Medical appointment DataSet investigation

March 11, 2021

1 Medical Appointment dataset investigation

1.1 Table of Contents

## Introduction

> The medical Appointment dataset contains 110.527 Appointment and it has 14 different variables studying the dataset to show what are the main factors that cause the patient to not show for the Appointment

1.2 Resarch Question

What days did the patients showed more ?
what is the average gender of the prople that didnt show ?
what is the age gender of the people that didnt show ?
Does reciving an SMS has something to do with Not showing ?

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```
%matplotlib inline
sns.set(rc={'figure.figsize': [10, 10]}, font_scale=1.3)
```

## Data Wrangling >in this section I will check the datatybe of all the clolums and check if there is any null values or duplicates

1.2.1 General Properties

[3]:
```
df = pd.read_csv('KaggleV2-May-2016.csv')
df.head()
```

```
[3]:        PatientId  AppointmentID Gender          ScheduledDay  \
     0  2.987250e+13        5642903      F  2016-04-29T18:38:08Z
     1  5.589978e+14        5642503      M  2016-04-29T16:08:27Z
     2  4.262962e+12        5642549      F  2016-04-29T16:19:04Z
     3  8.679512e+11        5642828      F  2016-04-29T17:29:31Z
     4  8.841186e+12        5642494      F  2016-04-29T16:07:23Z

              AppointmentDay  Age      Neighbourhood  Scholarship  Hipertension  \
     0  2016-04-29T00:00:00Z   62    JARDIM DA PENHA            0             1
     1  2016-04-29T00:00:00Z   56    JARDIM DA PENHA            0             0
     2  2016-04-29T00:00:00Z   62      MATA DA PRAIA            0             0
     3  2016-04-29T00:00:00Z    8  PONTAL DE CAMBURI            0             0
     4  2016-04-29T00:00:00Z   56    JARDIM DA PENHA            0             1

        Diabetes  Alcoholism  Handcap  SMS_received No-show
     0         0           0        0             0      No
     1         0           0        0             0      No
     2         0           0        0             0      No
     3         0           0        0             0      No
     4         1           0        0             0      No
```

[15]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 110521 entries, 0 to 110526
Data columns (total 14 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
 0   PatientId       110521 non-null  float64
 1   AppointmentID   110521 non-null  int64
 2   Gender          110521 non-null  object
 3   ScheduledDay    110521 non-null  datetime64[ns, UTC]
 4   AppointmentDay  110521 non-null  datetime64[ns, UTC]
 5   Age             110521 non-null  int64
 6   Neighbourhood   110521 non-null  object
 7   Scholarship     110521 non-null  int64
 8   Hipertension    110521 non-null  int64
 9   Diabetes        110521 non-null  int64
 10  Alcoholism      110521 non-null  int64
 11  Handcap         110521 non-null  int64
 12  SMS_received    110521 non-null  int64
 13  No-show         110521 non-null  object
dtypes: datetime64[ns, UTC](2), float64(1), int64(8), object(3)
memory usage: 12.6+ MB
```

[5]:

```
df.describe()
```

```
[5]:           PatientId  AppointmentID            Age    Scholarship  \
     count  1.105270e+05   1.105270e+05  110527.000000  110527.000000
     mean   1.474963e+14   5.675305e+06      37.088874       0.098266
     std    2.560949e+14   7.129575e+04      23.110205       0.297675
     min    3.921784e+04   5.030230e+06      -1.000000       0.000000
     25%    4.172614e+12   5.640286e+06      18.000000       0.000000
     50%    3.173184e+13   5.680573e+06      37.000000       0.000000
     75%    9.439172e+13   5.725524e+06      55.000000       0.000000
     max    9.999816e+14   5.790484e+06     115.000000       1.000000

             Hipertension       Diabetes     Alcoholism        Handcap  \
     count  110527.000000  110527.000000  110527.000000  110527.000000
     mean        0.197246       0.071865       0.030400       0.022248
     std         0.397921       0.258265       0.171686       0.161543
     min         0.000000       0.000000       0.000000       0.000000
     25%         0.000000       0.000000       0.000000       0.000000
     50%         0.000000       0.000000       0.000000       0.000000
     75%         0.000000       0.000000       0.000000       0.000000
     max         1.000000       1.000000       1.000000       4.000000

             SMS_received
     count  110527.000000
     mean        0.321026
     std         0.466873
     min         0.000000
     25%         0.000000
     50%         0.000000
     75%         1.000000
     max         1.000000
```

```
[6]: df.duplicated().sum()
```

```
[6]: 0
```

```
[7]: df.isnull().sum()
```

```
[7]: PatientId         0
     AppointmentID     0
     Gender            0
     ScheduledDay      0
     AppointmentDay    0
     Age               0
     Neighbourhood     0
     Scholarship       0
     Hipertension      0
     Diabetes          0
     Alcoholism        0
```

```
Handcap           0
SMS_received      0
No-show           0
dtype: int64
```

[8]:

```python
for col in df.columns:
    print(f'For column {col}\n------------------\n')
    print(df[col].value_counts())
    print('\n')
```

```
For column PatientId
------------------

8.221459e+14    88
9.963767e+10    84
2.688613e+13    70
3.353478e+13    65
2.584244e+11    62
                ..
1.222828e+13     1
6.821231e+11     1
7.163981e+14     1
9.798964e+14     1
2.724571e+11     1
Name: PatientId, Length: 62299, dtype: int64


For column AppointmentID
------------------

5769215    1
5731652    1
5707080    1
5702986    1
5715276    1
          ..
5586290    1
5584243    1
5598584    1
5602682    1
5771266    1
Name: AppointmentID, Length: 110527, dtype: int64


For column Gender
------------------

F    71840
```

```
M    38687
Name: Gender, dtype: int64


For column ScheduledDay
------------------

2016-05-06T07:09:54Z    24
2016-05-06T07:09:53Z    23
2016-04-25T17:17:46Z    22
2016-04-25T17:18:27Z    22
2016-04-25T17:17:23Z    19
                        ..
2016-05-24T15:34:54Z     1
2016-05-11T16:01:01Z     1
2016-06-08T10:42:47Z     1
2016-04-28T11:02:14Z     1
2016-05-03T08:46:59Z     1
Name: ScheduledDay, Length: 103549, dtype: int64


For column AppointmentDay
------------------

2016-06-06T00:00:00Z    4692
2016-05-16T00:00:00Z    4613
2016-05-09T00:00:00Z    4520
2016-05-30T00:00:00Z    4514
2016-06-08T00:00:00Z    4479
2016-05-11T00:00:00Z    4474
2016-06-01T00:00:00Z    4464
2016-06-07T00:00:00Z    4416
2016-05-12T00:00:00Z    4394
2016-05-02T00:00:00Z    4376
2016-05-18T00:00:00Z    4373
2016-05-17T00:00:00Z    4372
2016-06-02T00:00:00Z    4310
2016-05-10T00:00:00Z    4308
2016-05-31T00:00:00Z    4279
2016-05-05T00:00:00Z    4273
2016-05-19T00:00:00Z    4270
2016-05-03T00:00:00Z    4256
2016-05-04T00:00:00Z    4168
2016-06-03T00:00:00Z    4090
2016-05-24T00:00:00Z    4009
2016-05-13T00:00:00Z    3987
2016-05-25T00:00:00Z    3909
2016-05-06T00:00:00Z    3879
```

```
2016-05-20T00:00:00Z    3828
2016-04-29T00:00:00Z    3235
2016-05-14T00:00:00Z      39
Name: AppointmentDay, dtype: int64


For column Age
------------------

 0      3539
 1      2273
 52     1746
 49     1652
 53     1651
        …
 115       5
 100       4
 102       2
 99        1
-1         1
Name: Age, Length: 104, dtype: int64


For column Neighbourhood
------------------

JARDIM CAMBURI                 7717
MARIA ORTIZ                    5805
RESISTÊNCIA                    4431
JARDIM DA PENHA                3877
ITARARÉ                        3514
                               …
ILHA DO BOI                      35
ILHA DO FRADE                    10
AEROPORTO                         8
ILHAS OCEÂNICAS DE TRINDADE       2
PARQUE INDUSTRIAL                 1
Name: Neighbourhood, Length: 81, dtype: int64


For column Scholarship
------------------

0    99666
1    10861
Name: Scholarship, dtype: int64
```

```
For column Hipertension
------------------

0    88726
1    21801
Name: Hipertension, dtype: int64


For column Diabetes
------------------

0    102584
1      7943
Name: Diabetes, dtype: int64


For column Alcoholism
------------------

0    107167
1      3360
Name: Alcoholism, dtype: int64


For column Handcap
------------------

0    108286
1      2042
2       183
3        13
4         3
Name: Handcap, dtype: int64


For column SMS_received
------------------

0    75045
1    35482
Name: SMS_received, dtype: int64


For column No-show
------------------

No     88208
Yes    22319
```

```
Name: No-show, dtype: int64
```

we checked if their was any duplicated values or null values and there was none and checked the values count for each row and then the describe of the data showed there is a problem in the age column that it has a value quals to -1 and 115 which could be wrong and the scheduale day and appoitment dat are int Dtype object and it should be datetime

1.2.2 Data Cleaning

In this section I will handle to problem of outlier in the age column and the datatybe problem

[9]:
```
df[df.Age < 0]
```

[9]:
```
          PatientId  AppointmentID Gender          ScheduledDay  \
99832  4.659432e+14        5775010      F  2016-06-06T08:58:13Z

             AppointmentDay  Age Neighbourhood  Scholarship  Hipertension  \
99832  2016-06-06T00:00:00Z   -1         ROMÃO            0             0

       Diabetes  Alcoholism  Handcap  SMS_received No-show
99832         0           0        0             0      No
```

[10]:
```
df.drop([99832],axis=0, inplace=True)
```

[11]:
```
df[df.Age == 115]
```

[11]:
```
          PatientId  AppointmentID Gender          ScheduledDay  \
63912  3.196321e+13        5700278      F  2016-05-16T09:17:44Z
63915  3.196321e+13        5700279      F  2016-05-16T09:17:44Z
68127  3.196321e+13        5562812      F  2016-04-08T14:29:17Z
76284  3.196321e+13        5744037      F  2016-05-30T09:44:51Z
97666  7.482346e+14        5717451      F  2016-05-19T07:57:56Z

             AppointmentDay  Age Neighbourhood  Scholarship  Hipertension  \
63912  2016-05-19T00:00:00Z  115    ANDORINHAS            0             0
63915  2016-05-19T00:00:00Z  115    ANDORINHAS            0             0
68127  2016-05-16T00:00:00Z  115    ANDORINHAS            0             0
76284  2016-05-30T00:00:00Z  115    ANDORINHAS            0             0
97666  2016-06-03T00:00:00Z  115     SÃO JOSÉ             0             1

       Diabetes  Alcoholism  Handcap  SMS_received No-show
63912         0           0        1             0     Yes
63915         0           0        1             0     Yes
68127         0           0        1             0     Yes
```

```
76284         0           0        1             0      No
97666         0           0        0             1      No
```

[12]:

```
df.drop([63912],axis=0,inplace=True)
df.drop([63915],axis=0,inplace=True)
df.drop([68127],axis=0,inplace=True)
df.drop([76284],axis=0,inplace=True)
df.drop([97666],axis=0,inplace=True)
```

After handling the outlier problem now will handle the datatybe problem

[19]:

```
df['ScheduledDay'] = pd.to_datetime(df['ScheduledDay'],format="%Y/%m/%d %H:%M:
 ↪%S")
df['AppointmentDay'] = pd.to_datetime(df['AppointmentDay'])
df.tail()
```

[19]:

```
           PatientId  AppointmentID Gender              ScheduledDay  \
110522  2.572134e+12        5651768      F 2016-05-03 09:15:35+00:00
110523  3.596266e+12        5650093      F 2016-05-03 07:27:33+00:00
110524  1.557663e+13        5630692      F 2016-04-27 16:03:52+00:00
110525  9.213493e+13        5630323      F 2016-04-27 15:09:23+00:00
110526  3.775115e+14        5629448      F 2016-04-27 13:30:56+00:00

                  AppointmentDay  Age Neighbourhood  Scholarship  \
110522 2016-06-07 00:00:00+00:00   56    MARIA ORTIZ            0
110523 2016-06-07 00:00:00+00:00   51    MARIA ORTIZ            0
110524 2016-06-07 00:00:00+00:00   21    MARIA ORTIZ            0
110525 2016-06-07 00:00:00+00:00   38    MARIA ORTIZ            0
110526 2016-06-07 00:00:00+00:00   54    MARIA ORTIZ            0

        Hipertension  Diabetes  Alcoholism  Handcap  SMS_received No-show
110522             0         0           0        0             1      No
110523             0         0           0        0             1      No
110524             0         0           0        0             1      No
110525             0         0           0        0             1      No
110526             0         0           0        0             1      No
```

[29]:

```
df['Day_Name'] = df['ScheduledDay'].dt.day_name()
df.head()
```

[29]:

```
      PatientId  AppointmentID Gender              ScheduledDay  \
0  2.987250e+13        5642903      F 2016-04-29 18:38:08+00:00
1  5.589978e+14        5642503      M 2016-04-29 16:08:27+00:00
2  4.262962e+12        5642549      F 2016-04-29 16:19:04+00:00
3  8.679512e+11        5642828      F 2016-04-29 17:29:31+00:00
4  8.841186e+12        5642494      F 2016-04-29 16:07:23+00:00

             AppointmentDay  Age      Neighbourhood  Scholarship  \
0 2016-04-29 00:00:00+00:00   62     JARDIM DA PENHA            0
1 2016-04-29 00:00:00+00:00   56     JARDIM DA PENHA            0
2 2016-04-29 00:00:00+00:00   62       MATA DA PRAIA            0
3 2016-04-29 00:00:00+00:00    8   PONTAL DE CAMBURI            0
4 2016-04-29 00:00:00+00:00   56     JARDIM DA PENHA            0

   Hipertension  Diabetes  Alcoholism  Handcap  SMS_received No-show Day_Name
0             1         0           0        0             0      No   Friday
1             0         0           0        0             0      No   Friday
2             0         0           0        0             0      No   Friday
3             0         0           0        0             0      No   Friday
4             1         1           0        0             0      No   Friday
```

Then i will add a cloumn that shows the day of the appoitment to help me more in the investigation

## Exploratory Data Analysis ### What days did the patients showed more ?

[30]:

```
df['Day_Name'].value_counts()
```

[30]:

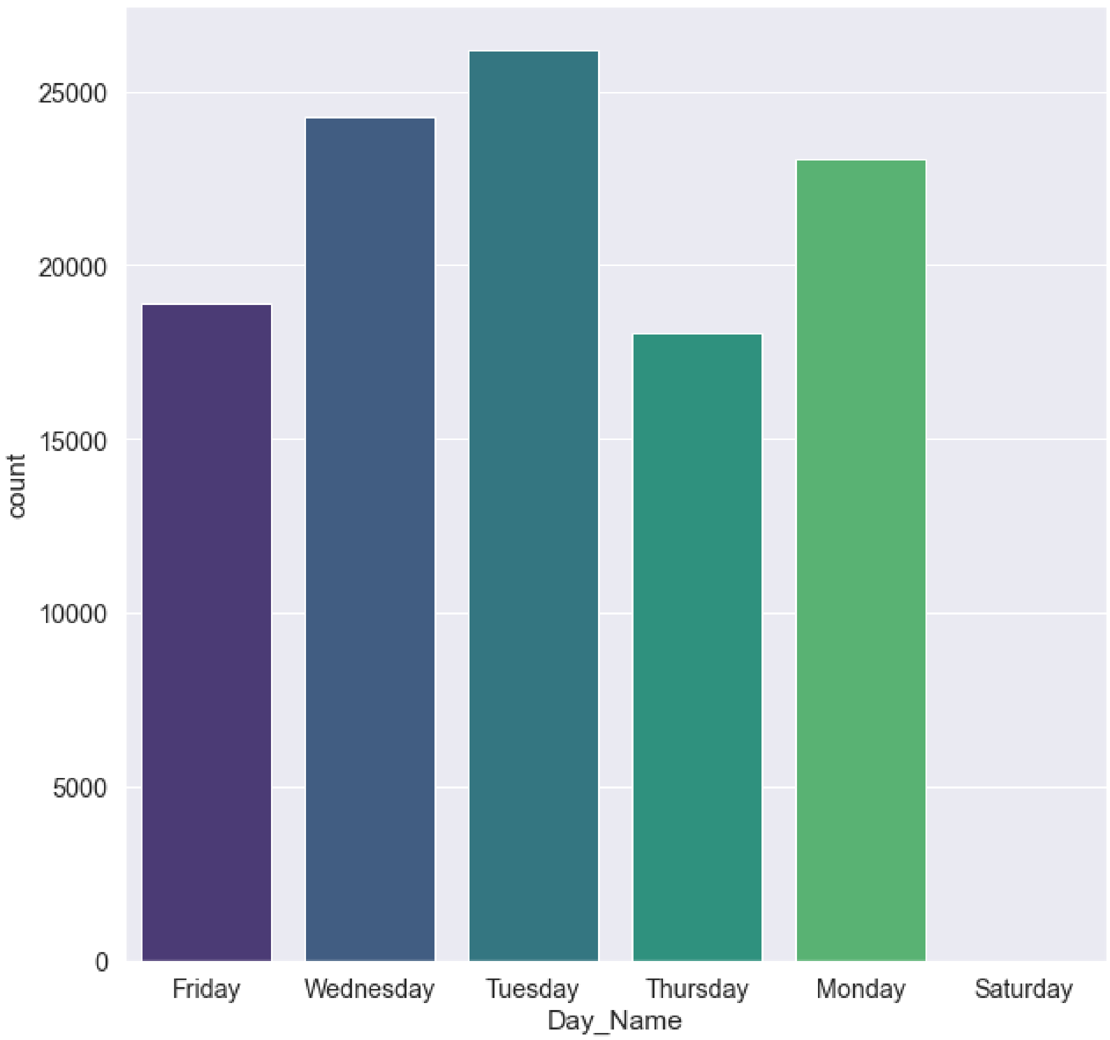
```
Tuesday      26168
Wednesday    24262
Monday       23081
Friday       18914
Thursday     18072
Saturday        24
Name: Day_Name, dtype: int64
```

[32]:

```
sns.countplot(x='Day_Name', data=df, palette='viridis')
```

[32]:

```
<AxesSubplot:xlabel='Day_Name', ylabel='count'>
```

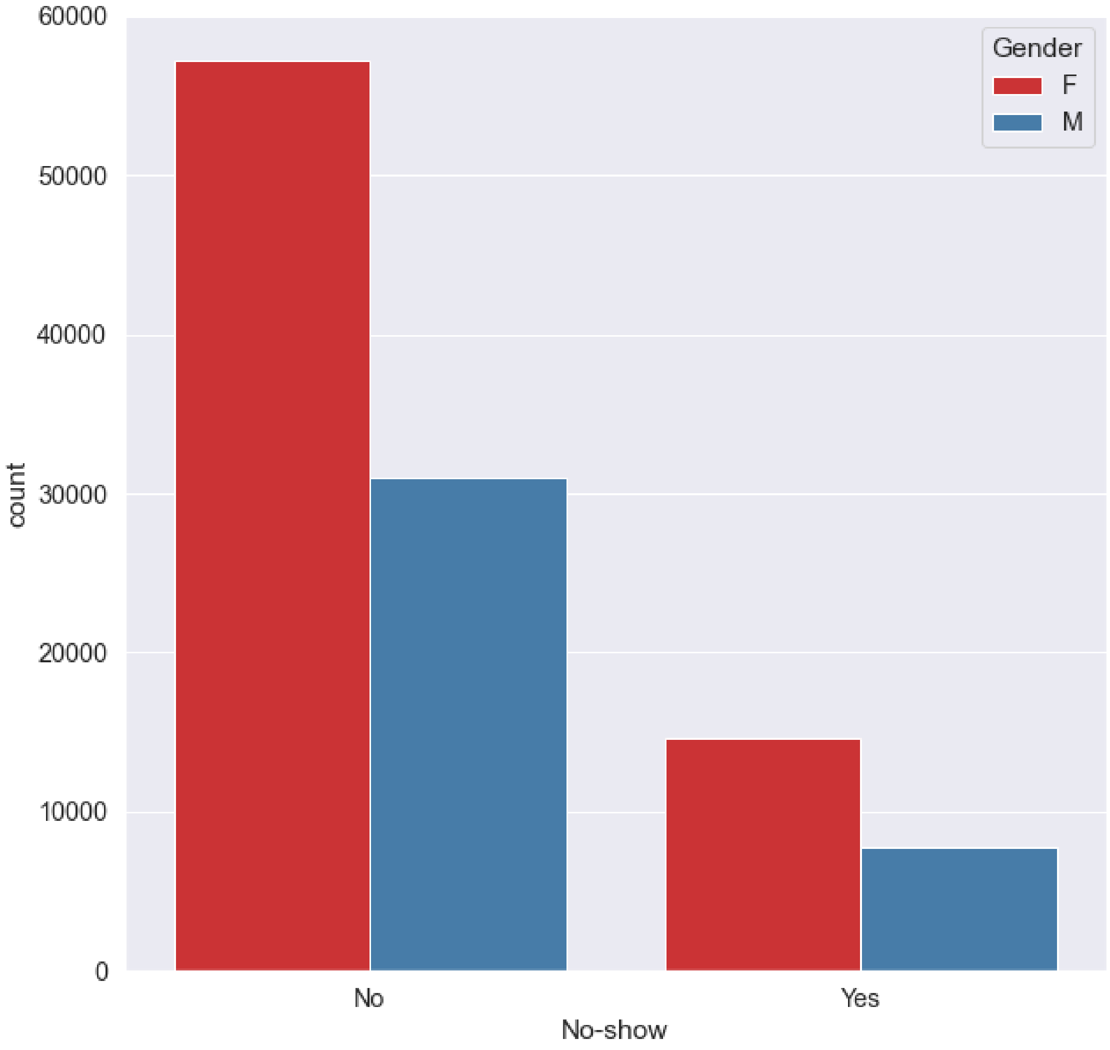


As it shows in the graph there is a problem in saturday as it shows a very little amount of people shown in this day

1.3 what is the average gender of the people that didnt show ?

```
[33]: sns.countplot(x='No-show', data=df, hue='Gender', palette='Set1')
```

```
[33]: <AxesSubplot:xlabel='No-show', ylabel='count'>
```

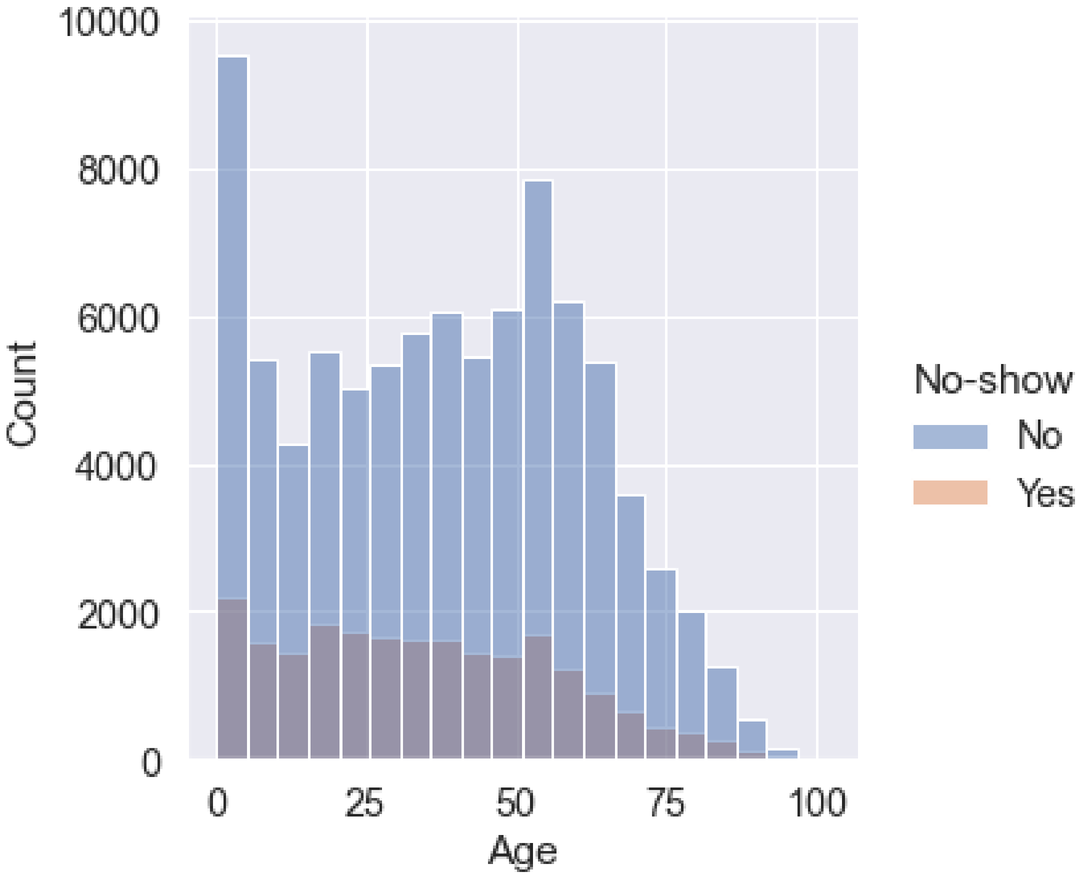


As it show in the graph that Male didnt show more than females

2 what is the average age of people that didn't show

```
[46]: sns.displot(data=df,x=df['Age'],hue='No-show', kde=False, bins=20, color='m')
```

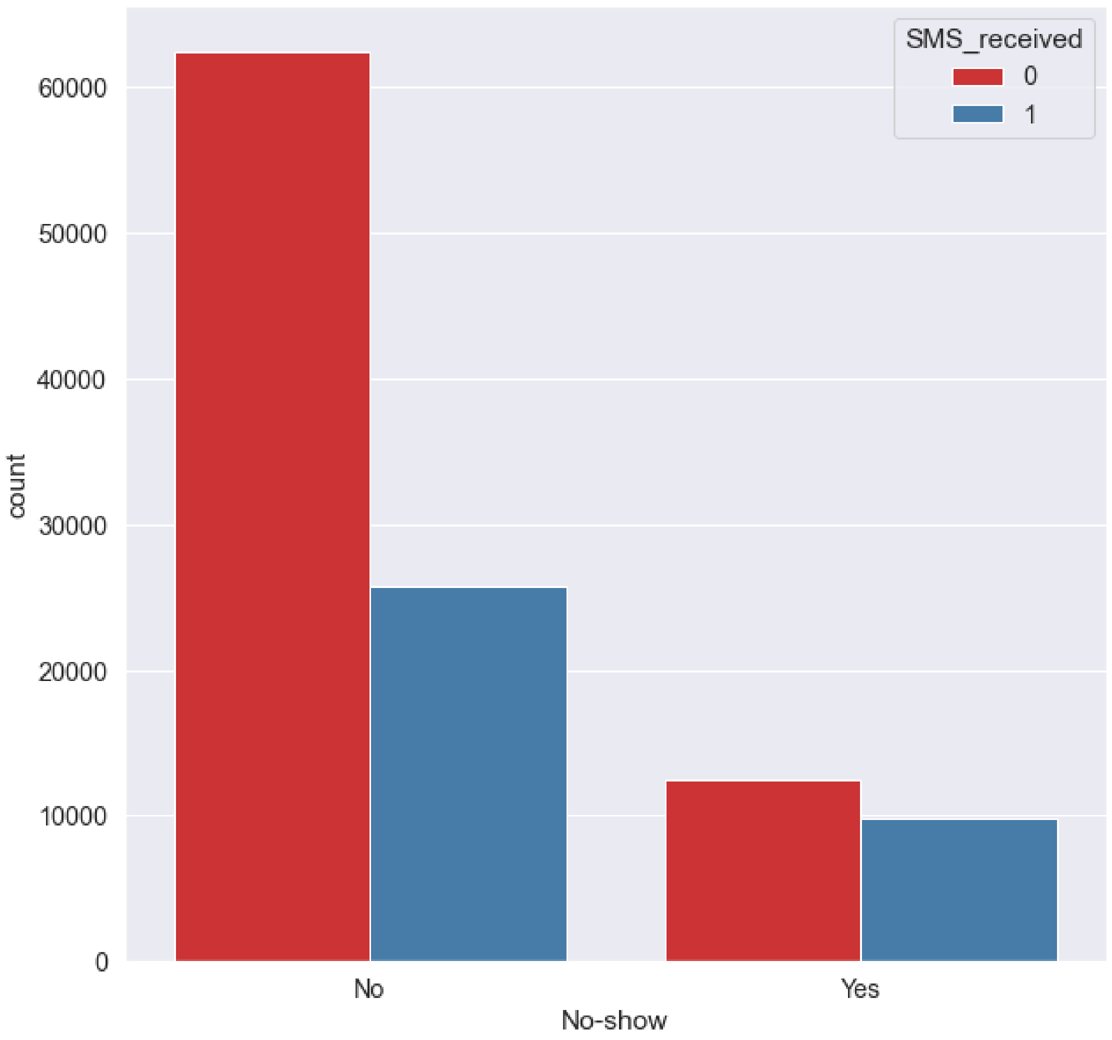
```
[46]: <seaborn.axisgrid.FacetGrid at 0x19c211c8e20>
```



3 Does reciving an SMS has something to do with Not showing ?

```
[48]: sns.countplot(x='No-show', data=df, hue='SMS_received', palette='Set1')
```

```
[48]: <AxesSubplot:xlabel='No-show', ylabel='count'>
```



3.0.1 As it show there is a little more in the average people that didn't recive an SMS and didn't show

## Conclusions

The analysis Showed there is correlation between the Gender and the average people that didn't show it also showed there is a problem in saturday and also there is a correlation between the age and the average people that didn't show and not reciving an SMS will make the average peoplt to Not show increase a little

[ ]: