

Telework time, telecommute frequency, commute frequency, work locatino and work trip modeling

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2024-04

```
hh<- get_query(sql= "select  household_id as hh_id, hhincome_broad,survey_year, hh_weight
                        from HHSurvey.v_households_labels")

person<- get_query(sql= "select household_id as hh_id,race_category,
person_id, workplace, telecommute_freq, survey_year, person_weight, gender, age, industry,office_availability
                        from HHSurvey.v_persons_labels")

day<- get_query(sql= "select person_id, day_id, household_id as hh_id, telework_time, day_weight , survey_year
                    from HHSurvey.v_days_labels")

trip<- get_query(sql= "select trip_id, household_id as hh_id, day_id,
person_id, mode_1, dest_purpose, survey_year, trip_weight, dest_purpose_cat
                    from HHSurvey.v_trips_labels")

setDT(hh)
setDT(person)
setDT(day)
setDT(trip)
```

#race_category needs to be added to the codebook

to do: add Seattle, Bellevue geographies

Read in Codebook

Set IDs as characters

TO DO: functionalize convert all ids to characters, or store as characters upfront

```
hh[, hh_id:=as.character(hh_id)]
person[, hh_id:=as.character(hh_id)]
day[, hh_id:=as.character(hh_id)]
trip[, hh_id := as.character(hh_id)]

person[, person_id := as.character(person_id)]
day[, person_id := as.character(person_id)]
trip[, person_id := as.character(person_id)]
```

```

day[, day_id := as.character(day_id)]
trip[, day_id := as.character(day_id)]

trip[, trip_id := as.character(trip_id)]
hh <- hh%>%mutate(survey_year=as.character(survey_year))
person <- person%>%mutate(survey_year=as.character(survey_year))
day <- day%>%mutate(survey_year=as.character(survey_year))
trip <- trip%>%mutate(survey_year=as.character(survey_year))

```

Variables that need grouping: telework_time: use group_2, group_2_value: telework_time_broad gender: gender_grp group_1 telecommute_freq: telecommute_freq_simple: group_1- this variable is confusing right now, need some digging dest_purpose: dest_purpose_simple, group_1 mode-> mode_simple, group_1

```

variable_list<-rbind(
  variable_list,
  data.table(
    variable = c("mode_simple", 'dest_purpose_simple', 'telework_time_broad', 'telework_time_hr', 'g
    is_checkbox = c(0,0,0,0,0,0,0,0,0,0,0),
    hh = c(0,0,0,0,0,0,0,0,0,0,1),
    person = c(0,0,0,0,1,1, 1,1,1,1,0),
    day = c(0,0,1,1,0,0,0, 0,0,0,1),
    trip = c(1,1, 0,0, 0,0, 0,0,0,0,1),
    vehicle = c(0,0,0,0,0,0,0,0,0,0,0),
    location = c(0,0,0,0,0,0,0,0,0,0,0),
    description = c("Mode Group", "Trip Purpose", "Telework Hours", "Telework Time Group", "Gender",
    logic = c('mode aggregation', 'destination aggregation',"telework time aggregation","telework time
    data_type = c("integer/categorical", "integer/categorical", "integer/categorical", "integer/categ
    shared_name = c("mode_simple", 'dest_purpose_simple', 'telework_time_broad', 'telework_time_hr', 'g
  )
)

```

```

group_labels<-get_grouped_labels(group_id='group_2', group_name='telecommute_freq_cond')
value_labels<-add_values_code(group_name='telecommute_freq_cond')
person<-grp_to_tbl(tbl=person, ungrouped_name='telecommute_freq', grouped_name='telecommute_freq_cond')

```

```

group_labels<-get_grouped_labels(group_id='group_1', group_name='commute_freq_simple')
value_labels<-add_values_code(group_name='commute_freq_simple')
person<-grp_to_tbl(tbl=person, ungrouped_name='commute_freq', grouped_name='commute_freq_simple')

```

```

group_labels<-get_grouped_labels(group_id='group_1', group_name='telecommute_freq_simple')
value_labels<-add_values_code(group_name='telecommute_freq_simple')
person<-grp_to_tbl(tbl=person, ungrouped_name='telecommute_freq', grouped_name='telecommute_freq_simple')

```

```

group_labels<-get_grouped_labels(group_id='group_1', group_name='dest_purpose_simple')
value_labels<-add_values_code(group_name='dest_purpose_simple')
trip<-grp_to_tbl(tbl=trip, ungrouped_name='dest_purpose', grouped_name='dest_purpose_simple')

```

```

#some how a duplicate snuck into the variable list not sure how
trip<- trip%>%distinct(trip_id, .keep_all=TRUE)

```

Classify all workers into a telecommute scheme

Remote Workers Always work at home

Hybrid Workers Any worker who teleworks at least once a week

Onsite Workers Telework never or less than weekly

```
person<-person%>%mutate(telecommute_status=
  case_when(workplace %in%c('Missing: Skip logic', 'Missing: Skip Logic')
    ~ 'Not Worker',
    (is.na(workplace)) ~ 'Not Worker',
    (workplace=='At home (telecommute or self-employed with home office)' )
    ~ 'Remote',
    (telecommute_freq_cond == '1+ days per week')
    ~ 'Hybrid',
    .default = 'Onsite'
  )
)
```

```
workers<-person%>%filter(!workplace %in% c('Missing: Skip logic', 'Missing: Skip Logic'))%>%drop_na(workplace)
worker_list<-list(person=workers)
```

```
value<- c(0,1,2,3)
label=c('Not Worker', 'Remote', 'Hybrid', 'Onsite')
tele_val_labels<-data.frame(value, label)
tele_val_labels<-tele_val_labels%>%mutate(variable='telecommute_status')%>%
  mutate(group_1_title = NA, group_1_value = NA,
    group_2_title = NA, group_2_value= NA,
    group_3_title = NA, group_3_value = NA)

all_value_labels<-value_labels%>%select(variable, value, label, group_1_title, group_1_value,
                                         group_2_title, group_2_value, group_3_title, group_3_value)
new_value_labels<-rbind(all_value_labels, tele_val_labels)
new_value_labels[, val_order := seq_len(nrow(new_value_labels))]
value_labels<-new_value_labels
```

```
group_labels<-get_grouped_labels(group_id='group_2', group_name='telework_time_broad')
value_labels<-add_values_code(group_name='telework_time_broad')
day<-grp_to_tbl(tbl=day, ungrouped_name='telework_time', grouped_name='telework_time_broad')
```

```
group_labels<-get_grouped_labels(group_id='group_3', group_name='telework_time_23')
value_labels<-add_values_code(group_name='telework_time_23')
day<-grp_to_tbl(tbl=day, ungrouped_name='telework_time', grouped_name='telework_time_23')
```

```
group_labels<-get_grouped_labels(group_id='group_1', group_name='telework_time_hr')
value_labels<-add_values_code(group_name='telework_time_hr')
day<-grp_to_tbl(tbl=day, ungrouped_name='telework_time', grouped_name='telework_time_hr')
```

```
#some how a duplicate snuck into the variable list not sure how
variable_list<-variable_list%>%distinct(variable, .keep_all=TRUE)
```

```
telecommute_status <- summarize_weighted(hts_data= worker_list,
                                         summarize_var = 'telecommute_status',
```

```

summarize_by = 'survey_year',
id_cols=c('person_id'),
wt_cols=c('person_weight'),
wtname= 'person_weight'
)

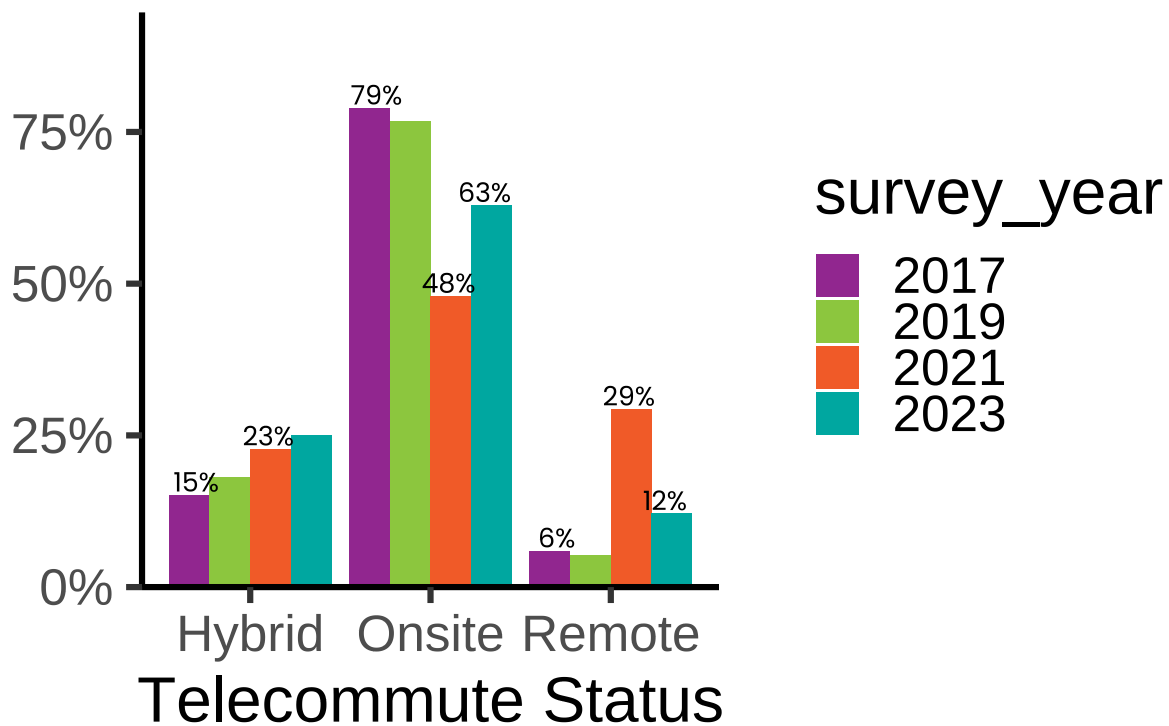
```

Visualize

```

telecommute_summary<-telecommute_status$summary$wtd
static_column_chart(telecommute_summary, y='prop', x='telecommute_status', fill='survey_year', xlabel='Telecommute Status')
theme_classic(base_size = 24)

```



2023 only

Visualize

```

worker_23<-workers%>%filter(survey_year=='2023')%>%filter(commute_freq != 'Missing: Skip Logic')
worker_list<-list(person=worker_23)

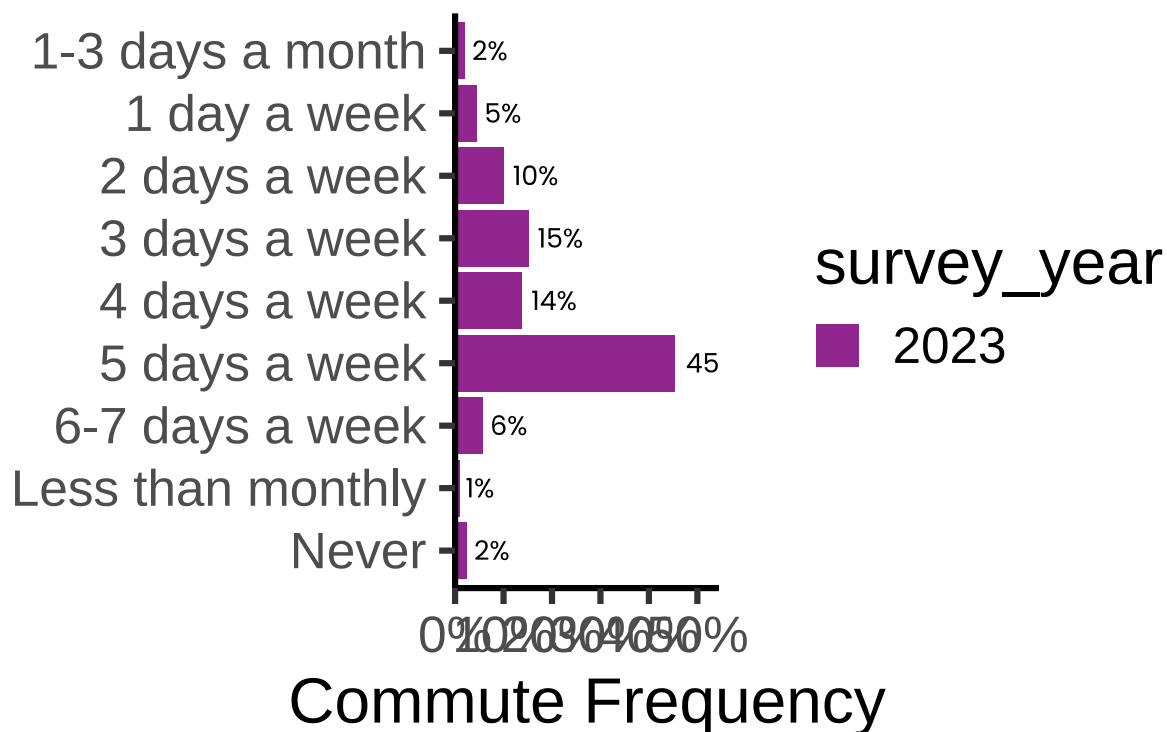
```

```

commute_summary <- summarize_weighted(hts_data= worker_list,
  summarize_var = 'commute_freq',
  summarize_by = 'survey_year',
  id_cols=c('person_id'),
  wt_cols=c('person_weight'),
  wtname= 'person_weight'
)

commute_summary<-commute_summary$summary$wtd
static_bar_chart(commute_summary, y='commute_freq', x='prop', fill='survey_year', xlabel='Commute Frequency',
theme_classic(base_size = 24)

```

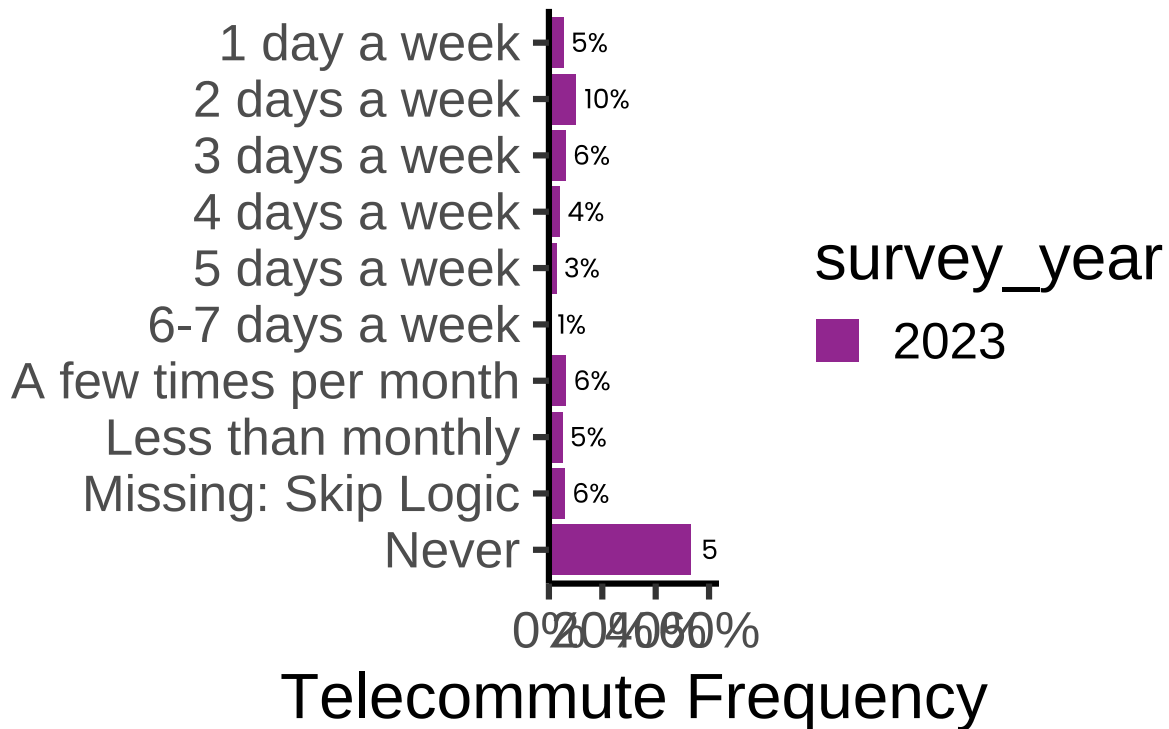


```

telework_freq <- summarize_weighted(hts_data= worker_list,
  summarize_var = 'telecommute_freq',
  summarize_by = 'survey_year',
  id_cols=c('person_id'),
  wt_cols=c('person_weight'),
  wtname= 'person_weight'
)

telework_freq<-telework_freq$summary$wtd
static_bar_chart(telework_freq, y='telecommute_freq', x='prop', fill='survey_year', xlabel='Telecommute Frequency',
theme_classic(base_size = 24)

```



Examine 2023 only: 2023 telework time on the day - all disaggregate data, for understanding how people answered the question

Step One. Who answered the question? For this include everyone, and non-workers to ensure we understand who answered it.

there were some workers who did not answer the telework question,

I do not understand why, maybe just plain no response, filter out for now

```
day_23<- day%>%filter(survey_year=='2023')%>%filter(telework_time!='Missing Response')
worker_23<-workers%>%filter(survey_year=='2023')
hh_person_day_trip_list<-list(hh=hh, person=worker_23, day=day_23, trip=trip)
```

```
day_23<- day%>%filter(survey_year=='2023')%>%filter(telework_time!='Missing Response')
worker_23<-workers%>%filter(survey_year=='2023')
hh_person_day_trip_list<-list(hh=hh, person=worker_23, day=day_23, trip=trip)
```

```
telecommute_day_time_all_wrkrs <- summarize_weighted(hts_data= hh_person_day_trip_list,
  summarize_var = 'telework_time',
  summarize_by = 'survey_year',
```

```

id_cols=c('hhid', 'person_id', 'day_id', 'trip_id'),
wt_cols=c('hh_weight', 'person_weight', 'day_weight', 'trip_weight'),
wtname= 'day_weight'
)

```

```

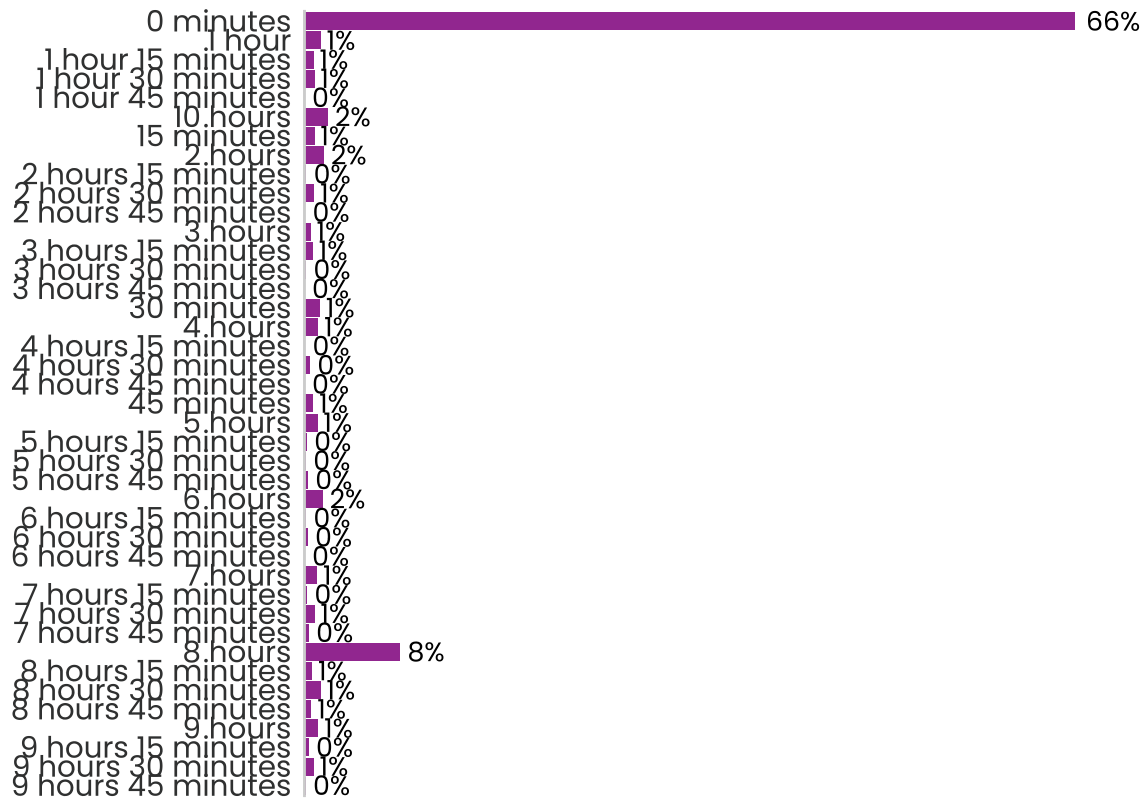
telecommute_day_time_all_wrkrs <- summarize_weighted(hts_data= hh_person_day_trip_list,
summarize_var = 'telework_time',
summarize_by = 'survey_year',
id_cols=c('hhid', 'person_id', 'day_id', 'trip_id'),
wt_cols=c('hh_weight', 'person_weight', 'day_weight', 'trip_weight'),
wtname= 'day_weight'
)

```

```

static_bar_chart(t=telecommute_day_time_all_wrkrs$summary$wtd,x='prop', y='telework_time', fill='survey_year')

```

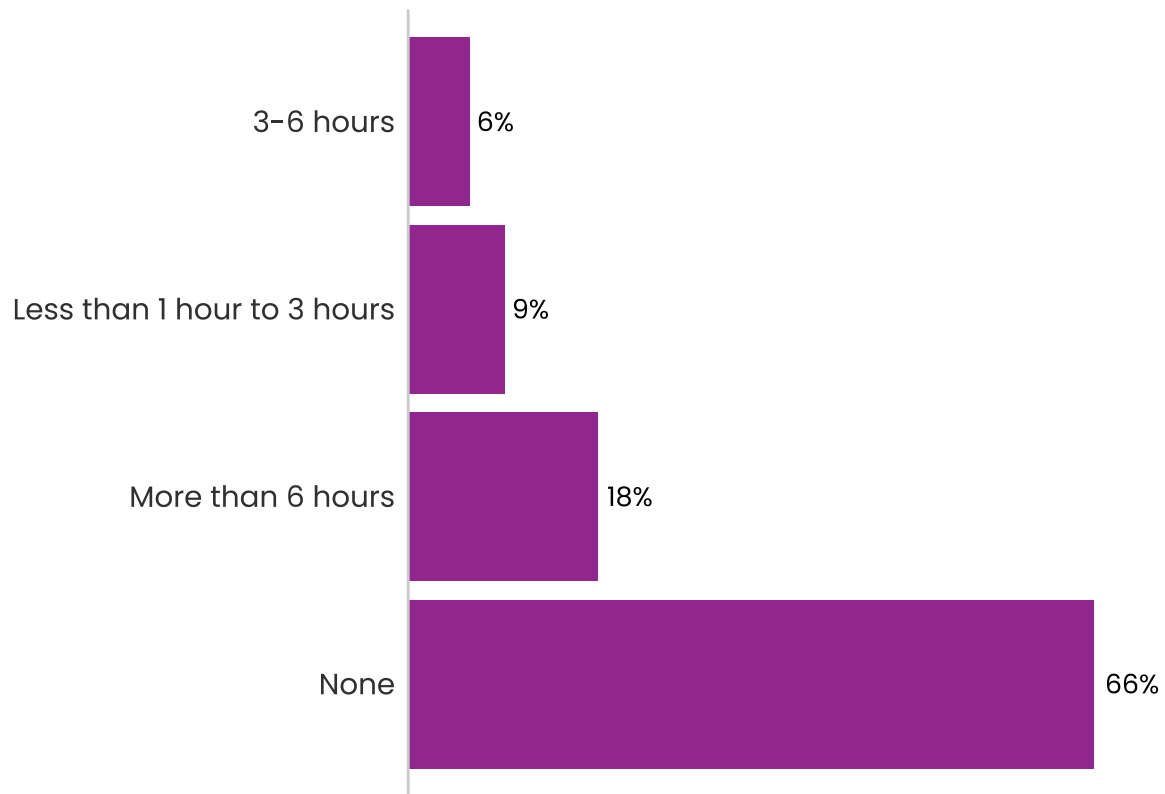


```

telecommute_status_day_time<- summarize_weighted(hts_data= hh_person_day_trip_list,
summarize_var = 'telework_time_broad',
summarize_by = 'survey_year',
id_cols=c('hhid', 'person_id', 'day_id', 'trip_id'),
wt_cols=c('hh_weight', 'person_weight', 'day_weight', 'trip_weight'),
wtname= 'day_weight'
)

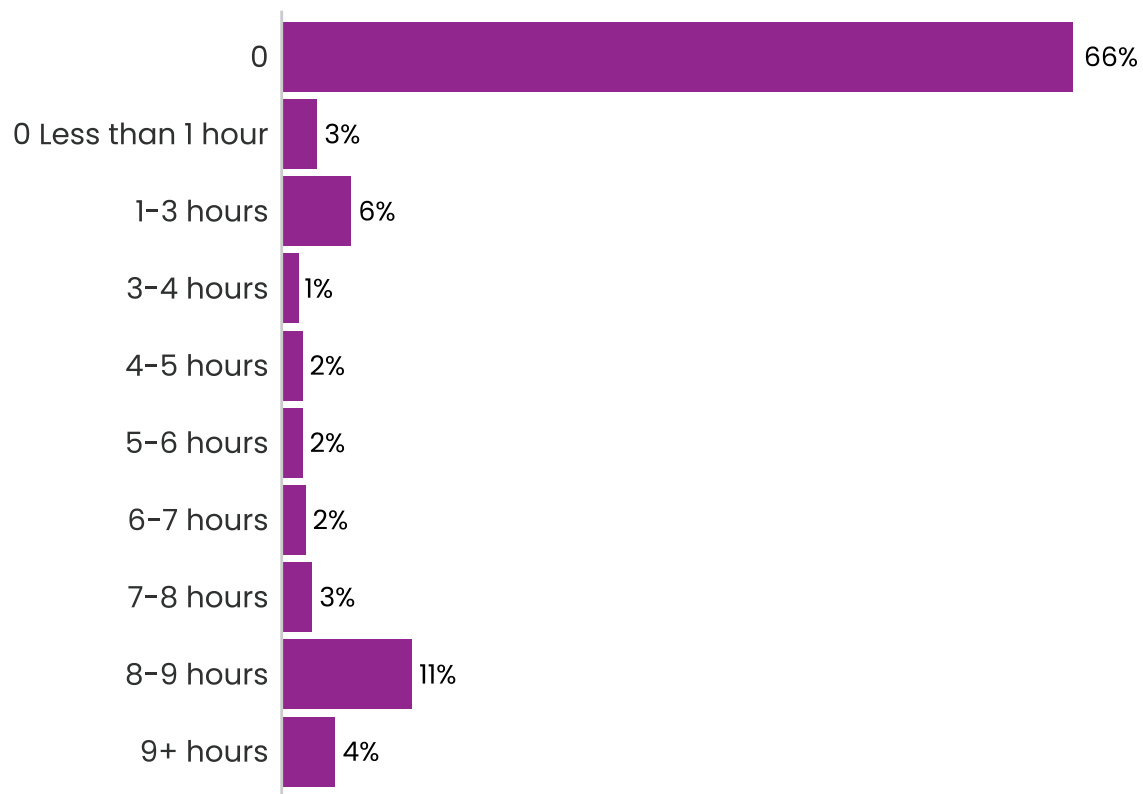
```

```
static_bar_chart(t=telecommute_status_day_time$summary$wtd,x='prop', y='telework_time_broad', fill='sur
```



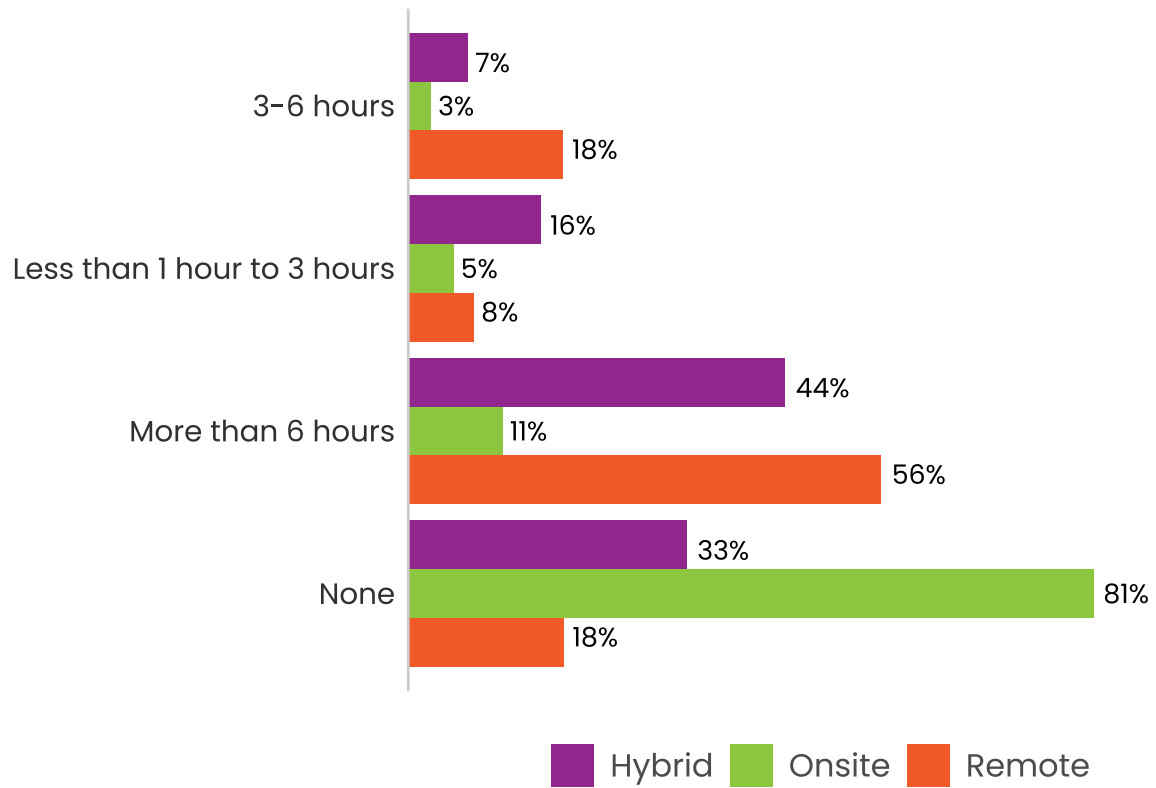
```
telecommute_status_day_hr<- summarize_weighted(hts_data= hh_person_day_trip_list,
  summarize_var = 'telework_time_hr',
  summarize_by = 'survey_year',
  id_cols=c('hhid', 'person_id', 'day_id', 'trip_id'),
  wt_cols=c('hh_weight', 'person_weight', 'day_weight', 'trip_weight'),
  wtname= 'day_weight'
)
```

```
static_bar_chart(t=telecommute_status_day_hr$summary$wtd,x='prop', y='telework_time_hr', fill='survey_y
```

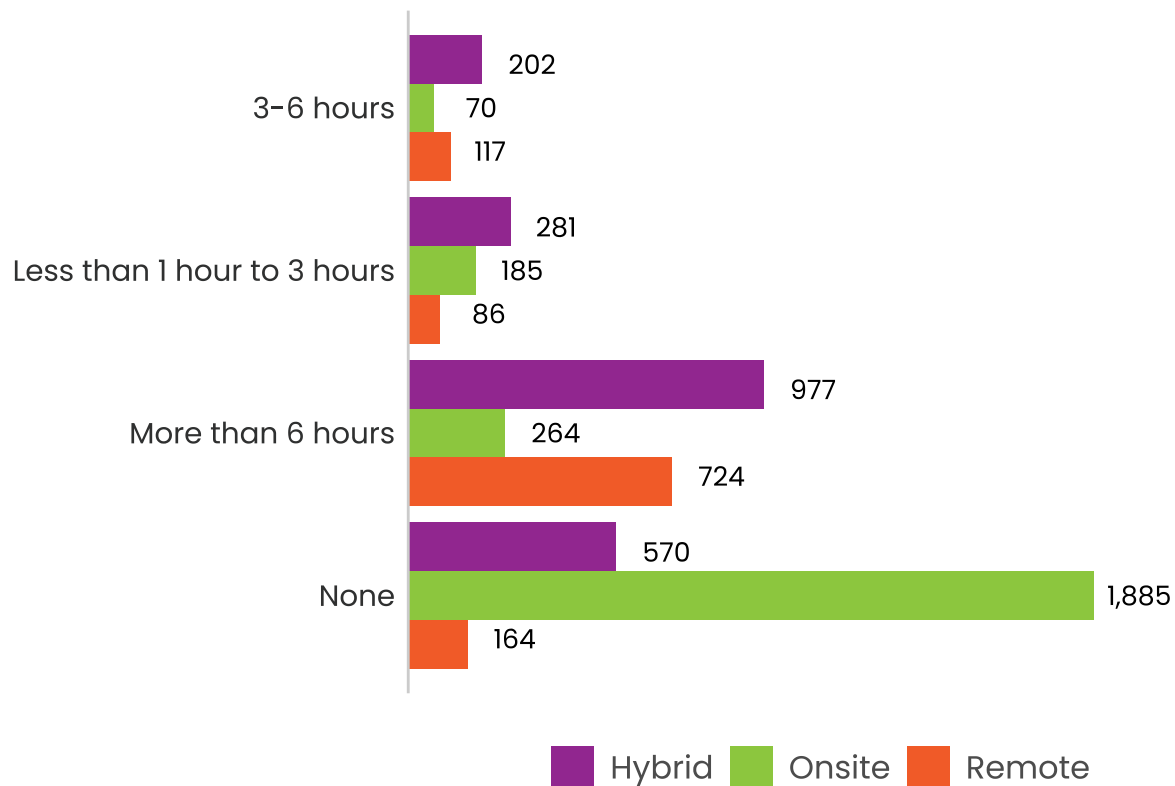



```
telecommute_status_day_time<- summarize_weighted(hts_data= hh_person_day_trip_list,
  summarize_var = 'telework_time_broad',
  summarize_by = 'telecommute_status',
  id_cols=c('hhid', 'person_id', 'day_id', 'trip_id'),
  wt_cols=c('hh_weight', 'person_weight', 'day_weight', 'trip_weight'),
  wtname= 'day_weight'
)

static_bar_chart(t=telecommute_status_day_time$summary$wtd,x='prop', y='telework_time_broad', fill='tel
```



```
static_bar_chart(t=telecommute_status_day_time$summary$wtd,x='count', y='telework_time_broad', fill='te
```



count the number of trips by broad purpose and put back on the days table

```
day_23<-day%>%filter(survey_year=='2023')
```

```
trip_23<-trip%>%filter(survey_year=='2023')
```

```
day_trip_purpose<-trip_23%>%group_by(day_id, dest_purpose_simple)%>%count()
```

join back to trip table

take care of 0 trip days

```
day_trip_purpose_wide<-day_trip_purpose%>%pivot_wider(id_cols=c(day_id),names_from=dest_purpose_simple,
```

```
day_23_trips<-left_join(day_23, day_trip_purpose_wide, by=c('day_id'))
```

```
day_23_trips<-day_23_trips %>% replace(is.na(.), 0)
```

Filter to workers, summarize weighted days by telework hours by 0, 1, 2+ Work Trips

```
workers_day<-right_join(worker_23, day_23_trips, by = c('person_id'))%>%filter(!workplace %in% c('Miss.
```

```
workers_day<-workers_day%>%mutate(WorkGrp=case_when(
```

```
  Work==0 ~ '0 work trips',
```

```
  Work==1 ~ '1 work trips',
```

```
  Work==2 ~ '2 work trips',
```

```
  Work>2 ~ '3+ work trips',
```

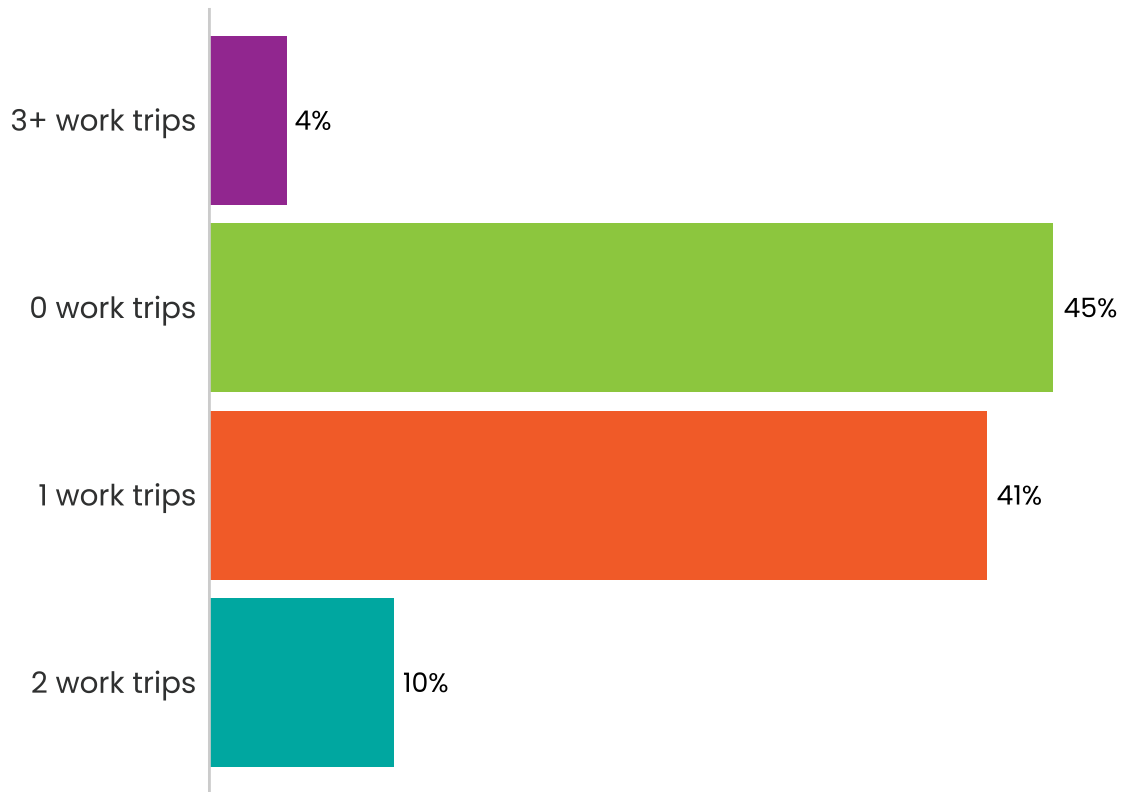
```
  .default = 'missing'
```

```
))
```

```
workers_work_trips<- workers_day%>%group_by( WorkGrp)%>%summarize(estimate_daily_workers=sum(day_weight
```

```
workers_share_work_trips<- workers_work_trips%>%
  mutate(share_wtd_wrkers=estimate_daily_workers/sum(estimate_daily_workers))
```

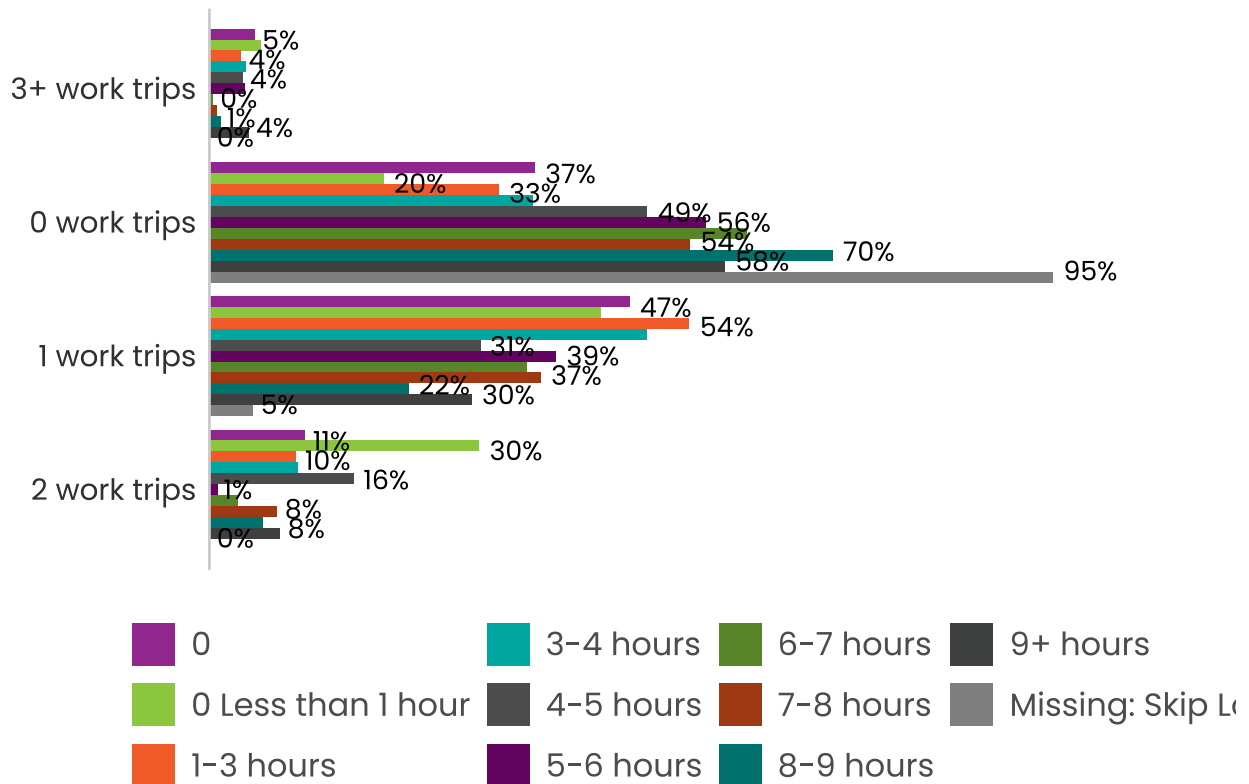
```
static_bar_chart(t=workers_share_work_trips, x='share_wtd_wrkers', y='WorkGrp', fill='WorkGrp', color=
```



```
workers_telework_work_trips<- workers_day%>%group_by(telework_time_hr, WorkGrp)%>%summarize(estimate_da
```

```
workers_teleworktime_share_work_trips<- workers_telework_work_trips%>%group_by(telework_time_hr)%>%
  mutate(share_wtd_wrkers=estimate_daily_workers/sum(estimate_daily_workers))
```

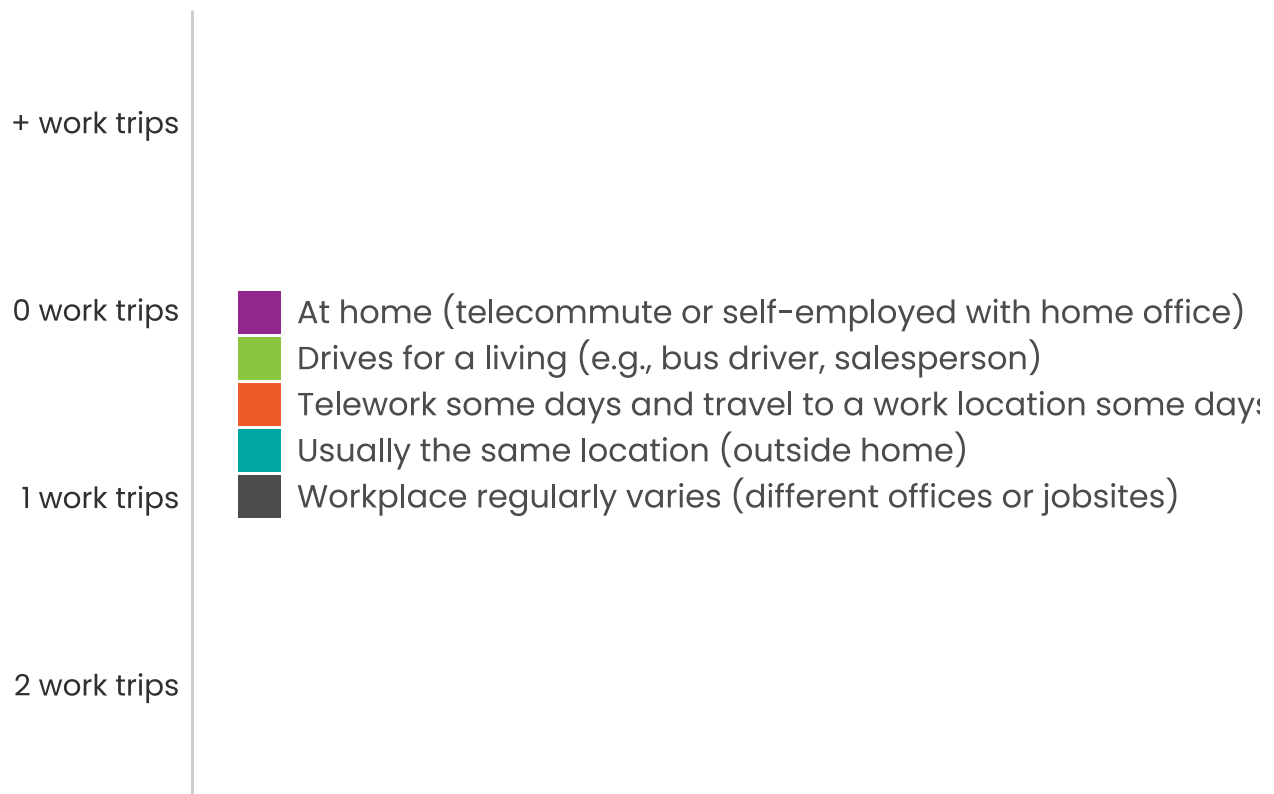
```
static_bar_chart(t=workers_teleworktime_share_work_trips, x='share_wtd_wrkers', y='WorkGrp', fill='tele
```



```
workers_telework_work_trips<- workers_day%>%group_by(workplace, WorkGrp)%>%summarize(estimate_daily_wor
```

```
workers_teleworkstatus_share_work_trips<- workers_telework_work_trips%>%group_by(workplace)%>%
  mutate(share_wtd_wrkers=estimate_daily_workers/sum(estimate_daily_workers))
```

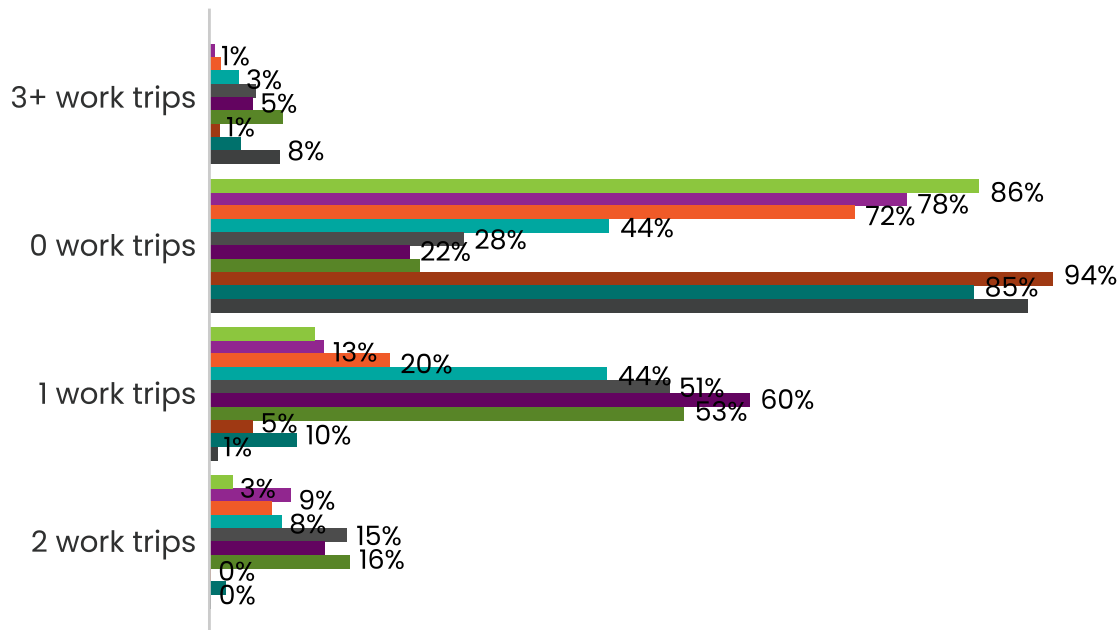
```
static_bar_chart(t=workers_teleworkstatus_share_work_trips, x='share_wtd_wrkers', y='WorkGrp', fill='wor
theme(legend.position="right")
```



```
workers_commute_work_trips<- workers_day%>%group_by(commute_freq, WorkGrp)%>%summarize(estimate_daily_w
```

```
workers_commute_share_work_trips<- workers_commute_work_trips%>%group_by(commute_freq)%>%
  mutate(share_wtd_wrkers=estimate_daily_workers/sum(estimate_daily_workers))
```

```
static_bar_chart(t=workers_commute_share_work_trips, x='share_wtd_wrkers', y='WorkGrp', fill='commute_f
```

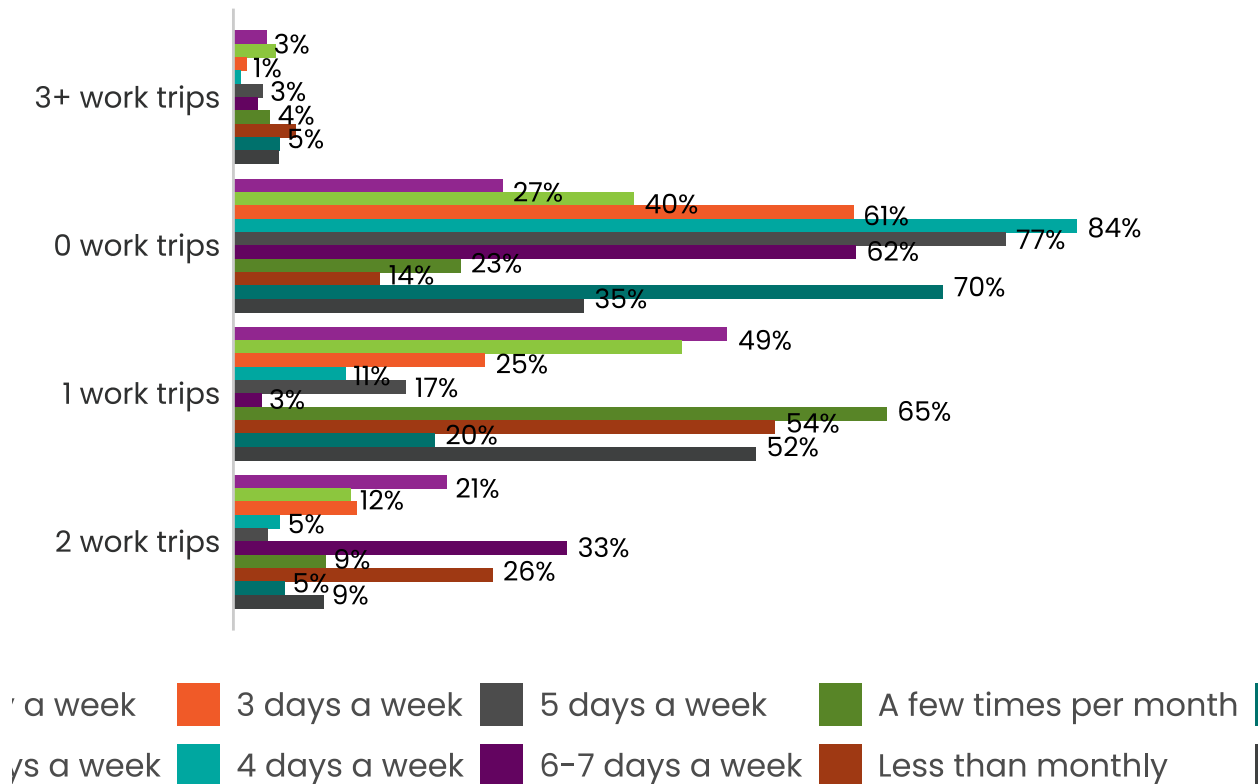


days a month 2 days a week 4 days a week 6-7 days a week 1 day a week
 3 days a week 5 days a week Less than monthly

```
workers_telework_Freq_work_trips<- workers_day%>%group_by(telecommute_freq, WorkGrp)%>%summarize(estimate
```

```
workers_freq_share_work_trips<- workers_telework_Freq_work_trips%>%group_by(telecommute_freq)%>%
  mutate(share_wtd_wrkers=estimate_daily_workers/sum(estimate_daily_workers))
```

```
static_bar_chart(t=workers_freq_share_work_trips, x='share_wtd_wrkers', y='WorkGrp', fill='telecommute_
```



build a logit model with all the variables for 0, 1, 2, 3+ work trips, with all the variables I have lying around at this point, probably should be ordered logit, but I have trouble with interpreting that sometimes so I'm just going to do logit

```
workers_day <- workers_day %>% mutate(WorkGrp = as.factor(WorkGrp))
workers_day$WorkGrp <- relevel(workers_day$WorkGrp, ref = "0 work trips")

model <- multinom(WorkGrp ~ commute_freq, data = workers_day)
```

weights: 44 (30 variable)

initial value 12295.044689 iter 10 value 8716.607552 iter 20 value 8097.011176 iter 30 value 7850.154421 iter 40 value 7825.308954 final value 7825.306603 converged

```
stargazer(model)
```

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Mon, Apr 08, 2024 - 8:59:52 AM

```
library(stargazer)

model <- multinom(WorkGrp ~ commute_freq + workplace, data = workers_day)
```


Table 1:

	<i>Dependent variable:</i>		
	3+ work trips	1 work trips	2 work trips
	(1)	(2)	(3)
commute_freq1 day a week	0.208 (0.675)	0.815*** (0.228)	0.392 (0.380)
commute_freq2 days a week	1.130** (0.549)	1.209*** (0.206)	0.920*** (0.328)
commute_freq3 days a week	1.909*** (0.524)	1.885*** (0.198)	1.653*** (0.310)
commute_freq4 days a week	2.308*** (0.526)	2.439*** (0.200)	1.892*** (0.315)
commute_freq5 days a week	2.908*** (0.509)	2.761*** (0.193)	2.381*** (0.301)
commute_freq6-7 days a week	3.816*** (0.532)	2.797*** (0.230)	2.738*** (0.341)
commute_freqLess than monthly	1.752*** (0.636)	0.157 (0.368)	-0.599 (0.772)
commute_freqMissing: Skip Logic	1.273** (0.518)	-0.505** (0.217)	-0.787** (0.354)
commute_freqNever	1.823*** (0.622)	0.335 (0.339)	0.437 (0.511)
Constant	-4.488*** (0.503)	-2.441*** (0.187)	-3.390*** (0.294)
Akaike Inf. Crit.	15,710.610	15,710.610	15,710.610

Note:

*p<0.1; **p<0.05; ***p<0.01

weights: 60 (42 variable)

initial value 12295.044689 iter 10 value 8636.885379 iter 20 value 7875.113481 iter 30 value 7622.693181 iter 40 value 7573.403267 iter 50 value 7569.060328 iter 60 value 7568.887611 final value 7568.875393 converged

```
stargazer(model)
```

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Mon, Apr 08, 2024 - 8:59:54 AM

```
workers_day<- workers_day%>%mutate(WorkGrp=as.factor(WorkGrp))
workers_day$WorkGrp <- relevel(workers_day$WorkGrp, ref = "0 work trips")

model<-multinom(WorkGrp~ workplace+telework_time_hr, data=workers_day)
```

weights: 64 (45 variable)

initial value 12295.044689 iter 10 value 9347.146174 iter 20 value 8238.424362 iter 30 value 7932.685524 iter 40 value 7849.070646 iter 50 value 7805.749890 iter 60 value 7805.067916 iter 60 value 7805.067899 iter 60 value 7805.067898 final value 7805.067898 converged

```
stargazer(model)
```

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Mon, Apr 08, 2024 - 8:59:56 AM

```
workers_day<- workers_day%>%mutate(WorkGrp=as.factor(WorkGrp))
workers_day$WorkGrp <- relevel(workers_day$WorkGrp, ref = "0 work trips")

model<-multinom(WorkGrp~ telework_time_hr, data=workers_day)
```

weights: 48 (33 variable)

initial value 12295.044689 iter 10 value 9197.879271 iter 20 value 8725.754571 iter 30 value 8658.014535 iter 40 value 8655.754345 final value 8655.753976 converged

```
stargazer(model)
```

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Mon, Apr 08, 2024 - 8:59:57 AM

building an overspecified model to explore

```
model<-multinom(WorkGrp~ commute_freq+telecommute_freq+workplace+age+industry+gender+race_category+offi
```

```
## # weights: 300 (222 variable)
## initial value 12295.044689
## iter 10 value 7615.141719
```

Table 2:

	<i>Dependent variable:</i>		
	3+ work trips	1 work trips	2 work trips
	(1)	(2)	(3)
commute_freq1 day a week	0.216 (0.675)	0.793*** (0.228)	0.404 (0.380)
commute_freq2 days a week	1.126** (0.550)	1.200*** (0.207)	0.961*** (0.328)
commute_freq3 days a week	1.872*** (0.527)	1.913*** (0.200)	1.769*** (0.313)
commute_freq4 days a week	2.265*** (0.533)	2.450*** (0.205)	2.072*** (0.321)
commute_freq5 days a week	2.860*** (0.525)	2.752*** (0.203)	2.640*** (0.316)
commute_freq6-7 days a week	3.699*** (0.548)	2.929*** (0.240)	3.067*** (0.356)
commute_freqLess than monthly	1.709*** (0.637)	0.215 (0.369)	-0.522 (0.772)
commute_freqMissing: Skip Logic	-8.202*** (0.390)	0.222 (0.567)	-11.910*** (0.287)
commute_freqNever	1.758*** (0.625)	0.415 (0.342)	0.579 (0.513)
workplaceDrives for a living (e.g., bus driver, salesperson)	4.553*** (0.347)	2.454*** (0.249)	2.908*** (0.408)
workplaceTelework some days and travel to a work location some days	-7.755*** (0.222)	1.232** (0.554)	-10.460*** (0.140)
workplaceUsually the same location (outside home)	-7.758*** (0.235)	1.351** (0.549)	-10.727*** (0.153)
workplaceWorkplace regularly varies (different offices or jobsites)	-7.404*** (0.239)	0.289 (0.557)	-11.076*** (0.169)
Constant	3.237*** (0.312)	-3.634*** (0.584)	7.113*** (0.190)
Akaike Inf. Crit.	15,221.750	15,221.750	15,221.750

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 3:

	<i>Dependent variable:</i>		
	3+ work trips (1)	1 work trips (2)	2 work trips (3)
workplaceDrives for a living (e.g., bus driver, salesperson)	4.508*** (0.354)	2.345*** (0.252)	2.821*** (0.412)
workplaceTelework some days and travel to a work location some days	1.942*** (0.323)	2.493*** (0.149)	2.733*** (0.289)
workplaceUsually the same location (outside home)	3.038*** (0.320)	3.588*** (0.151)	3.512*** (0.290)
workplaceWorkplace regularly varies (different offices or jobsites)	3.232*** (0.326)	2.267*** (0.168)	2.943*** (0.305)
telework_time_hr0 Less than 1 hour	0.891*** (0.332)	0.864*** (0.188)	1.294*** (0.236)
telework_time_hr1-3 hours	0.753*** (0.218)	0.999*** (0.117)	0.994*** (0.167)
telework_time_hr3-4 hours	0.682* (0.403)	1.217*** (0.206)	1.095*** (0.295)
telework_time_hr4-5 hours	0.568* (0.327)	0.599*** (0.178)	0.499* (0.276)
telework_time_hr5-6 hours	-0.368 (0.528)	0.289 (0.221)	0.109 (0.364)
telework_time_hr6-7 hours	-0.266 (0.435)	0.367** (0.180)	-0.164 (0.341)
telework_time_hr7-8 hours	0.179 (0.319)	-0.056 (0.171)	0.454** (0.227)
telework_time_hr8-9 hours	-0.596*** (0.216)	-0.531*** (0.092)	-0.572*** (0.156)
telework_time_hr9+ hours	0.581*** (0.193)	-0.213* (0.124)	-0.109 (0.194)
telework_time_hrMissing: Skip Logic	-1.528** (0.721)	-2.156*** (0.376)	-1.197** (0.466)
Constant	-5.011*** (0.316)	-3.432*** (0.149)	-4.849*** (0.288)
Akaike Inf. Crit.	15,700.140	15,700.140	15,700.140

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 4:

	<i>Dependent variable:</i>		
	3+ work trips	1 work trips	2 work trips
	(1)	(2)	(3)
telework_time_hr0 Less than 1 hour	0.355 (0.317)	0.383** (0.168)	0.872*** (0.222)
telework_time_hr1-3 hours	0.249 (0.205)	0.396*** (0.103)	0.509*** (0.157)
telework_time_hr3-4 hours	0.183 (0.381)	0.527*** (0.181)	0.537* (0.279)
telework_time_hr4-5 hours	-0.129 (0.309)	-0.237 (0.159)	-0.181 (0.264)
telework_time_hr5-6 hours	-1.091** (0.513)	-0.672*** (0.197)	-0.680* (0.351)
telework_time_hr6-7 hours	-0.869** (0.422)	-0.386** (0.163)	-0.758** (0.332)
telework_time_hr7-8 hours	-0.681** (0.303)	-0.909*** (0.154)	-0.307 (0.214)
telework_time_hr8-9 hours	-1.590*** (0.204)	-1.313*** (0.082)	-1.260*** (0.146)
telework_time_hr9+ hours	-0.219 (0.180)	-0.934*** (0.112)	-0.730*** (0.186)
telework_time_hrMissing: Skip Logic	-1.583** (0.718)	-1.946*** (0.371)	-1.065** (0.463)
Constant	-2.214*** (0.063)	-0.464*** (0.032)	-1.814*** (0.052)
Akaike Inf. Crit.	17,377.510	17,377.510	17,377.510
<i>Note:</i>		*p<0.1; **p<0.05; ***p<0.01	

```
## iter 20 value 7444.741472
## iter 30 value 7339.924516
## iter 40 value 7310.048379
## iter 50 value 7294.951167
## iter 60 value 7281.976970
## iter 70 value 7277.225799
## iter 80 value 7276.381393
## iter 90 value 7275.958488
## iter 100 value 7275.692527
## final value 7275.692527
## stopped after 100 iterations
```

```
stargazer(model)
```

```
##
## % Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac@sp.i.cas.cz
## % Date and time: Mon, Apr 08, 2024 - 9:00:06 AM
## \begin{table}[!htbp] \centering
##   \caption{}
##   \label{}
##   \begin{tabular}{@{\extracolsep{5pt}}lccc}
##     \hline
##     \hline \hline
##     & \multicolumn{3}{c}{\textit{Dependent variable:}} & \\
##     \cline{2-4}
##     \hline & 3+ work trips & 1 work trips & 2 work trips & \\
##     \hline & (1) & (2) & (3) & \\
##     \hline
##     commute\_freq1 day a week & 0.623 & 0.714$^{***}$ & 0.375 & \\
##     & (0.754) & (0.275) & (0.456) & \\
##     & & & & \\
##     commute\_freq2 days a week & 1.567$^{**}$ & 1.115$^{***}$ & 0.979$^{**}$ & \\
##     & (0.630) & (0.258) & (0.410) & \\
##     & & & & \\
##     commute\_freq3 days a week & 2.004$^{***}$ & 1.666$^{***}$ & 1.910$^{***}$ & \\
##     & (0.605) & (0.255) & (0.399) & \\
##     & & & & \\
##     commute\_freq4 days a week & 2.556$^{***}$ & 2.261$^{***}$ & 2.091$^{***}$ & \\
##     & (0.602) & (0.256) & (0.402) & \\
##     & & & & \\
##     commute\_freq5 days a week & 2.986$^{***}$ & 2.492$^{***}$ & 2.656$^{***}$ & \\
##     & (0.586) & (0.249) & (0.389) & \\
##     & & & & \\
##     commute\_freq6-7 days a week & 3.404 & 3.927 & 3.169 & \\
##     & (3.958) & (2.752) & (3.945) & \\
##     & & & & \\
##     commute\_freqLess than monthly & 1.677$^{**}$ & 0.264 & $-$0.560 & \\
##     & (0.662) & (0.375) & (0.804) & \\
##     & & & & \\
##     commute\_freqMissing: Skip Logic & $-$0.613 & 3.862 & $-$1.184 & \\
##     & (23.150) & (3.977) & (17.842) & \\
##     & & & & \\
##     commute\_freqNever & 1.516$^{**}$ & 0.478 & 0.640 & \\
##     & (0.666) & (0.360) & (0.544) & \end{table}
```

```

## & & & \\
## telecommute\_freq2 days a week & 0.251 & 0.124 & $-$0.215 \\
## & (0.344) & (0.162) & (0.249) \\
## & & & \\
## telecommute\_freq3 days a week & $-$0.298 & $-$0.122 & $-$0.113 \\
## & (0.439) & (0.189) & (0.299) \\
## & & & \\
## telecommute\_freq4 days a week & $-$0.287 & $-$0.058 & 0.022 \\
## & (0.586) & (0.230) & (0.365) \\
## & & & \\
## telecommute\_freq5 days a week & 0.628 & $-$0.115 & 0.008 \\
## & (0.429) & (0.238) & (0.362) \\
## & & & \\
## telecommute\_freq6-7 days a week & 0.969$^{*}$ & $-$0.518 & 0.034 \\
## & (0.498) & (0.362) & (0.481) \\
## & & & \\
## telecommute\_freqA few times per month & $-$0.295 & 0.097 & $-$0.187 \\
## & (0.340) & (0.163) & (0.237) \\
## & & & \\
## telecommute\_freqLess than monthly & $-$0.203 & 0.117 & $-$0.038 \\
## & (0.352) & (0.170) & (0.246) \\
## & & & \\
## telecommute\_freqMissing: Skip Logic & 0.641 & $-$1.015 & $-$0.226 \\
## & (3.920) & (2.740) & (3.926) \\
## & & & \\
## telecommute\_freqNever & 0.320 & 0.328$^{**}$ & $-$0.108 \\
## & (0.285) & (0.138) & (0.208) \\
## & & & \\
## workplaceDrives for a living (e.g., bus driver, salesperson) & 2.774 & $-$0.173 & 2.067 \\
## & (36.443) & (7.297) & (46.576) \\
## & & & \\
## workplaceTelework some days and travel to a work location some days & $-$1.568 & 1.250 & $-$0.853 \\
## & (28.422) & (6.704) & (43.203) \\
## & & & \\
## workplaceUsually the same location (outside home) & $-$1.431 & 1.413 & $-$0.897 \\
## & (28.422) & (6.704) & (43.203) \\
## & & & \\
## workplaceWorkplace regularly varies (different offices or jobsites) & $-$1.426 & 0.227 & $-$1.466 \\
## & (28.422) & (6.705) & (43.203) \\
## & & & \\
## age18-24 years & $-$0.326 & $-$0.238 & $-$0.264 \\
## & (3.573) & (0.992) & (4.885) \\
## & & & \\
## age25-34 years & 0.099 & $-$0.109 & 0.048 \\
## & (3.567) & (0.988) & (4.883) \\
## & & & \\
## age35-44 years & 0.134 & $-$0.139 & 0.031 \\
## & (3.567) & (0.988) & (4.883) \\
## & & & \\
## age45-54 years & $-$0.056 & $-$0.076 & $-$0.011 \\
## & (3.568) & (0.989) & (4.883) \\
## & & & \\
## age55-64 years & $-$0.272 & $-$0.008 & 0.060 \\
## & (3.570) & (0.990) & (4.884)

```

```

## & & & \\
## age65-74 years & $-$2.054 & $-$0.274 & $-$0.265 \\
## & (3.589) & (0.994) & (4.886) \\
## & & & \\
## age75-84 years & $-$1.571 & $-$0.619 & $-$0.322 \\
## & (3.686) & (1.028) & (4.902) \\
## & & & \\
## age85 or years older & $-$0.424 & $-$1.854 & $-$0.893 \\
## & (9.846) & (5.697) & (8.227) \\
## & & & \\
## industryChildcare (e.g., nanny, babysitter) & $-$0.036 & 0.142 & $-$0.120 \\
## & (0.901) & (0.306) & (0.542) \\
## & & & \\
## industryConstruction & 1.972$^{***}$ & $-$0.082 & 0.368 \\
## & (0.546) & (0.251) & (0.375) \\
## & & & \\
## industryFinancial services & 0.562 & $-$0.221 & 0.150 \\
## & (0.693) & (0.264) & (0.409) \\
## & & & \\
## industryGovernment & 1.627$^{***}$ & 0.050 & 0.427 \\
## & (0.554) & (0.223) & (0.349) \\
## & & & \\
## industryHealth care & 0.867 & $-$0.107 & 0.048 \\
## & (0.537) & (0.203) & (0.327) \\
## & & & \\
## industryHospitality (e.g., restaurant, accommodation) & 0.939$^{*}$ & $-$0.382$^{*}$ & $-$0.869$^{*}$ \\
## & (0.569) & (0.230) & (0.420) \\
## & & & \\
## industryLandscaping & 2.390$^{***}$ & $-$0.206 & 0.553 \\
## & (0.741) & (0.493) & (0.629) \\
## & & & \\
## industryManufacturing (e.g., aerospace & defense, electrical, machinery) & 1.234$^{**}$ & 0.009 & 0. \\
## & (0.560) & (0.224) & (0.353) \\
## & & & \\
## industryMedia & 0.970 & $-$0.084 & $-$0.346 \\
## & (0.804) & (0.333) & (0.620) \\
## & & & \\
## industryMilitary & 1.620$^{**}$ & 0.184 & 0.795 \\
## & (0.725) & (0.415) & (0.563) \\
## & & & \\
## industryMissing: Skip Logic & $-$0.174 & $-$0.428 & $-$1.163 \\
## & (11.550) & (1.489) & (9.727) \\
## & & & \\
## industryNatural resources (e.g., forestry, fishery, energy) & 2.629$^{***}$ & 0.358 & $-$0.504 \\
## & (0.847) & (0.470) & (1.100) \\
## & & & \\
## industryOther & 1.667$^{***}$ & $-$0.350$^{*}$ & $-$0.135 \\
## & (0.523) & (0.210) & (0.336) \\
## & & & \\
## industryPersonal services (e.g., hair styling, personal assistance, pet sitting) & 2.165$^{***}$ & \\
## & (0.573) & (0.294) & (0.443) \\
## & & & \\
## industryPrivate education & 1.364$^{**}$ & $-$0.104 & $-$0.075 \\
## & (0.630) & (0.267) & (0.438)

```



```

## & & & \\
## industryProfessional and business services (e.g., consulting, legal, marketing) & 1.553$^{***}$ & 0
## & (0.563) & (0.224) & (0.353) \\
## & & & \\
## industryPublic education & 1.060$^{*}$ & $-$0.208 & 0.181 \\
## & (0.552) & (0.213) & (0.338) \\
## & & & \\
## industryReal estate & 2.214$^{***}$ & 0.316 & 0.723 \\
## & (0.615) & (0.326) & (0.457) \\
## & & & \\
## industryRetail & 0.363 & $-$0.220 & 0.237 \\
## & (0.585) & (0.222) & (0.348) \\
## & & & \\
## industrySocial assistance & 1.321$^{*}$ & 0.047 & 0.189 \\
## & (0.682) & (0.300) & (0.474) \\
## & & & \\
## industrySports and fitness & $-$0.024 & $-$0.769$^{**}$ & $-$0.885 \\
## & (1.164) & (0.388) & (0.809) \\
## & & & \\
## industryTechnology and telecommunications & 0.571 & $-$0.140 & $-$0.028 \\
## & (0.553) & (0.205) & (0.330) \\
## & & & \\
## industryTransportation and utilities & 1.431$^{***}$ & $-$0.531$^{**}$ & 0.085 \\
## & (0.549) & (0.241) & (0.365) \\
## & & & \\
## genderGirl/Woman (cisgender or transgender) & $-$0.370$^{***}$ & $-$0.099 & $-$0.334$^{***}$ \\
## & (0.129) & (0.065) & (0.100) \\
## & & & \\
## genderNon-binary/Something else fits better & $-$0.818$^{*}$ & $-$0.215 & $-$0.859$^{**}$ \\
## & (0.450) & (0.192) & (0.389) \\
## & & & \\
## genderPrefer not to answer & 0.104 & $-$0.122 & $-$0.186 \\
## & (0.300) & (0.150) & (0.236) \\
## & & & \\
## race\_categoryAsian & 0.025 & 0.423$^{**}$ & 0.249 \\
## & (0.377) & (0.204) & (0.311) \\
## & & & \\
## race\_categoryChild & $-$0.174 & $-$0.428 & $-$1.163 \\
## & (11.550) & (1.489) & (9.727) \\
## & & & \\
## race\_categoryMissing & $-$0.371 & 0.338 & $-$0.034 \\
## & (0.423) & (0.222) & (0.345) \\
## & & & \\
## race\_categoryOther & 0.393 & 0.176 & 0.060 \\
## & (0.359) & (0.206) & (0.313) \\
## & & & \\
## race\_categoryWhite Only & 0.250 & 0.391$^{**}$ & 0.258 \\
## & (0.342) & (0.194) & (0.293) \\
## & & & \\
## office\_availableNo, I do not have a dedicated and private space available outside the home & $-$2.0
## & (36.447) & (7.295) & (46.576) \\
## & & & \\
## office\_availableYes, I have a dedicated and private space available outside the home that I do not
## & (36.445) & (7.303) & (46.579)

```

```

## & & & \\
## telework\_time\_hr0 Less than 1 hour & 1.182$^{***}$ & 0.974$^{***}$ & 1.332$^{***}$ \\
## & (0.347) & (0.200) & (0.249) \\
## & & & \\
## telework\_time\_hr1-3 hours & 1.065$^{***}$ & 1.107$^{***}$ & 1.081$^{***}$ \\
## & (0.234) & (0.126) & (0.177) \\
## & & & \\
## telework\_time\_hr3-4 hours & 0.915$^{**}$ & 1.341$^{***}$ & 1.199$^{***}$ \\
## & (0.426) & (0.219) & (0.309) \\
## & & & \\
## telework\_time\_hr4-5 hours & 0.773$^{**}$ & 0.817$^{***}$ & 0.652$^{**}$ \\
## & (0.352) & (0.189) & (0.287) \\
## & & & \\
## telework\_time\_hr5-6 hours & 0.181 & 0.602$^{***}$ & 0.480 \\
## & (0.548) & (0.232) & (0.378) \\
## & & & \\
## telework\_time\_hr6-7 hours & $-0.114 & 0.645$^{***}$ & 0.079 \\
## & (0.457) & (0.194) & (0.352) \\
## & & & \\
## telework\_time\_hr7-8 hours & 0.519 & 0.222 & 0.708$^{***}$ \\
## & (0.342) & (0.179) & (0.237) \\
## & & & \\
## telework\_time\_hr8-9 hours & $-0.453$^{**}$ & $-0.243$^{**}$ & $-0.342$^{**}$ \\
## & (0.228) & (0.099) & (0.163) \\
## & & & \\
## telework\_time\_hr9+ hours & 0.705$^{***}$ & $-0.007 & 0.031 \\
## & (0.208) & (0.131) & (0.201) \\
## & & & \\
## telework\_time\_hrMissing: Skip Logic & $-1.231 & $-1.897$^{***}$ & $-0.591 \\
## & (0.765) & (0.482) & (0.491) \\
## & & & \\
## Constant & $-4.643 & $-3.745 & $-2.778 \\
## & (25.349) & (6.043) & (38.533) \\
## & & & \\
## \hline \\[-1.8ex]
## Akaike Inf. Crit. & 14,983.390 & 14,983.390 & 14,983.390 \\
## \hline
## \hline \\[-1.8ex]
## \textit{Note:} & \multicolumn{3}{r}{\textit{$^{*}$}$p$<$0.1; \textit{$^{**}$}$p$<$0.05; \textit{$^{***}$}$p$<$0.01} \\
## \end{tabular}
## \end{table}

```

```
model<-multinom(WorkGrp~ workplace, data=workers_day)
```

weights: 24 (15 variable)

initial value 12295.044689 iter 10 value 9620.578199 iter 20 value 8069.383823 iter 30 value 7974.537860 final value 7974.532202 converged

```
stargazer(model)
```

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Mon, Apr 08, 2024 - 9:00:13 AM

Table 5:

	<i>Dependent variable:</i>		
	3+ work trips (1)	1 work trips (2)	2 work trips (3)
workplaceDrives for a living (e.g., bus driver, salesperson)	4.554*** (0.347)	2.453*** (0.249)	2.908*** (0.408)
workplaceTelework some days and travel to a work location some days	1.937*** (0.322)	2.496*** (0.148)	2.726*** (0.288)
workplaceUsually the same location (outside home)	2.999*** (0.313)	3.562*** (0.146)	3.477*** (0.285)
workplaceWorkplace regularly varies (different offices or jobsites)	3.270*** (0.322)	2.351*** (0.165)	2.995*** (0.301)
Constant	-4.965*** (0.303)	-3.411*** (0.141)	-4.798*** (0.279)
Akaike Inf. Crit.	15,979.060	15,979.060	15,979.060
<i>Note:</i>		*p<0.1; **p<0.05; ***p<0.01	