

Model summaries

```
## Loading required package: nlme
## This is mgcv 1.9-1. For overview type 'help("mgcv-package")'.
```

GPS data

```
summary(readRDS('../models/m_hr-hgamls.rds'))

##
## Family: gammals
## Link function: identity log
##
## Formula:
## hr_est_95 ~ sex_treatment + s(days_since_aug_1, by = sex_treatment,
##   k = 15, bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
## ~sex_treatment + s(days_since_aug_1, by = sex_treatment, k = 15,
##   bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
##
## Parametric coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -0.83072   0.07205 -11.529 < 2e-16 ***
## sex_treatmentf staten_island  0.20332   0.10129   2.007  0.0447 *
## sex_treatmentm rockefeller    0.91205   0.13196   6.911 4.80e-12 ***
## sex_treatmentm staten_island  0.61185   0.12702   4.817 1.46e-06 ***
## (Intercept).1    3.46953   0.09291  37.341 < 2e-16 ***
## sex_treatmentf staten_island.1 1.40047   0.13128  10.668 < 2e-16 ***
## sex_treatmentm rockefeller.1   1.08324   0.17177   6.306 2.86e-10 ***
## sex_treatmentm staten_island.1 1.67883   0.16271  10.318 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##               edf   Ref.df
## s(days_since_aug_1):sex_treatmentf rockefeller    11.463    12.027
## s(days_since_aug_1):sex_treatmentf staten_island   12.652    13.187
## s(days_since_aug_1):sex_treatmentm rockefeller    11.841    12.487
## s(days_since_aug_1):sex_treatmentm staten_island    4.759     5.455
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller    2.000     2.000
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    2.001     2.001
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller    9.105     9.979
## s(days_since_aug_1,study_year):sex_treatmentm staten_island   11.444    12.437
## s(days_since_aug_1,animal_year)                1000.112 1687.000
## s.1(days_since_aug_1):sex_treatmentf rockefeller    11.871    12.908
```

```

## s.1(days_since_aug_1):sex_treatmentf staten_island      11.425    12.485
## s.1(days_since_aug_1):sex_treatmentm rockefeller         3.996     4.660
## s.1(days_since_aug_1):sex_treatmentm staten_island       1.000     1.000
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller 2.000     2.000
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island 11.873    13.030
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller 8.831    10.054
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island 7.451     8.607
## s.1(days_since_aug_1,animal_year)                        596.901 1670.000
##                                                         Chi.sq
## s(days_since_aug_1):sex_treatmentf rockefeller          56.477
## s(days_since_aug_1):sex_treatmentf staten_island        102.613
## s(days_since_aug_1):sex_treatmentm rockefeller          56.323
## s(days_since_aug_1):sex_treatmentm staten_island         3.971
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller 0.757
## s(days_since_aug_1,study_year):sex_treatmentf staten_island 12.864
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller 10.837
## s(days_since_aug_1,study_year):sex_treatmentm staten_island 21.654
## s(days_since_aug_1,animal_year)                          72037.164
## s.1(days_since_aug_1):sex_treatmentf rockefeller         91.294
## s.1(days_since_aug_1):sex_treatmentf staten_island       121.693
## s.1(days_since_aug_1):sex_treatmentm rockefeller          4.602
## s.1(days_since_aug_1):sex_treatmentm staten_island        8.409
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller 5.035
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island 59.071
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller 17.181
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island 19.899
## s.1(days_since_aug_1,animal_year)                        4657.330
##                                                         p-value
## s(days_since_aug_1):sex_treatmentf rockefeller          < 2e-16 ***
## s(days_since_aug_1):sex_treatmentf staten_island        < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm rockefeller          2.66e-06 ***
## s(days_since_aug_1):sex_treatmentm staten_island         0.60464
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller 0.68501
## s(days_since_aug_1,study_year):sex_treatmentf staten_island 0.00161 **
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller 0.35272
## s(days_since_aug_1,study_year):sex_treatmentm staten_island 0.03148 *
## s(days_since_aug_1,animal_year)                          < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentf rockefeller          < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentf staten_island        < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentm rockefeller          0.40296
## s.1(days_since_aug_1):sex_treatmentm staten_island        0.00373 **
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller 0.08068 .
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island < 2e-16 ***
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller 0.07154 .
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island 0.04369 *
## s.1(days_since_aug_1,animal_year)                          < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Deviance explained = 94.5%
## -REML = -66.723  Scale est. = 1          n = 9288

```

```
summary(readRDS('../models/m_speed-hgamls.rds'))
```

```
##
## Family: gammals
## Link function: identity log
##
## Formula:
## speed_est ~ sex_treatment + s(days_since_aug_1, by = sex_treatment,
##   k = 15, bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
## ~sex_treatment + s(days_since_aug_1, by = sex_treatment, k = 15,
##   bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
##
## Parametric coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                   1.50542    0.03605  41.755 < 2e-16 ***
## sex_treatmentf staten_island   0.16129    0.05058   3.189  0.00143 **
## sex_treatmentm rockefeller     0.05578    0.06442   0.866  0.38656
## sex_treatmentm staten_island   0.10141    0.06345   1.598  0.10998
## (Intercept).1                 2.78682    0.07110  39.194 < 2e-16 ***
## sex_treatmentf staten_island.1 0.60058    0.09920   6.054 1.41e-09 ***
## sex_treatmentm rockefeller.1   0.34508    0.12422   2.778  0.00547 **
## sex_treatmentm staten_island.1 0.68142    0.12306   5.537 3.07e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##                                edf    Ref.df
## s(days_since_aug_1):sex_treatmentf rockefeller    10.705    12.014
## s(days_since_aug_1):sex_treatmentf staten_island   11.012    12.260
## s(days_since_aug_1):sex_treatmentm rockefeller    13.056    13.665
## s(days_since_aug_1):sex_treatmentm staten_island   12.140    13.189
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller    6.418     7.442
## s(days_since_aug_1,study_year):sex_treatmentf staten_island  11.704    13.011
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller    2.015     2.019
## s(days_since_aug_1,study_year):sex_treatmentm staten_island   2.013     2.016
## s(days_since_aug_1,animal_year)                   538.894  1607.000
## s.1(days_since_aug_1):sex_treatmentf rockefeller    1.003     1.004
## s.1(days_since_aug_1):sex_treatmentf staten_island   3.242     3.899
## s.1(days_since_aug_1):sex_treatmentm rockefeller    9.039    10.546
## s.1(days_since_aug_1):sex_treatmentm staten_island   4.831     5.803
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller    2.670     2.934
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island  2.002     2.002
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller    2.004     2.006
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island   2.002     2.004
## s.1(days_since_aug_1,animal_year)                   208.192  1601.000
##                                Chi.sq
## s(days_since_aug_1):sex_treatmentf rockefeller    58.004
## s(days_since_aug_1):sex_treatmentf staten_island   76.175
## s(days_since_aug_1):sex_treatmentm rockefeller   141.405
## s(days_since_aug_1):sex_treatmentm staten_island  100.907
```

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## s(days_since_aug_1,study_year):sex_treatmentf rockefeller      10.509
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    55.410
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller      3.054
## s(days_since_aug_1,study_year):sex_treatmentm staten_island    6.946
## s(days_since_aug_1,animal_year)                                15610.431
## s.1(days_since_aug_1):sex_treatmentf rockefeller                0.483
## s.1(days_since_aug_1):sex_treatmentf staten_island             14.126
## s.1(days_since_aug_1):sex_treatmentm rockefeller               52.670
## s.1(days_since_aug_1):sex_treatmentm staten_island             51.349
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller     1.590
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island   1.878
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller     3.733
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island   2.869
## s.1(days_since_aug_1,animal_year)                               725.253
## p-value
## s(days_since_aug_1):sex_treatmentf rockefeller                 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentf staten_island              < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm rockefeller                 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm staten_island              < 2e-16 ***
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller      0.15144
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    2.32e-06 ***
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller      0.21978
## s(days_since_aug_1,study_year):sex_treatmentm staten_island    0.03111 *
## s(days_since_aug_1,animal_year)                                < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentf rockefeller               0.48469
## s.1(days_since_aug_1):sex_treatmentf staten_island             0.00759 **
## s.1(days_since_aug_1):sex_treatmentm rockefeller               2.33e-06 ***
## s.1(days_since_aug_1):sex_treatmentm staten_island            < 2e-16 ***
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller    0.57919
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island  0.39124
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller    0.15448
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island  0.23849
## s.1(days_since_aug_1,animal_year)                              < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Deviance explained = 79.6%
## -REML = 7886.7  Scale est. = 1          n = 5445

```

```
summary(readRDS('../models/m_diffusion-hgamls.rds'))
```

```
##
## Family: gammals
## Link function: identity log
##
## Formula:
## diffusion_est ~ sex_treatment + s(days_since_aug_1, by = sex_treatment,
##   k = 15, bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
## ~sex_treatment + s(days_since_aug_1, by = sex_treatment, k = 15,
##   bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
##
## Parametric coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -3.91469    0.06725 -58.207 < 2e-16 ***
## sex_treatmentf staten_island    0.28460    0.09438   3.015 0.00257 **
## sex_treatmentm rockefeller      0.53841    0.12211   4.409 1.04e-05 ***
## sex_treatmentm staten_island    0.06146    0.11768   0.522 0.60147
## (Intercept).1      3.72217    0.06787  54.844 < 2e-16 ***
## sex_treatmentf staten_island.1  0.94987    0.09616   9.878 < 2e-16 ***
## sex_treatmentm rockefeller.1    0.30712    0.12857   2.389 0.01690 *
## sex_treatmentm staten_island.1  0.98776    0.11949   8.267 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##                                     edf   Ref.df
## s(days_since_aug_1):sex_treatmentf rockefeller      11.935   12.545
## s(days_since_aug_1):sex_treatmentf staten_island     12.794   13.307
## s(days_since_aug_1):sex_treatmentm rockefeller      13.073   13.453
## s(days_since_aug_1):sex_treatmentm staten_island     11.843   12.661
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller      2.014    2.017
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    10.467   11.540
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller      8.586    9.507
## s(days_since_aug_1,study_year):sex_treatmentm staten_island     2.046    2.056
## s(days_since_aug_1,animal_year)                    957.768 1679.000
## s.1(days_since_aug_1):sex_treatmentf rockefeller      9.313   10.713
## s.1(days_since_aug_1):sex_treatmentf staten_island    10.372   11.638
## s.1(days_since_aug_1):sex_treatmentm rockefeller      7.576    8.862
## s.1(days_since_aug_1):sex_treatmentm staten_island     5.272    6.264
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller      2.013    2.017
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island    11.696   12.944
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller    10.025   11.417
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island     2.011    2.014
## s.1(days_since_aug_1,animal_year)                   469.380 1667.000
##                                     Chi.sq
## s(days_since_aug_1):sex_treatmentf rockefeller      59.229
## s(days_since_aug_1):sex_treatmentf staten_island    171.159
## s(days_since_aug_1):sex_treatmentm rockefeller      143.199
## s(days_since_aug_1):sex_treatmentm staten_island     64.331
```

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## s(days_since_aug_1,study_year):sex_treatmentf rockefeller      1.375
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    14.520
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller      14.627
## s(days_since_aug_1,study_year):sex_treatmentm staten_island     7.894
## s(days_since_aug_1,animal_year)                                53860.569
## s.1(days_since_aug_1):sex_treatmentf rockefeller               37.534
## s.1(days_since_aug_1):sex_treatmentf staten_island            110.147
## s.1(days_since_aug_1):sex_treatmentm rockefeller               32.581
## s.1(days_since_aug_1):sex_treatmentm staten_island             25.602
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller     2.402
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island   70.499
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller     45.790
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island   2.461
## s.1(days_since_aug_1,animal_year)                              2699.844
##                                                                p-value
## s(days_since_aug_1):sex_treatmentf rockefeller                2.34e-06 ***
## s(days_since_aug_1):sex_treatmentf staten_island              < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm rockefeller                < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm staten_island              < 2e-16 ***
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller     0.505948
## s(days_since_aug_1,study_year):sex_treatmentf staten_island   0.263509
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller     0.105467
## s(days_since_aug_1,study_year):sex_treatmentm staten_island   0.017046 *
## s(days_since_aug_1,animal_year)                               < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentf rockefeller              9.01e-05 ***
## s.1(days_since_aug_1):sex_treatmentf staten_island            < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentm rockefeller              0.000227 ***
## s.1(days_since_aug_1):sex_treatmentm staten_island            0.000359 ***
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller   0.302130
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island < 2e-16 ***
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller   1.43e-05 ***
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island 0.294433
## s.1(days_since_aug_1,animal_year)                             < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Deviance explained = 89.1%
## -REML = -30616   Scale est. = 1           n = 9320

```

```
summary(readRDS('../models/m_density-hgamls.rds'))
```

```
##
## Family: betals
## Link function: identity identity
##
## Formula:
## density ~ sex_treatment + s(days_since_aug_1, by = sex_treatment,
##   k = 15, bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
## ~sex_treatment + s(days_since_aug_1, by = sex_treatment, k = 15,
##   bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 15, bs = "sz") + s(days_since_aug_1, animal_year, k = 15,
##   bs = "fs", xt = list(bs = "cr"))
##
## Parametric coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -0.19699    0.05235  -3.763 0.000168 ***
## sex_treatmentf staten_island -0.29277    0.07335  -3.992 6.56e-05 ***
## sex_treatmentm rockefeller    -0.15977    0.09633  -1.658 0.097217 .
## sex_treatmentm staten_island  -0.23254    0.09171  -2.536 0.011227 *
## (Intercept).1      -2.69152    0.05645 -47.680 < 2e-16 ***
## sex_treatmentf staten_island.1  0.06305    0.07914   0.797 0.425664
## sex_treatmentm rockefeller.1    0.37802    0.10364   3.647 0.000265 ***
## sex_treatmentm staten_island.1  0.33703    0.09939   3.391 0.000697 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##                                     edf   Ref.df
## s(days_since_aug_1):sex_treatmentf rockefeller      11.786    12.562
## s(days_since_aug_1):sex_treatmentf staten_island     11.898    12.699
## s(days_since_aug_1):sex_treatmentm rockefeller      13.142    13.579
## s(days_since_aug_1):sex_treatmentm staten_island      7.681     8.807
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller    2.003     2.004
## s(days_since_aug_1,study_year):sex_treatmentf staten_island  2.041     2.050
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller   11.374    12.460
## s(days_since_aug_1,study_year):sex_treatmentm staten_island  7.049     8.001
## s(days_since_aug_1,animal_year)                    969.229  1696.000
## s.1(days_since_aug_1):sex_treatmentf rockefeller      9.982    11.333
## s.1(days_since_aug_1):sex_treatmentf staten_island    10.884    12.123
## s.1(days_since_aug_1):sex_treatmentm rockefeller      1.014     1.018
## s.1(days_since_aug_1):sex_treatmentm staten_island      1.005     1.006
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller    2.005     2.006
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island  8.070     9.271
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller    2.014     2.017
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island 11.262    12.593
## s.1(days_since_aug_1,animal_year)                    790.163  1681.000
##                                     Chi.sq
## s(days_since_aug_1):sex_treatmentf rockefeller      61.758
## s(days_since_aug_1):sex_treatmentf staten_island     51.020
## s(days_since_aug_1):sex_treatmentm rockefeller     195.427
## s(days_since_aug_1):sex_treatmentm staten_island     34.464
```

```

## s(days_since_aug_1,study_year):sex_treatmentf rockefeller      0.937
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    4.853
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller      24.608
## s(days_since_aug_1,study_year):sex_treatmentm staten_island    3.853
## s(days_since_aug_1,animal_year)                                55845.107
## s.1(days_since_aug_1):sex_treatmentf rockefeller               19.673
## s.1(days_since_aug_1):sex_treatmentf staten_island             50.849
## s.1(days_since_aug_1):sex_treatmentm rockefeller                0.042
## s.1(days_since_aug_1):sex_treatmentm staten_island              0.131
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller     1.028
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island   7.745
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller     1.513
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island  35.179
## s.1(days_since_aug_1,animal_year)                               6465.661
##                                                                p-value
## s(days_since_aug_1):sex_treatmentf rockefeller                 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentf staten_island              5.09e-06 ***
## s(days_since_aug_1):sex_treatmentm rockefeller                 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm staten_island              7.87e-05 ***
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller      0.626764
## s(days_since_aug_1,study_year):sex_treatmentf staten_island    0.082115 .
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller      0.013818 *
## s(days_since_aug_1,study_year):sex_treatmentm staten_island    0.869719
## s(days_since_aug_1,animal_year)                                < 2e-16 ***
## s.1(days_since_aug_1):sex_treatmentf rockefeller               0.055103 .
## s.1(days_since_aug_1):sex_treatmentf staten_island             6.03e-06 ***
## s.1(days_since_aug_1):sex_treatmentm rockefeller               0.856879
## s.1(days_since_aug_1):sex_treatmentm staten_island             0.720167
## s.1(days_since_aug_1,study_year):sex_treatmentf rockefeller    0.599549
## s.1(days_since_aug_1,study_year):sex_treatmentf staten_island  0.481704
## s.1(days_since_aug_1,study_year):sex_treatmentm rockefeller    0.473243
## s.1(days_since_aug_1,study_year):sex_treatmentm staten_island  0.000566 ***
## s.1(days_since_aug_1,animal_year)                              < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Deviance explained =   NA%
## -REML = -16743   Scale est. = 1           n = 29856

```


Accelerometry data

```
summary(readRDS('../models/m_low-hgam.rds'))

##
## Family: Beta regression(101.977)
## Link function: logit
##
## Formula:
## p_low ~ sex_treatment + s(days_since_aug_1, by = sex_treatment,
##   k = 10, bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 10, bs = "sz") + s(days_since_aug_1, animal_year, k = 10,
##   bs = "fs", xt = list(bs = "cr"))
##
## Parametric coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.13169   0.02279   5.779 7.58e-09 ***
## sex_treatmentf staten_island -0.02786   0.03199  -0.871   0.384
## sex_treatmentm rockefeller  -0.02317   0.04621  -0.501   0.616
## sex_treatmentm staten_island  0.19928   0.03978   5.010 5.48e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##                                     edf   Ref.df
## s(days_since_aug_1):sex_treatmentf rockefeller      8.785    8.846
## s(days_since_aug_1):sex_treatmentf staten_island     8.343    8.535
## s(days_since_aug_1):sex_treatmentm rockefeller      6.509    6.901
## s(days_since_aug_1):sex_treatmentm staten_island     8.378    8.523
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller  2.363    2.425
## s(days_since_aug_1,study_year):sex_treatmentf staten_island  9.265    9.477
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller  6.214    6.627
## s(days_since_aug_1,study_year):sex_treatmentm staten_island  6.008    6.442
## s(days_since_aug_1,animal_year)                821.109 1075.000
##                                     F p-value
## s(days_since_aug_1):sex_treatmentf rockefeller      21.348 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentf staten_island     12.304 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm rockefeller       2.825 0.00488 **
## s(days_since_aug_1):sex_treatmentm staten_island      7.548 < 2e-16 ***
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller  0.098 0.94505
## s(days_since_aug_1,study_year):sex_treatmentf staten_island  5.691 < 2e-16 ***
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller  0.459 0.67006
## s(days_since_aug_1,study_year):sex_treatmentm staten_island  1.212 0.29994
## s(days_since_aug_1,animal_year)                25.199 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.622   Deviance explained = 64.5%
## fREML = -17118   Scale est. = 1           n = 28305
```

```
summary(readRDS('../models/m_n_transitions-hgam-2024-06-11.rds'))
```

```
##
## Family: Negative Binomial(63.215)
## Link function: log
##
## Formula:
## n_transitions ~ sex_treatment + s(days_since_aug_1, by = sex_treatment,
##   k = 10, bs = "tp") + s(days_since_aug_1, study_year, by = sex_treatment,
##   k = 10, bs = "sz") + s(days_since_aug_1, animal_year, k = 10,
##   bs = "fs", xt = list(bs = "cr"))
##
## Parametric coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      8.123078   0.017926 453.134  <2e-16 ***
## sex_treatmentf staten_island 0.022158   0.024967   0.887    0.375
## sex_treatmentm rockefeller   0.043288   0.036710   1.179    0.238
## sex_treatmentm staten_island 0.005262   0.030953   0.170    0.865
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##                                     edf   Ref.df
## s(days_since_aug_1):sex_treatmentf rockefeller      8.681    8.784
## s(days_since_aug_1):sex_treatmentf staten_island     8.528    8.675
## s(days_since_aug_1):sex_treatmentm rockefeller      8.816    8.876
## s(days_since_aug_1):sex_treatmentm staten_island     8.769    8.833
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller  8.488    8.858
## s(days_since_aug_1,study_year):sex_treatmentf staten_island 9.243    9.467
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller  6.641    7.098
## s(days_since_aug_1,study_year):sex_treatmentm staten_island 7.574    8.018
## s(days_since_aug_1,animal_year)                   808.212 1071.000
##                                     F p-value
## s(days_since_aug_1):sex_treatmentf rockefeller      18.200 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentf staten_island    18.164 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm rockefeller      29.269 < 2e-16 ***
## s(days_since_aug_1):sex_treatmentm staten_island    18.137 < 2e-16 ***
## s(days_since_aug_1,study_year):sex_treatmentf rockefeller  2.895 0.00316 **
## s(days_since_aug_1,study_year):sex_treatmentf staten_island 6.391 < 2e-16 ***
## s(days_since_aug_1,study_year):sex_treatmentm rockefeller  1.008 0.54605
## s(days_since_aug_1,study_year):sex_treatmentm staten_island 3.076 0.00180 **
## s(days_since_aug_1,animal_year)                   41.796 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) = 0.694   Deviance explained = 70.7%
## fREML = 42373   Scale est. = 1           n = 28220
```