

Gender Equality in the Happiest Countries

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Abstract

We expect that our nations strive to create communities and institutions that allow us to feel comfortable and hopefully happy. Here we explore the contributing factors that determine if women enjoy more or less equality in the countries with the happiest and unhappiest people. This work aggregates data from economic, social, and cultural perspectives to perform this analysis. Ultimately, our goal is to examine existing happiness metrics based on life evaluation and see how they correspond to the equality and well-being of women across different countries.

1. Introduction

When attempting to quantify women's equality it is imperative to not take a reductionist view that represents equality as a binary classification. Equality is a lived experience with multiple facets so when analysis is conducted into it the data that is used should reflect that outlook. Rather than using features like 'is there a gender pay gap? yes or no' we instead consider 'to what extent do women have the same educational and professional attainment as men?'. When answering the latter question we examine a weighted combination of several features such as literacy, independence, and cultural barriers.

Additionally, there is also a lack of clarity as to how happiness is defined. Most popular global reports use *Life Evaluation*, which is defined as how a person self-reports their happiness. To measure a person's Life Evaluation you would ask them a question such as "On a scale of 1-10 where 1 is the worst, and 10 is the best, how good is your life?". Another popular measurement is Well-Being, which is defined as the positive

and negative experiences in a person's life akin to asking a person, "How often do you smile?" or "How well can you cope with stress?". What we find in the data is that Latin American countries excel at well-being but rank lower in life evaluation while the opposite is true for Scandinavian countries [4]. In our exploration of world happiness data, we strive to compare our own curated data on well-being and compare it to more popularly measured life evaluation data.

We want to make clear that our analysis uses a statistical measurement of the happiness of people in a country rather than the happiness of a nation itself. Happiness is a personal experience and while certain environments may set up conditions more conducive to happiness there is no happy or unhappy nation.

2. Background

The World Happiness Report (WHR) was first released by the United Nations in 2013 and has been published every year since with the exception of 2014. The report attempts to rank all countries by the happiness of their constituents by using a 0-10 ladder scoring system. For reference, in their 2020 report the top ranked country was Finland (7.809) and the lowest was Afghanistan (2.567). This is a form of the *life evaluation* metric.

Some metrics that the report uses are **GDP per capita**, **healthy life expectancy**, **freedom to make choices**, **generosity**, and **perceptions of corruption**. An important part of their analysis is the creation of a fake nation called "Dystopia" that represents a country that does the worst in all the metrics they capture, this is used as a statistical baseline.

The WHR's metrics are overly concerned with income and economic measurements which strongly affect the ladder scores they give countries [5]. Ad-

ditionally, other self-reported happiness surveys that have been conducted conflicting results, giving higher rankings to South American countries over Scandinavian countries.

We take issue with pairing GDP and life evaluation since previous work has shown that, as income increases, so does life evaluation, but not measures of well-being [8]. This shows that there is a disconnect between the happiness people experience and the happiness that they would characterize their income gives them. In the USA, well-being only scales with income until a threshold salary of around \$90,000/year (when adjusted for inflation). After an individual makes this salary any increase in pay does not translate into linearly increasing well-being.

The author of the GDP metric himself warned against its use for measuring national wellness. [9]

We also take care to catch essentialist biases about what defines happiness as outlined in [1]. Research such as the World Happiness Report reinforce existing perceptions about the inferiority of African nations by evaluating them with the same standards that are used to define their underdevelopment. Additionally [1] critiques the idea that poor people who have never observed opulence are necessarily unhappy as a result of national wealth metrics. The author observes there is a preference for nations to track well-being with GDP rather than Global National Happiness (with the notable exception of Bhutan). Thus, world reports are apt to define happy and advanced countries as the ones that maximize GDP.

3. Data

We look to the following data to conduct our research into women's equality and compare it to self-evaluations of happiness. This data spans everything from nutrition, to birth rates, or visa laws for all nations.

3.1. World Happiness Report

The starting point for our work and what we will compare our features to and get inspiration to design additional ones. Since this is such a popular data source it has already been extensively scraped and explored by statisticians. In Figure 1, we show the rankings given to all nations they considered in 2020. Figure 2 shows the relative stability of the rankings over

a six year span (2015-2020) for the top and bottom countries.

3.2. World Bank - Development Indicators

An incredibly extensive dataset including everything from fruit consumption to internet access from 1960-2020. This stands as the major source of data for most APIs we can find online as well as the source for *Our World In Data*. The majority of the data that we source for this work will come from this data source due to its sheer scope and granularity.

3.2.1 Gender Statistics

This dataset was built using a survey of 624 unique questions ranging from the ability of a woman to apply for a passport independently to income disparities across a country. It provides information for 2016-2019. Due to the plethora of features available in this dataset, we plan to combine some of them to serve as proxy variables for the following questions we wish to investigate:

- How independent can women be with respect to their choice of spouse and position in the household?
- How easily can women take financial decisions that affect a large number of people without facing sexism?

3.2.2 Jobs and Employment Information

This dataset was created using a survey of 166 unique questions designed to gauge job opportunities and contribution to economic development of a country. It is available for 2012-2016. The first questions we seek to answer from this dataset are:

- How many women participate in the economy of a nation?
- Do women attain educational degrees that allow them to participate in technical fields?
- Pay disparity across gender and age demographic

3.3. Best Countries for Women

This US News ranking is based on life-evaluation from the survey responses of almost 9,800 women. These women participated in the 2020 Best Countries rankings also conducted by US News. They were surveyed on their feelings about human rights, gender

0th Percentile
 10th Percentile
 20th Percentile
 31th Percentile
 41th Percentile
 52th Percentile
 62th Percentile
 73th Percentile
 83th Percentile
 94th Percentile

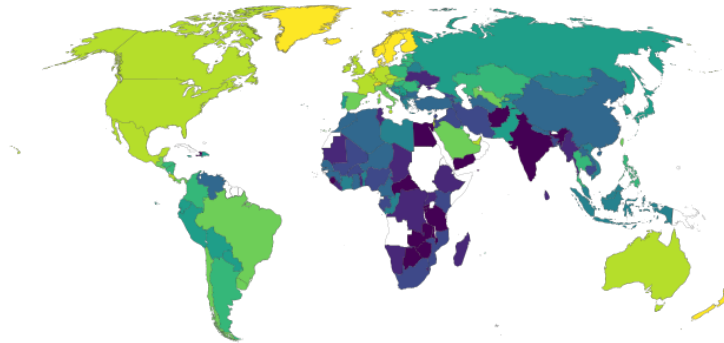


Figure 1: World Happiness Report's happiest countries split at every 10th percentile with New Zealand (NZ) - Finland (FI) being the best performing group and Afghanistan (AF) - Egypt (EG) the lowest performing. We use this as the economic baseline for self-reported happiness.

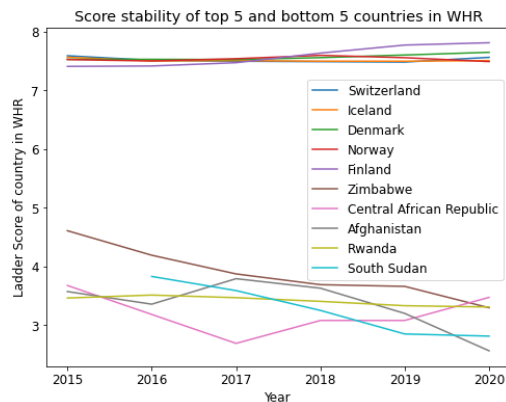


Figure 2: Stability of World Happiness Report Score from 2015-2020

equality, income equality, progress and safety. From those features US News derived rankings by equally weighting all the collected features.

3.4. Supplementary Data Sources

Other less prominent sources of information that we cite data from when researching the well-being of women.

3.4.1 Happiness And Life Satisfaction Dataset

Psychological analysis by "Our World In Data" covering topics such as mental illness and drug usage. This data is sourced from the WHR, World Bank, and the World Value Survey.

3.4.2 Happiest Countries By Experiences

Data collected by Gallup that measures well-being rather than life evaluation. This poll is often cited as a contradiction to the World Happiness Report as its results differ greatly.

4. Analysis

We examine the original feature list in the World Happiness Report and perform analysis on analogous variables that track the well-being of women rather than exclusively economic or self-reported factors.

The World Happiness Report determines a ladder score that is then used to give a resulting ranking for every country. e.g., In 2020, the following linear combination could be used to explain their scoring: Social Support (33%), GDP per capita (25%), healthy life expectancy (20%), freedom of choice (13%), consistent generosity (5%), and perceived corruption (4%) [7].

We break equality into a group of categories that correspond with the following WHR features: GDP

Per Capita with Achievement, Life Expectancy with Health Outcomes, Perceived Corruption with Cultural, and Freedom of Choice remains the same. In the later sections we describe how proxy variables are used to model these features.

We now discuss how each of these features can be looked at from a well-being perspective and then understood through the lens of a woman’s lived experience of equality. From this analogue we can understand what is important to women’s well-being.

4.1. Achievement Equality

This measure of equality addresses the shortcomings in using GDP Per Capita as a measure of happiness. Figure 4 illustrates the strong connection between GDP and the Ladder Score that the WHR assigns. Per [8], income needs to be adjusted to be consistent with experiences of happiness rather than self-reporting.

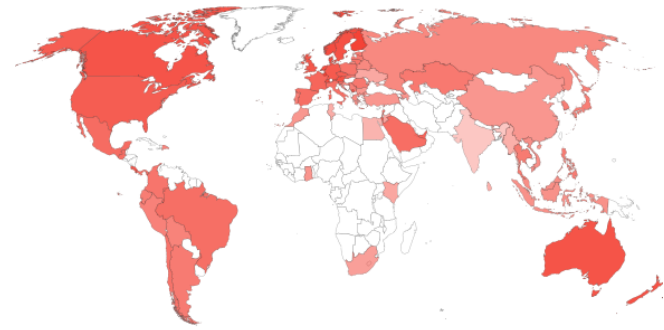
When evaluating achievement we can further break down the problem into one of educational attainment, right to own property, and financial independence. We track several variables in these calculations but at a high level these are the types of questions we ask. Research done on Pakistani women found that the most important features of autonomy that correspond with happiness are education, decision-making ability, and property ownership. [2]

4.1.1 Education

When investigating women’s freedom to get an education we consider that rate at which they enroll in primary schooling through college and all the way to graduate education. Furthermore we look at literacy rates for women in these nations. Example: “Literacy rate, adult female (% of females ages 15 and above)”

4.1.2 Job Opportunity

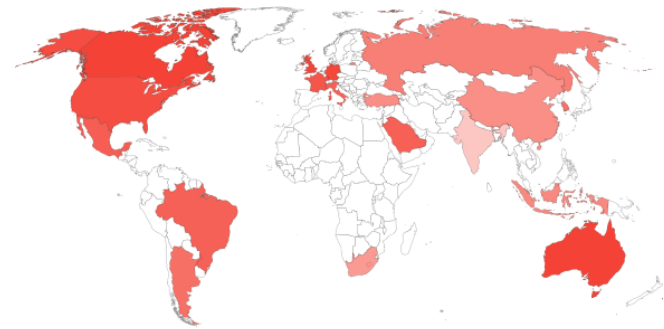
For job opportunity we study whether women can be hired for the same jobs that a man can. We also consult data on laws that protect women’s rights to be employed and be paid an equal wage. We also have access to information on the number of company executives and government officials who identify as female. Example: “Law prohibits discrimination in employment based on gender”



(a) All sampled countries



(b) Sampled European countries



(c) G20 countries



(d) Sampled Latin American nations

Figure 3: Sampled regions, colored by their relative World Happiness Report ladder scores.

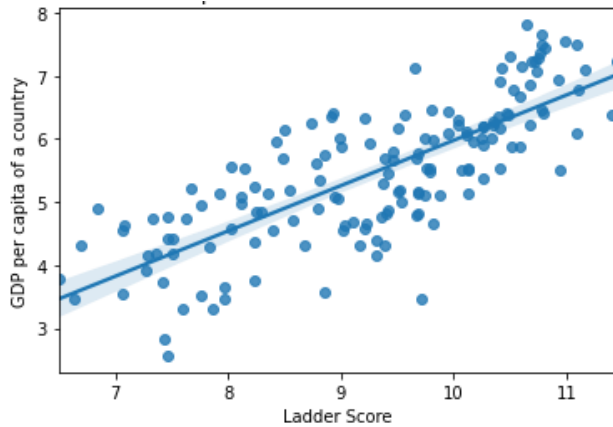


Figure 4: Per Capita GDP vs Ladder Score in the World Happiness Report (2020). The Pearson Correlation is 0.775 with a p-value of 5.98e-32.

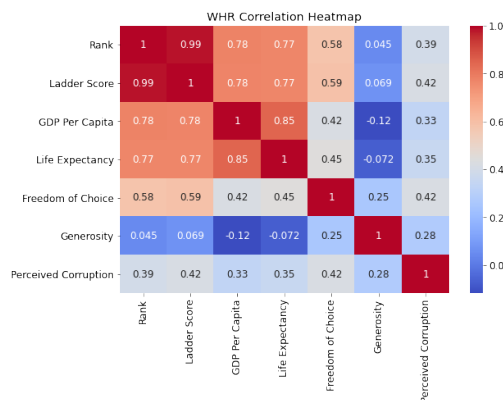


Figure 5: Correlation matrix for the 2020 World Happiness Report

4.1.3 Property Ownership

An essential piece of personal financial achievement for women is the ability to own personal property. We examine women's ability to own housing and land. Example: "Women who own a house both alone and jointly (% of women age 15-49)"

4.2. Health Equality

Healthy life expectancy at birth is collected from the the World Health Organization's (WHO) Global Health Observatory available datasets. Since this data is only available for a subset of years that the WHR was completed for, missing data is filled in with re-

gression fits.

While lifespan stands as the canonical measure of healthcare outcomes for a country we wanted to use information about the how disease and pain affect the lives of citizens. This gives a larger picture of how health affects the day to day happiness of women.

4.2.1 Access to Medicine

The extent to which women can access medicines and procedures they need. This ranges from medication meant to reduce the symptoms of HIV/AIDs and contraceptives. Example: "Access to anti-retroviral drugs, female (%)"

4.2.2 Equality of Health Outcomes

How well women are able to recover from serious disease. This can be seen as a proxy for the quality of healthcare provided to women. Example: "Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70, female (%)"

4.2.3 Drug Use and Mental Health

Whether women suffer to a greater extent than usual in their mental health. We also look to drug use as an indicator of a woman's struggle with an underlying mental health concern. This is supported by background research done in psychology regarding the high co-morbidity of drug use disorder and major depression. [6] Example: "Suicide mortality rate, female"

4.2.4 Equality of Health Condition

On top of whether women can recover from serious medical ailments we also consider the current health conditions of women who may have never been to a doctor prior to diagnosis. Example: "Prevalence of HIV, female (% ages 15-24)"

4.3. Freedom of Choice Equality

The World Happiness reports Freedom of Choice with a self-reported metric where participants are asked "Are you satisfied or dissatisfied with your freedom to choose what you do with your life?"

Again we see the reliance of the WHR on self-reported metrics which we have seen are prone to

flawed analysis. We instead propose an examination of the types of freedoms that a country is afforded such as freedom to travel, marry freely, and bodily autonomy as collected by the World Bank.

4.3.1 Freedom to Travel

For Travel, we examine whether or not women can travel and move with the same level of freedom as men. In particular we have data about whether women's access to passports, and freedom to travel without their husbands. Example: "A woman can travel outside her home in the same way as a man"

4.3.2 Freedom to Marry

A women's freedom to choose her own marriage is a strong predictor of the agency that she has in her personal life. The age that a woman first marries has already been studied as an indicator of female empowerment. [3] We also look at data regarding a woman's ability to get divorced, to remarry, and legally make decisions independently of their husband. Example: "A woman can obtain a judgment of divorce in the same way as a man"

4.3.3 Freedom to Bodily Autonomy

We use data about the extent to which women in a country have control over their own body. We examine data about whether women can transition into men and if they can make decisions regarding their own health-care. Example: "Contraceptive prevalence, modern methods (% of women ages 15-49)"

4.3.4 Freedom to Run Household

Tracks a women's ability to run a household on her own and to make decisions about the major purchases for said household. Example: "A woman can be head of household in the same way as a man"

4.3.5 Freedom to Financial Independence

Based on data that describes a woman's ability to control her own banking, business, and financial contracts. We also look at data regarding women's retirement rights, credit discrimination, and rights to inheritance.

Example: "A woman can register a business in the same way as a man"

4.4. Cultural Equality

Social support (or having someone to count on in times of trouble) is defined in the WHR as the national average of binary responses to the question "If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them, or not?".

We look to the World Bank dataset to find comparable Social Protection metrics that are used to describe the systems that exist in a country. In particular Oxford examined the effects of unequal domestic workload and its affect on the subjective happiness of women. [10] We use this to inform the types of features we collect and aggregate.

4.4.1 Criminal Justice for Women

We define this as whether or not laws are in place to protect women who are victims of crimes. Specifically we track crimes such as domestic abuse, workplace harassment, and genital mutilation. Example: "There is legislation specifically addressing domestic violence"

4.4.2 Matriarchal Societies

To create a proxy for how much women are in control of their societies we look to the number of households that are run by women. We also examine how much time women spend doing unpaid domestic work. Example: "Proportion of time spent on unpaid domestic and care work, female (% of 24 hour day)"

4.4.3 Disparity as Children

To track youth disparity we examine the number of young girls who are not enrolled in schools and are part of the workforce at a young age. Example: "Children out of school, primary, female"

5. Results

From all of these collected features we assign each country a score on the higher level equality categories for women: Freedom, Achievement, Health, and Cultural. With these scores we can calculate how these

Freedom Equality		Achievement Equality		Health Equality		Cultural Equality	
Country	Score	Country	Score	Country	Score	Country	Score
United States	0.911	Slovenia	0.702	Peru	0.872	Philippines	0.758
Spain	0.909	Australia	0.693	Australia	0.816	Costa Rica	0.732
Australia	0.902	Latvia	0.689	Colombia	0.789	South Africa	0.723
Bolivia	0.887	Switzerland	0.685	Spain	0.789	Mexico	0.709
Poland	0.873	United Kingdom	0.682	Singapore	0.783	Peru	0.705
...
Malaysia	0.428	U.A.E.	0.468	Croatia	0.645	Guatemala	0.512
Egypt	0.373	Guatemala	0.461	South Africa	0.632	Indonesia	0.509
Saudi Arabia	0.325	Sri Lanka	0.451	Myanmar	0.617	U.A.E.	0.489
U.A.E.	0.303	Egypt	0.433	Ghana	0.605	Myanmar	0.471
Jordan	0.239	Jordan	0.353	India	0.604	Russia	0.421

Table 1: The scores we assigned to the five best and worst countries for each type of equality we track

	All	Europe	Latin America	G20
<i>Freedom</i>	0.3078 (0.009)	-0.0258 (0.8942)	-0.4125 (0.2074)	0.158 (0.5311)
<i>Achievement</i>	0.5887 (6.6e-08)	0.6291 (0.0002)	-0.3221 (0.334)	0.5094 (0.0308)
<i>Health</i>	0.2536 (0.0328)	0.3156 (0.0953)	-0.078 (0.8196)	0.5634 (0.0149)
<i>Cultural</i>	0.2855 (0.0158)	0.3031 (0.11)	0.3654 (0.2691)	0.1848 (0.4628)

Table 2: A woman’s equality in sampled countries and how it correlates to the World Happiness Report. Reported with the the Pearson correlation (and p-value) with the countries’ ladder score assigned by WHR.

	All	Europe	Latin America	G20
<i>Freedom</i>	0.5097 (5.62e-06)	-0.0563 (0.7715)	-0.4622 (0.1523)	0.8423 (1.15e-05)
<i>Achievement</i>	0.6183 (9.16e-09)	0.431 (0.0195)	-0.1909 (0.5739)	0.7358 (0.0005)
<i>Health</i>	0.0119 (0.9215)	0.464 (0.0112)	-0.5364 (0.0889)	0.3292 (0.1822)
<i>Cultural</i>	0.3524 (0.0025)	0.3268 (0.0835)	-0.1321 (0.6985)	0.2416 (0.3340)

Table 3: A woman’s equality in sampled countries and how it correlates to the US News Report. Reported with the Spearman correlation (and p-value) with the ranking for women assigned by US News.

equality metrics track with the self-reported happiness of a country’s citizens and also women’s’ rankings.

5.1. Country Equality Scores

The top and bottom five countries for each equality category are recorded in Table 1. All features were combined and normalized to guarantee that all scores given will fit between 0 and 1. Since we do not smooth over them a final time Freedom has a range of 0.239-0.911 while Health has a range of 0.872-0.604. This is a product of how it is relatively easier to score nearly

perfectly on Freedom which uses mostly binary features (e.g. can women vote?) where as the features for Health are nearly all continuous (e.g. what percent of women can access contraceptives?).

The countries that scored on the top of Freedom and Achievement Equality are all highly developed nations, with the exception of Bolivia. This confirms the findings of WHR which show that people who live in very affluent and developed nations self-report that they are the happiest. However, those highly developed countries are not the same ones that score the

best on Health Equality. The countries that exhibit the best health equality are at the current time run by left-leaning and collectivist governments with strong social systems. Additionally, the countries that score best on cultural equality are some of the poorest countries we track. This possibly indicates that in those nations their perception of happiness is less tied to money.

Looking to the countries that scored towards the bottom of freedom, achievement, and cultural equality categories we find nations with orthodox and conservative governments. In India, Ghana, and Myanmar we note a lack of resources and centralized health infrastructure that negatively affects their ability to offer health equality for women.

The most impressive nation was Australia which while never at the top of any of the rankings consistently placed in the top 10. Likewise the worst countries for women were consistently the United Arab Emirates, Myanmar, and Jordan. Surprisingly South Africa made an appearance in the top five for cultural equality and the bottom five for Health equality. This was likely the result of South Africa introducing its Constitution in 1996 which guaranteed equal rights for women. However South African women still suffer disproportionately from AIDS, and water/food shortages.

5.2. Country Sampling

When reporting our results we explore subsets of our 71 sampled nations to see if any correlations are artifacts of strong correlations that exist in certain geographical reasons. To that end, we examine Europe, Latin America, and the G20 nations as non-disjoint subsets to experiment on. We particularly consider these since Europe consistently ranks highest in self-reported happiness and Latin America in experiences of happiness. The inclusion of G20 countries is to try and mitigate the result of overly weighting European nations that are over-represented in our sample of 71 countries. It should be noted that the G20 does have an over-representation of developed nations.

Care is taken to not over-represent countries from the top of the WHR scoring list since there is relatively little variance in those countries as we saw in 2. To do this we use the US News Report on the best countries for women to create a meaningful under-sampling.

5.3. Correlations with WHR and US News

In Table 2 and Table 3 we see how a woman's freedom of choice, ability to achieve, access medicine, and cultural equality correlate with their country's WHR ladder score and US News Women's Ratings. This table specifically tracks the 71 countries that we had the most information on. To understand this table consider WHR as the correlation between citizens self-reported happiness with women's experienced equality. And consider US News as the correlation between women's self-reported happiness ranking and their experiences of gender equality.

Europe has a strong and significant correlation between their WHR ladder scores and the achievement equality for European women. This corroborates the finding that women who report being happy are also the women with the most financial autonomy. Likewise when we look at G20 nations we notes that Achievement and Health equality are both strongly correlated to WHR scoring, both of which are prominent factors in determining WHR score.

European countries show a moderate correlation to the rankings women gave in the US News Report. This shows that at least in Europe their experiences of equality do correspond to their self-reported happiness. Looking at women's rankings of happiness for G20 we see a very different story from the WHR scoring. Here we note that freedom is a very strong indicator of reported happiness, with achievement also having a strong but lower correlation.

Looking at both our US News and WHR data we see a negative correlation trend coming from Latin America, though we can make no significant claims. Notably, Latin America struggles to report significant p-values since there are very few countries in that region with sufficient data. That disclaimed, this would indicate that the happiness self-reported by individuals in Latin American countries is inverse related with their experiences of gender equality.

6. Conclusion

After investigating how the World Happiness Report uses the self-reported happiness of citizens as a metric for the happiness of a country we examined how that corresponds to women's experiences of well-being. Looking at other comparative studies about

flaws in self-reporting emotional being our analysis takes care to study equality and experiences of happiness.

The WHR sorts the major factors to happiness in the following order: (1) GDP Per Capita, (2) Life Expectancy, (3) Freedom of Choice, (4) Generosity, and (5) Perceived Corruption. In terms of well-being we would reframe that ordering as: Achievement, Health, Freedom, and Cultural equality.

We conclude that this ordering correctly places Achievement and Health as the most important factors in global comparisons. However, women's well-being emphasizes Health and Freedom more than the WHR and the US News report account for. We also corroborate the Gallup poll's find that the needs for women's well-being in Latin America strongly differs from the criteria for other nations. Latin American women's reported happiness is affected by Cultural equality more than any another group of nations explored.

We posit that capitalist and individualist nations concern themselves strongly with achievement and freedom based values, in contrast with more collectivist nations who value culture and health. This reflects a possible bias in the WHR towards euro-centric values that debase countries in Africa or the Middle East as pointed out by Jidefor Adibe [1]. This is not a particularly novel idea as the social sciences have theorized that there is Conceptual Referent for Happiness [11]. This referent is the basis upon which different cultures build their unique conceptions of subjective happiness or well-being. This leads us to conclude that while happiness can be roughly approximated by asking people if they are happy this type of analysis does not hold when we examine subsets of all countries.

7. Acknowledgments

I would like to thank Prof Leslie Lander for all the help and advice with this Masters degree. I appreciate all the support I received from the Professors of Computer Science department.

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