Reproduced Anaylsis of FARS data

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Results

Percentages of drivers testing positive by drug type, sex, and year group

```
clean_fars %>%
  mutate(year_cat = cut(year, breaks = c(1999, 2002, 2006, 2010),
                        labels = c("1999-2002", "2003-2006", "2007-2010"),
                        include.lowest = TRUE, right = TRUE)) %>% filter(!is.na(sex))%>%
  group_by(drug_type, sex, year_cat) %>%
  summarize(n_non_missing = sum(!is.na(positive_for_drug)),
            positive_test = sum(positive_for_drug, na.rm = TRUE),
            perc_positive = round(100 * positive_test / n_non_missing, 1)) %>%
  select(drug_type, sex, year_cat, perc_positive) %>%
  unite(sex_year_cat, sex, year_cat) %>%
  spread(sex_year_cat, perc_positive) %>%
  knitr::kable(col.names = c("Drug type", "F 1999-2002",
                             "F 2003-2006", "F 2007-2010",
                             "M 1999-2002", "M 2003-2006",
                             "M 2007-2010"))
```

Drug type	F 1999-2002	F 2003-2006	F 2007-2010	M 1999-2002	M 2003-2006	M 2007-2010
Alcohol	26.4	24.3	27.1	43.2	42.9	43.3
Cannabinoid	2.8	5.7	7.3	5.8	10.3	11.8
Depressant	3.4	3.8	4.8	2.0	2.5	3.2
Narcotic	4.2	4.9	7.0	2.2	3.4	4.0
Other	5.6	6.6	7.2	4.3	4.5	4.2
Stimulant	7.2	9.1	8.7	10.5	11.9	9.2

Figure 1: Prevalence of nonalcohol drugs in fatally injured drivers by year and age group

```
graph1 <- clean_fars %>%
  filter(drug_type!= "Alcohol") %>%
  group_by(unique_id, agecat, year)%>%
  summarize(n_non_missing = sum(!is.na(positive_for_drug)),
            positive = any(positive_for_drug, na.rm = TRUE)) %>%
  ungroup() %>%
  group_by(year, agecat) %>%
  summarize(total_test = length(positive),
            positive = sum(positive),
            perc_positive = round(100 * positive / total_test, 1)) %>%
  select(year, agecat, perc_positive, positive) %>%
```

```
  na.omit


graph1 %>%
  ggplot(aes(x = year, y = perc_positive, group = agecat))+
  geom_line()+
  geom_point(aes(shape=agecat))+
  labs(x = "Year",
       y = "Positive for Nonalcohol Drugs, %")+
  theme_few()+
  scale_shape_manual(values = c(16, 17, 15, 3))+
  scale_y_continuous(limits = c(0, 35))
```

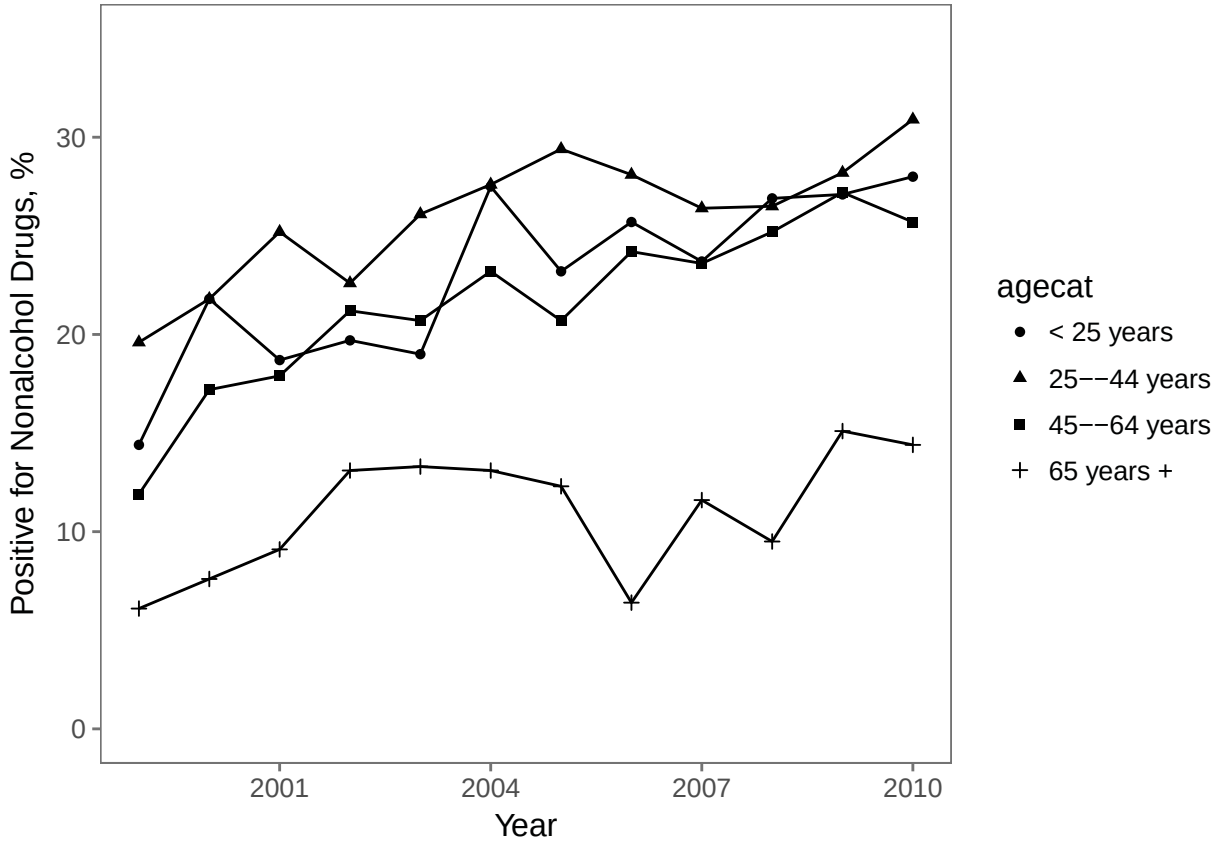


Figure 2: Prevalence of nonalcohol drugs in fatally injured drivers by year and drug type

```
graph2 <- clean_fars %>%
  filter(drug_type!= "Alcohol") %>%
  group_by(year, drug_type)%>%
  summarize(n_non_missing = sum(!is.na(positive_for_drug)),
            positive_test = sum(positive_for_drug, na.rm = TRUE),
            perc_positive = round(100 * positive_test / n_non_missing, 1)) %>%
  select(year, drug_type, perc_positive) %>%
  na.omit
```

```
graph2 %>%
  ggplot(aes(x = year, y = perc_positive, group = drug_type))+
  geom_line()+
  geom_point(aes(shape=drug_type))+
  theme_few()+
  scale_shape_manual("Drug Type", values = c(16, 17, 15, 3, 7)) +
  scale_y_continuous(limits = c(0, 13), breaks = c(0, 4, 8, 12))+
  labs( x = "Year",
        y = "Positive for Cannabinoid, %")
```

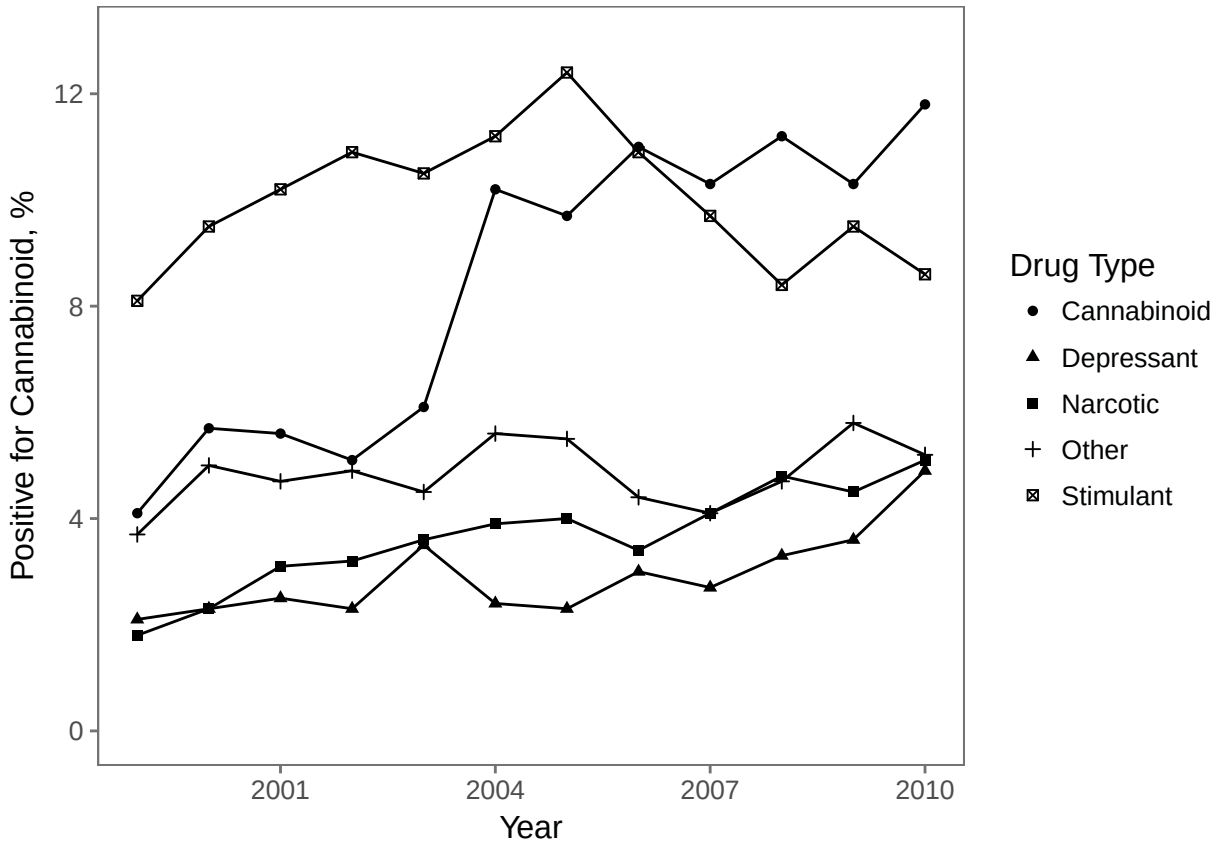
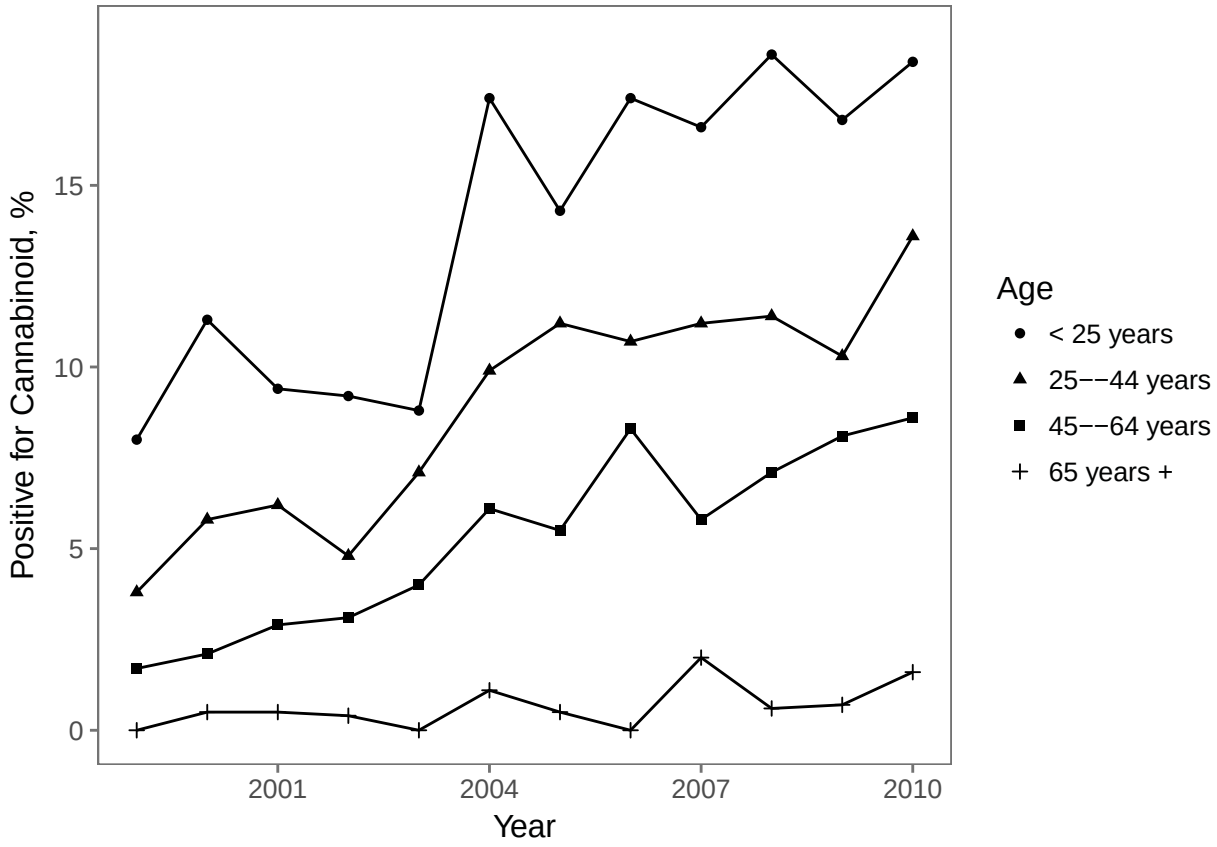


Figure 3: Prevalence of cannabinoid drugs in fatally injured drivers by year and age group

```
graph3 <- clean_fars %>%
  filter(drug_type== "Cannabinoid") %>%
  group_by(year, agecat)%>%
  summarize(n_non_missing = sum(!is.na(positive_for_drug)),
            positive_test = sum(positive_for_drug, na.rm = TRUE),
            perc_positive = round(100 * positive_test / n_non_missing, 1)) %>%
  select(year, agecat, perc_positive) %>%
  na.omit


graph3 %>%
  ggplot(aes(x = year, y = perc_positive, group = agecat))+
  geom_line()+
```

```
  geom_point(aes(shape=agecat))+
  theme_few()+
  scale_shape_manual("Age", values = c(16, 17, 15, 3)) +
  scale_y_continuous(limits = c(0, 19), breaks = c(0, 5, 10, 15)) +
  labs( x = "Year",
        y = "Positive for Cannabinoid, %")
```




```
driver_table <- clean_fars %>%
  filter(year %in% c(1999, 2010)) %>%
  group_by(drug_type, year) %>%
  summarize( x = sum(positive_for_drug, na.rm = TRUE),
             n = sum(!is.na(positive_for_drug))) %>%
  mutate( or = perc_cis(x, n) ) %>%
  select(drug_type, year, or) %>%
  spread(key = year, value = or) %>%
  rename("Drug Type" = drug_type)

kable(driver_table)
```

Drug Type	1999	2010
Alcohol	38.7% (36.5%, 40.9%)	39.1% (36.7%, 41.5%)
Cannabinoid	4.1% (3.1%, 5%)	11.8% (10.2%, 13.4%)
Depressant	2.1% (1.5%, 2.8%)	4.9% (3.8%, 5.9%)
Narcotic	1.8% (1.2%, 2.5%)	5.1% (4%, 6.2%)
Other	3.7% (2.9%, 4.6%)	5.2% (4.1%, 6.3%)
Stimulant	8.1% (6.8%, 9.4%)	8.6% (7.2%, 9.9%)

```
drug_list <- c("Alcohol", "Nonalcohol", "Narcotic", "Depressant",
               "Stimulant", "Cannabinoid", "Other")
drug_trend_tests_ca <- lapply(drug_list, test_trend_ca)
drug_trend_tests_ca <- dplyr::bind_rows(drug_trend_tests_ca) %>%
  dplyr::mutate(drug = drug_list) %>%
  dplyr::select(drug, Z, p.value)
drug_trend_tests_ca %>% knitr::kable()
```

drug	Z	p.value
Alcohol	1.2	0.228
Nonalcohol	10.9	0.000
Narcotic	6.7	0.000
Depressant	4.7	0.000
Stimulant	0.5	0.604
Cannabinoid	13.6	0.000
Other	1.4	0.157