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# Metal Bands vs Happiness Worldwide

By Moira Riggs

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# Introduction

~Population: Countries of the World

~Measuring: happiness scores, number of metal bands per 100,000 people

## **Data:**

~Listing of bands by country from the Encyclopaedia Metallum vs population

~Happiness score put out by United Nations

**Question?** Will countries with a higher band count be happier?

**Personal Hypothesis:** Happiness and the proportion of metal bands to the population are related, and the countries with higher happiness scores will have a higher proportion of metal bands on average, while the countries with lower happiness scores will have on average less metal bands in proportion to their population.

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# Why?

Though not a particularly huge metal fan, I enjoy many types of music including some metal, and in stumbling upon this data set, it was interesting to me that in looking at a map representation of the data, I noticed some things:

1. Scandinavia has very dense values of metal bands

~There is a tradition of metal in Scandinavia due to the culture as well as several metal movements such as the Black Metal movement in Norway

~From background knowledge, I knew that Scandinavia also has generally the highest ranking happiness scores

2. Much of Africa had no metal bands listed

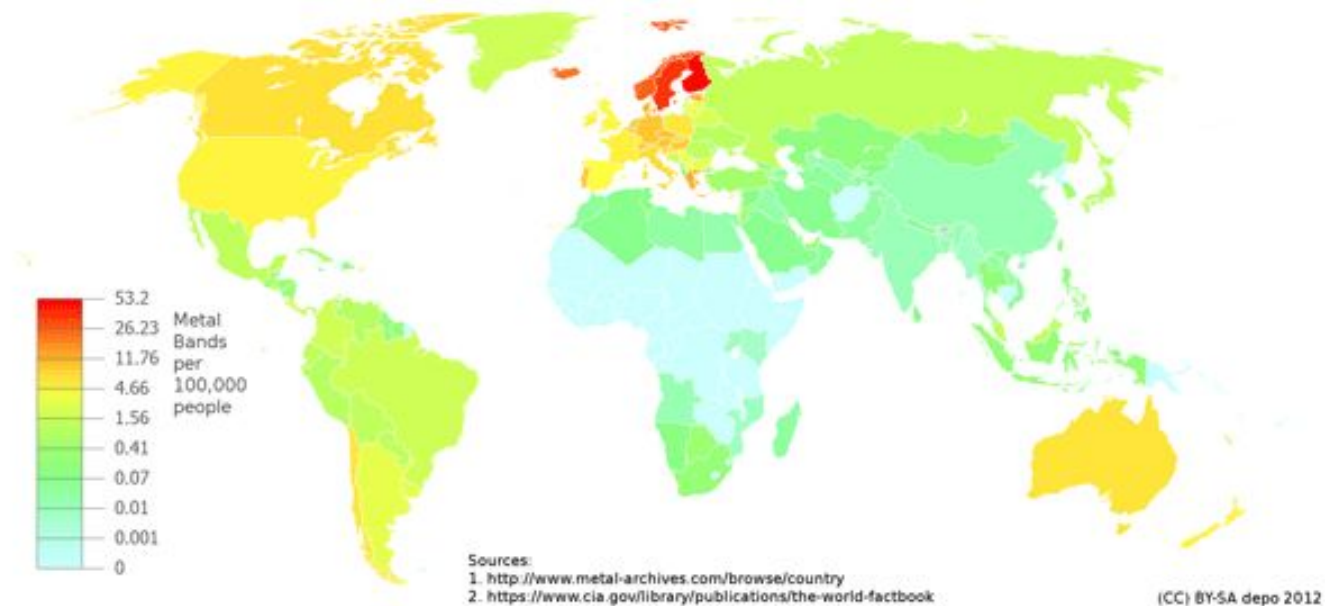
~Some of the most unhappy countries as listed in UN reports are in Africa

Let's look at the graphs:

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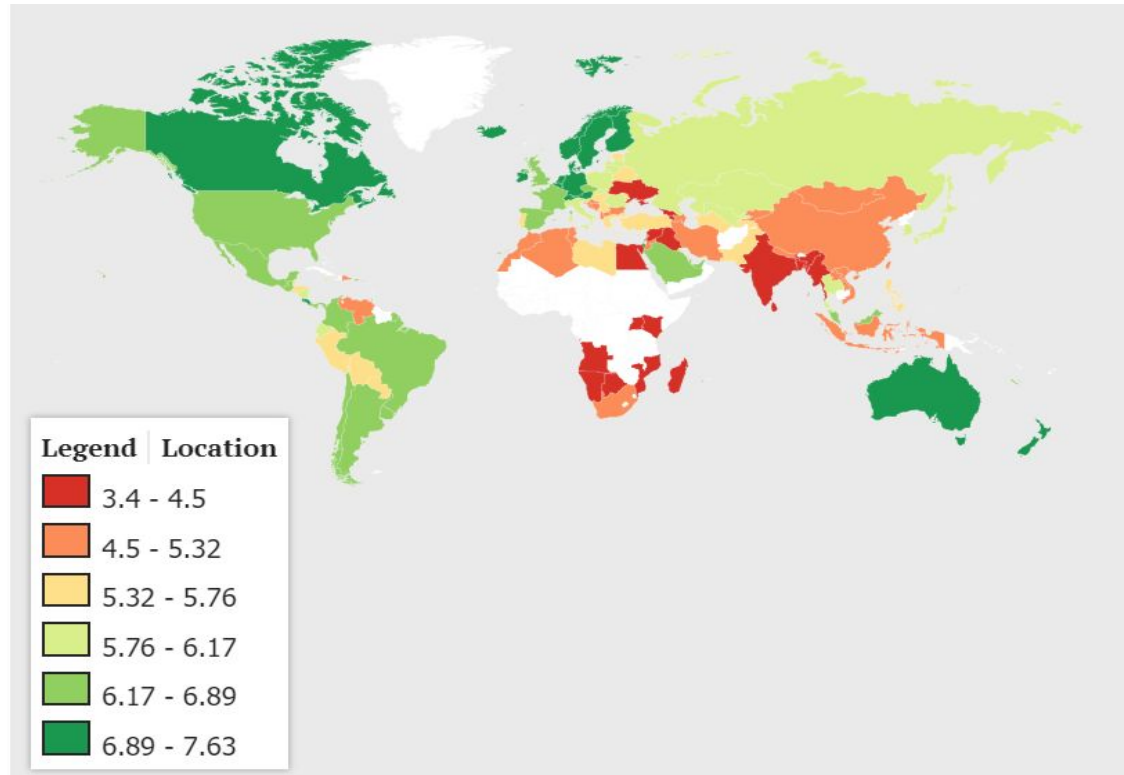
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# Metal Band Density in the World



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# Happiness in the World\*



\*Adjusted to only include the data points being used

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# Sampling Design

**Elements, Sampling Units, Population:** Countries of the World

~ Measuring happiness scores (0 low to 10 happiest), number of metal bands per 100,000 people

**Sampling Frames:**

~ List of Metal bands vs 100,000 people per country compiled by Caitlin Dempsey using data from Encyclopedia Metallum which lists metal bands in each country

~ UN World Happiness report data compiled by Knoema that lists happiness scores for countries around the world along with their world rankings

**Sampling:**

I decided to use every data point that was on both lists, because the population of world countries is already small. This gave me a population size of 120, which is sufficiently large, but much smaller and it would have been problematic.

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# Methods, Implementation Details:

As stated, the sample was not random, instead choosing to use the data available

**Implementation:** I decided to do regression tests that would tell me if bands were significantly related to happiness

**Hypothesis tests:**

$$H_0: \beta_1=0 ; \text{slope}=0 \quad H_a: \beta_1 \neq 0 ; \text{slope} \neq 0$$

The Null hypothesis, if it was true, would mean that there was no relationship between happiness and metal bands, in this case we would probably expect to see random scatter on the graph

My alternate hypothesis simply looks at if there is correlation between metal bands and happiness scores. If the t score I calculate based on the data using pvalue tests rejects the Null Hypothesis, my personal hypothesis that bands are significantly related to happiness will be met

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# Rcode

```
> fit=lm(Happiness.Score~Bands,data=MBvH)
> summary(fit)
```

Call:

```
lm(formula = Happiness.Score ~ Bands, data = MBvH)
```

Residuals:

```
   Min      1Q  Median      3Q      Max
-2.20127 -0.52946  0.03493  0.61995  1.83001
```

Coefficients:

```
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 5.659e+00  9.132e-02  61.966 < 2e-16 ***
Bands       1.616e-04  4.495e-05   3.595 0.000476 ***
```

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```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Residual standard error: 0.9357 on 117 degrees of freedom

Multiple R-squared: 0.09947, Adjusted R-squared: 0.09177

F-statistic: 12.92 on 1 and 117 DF, p-value: 0.0004764

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# Rcode cont.

```
> with(MBvH,plot(Bands,Happiness.Score))
> abline(fit)
> with(MBvH,t.test(Happiness.Score))
```

One Sample t-test

```
data: Happiness.Score
t = 64.117, df = 118, p-value < 2.2e-16
alternative hypothesis: true mean is not equal
to 0
95 percent confidence interval:
 5.592850 5.949335
sample estimates:
mean of x
5.771092
```

```
> with(MBvH,t.test(Bands))
```

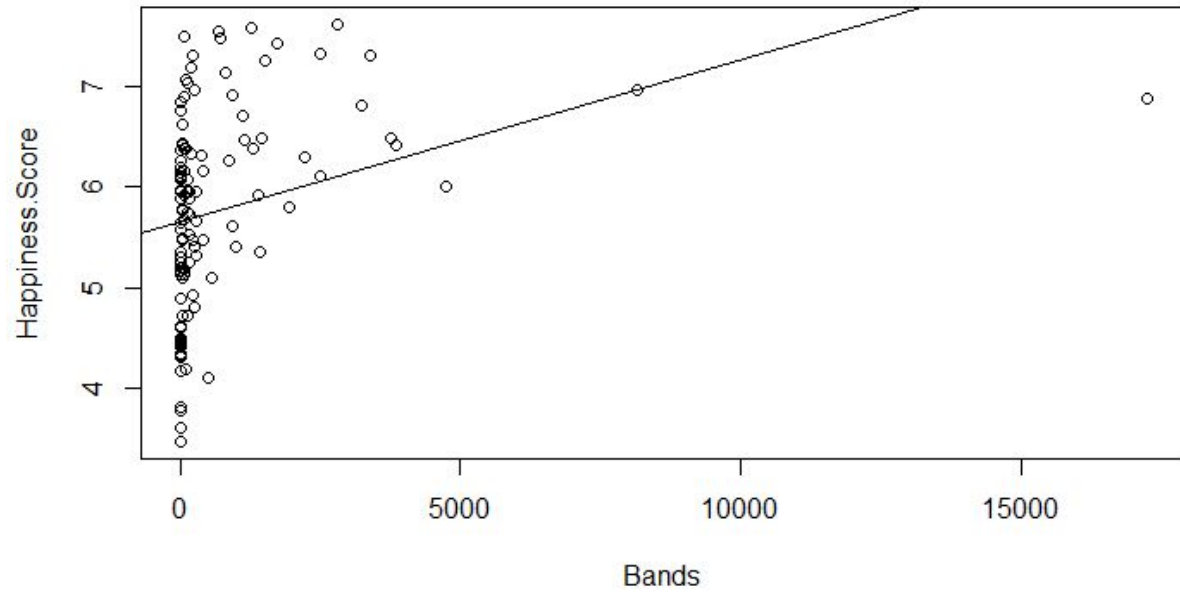
One Sample t-test

```
data: Bands
t = 3.9656, df = 118, p-value = 0.000126
alternative hypothesis: true mean is not
equal to 0
95 percent confidence interval:
 348.781 1044.552
sample estimates:
mean of x
696.6664
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# Graph



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# Analysis:

The graph, though obviously not linear, has a clear correlation that more bands appear in countries with higher happiness. The curve may be able to better estimated by other methods, but that is out of the range of this course.

Recall that I conducted a **Hypothesis test**:

$$H_0: \beta_1=0 ; \text{slope}=0 \quad H_a: \beta_1 \neq 0 ; \text{slope} \neq 0$$

~By conducting a t-test, as seen in the R code,  $t=3.9656$ , and pvalue is  $0.000126$

~The null hypothesis may be rejected iff  $p\text{value} \leq \alpha$

We will let  $\alpha = 0.05$  ; Clearly,  $0.000126 \leq 0.05$ , thus we reject  $H_0$  , meaning that bands per capita are significantly related to happiness.

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# Conclusion

Through the analysis, it is clear that the amount of metal bands per capita is somehow related to the happiness of a country.

This likely has to do somewhat with the success of a country meaning both that more people are happier, and they have time to dedicate to arts like music.

Even though we can not determine the exact cause of this relationship with statistics or otherwise, it is fun to know that metal and happiness are linked.

If I did a project like this again it would be better to start with a population large enough to take a random sample in order to better understand how to do this.

It may also be better if I ever did any further analysis to flip the variables, which may easier show the relationship, however, this way shows positive correlation which is perhaps easier to explain to an audience.

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# Sources

Dempsey, Caitlin. “Interactive Map of Heavy Metal Bands By Country Per Capita ~ GIS

Lounge.” *GIS Lounge*, 15 Dec. 2015,

[www.gislounge.com/map-of-heavy-metal-bands-by-country-per-capita/](http://www.gislounge.com/map-of-heavy-metal-bands-by-country-per-capita/).

“United Nations World Happiness Report.” *Knoema*,

[knoema.com/SDSNWHP2016/world-happiness-report](http://knoema.com/SDSNWHP2016/world-happiness-report).

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