# Unhappy Metros: Panel Evidence

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We study the effect of living in a metropolitan area on life satisfaction, or Subjective WellBeing (SWB). The literature agrees that residents of metropolitan areas tend to be less satisfied with their lives than residents of smaller settlements in the developed world. This is the first study using longitudinal dataset to test the "unhappy metro" hypothesis. Using the 2009-2019 US Panel Study of Income Dynamics (PSID), we find support for the corss-sectional findings: metros are less happy than nonmetros.

Panel Study of Income Dynamics (PSID), urban-rural happiness gradient, urban, cities, happiness, life satisfaction, Swubjective WellBeing (SWB)

Urbanism is not just built environment, but a way of life (Wirth 1938). Urbanism affects humans in multiple and profound ways, indeed urbanism is arguably the most significant disruption of human habitat in our species history (Okulicz-Kozaryn 2015). World is urbanizing at an astonishing pace–urban population will explode from .75b in 1950 in to 6.75b in 2050 (`https://population.un.org/wup`)–6 billion people put in urban areas over just 100 years.

At the same time an agreement has emerged that aside from, or even instead of, traditional development measures such as Gross Domestic Product (GDP) and Human Development Index (HDI), it is useful to measure human development as Subjective WellBeing (SWB) (Stiglitz et al. 2009, Diener 2009).

There are multiple studies finding lowest happiness in largest cities (Okulicz-Kozaryn and Valente 2021, **?**, **?**, **?**, **?**, **?**, **?**, **?**, **?**).

Yet all studies to date are cross sectional and panel evidence is missing. Few studies that use panel data do not actually test the urban unhappiness hypothesis.

White et al. (2013b) and White et al. (2013a) use British panel (BHPS) but test green space (such as gardens, parks, and proximity to coast), not size of a place. Similarly, Alcock et al. (2014) is a panel (BHPS) but also examining green space, not size of a place.

Hoogerbrugge and Burger (????)

using BHPS examines size of a place, but rather than testing urban unhappiness, again, tests open green space hypothesis. The size of a place cutoff is at 10,000 people or even 3,000 people for Scottland. Hence, much of the places above the cutoff, such as large villages and small towns are not really "urban." They are lacking defining features of urbanness: size, density, and heterogeneity Wirth (1938). The build envirnment in villages or small towns lacks tall bildings, urban transit, airports, etc. Way of life in such places is not urban, lacking shaloowness transitriness, etc The way of life lacks transitoriness, etc these words from city book.

cite when metropolis is too big and urgan unhappiness is common–ideally it should be a gradient, and if necessarily a binary disctinction then it is several hundred thousand, not 3 or 10 thoudsand as in Hoogerbrugge and Burger (????).

Rehdanz and Maddison (2008) uses a German panel dataset (GSOEP), properly defining urban rural happiness gradient with multiple cutoffs including at several hundred thousand, but without panel modelling techniques such as fixed or random effects.

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I thank Gordon D. A. Brown for sharing STATA code. All mistakes are mine.

# 1 Data and model

We use 2009-2019 psid from `psidonline.isr.umich.edu`, the reason being that swb question only started in 2009. from the family files we only retain household reference person (or head as it used to be called). This is the same practice as in (Brown and Gathergood 2019).

the swb question reads: "Please think about your life as a whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?" on scale from 1 (low) to 5 (high).

and the key independent variable is metro as defined in table 1.

| metro | beale rural-urban code | description |
|---|---|---|
| 1 | 1 | Metro: Counties in metro areas of 1 million population or more |
| 1 | 2 | Metro: Counties in metro areas of 250,000 to 1 million population |
| 1 | 3 | Metro: Counties in metro areas of fewer than 250,000 population |
| 0 | 4 | Nonmetro: Urban population of 20,000 or more, adjacent to a metro area |
| 0 | 5 | Nonmetro: Urban population of 20,000 or more, not adjacent to a metro area |
| 0 | 6 | Nonmetro: Urban population of 2,500 to 19,999, adjacent to a metro area |
| 0 | 7 | Nonmetro: Urban population of 2,500 to 19,999, not adjacent to a metro area |
| 0 | 8 | Nonmetro: Completely rural or less than 2,500 urban population, adjacent to a metro area |
| 0 | 9 | Nonmetro: Completely rural or less than 2,500 urban population, not adjacent to a metro area |

**Table 1:** metro variable: Metropolitan/Non-metropolitan Indicator: This indicator is derived from the 2013 Beale-Ross Rural-Urban Continuum Codes published by USDA based on matches to the FIPS state and county codes: 1. Metropolitan area (Beale-Ross Code ER775923= 1-3); 0. Non-metropolitan area (Beale-Ross Code ER775923= 4-9). Each county in the U.S. is assigned one of the 9 codes.

Summary statistics are shown in Supplementary Online Material (SOM).

There are 3 vars that not only predict SWB, but also are likely to be confounded with metro: race, political views, and religiosity–yet, they are irrelevant in fixed effects model as they are mostly constant over short period of time such as that considered here.

panel structure description of metro variable is shown in the appendix yes one problem is that tehre is little variability in urb-rur

controls are set in table **??** var_des in SOM

in controls we follow Brown and Gathergood (2019)

it is impostrant to control for employment status–it both predicts swb, especially unmeployment has lasting negative effect on swb, and it also correlates with urbanicity as cities have more employment opportunities (e.g., O'Sullivan 2009).

boilerplate on linear models, no need for categorical dependent variable modeling, elaborate

a standard fixed effects model is given by:

$$SWB_{it} = \gamma METRO_{it} X_{it}\beta + \alpha_i + u_{it} \tag{1}$$

Where, $METRO_{it}$ is a metro dummy for person i at time t. $\gamma$ is the main coefficient of interest. $\alpha_i$ (i=1...n) is the unknown intercept for each person(n person-specific intercepts). SWB is the dependent variable, where i = person and t = wave. $X_{it}$ is a vector of control variables. $\beta$ is the vector of coefficients for control variables. $u_{it}$ is the error term.

A limitation of fixed effects model is that there are just 6 waves and tehre is limited variablility across time and hence time-invariant variables cannot be estimated. metro which is not that often changed does change but not very often—discuss that des sta from som.

We also present RE and single year and pooled in SOM

# 2 Resuklts

by wave each cross section just have in app and refer briefly, and re; in body only fe

**Table 2:** FE regressions of SWB.

| | a1 | a2 | a3 | a4 | a5 |
|---|---|---|---|---|---|
| metro | 0.01 | -0.04* | -0.03* | -0.04** | -0.04* |
| age | | 0.02*** | 0.02*** | 0.01*** | 0.00 |
| age sq | | -0.00** | -0.00 | -0.00 | -0.00 |
| last year total family income | | 0.00* | 0.00 | 0.00 | 0.00 |
| unemployed | | -0.18*** | -0.18*** | -0.16*** | -0.16*** |
| male | | 0.27 | 0.21 | 0.07 | 0.08 |
| health | | 0.13*** | 0.13*** | 0.10*** | 0.10*** |
| kids | | | -0.01 | -0.01 | -0.01 |
| college | | | -0.08* | -0.07 | -0.07 |
| married | | | 0.18*** | 0.17*** | 0.17*** |
| family unit size | | | 0.04*** | 0.03*** | 0.03*** |
| distress | | | | -0.05*** | -0.05*** |
| constant | 3.71*** | 2.37*** | 2.45*** | 2.90*** | 3.60*** |
| state and year dummies | no | no | no | no | yes |
| N | 37567 | 37489 | 36285 | 36142 | 36142 |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | |

nice size effect like a third or half of step in 1-5 hea, like going third or half way from poor health to fair health for instance

## 3 Conclusion and discussion

This is the first panel data investigation of metro-nonmetro happiness gap. The results confirm crosssectional evidence of urban unhappiness.

Future research can improve in a number of ways. Use finer classfication than binary metro-nonmetro. As more waves become available, it will be possible to estimate SWB from moving across urbanicity.

Regressions coefficients on `metro` are not significant without controling for predictors of SWB, so it is important to adjust the metro non-metro happiness gap with happiness predictors, unlike in Burger et al. (2020).[1]

Time invariant person-level characteristics, such as personality traits do matter–the metro unhappiness disadvantage is only about half in fixed effects model v single-year or pooled data (SOM).

# Supplementary Online Material (SOM)

**[note: this section will NOT be a part of the final version of the manuscript, but will be available online instead]**

[1]Burger et al. (2020) also uses faulty Gallup data as elaborated in Okulicz-Kozaryn and Valente (2021)–in general, one should steer away from Gallup happiness data–Gallup charges $30,000 for access (per one year), clearly "happiness industry", not happiness research Davies (2015).

## 3.1 Variables' Definitions

**Table 3:** Variable definitions.

| name | description |
|---|---|
| swb | "Please think about your life as a whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?" 1 (lo) - 5 (hi) |
| metro | "Metropolitan/Non-metropolitan Indicator. This indicator is derived from the 2013 Beale-Ross Rural-Urban Continuum Codes published by USDA based on matches to the FIPS state and county codes." 1 Metropolitan area (Beale-Ross Code ER775923= 1-3) 0 Non-metropolitan area (Beale-Ross Code ER775923= 4-9) |
| age | age |
| age sq | age squared |
| last year total family income | last year total family income |
| unemployed | EMPLOYMENT STATUS-1ST MENTION; We would like to know about what you do – are you working now, looking for work, retired, keeping house, a student, or what?–FIRST MENTION; 1="Looking for work, unemployed", 0 otherwhise |
| male | gender |
| health | "Now I have a few questions about your health. Would you say your health in general is excellent, very good, good, fair, or poor?" 1 (poor) to 5 (excellent) |
| kids | "Number of Persons Now in the FU Under 18 Years of Age" |
| college | "Did (you/he/she) attend college?" 1='yes', 0='no' |
| married | "Are you married, widowed, divorced, separated, or have you never been married?" 1='married'; 0 otherwhise |
| family unit size | Number of Persons in FU at the Time of the Interview |
| white | "What is (your/his/her) race? (Are you/Is [he/she]) white, black, American Indian, Alaska Native, Asian, Native Hawaiian or other Pacific Islander?–FIRST MENTION" 1='white', 0 otherwhise |
| distress | The K-6 Non-Specific Psychological Distress Scale |

## 3.2 Summary statistics

```
      id:  2, 3, ..., 14365                          n =      10108
      yr:  2009, 2011, ..., 2019                     T =          6
           Delta(yr) = 1 unit
           Span(yr)  = 11 periods
           (id*yr uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                         1       1       2         4         6       6       6

     Freq.  Percent    Cum. |  Pattern*
 ---------------------------+----------
     3179     31.45   31.45 |  111111
      723      7.15   38.60 |  ....11
      672      6.65   45.25 |  .....1
      548      5.42   50.67 |  ...111
      505      5.00   55.67 |  ..1111
      502      4.97   60.64 |  1.....
      481      4.76   65.39 |  .11111
      480      4.75   70.14 |  111...
      450      4.45   74.59 |  11....
     2568     25.41  100.00 | (other patterns)
 ---------------------------+----------
    10108    100.00         |  XXXXXX
 ------------------------------------
 *Each column represents 2 periods.



Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
swb      overall |  3.718723   .8759134          1          5 |     N =   37767
         between |             .7136601          1          5 |     n =   10091
```

```
         within  |            .5603667   .5187227   6.552056 | T-bar = 3.74264
                 |                                          |
met      overall |  .7801749   .4141335          0          1 |     N =   37730
         between |             .385049          0          1 |     n =   10073
         within  |            .1878218  -.0531584   1.613508 | T-bar = 3.74566
                 |                                          |
age      overall |  44.85923   16.82858         16         99 |     N =   37928
         between |            17.23457         17         99 |     n =   10107
         within  |            2.911229   37.19257   51.60923 | T-bar = 3.75265
                 |                                          |
age2     overall |  2295.544   1698.311        256       9801 |     N =   37928
         between |            1728.178        289       9801 |     n =   10107
         within  |            285.6776   1268.044   3368.044 | T-bar = 3.75265
                 |                                          |
inc      overall |  61242.84   81095.25          0    3316000 |     N =   37912
         between |            66126.72          0    1883797 |     n =   10108
         within  |            39658.52  -937554.6    2052160 | T-bar = 3.75069
                 |                                          |
une      overall |  .0907629   .2872754          0          1 |     N =   37923
         between |            .2197753          0          1 |     n =   10108
         within  |            .2116276  -.7425705   .9240962 | T-bar = 3.75178
                 |                                          |
male     overall |  .5491432   .4975856          0          1 |     N =   37930
         between |            .4994373          0          1 |     n =   10108
         within  |            .0058544  -.2508568   1.049143 | T-bar = 3.75247
                 |                                          |
hea      overall |  3.436374   1.046857          1          5 |     N =   37862
         between |              .92175          1          5 |     n =   10100
         within  |            .5731675   .4363742   6.603041 | T-bar = 3.74871
                 |                                          |
kid      overall |  .6846296   1.119852          0         11 |     N =   37930
         between |            1.061457          0         11 |     n =   10108
         within  |            .4720193  -3.148704    5.18463 | T-bar = 3.75247
                 |                                          |
col      overall |  .6264205   .4837605          0          1 |     N =   36608
         between |            .4803487          0          1 |     n =    9674
         within  |            .0744979  -.2069129   1.459754 | T-bar = 3.78416
                 |                                          |
mar      overall |  .2802942   .4491489          0          1 |     N =   37928
         between |             .412416          0          1 |     n =   10107
         within  |            .1586708  -.5530391   1.113628 | T-bar = 3.75265
                 |                                          |
nFU      overall |  2.281413   1.412387          1         14 |     N =   37930
         between |            1.317328          1         13 |     n =   10108
         within  |             .615575  -3.468587   8.081413 | T-bar = 3.75247
                 |                                          |
whi      overall |  .5256386   .4993489          0          1 |     N =   37697
         between |            .4985538          0          1 |     n =   10038
         within  |            .0213918  -.2743614   1.192305 | T-bar = 3.75543
                 |                                          |
k        overall |  3.608904   4.151942          0         24 |     N =   37689
         between |            3.629813          0         24 |     n =   10083
         within  |            2.339743  -10.05776    22.6089 | T-bar = 3.73788

(obs=5.00  ,55  8.00  )

             |      swb      met      age     age2      inc      une     male      hea      kid      col      mar      nFU      whi
-------------+-------------------------------------------------------------------------------------------------------------------
         swb |   1.00
         met |  -0.08     1.00
         age |   0.09    -0.05     1.00
        age2 |   0.09    -0.06     0.98     1.00
         inc |   0.13     0.06     0.10     0.06     1.00
         une |  -0.12     0.02    -0.19    -0.18    -0.13     1.00
        male |   0.09    -0.06    -0.01    -0.03     0.29    -0.02     1.00
         hea |   0.27     0.02    -0.24    -0.23     0.20    -0.01     0.15     1.00
         kid |  -0.01     0.02    -0.29    -0.30     0.01     0.09    -0.10     0.05     1.00
         col |   0.04     0.08    -0.08    -0.09     0.24    -0.12     0.06     0.17    -0.04     1.00
         mar |   0.20    -0.06     0.17     0.14     0.43    -0.12     0.55     0.13     0.10     0.14     1.00
         nFU |   0.04     0.01    -0.16    -0.19     0.16     0.05     0.08     0.06     0.86    -0.03     0.35     1.00
         whi |   0.09    -0.19     0.16     0.17     0.26    -0.16     0.26     0.12    -0.16     0.19     0.29    -0.09     1.00
           k |  -0.37    -0.00    -0.12    -0.12    -0.17     0.12    -0.14    -0.30     0.04    -0.10    -0.18    -0.02    -0.09     1.00


(obs=6,294)

             |      swb      met      age     age2      inc      une     male      hea      kid      col      mar      nFU      whi
-------------+-------------------------------------------------------------------------------------------------------------------
         swb |   1.0000
         met |  -0.0233   1.0000
         age |   0.0701  -0.0482   1.0000
```

```
        age2 |   0.0704  -0.0482   0.9850   1.0000
         inc |   0.1675   0.0793   0.0604   0.0308   1.0000
         une |  -0.0931   0.0118  -0.1420  -0.1345  -0.1376   1.0000
        male |   0.0619  -0.0174  -0.0316  -0.0407   0.2897  -0.0217   1.0000
         hea |   0.3035   0.0486  -0.1854  -0.1776   0.2135  -0.0393   0.1189   1.0000
         kid |   0.0501  -0.0036  -0.2768  -0.2929   0.0566   0.0246  -0.0676   0.0553   1.0000
         col |  -0.0072   0.1033  -0.0532  -0.0633   0.2552  -0.1330   0.0317   0.1209  -0.0449   1.0000
         mar |   0.2059  -0.0181   0.1509   0.1293   0.4559  -0.1102   0.5009   0.1282   0.1246   0.1368   1.0000
         nFU |   0.1095  -0.0064  -0.1650  -0.1919   0.2014  -0.0005   0.0708   0.0593   0.8656  -0.0266   0.3526   1.0000
         whi |   0.0585  -0.1388   0.1392   0.1496   0.2572  -0.1132   0.2024   0.0756  -0.0782   0.1494   0.2623  -0.0181   1.0000
           k |  -0.3863  -0.0110  -0.1877  -0.1813  -0.1506   0.1098  -0.1076  -0.3022   0.0164  -0.0556  -0.1855  -0.0381  -0.0161   1.00
```

## 3.3 Panel Structure of Metro Variable

```
xttab met
```

```
                Overall             Between            Within
      met |    Freq.  Percent       Freq.  Percent        Percent
----------+-----------------------------------------------------
 Inap.:   |    8294     21.98       2947     29.26          77.39
 Metropol |   29436     78.02       8362     83.01          93.19
----------+-----------------------------------------------------
    Total |   37730    100.00      11309    112.27          89.07
                           (n = 10073)
```

```
xtsum met
```

```
Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
met      overall |  .7801749   .4141335          0          1 |     N =   37730
         between |              .385049          0          1 |     n =   10073
         within  |             .1878218  -.0531584   1.613508 | T-bar = 3.74566
```

## 3.4 Single Year And Pooled Results V FE Results

**Table 4:** Regressions of SWB: FE v OLS 2015

| | c1-FE | c1-2015 | c2-FE | c2-2015 | c3-FE | c3-2015 | c4-FE | c4-2015 | c5-FE | c5-2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| metro | 0.01 | -0.11*** | -0.04* | -0.12*** | -0.03* | -0.10*** | -0.04** | -0.09*** | -0.04* | -0.08*** |
| age | | | 0.02*** | -0.00 | 0.02*** | -0.01** | 0.01*** | -0.01*** | 0.00 | -0.01*** |
| age sq | | | -0.00** | 0.00** | -0.00 | 0.00*** | -0.00 | 0.00*** | -0.00 | 0.00*** |
| last year total family income | | | 0.00* | 0.00*** | 0.00 | 0.00** | 0.00 | 0.00* | 0.00 | 0.00* |
| unemployed | | | -0.18*** | -0.23*** | -0.18*** | -0.24*** | -0.16*** | -0.18*** | -0.16*** | -0.18*** |
| male | | | 0.27 | 0.08*** | 0.21 | -0.05* | 0.07 | -0.06** | 0.08 | -0.06** |
| health | | | 0.13*** | 0.26*** | 0.13*** | 0.26*** | 0.10*** | 0.18*** | 0.10*** | 0.18*** |
| kids | | | | | -0.01 | -0.04* | -0.01 | -0.03 | -0.01 | -0.03 |
| college | | | | | -0.08* | -0.12*** | -0.07 | -0.13*** | -0.07 | -0.13*** |
| married | | | | | 0.18*** | 0.28*** | 0.17*** | 0.24*** | 0.17*** | 0.24*** |
| family unit size | | | | | 0.04*** | 0.06*** | 0.03*** | 0.05*** | 0.03*** | 0.05*** |
| distress | | | | | | | -0.05*** | -0.06*** | -0.05*** | -0.06*** |
| constant | 3.71*** | 3.82*** | 2.37*** | 2.80*** | 2.45*** | 2.93*** | 2.90*** | 3.63*** | 3.60*** | 3.74*** |
| state and year dummies | no | no | no | no | no | no | no | no | yes | yes |
| N | 37567 | 6256 | 37489 | 6250 | 36285 | 6092 | 36142 | 6068 | 36142 | 6068 |

*** p<0.01, ** p<0.05, * p<0.1; robust std err (OLS)

**Table 5:** Regressions of SWB: FE v OLS Pooled 2015-2019.

| | d1-FE | d1-09-19 | d2-FE | d2-09-19 | d3-FE | d3-09-19 | d4-FE | d4-09-19 | d5-FE | d5-09-19 |
|---|---|---|---|---|---|---|---|---|---|---|
| metro | 0.01 | -0.08*** | -0.04* | -0.09*** | -0.03* | -0.07*** | -0.04** | -0.08*** | -0.04* | -0.08*** |
| age | | | 0.02*** | -0.00 | 0.02*** | -0.01*** | 0.01*** | -0.01*** | 0.00 | -0.01*** |
| age sq | | | -0.00** | 0.00*** | -0.00 | 0.00*** | -0.00 | 0.00*** | -0.00 | 0.00*** |
| last year total family income | | | 0.00* | 0.00*** | 0.00 | 0.00*** | 0.00 | 0.00*** | 0.00 | 0.00*** |
| unemployed | | | -0.18*** | -0.25*** | -0.18*** | -0.25*** | -0.16*** | -0.20*** | -0.16*** | -0.20*** |
| male | | | 0.27 | 0.05*** | 0.21 | -0.08*** | 0.07 | -0.11*** | 0.08 | -0.10*** |
| health | | | 0.13*** | 0.25*** | 0.13*** | 0.25*** | 0.10*** | 0.17*** | 0.10*** | 0.17*** |
| kids | | | | | -0.01 | -0.03*** | -0.01 | -0.02*** | -0.01 | -0.02*** |
| college | | | | | -0.08* | -0.10*** | -0.07 | -0.11*** | -0.07 | -0.11*** |
| married | | | | | 0.18*** | 0.29*** | 0.17*** | 0.26*** | 0.17*** | 0.26*** |
| family unit size | | | | | 0.04*** | 0.04*** | 0.03*** | 0.04*** | 0.03*** | 0.04*** |
| distress | | | | | | | -0.05*** | -0.06*** | -0.05*** | -0.06*** |
| constant | 3.71*** | 3.78*** | 2.37*** | 2.77*** | 2.45*** | 2.91*** | 2.90*** | 3.60*** | 3.60*** | 3.66*** |
| state and year dummies | no | no | no | no | no | no | no | no | yes | yes |
| N | 37567 | 37567 | 37489 | 37489 | 36285 | 36285 | 36142 | 36142 | 36142 | 36142 |

*** p<0.01, ** p<0.05, * p<0.1; robust std err (OLS)

## 3.5 Random Effects

**Table 6:** RE regressions of SWB.

| | b1 | b2 | b3 | b4 | b5 |
|---|---|---|---|---|---|
| metro | -0.04*** | -0.05*** | -0.04*** | -0.05*** | -0.06*** |
| age | | 0.00 | -0.01*** | -0.01*** | -0.01*** |
| age sq | | 0.00*** | 0.00*** | 0.00*** | 0.00*** |
| last year total family income | | 0.00*** | 0.00*** | 0.00*** | 0.00*** |
| unemployed | | -0.22*** | -0.22*** | -0.19*** | -0.19*** |
| male | | 0.07*** | -0.05*** | -0.08*** | -0.08*** |
| health | | 0.19*** | 0.19*** | 0.14*** | 0.14*** |
| kids | | | -0.02** | -0.02** | -0.02** |
| college | | | -0.06*** | -0.08*** | -0.08*** |
| married | | | 0.27*** | 0.24*** | 0.25*** |
| family unit size | | | 0.04*** | 0.04*** | 0.04*** |
| distress | | | | -0.05*** | -0.05*** |
| constant | 3.74*** | 2.92*** | 3.03*** | 3.59*** | 3.68*** |
| state and year dummies | no | no | no | no | yes |
| N | 37567 | 37489 | 36285 | 36142 | 36142 |

*** p<0.01, ** p<0.05, * p<0.1

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