impact on life satisfaction, which is in line with what would be expected if this effect is attributable to a comparison effect. To examine if the impact of exposure differs between people from the same country, we tested an interaction effect between exposure and income class. We found that lower income classes, in all countries, are affected more by exposure. Research could expand on this finding and provide a more detailed description of which individual characteristics are important when assessing the effect of international exposure. Furthermore, we assume that citizens from a country are equally exposed to other countries, although some individuals may be exposed more than others. Exposure at an individual

level is difficult to measure given that it is influenced by a lot of individual characteristics such as socio-economic and job characteristics. These differences in exposure to other countries at an individual level should be the subject of further research.

Research (Ferrer-i-Carbonell 2005) on an individual level shows that comparison effects only negatively affect poor people and have no positive impact on rich people. Likewise, comparison effects might be stronger for low- and middle income countries than for high-income countries. We note that richer countries are generally more exposed, but GNI per capita and exposure have an opposite effect on life satisfaction in middle- and low-income countries. As a country gets richer, its exposure is likely to increase as well, negating a part of the positive effect of increasing GNI per capita in these countries. If exposure is omitted from the model, GNI might partly capture its negative effect and the benefits of GNI for life satisfaction in these countries could be underestimated.

The existence of international comparison effects has implications for various research topics. Aronsson and Johansson-Stenman (2013, 2014) look at the consequences for optimal tax rates when international comparison effects are taken into account. They find that when there is no cooperation between countries marginal tax rates will be lower (2013) and that both national and global public goods will be under-provided in a Nash Equilibrium (2014). Becchetti et al. (2013) suggest that international comparisons could play a role in explaining migration patterns. Our research shows that it is crucial to account for exposure to other countries when examining the determinants of migration decisions. Finally, economists have traditionally considered preferences as endogenous and assumed that consumers know best how to allocate their resources. However, previous research (Zhang et al. 2009) concludes that lifestyles are influenced by globalization and note that it is important to consider the societal and environmental impact of consumption caused by comparison effects. This study confirms these findings and illustrates the central role of exposure in influencing these preferences.

International comparison effects can put a different perspective on economic growth as a means to enhance life satisfaction. Instead of benefiting citizens' wellbeing directly, economic growth also affects them indirectly through international comparison effects. It is important to distinguish between the effects of economic growth due to an increase in living standards, and the more ambiguous effect of economic growth due to comparison effects. According to a pessimistic view, described by Clark and Senik (2011), economic growth may be a zero-sum game, in which whatever one country gains in life satisfaction as the result of economic growth, another country loses due to the relative nature of the benefits of economic growth. Following this hypothesis, single countries, in an attempt to move up the ladder, will always have an incentive to grow.

Conflict of interest   The authors declare that they have no conflict of interest.

Appendix

See Table 6.

Table 6 Country-specific values on all constructed country level characteristics

Country	Exposure	Social trust	Trust in government	Regional relative income
Low-income countries				
Burkina Faso	69.41	0.15	2.44	1.01
Ethiopia	41.02	0.24	2.09	0.72
Ghana	99.77	0.09	2.95	1.08
Guatemala	92.56	0.16	2.20	0.75
India	60.74	0.23	2.63	0.49
Indonesia	56.34	0.43	2.61	0.64
Iraq	74.57	0.41	2.69	0.59
Mali	58.24	0.17	2.96	0.87
Moldova	122.84	0.18	2.11	0.64
Morocco	109.96	0.13	2.62	0.70
Vietnam	71.44	0.52	3.78	0.47
Zambia	75.76	0.12	2.41	1.04
Middle-income countries				
Brazil	74.97	0.09	2.34	1.49
Bulgaria	130.07	0.22	2.15	1.22
Chile	115.34	0.12	2.40	2.37
China	72.46	0.52	3.32	1.01
Colombia	89.03	0.14	2.46	1.38
Georgia	113.96	0.18	2.14	0.71
Iran	87.32	0.11	2.60	1.88
Malaysia	134.50	0.09	3.02	2.41
Mexico	107.59	0.16	2.35	2.35
Peru	84.04	0.06	1.78	0.87
Poland	143.05	0.19	1.94	1.74
Romania	116.67	0.20	2.00	1.20
Russian Federation	126.94	0.27	2.33	0.46
Serbia	146.48	0.15	2.01	1.05
South Africa	93.81	0.17	2.84	8.18
Thailand	95.31	0.42	2.36	1.34
Turkey	113.18	0.05	2.74	2.46
Ukraine	129.40	0.28	2.07	1.38
Uruguay	101.86	0.28	2.65	2.04
High-income countries				
Australia	152.17	0.48	2.32	1.05
Canada	173.52	0.42	2.30	1.15
Cyprus	183.19	0.13	2.58	0.79
Finland	154.83	0.59	2.67	1.02
France	162.59	0.19	2.01	1.01
Germany	157.84	0.34	2.01	1.14
Great Britain	168.56	0.30	2.18	1.05
Italy	142.70	0.29	2.07	0.94
Japan	113.28	0.39	2.14	6.59

Table 6 continued

Country	Exposure	Social trust	Trust in government	Regional relative income
Netherlands	170.74	0.44	2.06	1.23
Norway	157.39	0.74	2.53	1.52
Slovenia	165.41	0.18	2.07	3.01
South Korea	96.23	0.30	2.41	4.82
Spain	160.36	0.20	2.37	0.91
Sweden	158.04	0.68	2.34	1.14
Switzerland	174.73	0.51	2.73	1.26
Trinidad and Tobago	127.85	0.04	2.13	3.76
United States	143.89	0.40	2.32	1.44

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