Associations of Urbanicity and Sociodemographic Characteristics with Protective Health Behaviors and Reasons for Leaving the Home During COVID-19

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ABSTRACT

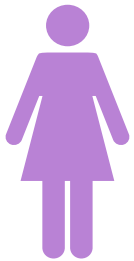
BACKGROUND Limited data existed on US compliance with movement restrictions and protective health behaviors during C19.

PURPOSE Evaluate the associations of individual and area level characteristics with reasons for leaving the home (LTHR) and subsequent protective health behaviors (PHBs)

METHODS Convenience sample of N = 2,441.
Self-report online questionnaire.
Multivariable logistic regression models estimated the odds of citing reasons for LTHR and PHBs.

The Analytic Sample

28%



72%

43% of the sample lived in Urban Areas

85% were educated to college degree level or higher

79% were Non- Hispanic White

April and May of 2020

Data Gathering

Recruited through Twitter, Facebook and Instagram

Survey Questions

- LTHRs
- PHBs
- Demographics
- Sleep Quality
- Substance Use
- Comorbidity

Excluded

- Anyone that didn’t report their ZIP code
- Currently sick with COVID-19
- Difficulty with errands
- Essential service employment

Reasons for Leaving the Home

01 Work

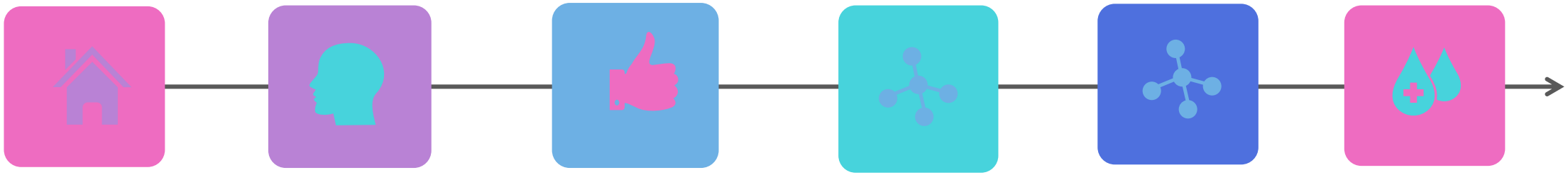
02 Grocery Shopping

03 Other Essential Shopping

04 Exercise

05 Walking the Dog

Protective Health Behaviors



01

Social Distancing

02

Protective Masks

03

Wearing Gloves

04

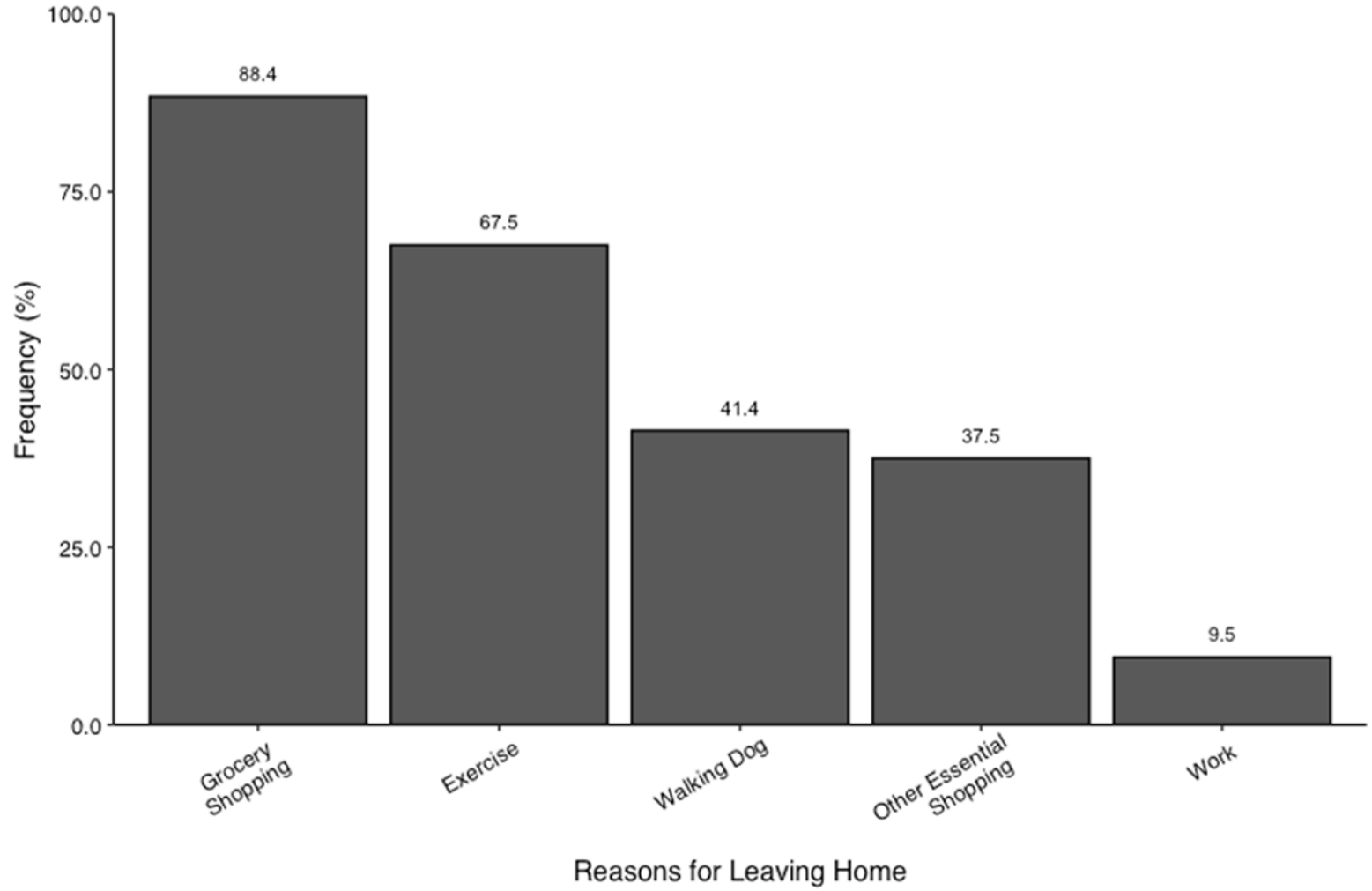
Use of Hand Sanitizer

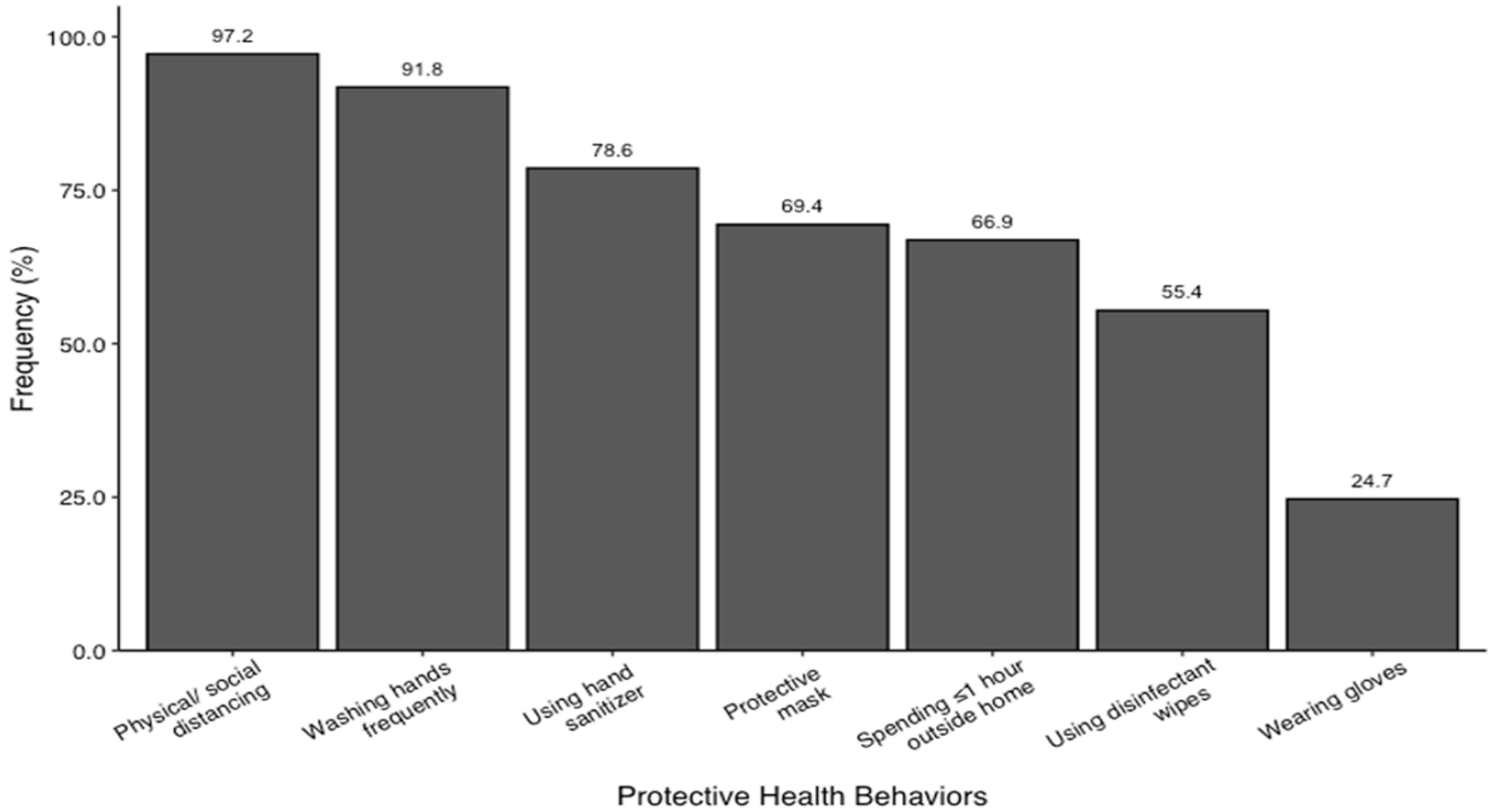
05

Using Disinfectant Wipes

06

Washing Hands Frequently


100.0
75.0
50.0
25.0
0.0
Frequency (%)
88.4
67.5
41.4
37.5
9.5
Grocery Shopping
Exercise
Walking Dog
Other Essential Shopping
Work
Reasons for Leaving Home


100.0
75.0
50.0
25.0
0.0
Frequency (%)
97.2
91.8
78.6
69.4
66.9
55.4
24.7
Physical/ social distancing
Washing hands frequently
Using hand sanitizer
Protective mask
Spending ≤1 hour outside home
Using disinfectant wipes
Wearing gloves
Protective Health Behaviors

Key Findings for Leaving the Home

Rural residents had higher odds of leaving home for work compared with urban residents.
OR = 1.64.

Women reported significantly lower odds of leaving home for work, grocery and other essential shopping than men.

Oldest age bracket had higher odds for leaving home for grocery shopping (2.07) and the middle age bracket had higher odds for leaving home for work (1.90) compared to younger bracket.

Individuals without a college degree had significantly lower odds of leaving the home for grocery shopping (.53) and exercise(.69).

Participants reported an average of 2.4 +- 1.0 reasons for leaving the home.

Individuals that had one or more comorbidities had significantly lower odds of leaving the home. This is to be expected as individuals living with Asthma and other illnesses were in greater danger of serious long-term COVID 19 effects.

Key Findings for Protective Health Behaviors

Suburban residents had significantly greater odds (OR = 1.45) of spending at least 23 hours in the home compared to urban residents.

Rural residents had significantly lower odds of wearing a mask (.60) and gloves (.60) compared to urban.

Women had sig higher odds of social distancing, washing hands frequently, wearing a mask, using sanitizer and using disinfectant.

Older individuals had higher odds of using protective masks yet significantly lower odds of spending at least 23 hours inside the home compared to the youngest age bracket.

Individuals reported engaging in 4.8 +- 1.3 behaviors in total.

It was found that individuals suffering from severe depressive symptoms had significantly lower odds of social distancing compared to people that presented with mild to none.

“The major findings of this study were that in this sample of U.S. adults, those who were male, older, living without comorbidities, and residing in rural areas had higher odds of leaving the home. Additionally, those who were male, younger, and residing in rural areas had lower odds of enacting various protective health behaviours.”

Interactive Effects

Altered Multivariable logistic regression models

Age, Depression and Where We Live

The relationship between migration and age has long been established, and most recently, there have been calls for the inclusion of a life course perspective to migration research. In this paper, we explore Northern Ireland's internal migration patterns, and in particular, we test for the importance of urban to rural migration at different stages of the life course. Data from the Northern Ireland Longitudinal Study are used for the first

In this study, the relationship between age and depression is analyzed, looking for effects of maturity, decline, life-cycle stage, survival, and historical trend. The data are from a 1990 sample of 2,031 U.S. adults and a 1985 sample of 809 Illinois adults. The results show that depression reaches its lowest level in the middle aged, at about age 45. The fall of depression in early adulthood and rise in late life mostly reflects life-cycle gains and losses in marriage, employment, and economic well-being. Depression reaches its highest level in adults 80 years old or older, because physical dysfunction and low personal control add to personal and status losses. Malaise from poor health does not create a spurious rise of measured

Several studies have suggested an age-related difference in the pattern of symptoms of depression; this may be important clinically as a contributor to the underdiagnosis or misdiagnosis of depression in old age. Brown *el al.*'s[1] classic

Without Interactive Effect

```
Call:
glm(formula = leavehomereason___5 ~ Classification + sexf + agegroup +
    edu1 + hhincomef + childrenf + depression_dichotf + comorbidf_relevel,
    family = "binomial", data = COVID_data_notessential)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.9335  -1.2979   0.7306   0.8901   1.4374

Coefficients:
                            Estimate Std. Error z value Pr(>|z|)
(Intercept)                   0.7018     0.2684   2.615 0.008933 **
ClassificationSuburban        0.3158     0.1728   1.828 0.067571 .
ClassificationUrban           0.2572     0.1642   1.567 0.117126
sexfFemale                   -0.1655     0.1455  -1.138 0.255153
agegroup35-49                -0.2396     0.1687  -1.421 0.155376
agegroup>=50                 -0.2630     0.1759  -1.495 0.134817
edu1Notcollegegraduate       -0.3655     0.1758  -2.078 0.037665 *
hhincomef50-<100k             0.3935     0.2301   1.710 0.087264 .
hhincomef100-150k             0.2593     0.2366   1.096 0.273219
hhincomef>150k                0.5218     0.2355   2.215 0.026742 *
childrenfYes                  0.2209     0.1493   1.479 0.139143
depression_dichotfModsevere  -0.2660     0.1545  -1.722 0.085152 .
comorbidf_relevel1 or more   -0.4979     0.1314  -3.787 0.000152 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 1521.2  on 1209  degrees of freedom
Residual deviance: 1469.8  on 1197  degrees of freedom
  (164 observations deleted due to missingness)
AIC: 1495.8

Number of Fisher Scoring iterations: 4
```

With Depression:Age Interaction

```
Call:
glm(formula = leavehomereason___5 ~ Classification + sexf + agegroup +
    edu1 + hhincomef + childrenf + depression_dichotf + comorbidf_relevel +
    depression_dichotf:agegroup, family = "binomial", data = COVID_data_notessential)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.9010  -1.2871   0.7358   0.8897   1.7017

Coefficients:
                                          Estimate Std. Error z value Pr(>|z|)
(Intercept)                                0.56531    0.28066   2.014 0.043984 *
ClassificationSuburban                     0.32239    0.17397   1.853 0.063865 .
ClassificationUrban                        0.26852    0.16508   1.627 0.103814
sexfFemale                                -0.17464    0.14605  -1.196 0.231793
agegroup35-49                             -0.16726    0.19353  -0.864 0.387450
agegroup>=50                              -0.05708    0.19464  -0.293 0.769319
edu1Notcollegegraduate                    -0.36891    0.17688  -2.086 0.037007 *
hhincomef50-<100k                          0.43641    0.23180   1.883 0.059740 .
hhincomef100-150k                          0.29851    0.23739   1.257 0.208586
hhincomef>150k                             0.56621    0.23669   2.392 0.016749 *
childrenfYes                               0.22747    0.15001   1.516 0.129418
depression_dichotfModsevere                0.07043    0.25255   0.279 0.780336
comorbidf_relevel1 or more                -0.50290    0.13215  -3.806 0.000141 ***
agegroup35-49:depression_dichotfModsevere -0.25880    0.33756  -0.767 0.443275
agegroup>=50:depression_dichotfModsevere  -1.14843    0.43020  -2.670 0.007595 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 1521.2  on 1209  degrees of freedom
Residual deviance: 1462.3  on 1195  degrees of freedom
  (164 observations deleted due to missingness)
AIC: 1492.3

Number of Fisher Scoring iterations: 4
```

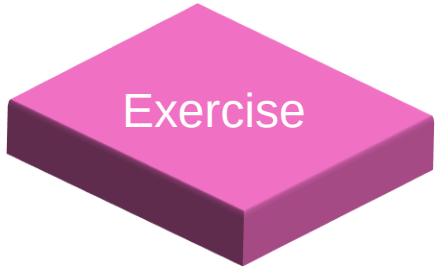
Without Interactive Effect

```
Call:
glm(formula = leavehomereason___1 ~ Classification + sexf + agegroup +
    edu1 + hhincomef + childrenf + depression_dichotf + comorbidf_relevel,
    family = "binomial", data = COVID_data_notessential)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-0.9151  -0.4843  -0.3976  -0.3345   2.4833

Coefficients:
                           Estimate Std. Error z value Pr(>|z|)
(Intercept)                -1.51221    0.41774  -3.620 0.000295 ***
ClassificationSuburban     -0.85004    0.27206  -3.125 0.001781 **
ClassificationUrban        -0.49478    0.23697  -2.088 0.036806 *
sexfFemale                 -0.57192    0.20868  -2.741 0.006131 **
agegroup35-49               0.63920    0.26234   2.437 0.014828 *
agegroup>=50                0.12791    0.29406   0.435 0.663575
edu1Notcollegegraduate     -0.17538    0.29504  -0.594 0.552236
hhincomef50-<100k           0.21910    0.37688   0.581 0.561010
hhincomef100-150k          -0.02854    0.39443  -0.072 0.942325
hhincomef>150k             -0.23031    0.39490  -0.583 0.559751
childrenfYes               -0.14738    0.23029  -0.640 0.522194
depression_dichotfModsevere 0.08039    0.25045   0.321 0.748210
comorbidf_relevel1 or more -0.21899    0.21261  -1.030 0.303013
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 768.97  on 1209  degrees of freedom
Residual deviance: 739.77  on 1197  degrees of freedom
  (164 observations deleted due to missingness)
AIC: 765.77

Number of Fisher Scoring iterations: 5
```

With Age:Classification Interaction (Area and Age)

```
Call:
glm(formula = leavehomereason___1 ~ Classification + sexf + agegroup +
    edu1 + hhincomef + childrenf + depression_dichotf + comorbidf_relevel +
    agegroup:Classification, family = "binomial", data = COVID_data_notessential)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-0.8677  -0.5000  -0.3928  -0.3065   2.5839

Coefficients:
                                          Estimate Std. Error z value Pr(>|z|)
(Intercept)                               -0.87299    0.46755  -1.867 0.061879 .
ClassificationSuburban                    -1.21965    0.52732  -2.313 0.020726 *
ClassificationUrban                       -1.54272    0.44169  -3.493 0.000478 ***
sexfFemale                                -0.56892    0.21010  -2.708 0.006772 **
agegroup35-49                             -0.07914    0.43137  -0.183 0.854438
agegroup>=50                              -0.73185    0.46792  -1.564 0.117808
edu1Notcollegegraduate                    -0.15471    0.29707  -0.521 0.602528
hhincomef50-<100k                          0.16934    0.38239   0.443 0.657877
hhincomef100-150k                         -0.09437    0.40015  -0.236 0.813561
hhincomef>150k                            -0.31755    0.40091  -0.792 0.428328
childrenfYes                              -0.17219    0.22960  -0.750 0.453266
depression_dichotfModsevere                0.03699    0.25324   0.146 0.883876
comorbidf_relevel1 or more                -0.21907    0.21379  -1.025 0.305500
ClassificationSuburban:agegroup35-49       0.53487    0.66046   0.810 0.418026
ClassificationUrban:agegroup35-49          1.31384    0.56492   2.326 0.020033 *
ClassificationSuburban:agegroup>=50        0.52290    0.75196   0.695 0.486821
ClassificationUrban:agegroup>=50           1.71448    0.63058   2.719 0.006550 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 768.97  on 1209  degrees of freedom
Residual deviance: 730.95  on 1193  degrees of freedom
  (164 observations deleted due to missingness)
AIC: 764.95
```

Main Interaction Findings

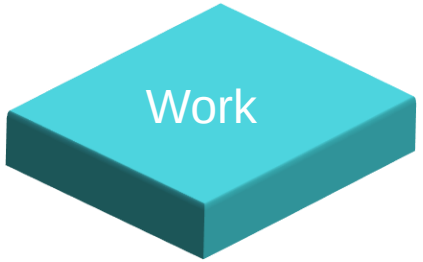


The coefficient for the interactive term for age and depression for the >= 50 group is negative and statistically significant (-1.15, p = .008).

The effect of depression is significantly stronger among this age group in decreasing the likelihood of leaving home to exercise.

The coefficient for depression and age interaction is positive and a significant predictor in the 35-49 age group for LH to walk the dog (.67, p =.041).

The effect of depression is significantly stronger among this age group in increasing the likelihood of leaving home to exercise.



The coefficient for the interactive term for age and area for the >= 50 group in Urban areas is positive and statistically significant (1.71, p = .007).
It is also statistically significant for the 35-49 age group living in urban areas (1.31, p = .02)

The effect of where you live is significantly stronger among these age groups in increasing the likelihood of leaving home to work.

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```
Analysis of Deviance Table

Model 1: leavehomereason___5 ~ Classification + sexf + agegroup + edu1 +
    hhincomef + childrenf + depression_dichotf + comorbidf_relevel
Model 2: leavehomereason___5 ~ Classification + sexf + agegroup + edu1 +
    hhincomef + childrenf + depression_dichotf + comorbidf_relevel +
    depression_dichotf:agegroup
  Resid. Df Resid. Dev Df Deviance Pr(>Chi)
1      1197     1469.8
2      1195     1462.3  2   7.4981  0.02354 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
> AIC(fullmod_exercise, fullmod_exercise2)
                    df      AIC
fullmod_exercise  13 1495.783
fullmod_exercise2 15 1492.285
```

Model Testing

When introducing the interaction terms I tested the models using the Likelihood Ratio Test and the Akaike Information Criterion.

The model including the depression:agegroup interaction for LH to exercise was a better fit according to the LRT. This was reflected in a lower AIC score.

Including this interaction in the LH to walk the dog model produced a lower AIC score.

Including the age:classification interaction produced a lower AIC score than the original model for LH to work.

A Note on Model Fit

This study's aim was to compare behaviour among different sections of society. The interactions here, even in models that did not present as a better fit under the LRT, are allowing us to gain clarity on how the effects vary among certain groups. The more in depth information attained through adding these variables is highly relevant for future health epidemic research and policy adherence planning.

References

Stockdale, A., & Catney, G. (2012). A Life Course Perspective on Urban-Rural Migration: the Importance of the Local Context. *Population, Space and Place*, *20*(1), 83–98. https://doi.org/10.1002/psp.1758

Mirowsky, J., & Ross, C. E. (1992). Age and Depression. *Journal of Health and Social Behavior*, *33*(3), 187. https://doi.org/10.2307/2137349

Katona, C. L., & Watkin, V. (1995). Depression in old age. *Reviews in Clinical Gerontology*, *5*(4), 427–441. https://doi.org/10.1017/s095925980000486x

THANK YOU