The exploration should have a goal. As you explore the data, keep in mind that you want to answer which type of shows to produce and how to grow the business. Ensure each recommendation is backed by data. The company is looking for data-driven insights, not personal opinions or anecdotes. Assume that you are presenting your findings to business executives who have only a basic understanding of data science. Avoid unnecessary technical jargon. Start by exploring a few questions: What type of content is available in different countries? How has the number of movies released per year changed over the last 20-30 years? Comparison of tv shows vs. movies. What is the best time to launch a TV show? Analysis of actors/directors of different types of shows/movies. Does Netflix has more focus on TV Shows than movies in recent years Understanding what content is available in different countries Evaluation Criteria (100 Points):

1. Defining Problem Statement and Analysing basic metrics
2. Observations on the shape of data, data types of all the attributes, conversion of categorical attributes to 'category' (If required), missing value detection, statistical summary
3. Non-Graphical Analysis: Value counts and unique attributes
4. Visual Analysis - Univariate, Bivariate after pre-processing of the data

Note: Pre-processing involves unnesting of the data in columns like Actor, Director, Country

4.1 For continuous variable(s): Distplot, countplot, histogram for univariate analysis

4.2 For categorical variable(s): Boxplot

4.3 For correlation: Heatmaps, Pairplots

5. Missing Value & Outlier check (Treatment optional)
6. Insights based on Non-Graphical and Visual Analysis

6.1 Comments on the range of attributes

6.2 Comments on the distribution of the variables and relationship between them

6.3 Comments for each univariate and bivariate plot

7. Business Insights - Should include patterns observed in the data along with what you can infer from it
8. Recommendations - Actionable items for business. No technical jargon. No complications. Simple action items that everyone can understand

In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import os
```

Observations on the shape of data, data types of all the attributes, conversion of categorical attributes to 'category' (If required), missing value detection, statistical summary (10 Points)

In [2]:

```
os.chdir('C:\\Users\Ashok kumar\Desktop\chanu\DSML_Course\Class Files')

### Read CSV

df = pd.read_csv('netflix.csv')
```

In [3]:

```
df.shape
```

Out[3]:

```
(8807, 12)
```

In [4]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype 
---  ------        --------------  ----- 
 0   show_id       8807 non-null   object
 1   type          8807 non-null   object
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   object
 7   release_year  8807 non-null   int64 
 8   rating        8803 non-null   object
 9   duration      8804 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: int64(1), object(11)
memory usage: 825.8+ KB
```

In [5]:

```
df.rating.unique()
```

Out[5]:

```
array(['PG-13', 'TV-MA', 'PG', 'TV-14', 'TV-PG', 'TV-Y', 'TV-Y7', 'R',
       'TV-G', 'G', 'NC-17', '74 min', '84 min', '66 min', 'NR', nan,
       'TV-Y7-FV', 'UR'], dtype=object)
```

In [6]:

```
df.type.unique()
```

Out[6]:

```
array(['Movie', 'TV Show'], dtype=object)
```

In [7]:

```
# we can convert type into category value
```

In [8]:

```
df.loc[df.type == 'Movie', 'type'] = 1
```

In [9]:

```
df.loc[df.type == 'TV Show', 'type'] = 0
```

In [10]:

```
df['type'] = df['type'].astype('int32')
```

In [11]:

```
df.head()
```

Out[11]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	du
0	s1	1	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	
1	s2	0	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	S
2	s3	0	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	September 24, 2021	2021	TV-MA	[illegible]
3	s4	0	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	[illegible]
4	s5	0	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	S

In [12]:

```
df.type.value_counts()
```

Out[12]:

```
1    6131
0    2676
Name: type, dtype: int64
```

In [13]:

```
df.release_year.value_counts().reset_index().sort_values('index').head()
```

Out[13]:

	index	release_year
70	1925	1
67	1942	2
58	1943	3
54	1944	3
53	1945	4

we can see that after 1925 there are no movies/tv shows released till 1942, so we can consider that 1925 as an outlier and take possible actions

In [14]:

```
df.rating.unique()
```

Out[14]:

```
array(['PG-13', 'TV-MA', 'PG', 'TV-14', 'TV-PG', 'TV-Y', 'TV-Y7', 'R',
       'TV-G', 'G', 'NC-17', '74 min', '84 min', '66 min', 'NR', nan,
       'TV-Y7-FV', 'UR'], dtype=object)
```

In [15]:

```
# There are some durations present in rating,so checking if there are any null values in du
```

In [16]:

```
df.duration.isna().sum()
# there are 3 null values in duration.
```

Out[16]:

```
3
```

In [17]:

```
df.loc[df.duration.isna()]
```

Out[17]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	durat
5541	s5542	1	Louis C.K. 2017	Louis C.K.	Louis C.K.	United States	April 4, 2017	2017	74 min	N
5794	s5795	1	Louis C.K.: Hilarious	Louis C.K.	Louis C.K.	United States	September 16, 2016	2010	84 min	N
5813	s5814	1	Louis C.K.: Live at the Comedy Store	Louis C.K.	Louis C.K.	United States	August 15, 2016	2015	66 min	N

In [18]:

```
#lets replace fill the duration null values
df.loc[df.duration.isna(),'duration'] = df.loc[df.duration.isna(),'rating']
```

In [19]:

```
df.duration.isna().sum()
```

Out[19]:

```
0
```

In [20]:

```
df.loc[df.director == 'Louis C.K.']
#replaced the duration and there are no null values
```

Out[20]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	durat
5541	s5542	1	Louis C.K. 2017	Louis C.K.	Louis C.K.	United States	April 4, 2017	2017	74 min	74
5794	s5795	1	Louis C.K.: Hilarious	Louis C.K.	Louis C.K.	United States	September 16, 2016	2010	84 min	84
5813	s5814	1	Louis C.K.: Live at the Comedy Store	Louis C.K.	Louis C.K.	United States	August 15, 2016	2015	66 min	66

In [21]:

```
df['date_added'] = pd.to_datetime(df['date_added'])
```

In [22]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   show_id       8807 non-null   object
 1   type          8807 non-null   int32
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   datetime64[ns]
 7   release_year  8807 non-null   int64
 8   rating        8803 non-null   object
 9   duration      8807 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: datetime64[ns](1), int32(1), int64(1), object(9)
memory usage: 791.4+ KB
```

In [23]:

```
df['year_added'] = df['date_added'].dt.year
```

In [24]:

```
# we can find the null values in the year_added, for now we will assume that they are relea
#and date added, year added are same
df.loc[df.year_added.isna()]
```

Out[24]:

	show_id	type	title	director	cast	country	date_added	release_year	ra
6066	s6067	0	A Young Doctor's Notebook and Other Stories	NaN	Daniel Radcliffe, Jon Hamm, Adam Godley, Chris...	United Kingdom	NaT	2013	
6174	s6175	0	Anthony Bourdain: Parts Unknown	NaN	Anthony Bourdain	United States	NaT	2018	
6795	s6796	0	Frasier	NaN	Kelsey Grammer, Jane Leeves, David Hyde Pierce...	United States	NaT	2003	
6806	s6807	0	Friends	NaN	Jennifer Aniston, Courteney Cox, Lisa Kudrow, ...	United States	NaT	2003	T
6901	s6902	0	Gunslinger Girl	NaN	Yuuka Nanri, Kanako Mitsuhashi, Eri Sendai, Am...	Japan	NaT	2008	T
7196	s7197	0	Kikoriki	NaN	Igor Dmitriev	NaN	NaT	2010	T
7254	s7255	0	La Familia P. Luche	NaN	Eugenio Derbez, Consuelo Duval, Luis Manuel Áv...	United States	NaT	2012	T
7406	s7407	0	Maron	NaN	Marc Maron, Judd Hirsch, Josh Brener, Nora Zeh...	United States	NaT	2016	
7847	s7848	0	Red vs. Blue	NaN	Burnie Burns, Jason Saldaña, Gustavo Sorola, G...	United States	NaT	2015	

	show_id	type	title	director	cast	country	date_added	release_year	ra
8182	s8183	0	The Adventures of Figaro Pho	NaN	Luke Jurevicius, Craig Behenna, Charlotte Haml...	Australia	NaT	2015	T\

In [25]:

```
df.loc[df.year_added.isna(),'year_added'] = df.loc[df.year_added.isna(),'release_year']
```

In [26]:

```
df.loc[df.date_added.isna()]
```

Out[26]:

	show_id	type	title	director	cast	country	date_added	release_year	ra
6066	s6067	0	A Young Doctor's Notebook and Other Stories	NaN	Daniel Radcliffe, Jon Hamm, Adam Godley, Chris...	United Kingdom	NaT	2013	
6174	s6175	0	Anthony Bourdain: Parts Unknown	NaN	Anthony Bourdain	United States	NaT	2018	
6795	s6796	0	Frasier	NaN	Kelsey Grammer, Jane Leeves, David Hyde Pierce...	United States	NaT	2003	
6806	s6807	0	Friends	NaN	Jennifer Aniston, Courteney Cox, Lisa Kudrow, ...	United States	NaT	2003	T
6901	s6902	0	Gunslinger Girl	NaN	Yuuka Nanri, Kanako Mitsuhashi, Eri Sendai, Am...	Japan	NaT	2008	T
7196	s7197	0	Kikoriki	NaN	Igor Dmitriev	NaN	NaT	2010	T
7254	s7255	0	La Familia P. Luche	NaN	Eugenio Derbez, Consuelo Duval, Luis Manuel Áv...	United States	NaT	2012	T
7406	s7407	0	Maron	NaN	Marc Maron, Judd Hirsch, Josh Brener, Nora Zeh...	United States	NaT	2016	
7847	s7848	0	Red vs. Blue	NaN	Burnie Burns, Jason Saldaña, Gustavo Sorola, G...	United States	NaT	2015	

	show_id	type	title	director	cast	country	date_added	release_year	ra
8182	s8183	0	The Adventures of Figaro Pho	NaN	Luke Jurevicius, Craig Behenna, Charlotte Haml...	Australia	NaT	2015	T\

In [27]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 13 columns):
 #   Column        Non-Null Count  Dtype         
---  ------        --------------  -----         
 0   show_id       8807 non-null   object        
 1   type          8807 non-null   int32         
 2   title         8807 non-null   object        
 3   director      6173 non-null   object        
 4   cast          7982 non-null   object        
 5   country       7976 non-null   object        
 6   date_added    8797 non-null   datetime64[ns]
 7   release_year  8807 non-null   int64         
 8   rating        8803 non-null   object        
 9   duration      8807 non-null   object        
 10  listed_in     8807 non-null   object        
 11  description   8807 non-null   object        
 12  year_added    8807 non-null   float64       
dtypes: datetime64[ns](1), float64(1), int32(1), int64(1), object(9)
memory usage: 860.2+ KB
```

In [28]:

```
df.loc[df.rating.isna()]
```

Out[28]:

	show_id	type	title	director	cast	country	date_added	release_year	r
5989	s5990	1	13TH: A Conversation with Oprah Winfrey & Ava ...	NaN	Oprah Winfrey, Ava DuVernay	NaN	2017-01-26	2017	
6827	s6828	0	Gargantia on the Verdurous Planet	NaN	Kaito Ishikawa, Hisako Kanemoto, Ai Kayano, Ka...	Japan	2016-12-01	2013	
7312	s7313	0	Little Lunch	NaN	Flynn Curry, Olivia Deeble, Madison Lu, Oisín ...	Australia	2018-02-01	2015	
7537	s7538	1	My Honor Was Loyalty	Alessandro Pepe	Leone Frisa, Paolo Vaccarino, Francesco Miglio...	Italy	2017-03-01	2015	

In [29]:

```
df['year_added'] = df['year_added'].astype('int32')
```

In [30]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 13 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   show_id       8807 non-null   object
 1   type          8807 non-null   int32
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   datetime64[ns]
 7   release_year  8807 non-null   int64
 8   rating        8803 non-null   object
 9   duration      8807 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
 12  year_added    8807 non-null   int32
dtypes: datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 825.8+ KB
```

In [31]:

```
df.year_added.value_counts().sort_values(ascending=False)
```

Out[31]:

```
2019    2016
2020    1879
2018    1650
2021    1498
2017    1188
2016     430
2015      84
2014      24
2011      13
2013      12
2012       4
2008       3
2009       2
2003       2
2010       2
Name: year_added, dtype: int64
```

In [32]:

```
df.year_added.nunique()
```

Out[32]:

```
15
```

From above we can say that no content was upoloaded to Netflix during 2004-2007, so we can consider 2003 as an outlier

In [33]:

```
df.describe()
```

Out[33]:

	type	release_year	year_added
count	8807.000000	8807.000000	8807.000000
mean	0.696151	2014.180198	2018.863291
std	0.459944	8.819312	1.602696
min	0.000000	1925.000000	2003.000000
25%	0.000000	2013.000000	2018.000000
50%	1.000000	2017.000000	2019.000000
75%	1.000000	2019.000000	2020.000000
max	1.000000	2021.000000	2021.000000

->From the above statistical analysis we can infer that there are total 8807 movies and TV shows combined in Netflix from the years 1925 to 2021. there are more number of movies when compared to TV shows. -> TV shows or movies are added into netflix 2 years after they are released.

Non-Graphical Analysis: Value counts and unique attributes (10 Points)

In [34]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 13 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   show_id       8807 non-null   object
 1   type          8807 non-null   int32
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   datetime64[ns]
 7   release_year  8807 non-null   int64
 8   rating        8803 non-null   object
 9   duration      8807 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
 12  year_added    8807 non-null   int32
dtypes: datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 825.8+ KB
```

In [35]:

```
# from type we can say that there are only two kinds of content is present in netflix : Mov
# #_of_Movies > #_of_TV_Shows
# both combined there are total 8807 shows in netflix
```

In [36]:

```
df.type.value_counts()
```

Out[36]:

```
1    6131
0    2676
Name: type, dtype: int64
```

In [37]:

```
# Most number of movies added in the year 2019 when compared to all other years
df.year_added.value_counts().sort_values(ascending=False)
```

Out[37]:

```
2019    2016
2020    1879
2018    1650
2021    1498
2017    1188
2016     430
2015      84
2014      24
2011      13
2013      12
2012       4
2008       3
2009       2
2003       2
2010       2
Name: year_added, dtype: int64
```

In [38]:

```
#from the above result we can say that netflix started adding movies/tv shows from the year
# any content till 2008
df.year_added.nunique()
```

Out[38]:

```
15
```

In [39]:

```
# Most number of movies released in the year of 2018
df.release_year.value_counts().sort_values(ascending=False)
```

Out[39]:

```
2018    1147
2017    1032
2019    1030
2020     953
2016     902
        ... 
1959       1
1925       1
1961       1
1947       1
1966       1
Name: release_year, Length: 74, dtype: int64
```

In [40]:

```
df.year_added.nunique()
```

Out[40]:

```
15
```

In [41]:

```
# we have converted the movie duration into only numerical value to generate some insights
df.loc[df.type == 1,'duration']=df.duration.apply(lambda x: str(x).split()[0])
```

In [42]:

```
df.head()
```

Out[42]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	du
0	s1	1	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	PG-13	
1	s2	0	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	2021-09-24	2021	TV-MA	S
2	s3	0	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	2021-09-24	2021	TV-MA	
3	s4	0	Jailbirds New Orleans	NaN	NaN	NaN	2021-09-24	2021	TV-MA	
4	s5	0	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	2021-09-24	2021	TV-MA	S

In [43]:

```
#
duration_df=df.loc[df.type==1,'duration'].astype('int32')
```

In [44]:

```
duration_df=duration_df.reset_index()
```

In [45]:

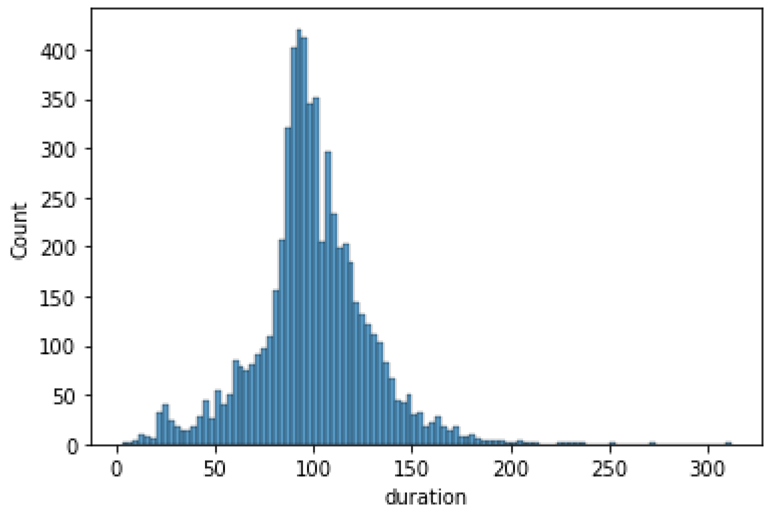
```
duration_df=duration_df.sort_values('duration')
```

In [46]:

```
sns.histplot(data = duration_df,x='duration')
```

Out[46]:

```
<AxesSubplot:xlabel='duration', ylabel='Count'>
```



In [47]:

```
duration_df.duration.min()
```

Out[47]:

```
3
```

In [48]:

```
duration_df.duration.max()
```

Out[48]:

```
312
```

In [49]:

```
director_df = df['director'].apply(lambda x: str(x).split(',')).to_list()
director_df = pd.DataFrame(director_df,index = df['title'])
director_df=director_df.stack()
director_df = pd.DataFrame(director_df)
director_df.reset_index(inplace = True)
director_df = director_df[['title',0]]
director_df.columns=['title','director']
director_df['director'] = director_df['director'].apply(lambda x : x.strip())
director_df.head()
```

Out[49]:

	title	director
0	Dick Johnson Is Dead	Kirsten Johnson
1	Blood & Water	nan
2	Ganglands	Julien Leclercq
3	Jailbirds New Orleans	nan
4	Kota Factory	nan

In [50]:

```
cast_df = df['cast'].apply(lambda x: str(x).split(',')).to_list()
cast_df = pd.DataFrame(cast_df,index = df['title'])
cast_df=cast_df.stack()
cast_df = pd.DataFrame(cast_df)
cast_df.reset_index(inplace = True)
cast_df = cast_df[['title',0]]
cast_df.columns=['title','cast']
cast_df['cast'] = cast_df['cast'].apply(lambda x : x.strip())
cast_df.head()
```

Out[50]:

	title	cast
0	Dick Johnson Is Dead	nan
1	Blood & Water	Ama Qamata
2	Blood & Water	Khosi Ngema
3	Blood & Water	Gail Mabalane
4	Blood & Water	Thabang Molaba

In [51]:

```
country_df = df['country'].apply(lambda x: str(x).split(',')).to_list()
country_df = pd.DataFrame(country_df,index = df['title'])
country_df = country_df.stack()
country_df = pd.DataFrame(country_df)
country_df.reset_index(inplace = True)
country_df = country_df[['title',0]]
country_df.columns=['title','country']
country_df['country'] = country_df['country'].apply(lambda x : x.strip())
country_df.head()
```

Out[51]:

	title	country
0	Dick Johnson Is Dead	United States
1	Blood & Water	South Africa
2	Ganglands	nan
3	Jailbirds New Orleans	nan
4	Kota Factory	India

In [52]:

```
listed_in_df = df['listed_in'].apply(lambda x: str(x).split(',')).to_list()
listed_in_df = pd.DataFrame(listed_in_df,index = df['title'])
listed_in_df = listed_in_df.stack()
listed_in_df = pd.DataFrame(listed_in_df)
listed_in_df.reset_index(inplace = True)
listed_in_df = listed_in_df[['title',0]]
listed_in_df.columns=['title','listed_in']
listed_in_df['listed_in'] = listed_in_df['listed_in'].apply(lambda x : x.strip())
listed_in_df.head()
```

Out[52]:

	title	listed_in
0	Dick Johnson Is Dead	Documentaries
1	Blood & Water	International TV Shows
2	Blood & Water	TV Dramas
3	Blood & Water	TV Mysteries
4	Ganglands	Crime TV Shows

In [53]:

```
dir_cas_df = director_df.merge(cast_df,how='inner',left_on='title',right_on='title')
dir_cas_df
```

Out[53]:

	title	director	cast
0	Dick Johnson Is Dead	Kirsten Johnson	nan
1	Blood & Water	nan	Ama Qamata
2	Blood & Water	nan	Khosi Ngema
3	Blood & Water	nan	Gail Mabalane
4	Blood & Water	nan	Thabang Molaba
...	...	...	...
70807	Zubaan	Mozez Singh	Manish Chaudhary
70808	Zubaan	Mozez Singh	Meghna Malik
70809	Zubaan	Mozez Singh	Malkeet Rauni
70810	Zubaan	Mozez Singh	Anita Shabdish
70811	Zubaan	Mozez Singh	Chittaranjan Tripathy

70812 rows × 3 columns

In [54]:

```
dir_cas_cou_df = dir_cas_df.merge(country_df,how='inner',left_on='title',right_on='title')
dir_cas_cou_df
```

Out[54]:

	title	director	cast	country
0	Dick Johnson Is Dead	Kirsten Johnson	nan	United States
1	Blood & Water	nan	Ama Qamata	South Africa
2	Blood & Water	nan	Khosi Ngema	South Africa
3	Blood & Water	nan	Gail Mabalane	South Africa
4	Blood & Water	nan	Thabang Molaba	South Africa
...	...	...	...	...
89410	Zubaan	Mozez Singh	Manish Chaudhary	India
89411	Zubaan	Mozez Singh	Meghna Malik	India
89412	Zubaan	Mozez Singh	Malkeet Rauni	India
89413	Zubaan	Mozez Singh	Anita Shabdish	India
89414	Zubaan	Mozez Singh	Chittaranjan Tripathy	India

89415 rows × 4 columns

In [55]:

```
dir_cas_cou_lis_df = dir_cas_cou_df.merge(listed_in_df,how='inner',left_on='title',right_on
dir_cas_cou_lis_df
```

Out[55]:

	title	director	cast	country	listed_in
0	Dick Johnson Is Dead	Kirsten Johnson	nan	United States	Documentaries
1	Blood & Water	nan	Ama Qamata	South Africa	International TV Shows
2	Blood & Water	nan	Ama Qamata	South Africa	TV Dramas
3	Blood & Water	nan	Ama Qamata	South Africa	TV Mysteries
4	Blood & Water	nan	Khosi Ngema	South Africa	International TV Shows
...	...	...	...	...	...
202060	Zubaan	Mozez Singh	Anita Shabdish	India	International Movies
202061	Zubaan	Mozez Singh	Anita Shabdish	India	Music & Musicals
202062	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Dramas
202063	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	International Movies
202064	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Music & Musicals

202065 rows × 5 columns

In [56]:

```
trimmed_df = df.drop(['director','cast','country','listed_in'],axis = 1)
trimmed_df
```

Out[56]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_
0	s1	1	Dick Johnson Is Dead	2021-09-25	2020	PG-13	90	As her father nears the end of his life, filmm...	
1	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	
2	s3	0	Ganglands	2021-09-24	2021	TV-MA	1 Season	To protect his family from a powerful drug lor...	
3	s4	0	Jailbirds New Orleans	2021-09-24	2021	TV-MA	1 Season	Feuds, flirtations and toilet talk go down amo...	
4	s5	0	Kota Factory	2021-09-24	2021	TV-MA	2 Seasons	In a city of coaching centers known to train I...	
...	...	...	...	...	...	...	...	...	
8802	s8803	1	Zodiac	2019-11-20	2007	R	158	A political cartoonist, a crime reporter and a...	
8803	s8804	0	Zombie Dumb	2019-07-01	2018	TV-Y7	2 Seasons	While living alone in a spooky town, a young g...	
8804	s8805	1	Zombieland	2019-11-01	2009	R	88	Looking to survive in a world taken over by zo...	
8805	s8806	1	Zoom	2020-01-11	2006	PG	88	Dragged from civilian life, a former superhero...	
8806	s8807	1	Zubaan	2019-03-02	2015	TV-14	111	A scrappy but poor boy worms his way into a ty...	

8807 rows × 9 columns

In [57]:

```
new_df = trimmed_df.merge(dir_cas_cou_lis_df,how='inner',left_on='title',right_on='title')
new_df.head()
```

Out[57]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_added
0	s1	1	Dick Johnson Is Dead	2021-09-25	2020	PG-13	90	As her father nears the end of his life, filmm...	2021
1	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
2	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
3	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
4	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021

In [58]:

```
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 202065 entries, 0 to 202064
Data columns (total 13 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       202065 non-null  object
 1   type          202065 non-null  int32
 2   title         202065 non-null  object
 3   date_added    201907 non-null  datetime64[ns]
 4   release_year  202065 non-null  int64
 5   rating        201998 non-null  object
 6   duration      202065 non-null  object
 7   description   202065 non-null  object
 8   year_added    202065 non-null  int32
 9   director      202065 non-null  object
 10  cast          202065 non-null  object
 11  country       202065 non-null  object
 12  listed_in     202065 non-null  object
dtypes: datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 20.0+ MB
```

In [59]:

```
new_df.shape
```

Out[59]:

```
(202065, 13)
```

Visual Analysis - Univariate, Bivariate after pre-processing of the data

Note: Pre-processing involves unnesting of the data in columns like Actor, Director, Country

4.1 For continuous variable(s): Distplot, countplot, histogram for univariate analysis (10 Points)

4.2 For categorical variable(s): Boxplot (10 Points)

4.3 For correlation: Heatmaps, Pairplots (10 Points)

In [60]:

```
new_df.info()
```

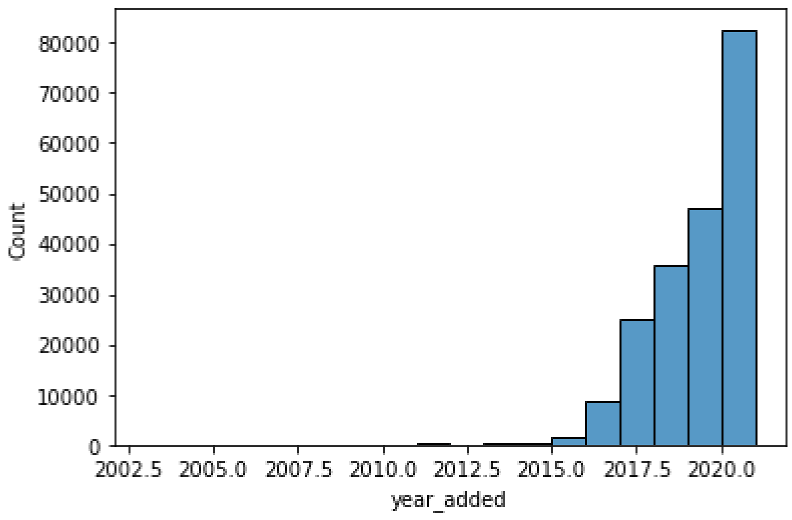
```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 202065 entries, 0 to 202064
Data columns (total 13 columns):
 #   Column        Non-Null Count   Dtype         
---  ------        --------------   -----         
 0   show_id       202065 non-null  object        
 1   type          202065 non-null  int32         
 2   title         202065 non-null  object        
 3   date_added    201907 non-null  datetime64[ns]
 4   release_year  202065 non-null  int64         
 5   rating        201998 non-null  object        
 6   duration      202065 non-null  object        
 7   description   202065 non-null  object        
 8   year_added    202065 non-null  int32         
 9   director      202065 non-null  object        
 10  cast          202065 non-null  object        
 11  country       202065 non-null  object        
 12  listed_in     202065 non-null  object        
dtypes: datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 20.0+ MB
```

In [61]:

```
sns.histplot(new_df.year_added,bins =18)
```

Out[61]:

```
<AxesSubplot:xlabel='year_added', ylabel='Count'>
```



In [62]:

```
actor_df = new_df.groupby('cast')['title'].nunique()
```

In [63]:

```
actor_df=actor_df.sort_values(ascending=False).reset_index()
```

In [64]:

```
actor_df.dropna(how='any',inplace=True)
```

In [65]:

```
actor_df
```

Out[65]:

	cast	title
0	nan	825
1	Anupam Kher	43
2	Shah Rukh Khan	35
3	Julie Tejwani	33
4	Naseeruddin Shah	32
...	...	...
36435	Jamie Kenna	1
36436	Jamie Kaler	1
36437	Jamie Johnston	1
36438	Jamie Jacqueline Burns	1
36439	Ṣọpẹ́ Dìrísù	1

36440 rows × 2 columns

In [66]:

```
actor_df=actor_df.drop(index=0)
```

In [67]:

```
# actor_df.loc[actor_df.title < 20,'cast'] = 'others'
```

In [68]:

```
actor_df.head()
```

Out[68]:

	cast	title
1	Anupam Kher	43
2	Shah Rukh Khan	35
3	Julie Tejwani	33
4	Naseeruddin Shah	32
5	Takahiro Sakurai	32

We can say that 'Anupam Kher' is famous actor and people likes to watch his movies/tv shows

In [131]:

```
movie_df = new_df[new_df.type == 1]
```

In [137]:

```
movie_cast_count_df=movie_df.groupby('title')['cast'].nunique().sort_values(ascending = Fal
```

In [139]:

```
movie_cast_count_df.head()
```

Out[139]:

	title	cast
0	Arthur Christmas	44
1	Michael Bolton's Big, Sexy Valentine's Day Spe...	41
2	The Princess and the Frog	39
3	Movie 43	39
4	John Carter	38

In [145]:

```
movie_cast_count_df[movie_cast_count_df.cast > 2]
```

Out[145]:

	title	cast
0	Arthur Christmas	44
1	Michael Bolton's Big, Sexy Valentine's Day Spe...	41
2	The Princess and the Frog	39
3	Movie 43	39
4	John Carter	38
...	...	...
4895	Krish Trish and Baltiboy	3
4896	Benji's Very Own Christmas Story	3
4897	Krish Trish and Baltiboy: Best Friends Forever	3
4898	Krish Trish and Baltiboy: Comics of India	3
4899	Chopsticks	3

4900 rows × 2 columns

In [170]:

```
director_df.groupby('director')['title'].nunique().sort_values()
```

Out[170]:

```
director
Jesse Adang          1
Lisa Arnold          1
Lisa Cortés          1
Liu Bang-yao         1
Liu Jiang            1
                  ...
Suhas Kadav         16
Raúl Campos         19
Jan Suter           21
Rajiv Chilaka       22
nan               2634
Name: title, Length: 4994, dtype: int64
```

In [166]:

```
director_title_df
```

Out[166]:

	title
director	
A. L. Vijay	2
A. Raajdheep	1
A. Salaam	1
A.R. Murugadoss	2
Aadish Keluskar	1
...	...
Éric Warin	1
Ísold Uggadóttir	1
Óskar Thór Axelsson	1
Ömer Faruk Sorak	3
Şenol Sönmez	2

4994 rows × 1 columns

In [164]:

```
```

Out[164]:

```
4978    2634
3749      22
1906      21
3800      19
4457      16
        ...
635        1
2295       1
2296       1
2297       1
2957       1
Name: title, Length: 4994, dtype: int64
```

In [69]:

```
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 202065 entries, 0 to 202064
Data columns (total 13 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       202065 non-null  object
 1   type          202065 non-null  int32
 2   title         202065 non-null  object
 3   date_added    201907 non-null  datetime64[ns]
 4   release_year  202065 non-null  int64
 5   rating        201998 non-null  object
 6   duration      202065 non-null  object
 7   description   202065 non-null  object
 8   year_added    202065 non-null  int32
 9   director      202065 non-null  object
 10  cast          202065 non-null  object
 11  country       202065 non-null  object
 12  listed_in     202065 non-null  object
dtypes: datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 20.0+ MB
```

In [70]:

```
new_df.groupby('title')['cast'].nunique().sort_values(ascending=False)
```

Out[70]:

```
title
Social Distance                  50
Black Mirror                     50
Creeped Out                      47
COMEDIANS of the world           47
Heartbreak High                  47
                                 ..
Little Singham in London          1
Little Singham: Kaal Ki Tabaahi   1
The Minimighty Kids               1
The Minimalists: Less Is Now      1
Iliza Shlesinger: War Paint       1
Name: cast, Length: 8807, dtype: int64
```

Social Distance and Black Mirror has more number of actors compared to all other tv shows/movies

In [71]:

```
new_df.listed_in.value_counts()
```

Out[71]:

```
Dramas                          29806
International Movies            28243
Comedies                        20829
International TV Shows          12845
Action & Adventure              12216
Independent Movies               9834
Children & Family Movies         9771
TV Dramas                        8942
Thrillers                        7107
Romantic Movies                  6412
TV Comedies                      4963
Crime TV Shows                   4733
Horror Movies                    4571
Kids' TV                         4568
Sci-Fi & Fantasy                 4037
Music & Musicals                 3077
Romantic TV Shows                3049
Documentaries                    2409
Anime Series                     2313
TV Action & Adventure            2288
Spanish-Language TV Shows        2126
British TV Shows                 1808
Sports Movies                    1531
Classic Movies                   1443
TV Mysteries                     1281
Korean TV Shows                  1122
Cult Movies                      1077
TV Sci-Fi & Fantasy              1045
Anime Features                   1045
TV Horror                         941
Docuseries                        845
LGBTQ Movies                      838
TV Thrillers                      768
Teen TV Shows                     742
Reality TV                        735
Faith & Spirituality              719
Stand-Up Comedy                   540
Movies                            412
TV Shows                          337
Classic & Cult TV                 272
Stand-Up Comedy & Talk Shows      268
Science & Nature TV               157
Name: listed_in, dtype: int64
```

In [72]:

```
pd.DataFrame(new_df.groupby('title')['listed_in'].value_counts()).head(20)
```

Out[72]:

		listed_in
title	**listed_in**	
#Alive	**Horror Movies**	2
	International Movies	2
	Thrillers	2
#AnneFrank - Parallel Stories	**Documentaries**	4
	International Movies	4
#FriendButMarried	**Dramas**	8
	International Movies	8
	Romantic Movies	8
#FriendButMarried 2	**Dramas**	8
	International Movies	8
	Romantic Movies	8
#Roxy	**Comedies**	8
	Romantic Movies	8
#Rucker50	**Documentaries**	1
	Sports Movies	1
#Selfie	**Comedies**	8
	Dramas	8
	International Movies	8
#Selfie 69	**Comedies**	10
	Dramas	10

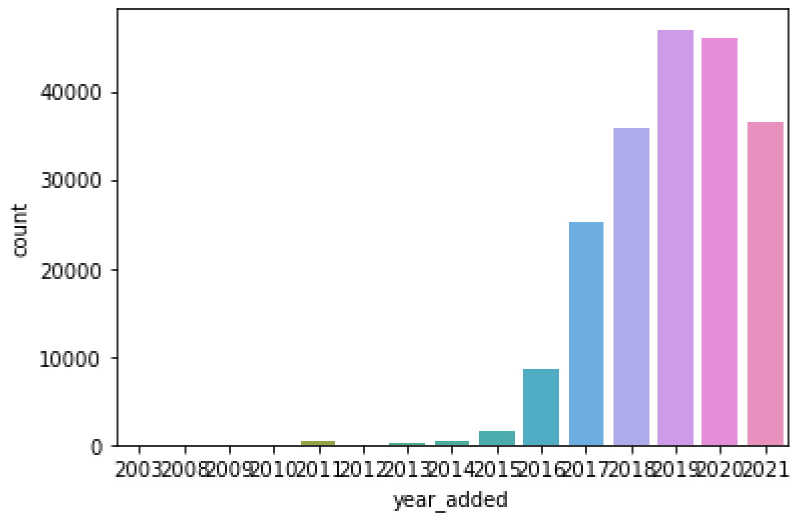
In [73]:

```
sns.countplot(new_df.year_added)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\_decorators.py:36: Future
Warning: Pass the following variable as a keyword arg: x. From version 0.12,
the only valid positional argument will be `data`, and passing other argumen
ts without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[73]:

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



In [74]:

```
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 202065 entries, 0 to 202064
Data columns (total 13 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       202065 non-null  object
 1   type          202065 non-null  int32
 2   title         202065 non-null  object
 3   date_added    201907 non-null  datetime64[ns]
 4   release_year  202065 non-null  int64
 5   rating        201998 non-null  object
 6   duration      202065 non-null  object
 7   description   202065 non-null  object
 8   year_added    202065 non-null  int32
 9   director      202065 non-null  object
 10  cast          202065 non-null  object
 11  country       202065 non-null  object
 12  listed_in     202065 non-null  object
dtypes: datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 20.0+ MB
```

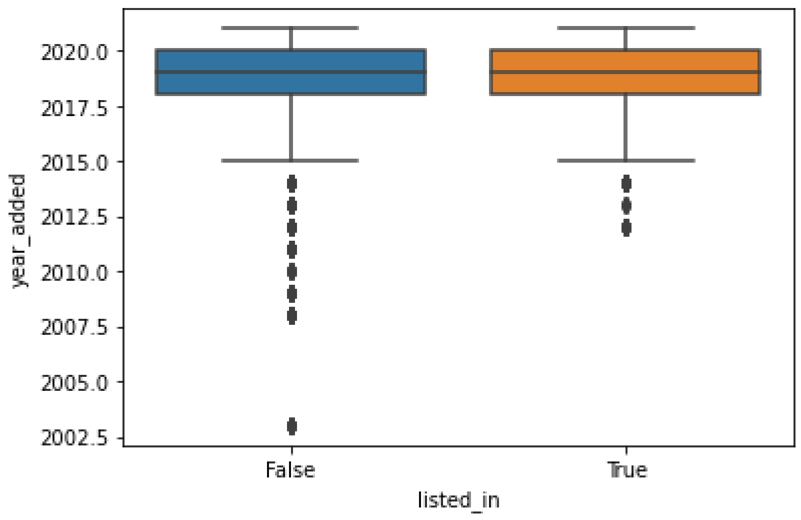
In [75]:

```
sns.boxplot(new_df.listed_in=='Comedies',new_df.year_added)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\_decorators.py:36: Future
Warning: Pass the following variables as keyword args: x, y. From version 0.
12, the only valid positional argument will be `data`, and passing other arg
uments without an explicit keyword will result in an error or misinterpretat
ion.
  warnings.warn(
```

Out[75]:

```
<AxesSubplot:xlabel='listed_in', ylabel='year_added'>
```



In [76]:

```
comedy = new_df[new_df.listed_in == 'Comedies']
```

In [77]:

```
comedy
```

Out[77]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_added	directo
331	s10	1	The Starling	2021-09-24	2021	PG-13	104	A woman adjusting to life after a loss contend...	2021	Theodor Mel
333	s10	1	The Starling	2021-09-24	2021	PG-13	104	A woman adjusting to life after a loss contend...	2021	Theodor Mel
335	s10	1	The Starling	2021-09-24	2021	PG-13	104	A woman adjusting to life after a loss contend...	2021	Theodor Mel

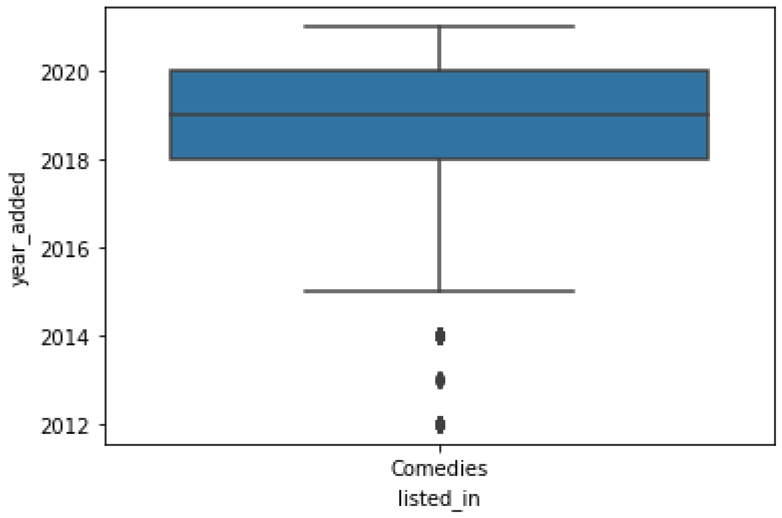
In [78]:

```
sns.boxplot(comedy.listed_in,new_df.year_added)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\_decorators.py:36: Future
Warning: Pass the following variables as keyword args: x, y. From version 0.
12, the only valid positional argument will be `data`, and passing other arg
uments without an explicit keyword will result in an error or misinterpretat
ion.
  warnings.warn(
```

Out[78]:

```
<AxesSubplot:xlabel='listed_in', ylabel='year_added'>
```



In [79]:

```
comedy.groupby('title')['country'].nunique().sort_values(ascending=False)
```

Out[79]:

```
title
Arctic Dogs                                7
The Death of Stalin                        5
Houston, We Have a Problem!                5
A Shaun the Sheep Movie: Farmageddon       5
The Lobster                                5
                                          ..
House Party                                1
House Arrest                               1
Hotel Transylvania 3: Summer Vacation      1
Hot Rod                                    1
1                                   الف مبروك
Name: country, Length: 1674, dtype: int64
```

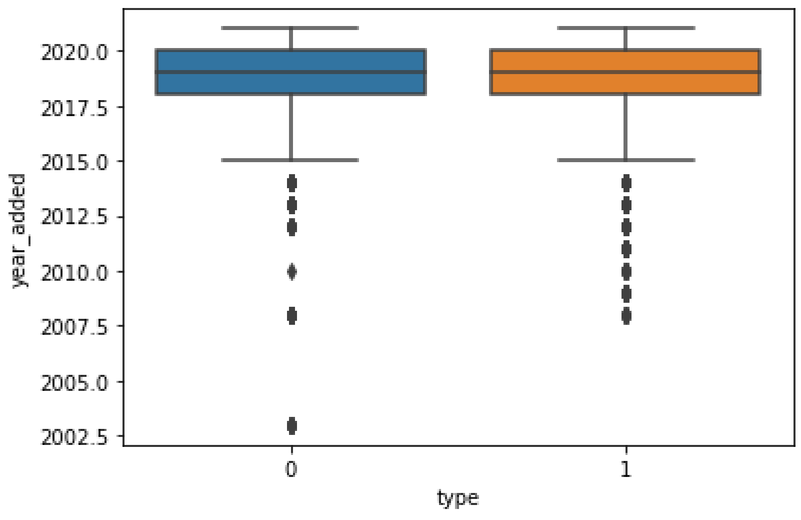
In [80]:

```
sns.boxplot(new_df.type,new_df.year_added)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\_decorators.py:36: Future
Warning: Pass the following variables as keyword args: x, y. From version 0.
12, the only valid positional argument will be `data`, and passing other arg
uments without an explicit keyword will result in an error or misinterpretat
ion.
  warnings.warn(
```

Out[80]:

```
<AxesSubplot:xlabel='type', ylabel='year_added'>
```

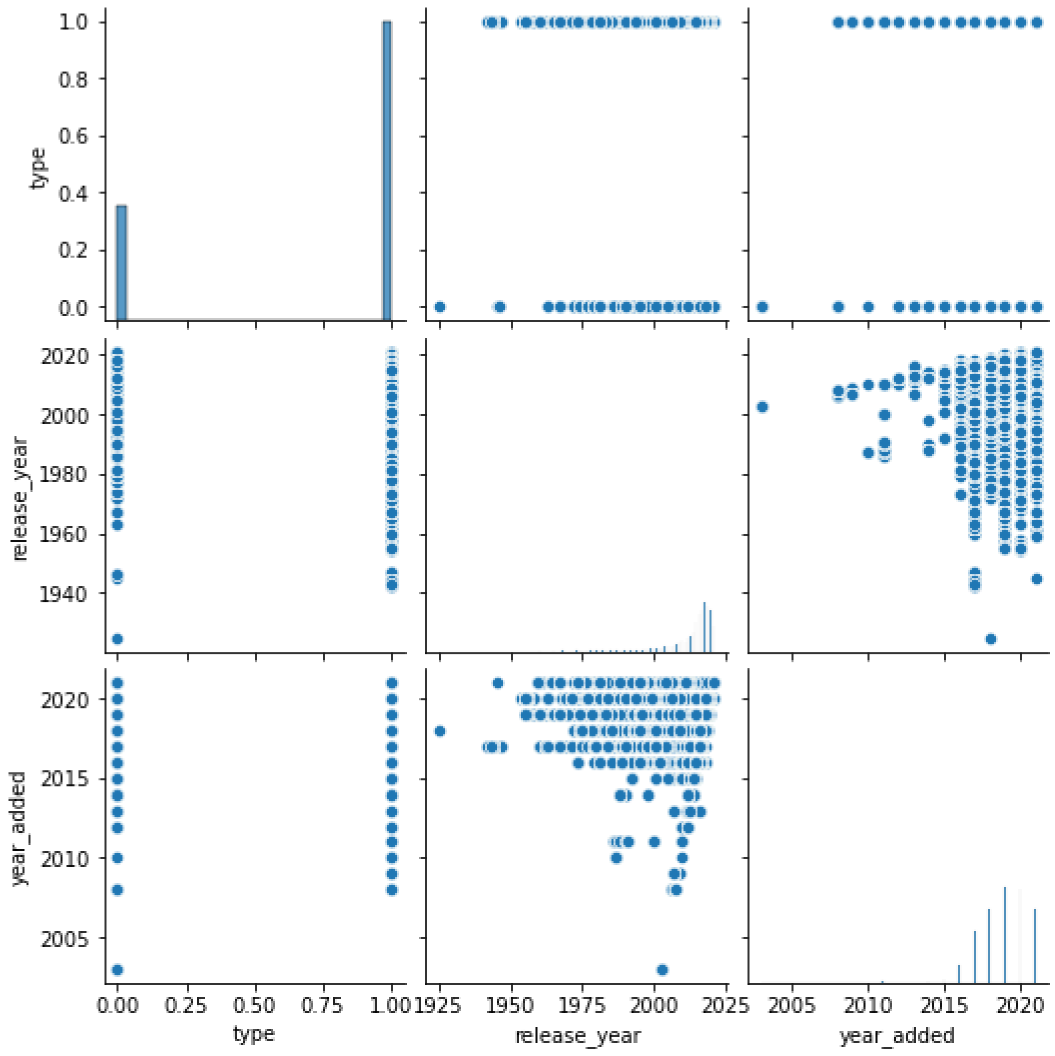


In [81]:

```
sns.pairplot(new_df)
```

Out[81]:

```
<seaborn.axisgrid.PairGrid at 0x1e78ac709a0>
```



In [123]:

```
country_df.country.value_counts()
```

Out[123]:

```
United States     3690
India             1046
nan                831
United Kingdom     806
Canada             445
                  ... 
Ecuador              1
Armenia              1
Mongolia             1
Bahamas              1
Montenegro           1
Name: country, Length: 124, dtype: int64
```

In [125]:

```
listed_in_df.listed_in.value_counts()
```

Out[125]:

```
International Movies            2752
Dramas                          2427
Comedies                        1674
International TV Shows          1351
Documentaries                    869
Action & Adventure               859
TV Dramas                        763
Independent Movies               756
Children & Family Movies         641
Romantic Movies                  616
TV Comedies                      581
Thrillers                        577
Crime TV Shows                   470
Kids' TV                         451
Docuseries                       395
Music & Musicals                 375
Romantic TV Shows                370
Horror Movies                    357
Stand-Up Comedy                  343
Reality TV                       255
British TV Shows                 253
Sci-Fi & Fantasy                 243
Sports Movies                    219
Anime Series                     176
Spanish-Language TV Shows        174
TV Action & Adventure            168
Korean TV Shows                  151
Classic Movies                   116
LGBTQ Movies                     102
TV Mysteries                      98
Science & Nature TV               92
TV Sci-Fi & Fantasy               84
TV Horror                         75
Anime Features                    71
Cult Movies                       71
Teen TV Shows                     69
Faith & Spirituality              65
TV Thrillers                      57
Movies                            57
Stand-Up Comedy & Talk Shows      56
Classic & Cult TV                 28
TV Shows                          16
Name: listed_in, dtype: int64
```

In [82]:

```
new_df.head()
```

Out[82]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_added
0	s1	1	Dick Johnson Is Dead	2021-09-25	2020	PG-13	90	As her father nears the end of his life, filmm...	2021
1	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
2	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
3	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
4	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021

In [83]:

```
new_df.loc[new_df.date_added.isna()]
```

Out[83]:

	show_id	type	title	date_added	release_year	rating	duration	description	yea
136940	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	
136941	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	
136942	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	
136943	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	
136944	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	
...	...	...	...	...	...	...	...	...	
186965	s8183	0	The Adventures of Figaro Pho	NaT	2015	TV-Y7	2 Seasons	Imagine your worst fears, then multiply them: ...	
186966	s8183	0	The Adventures of Figaro Pho	NaT	2015	TV-Y7	2 Seasons	Imagine your worst fears, then multiply them: ...	
186967	s8183	0	The Adventures of Figaro Pho	NaT	2015	TV-Y7	2 Seasons	Imagine your worst fears, then multiply them: ...	
186968	s8183	0	The Adventures of Figaro Pho	NaT	2015	TV-Y7	2 Seasons	Imagine your worst fears, then multiply them: ...	
186969	s8183	0	The Adventures of Figaro Pho	NaT	2015	TV-Y7	2 Seasons	Imagine your worst fears, then multiply them: ...	

158 rows × 13 columns

In [84]:

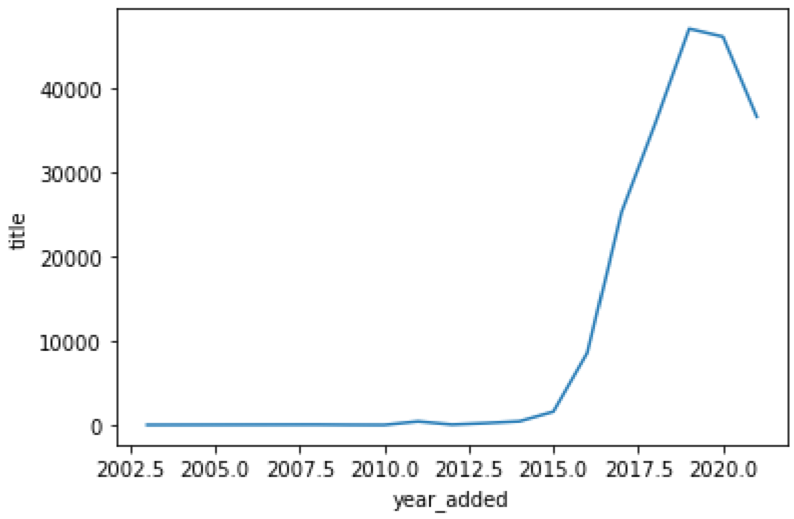
```
moviesreleased_df = new_df.groupby('year_added')['title'].count().reset_index()
```

In [85]:

```
sns.lineplot(x=moviesreleased_df.year_added,y=moviesreleased_df.title)
```

Out[85]:

```
<AxesSubplot:xlabel='year_added', ylabel='title'>
```



In [ ]:

In [ ]:

In [ ]:

In [86]:

```
new_df.head()
```

Out[86]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_added
0	s1	1	Dick Johnson Is Dead	2021-09-25	2020	PG-13	90	As her father nears the end of his life, filmm...	2021
1	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
2	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
3	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021
4	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	2021

In [87]:

```
new_df['month'] = pd.to_datetime(new_df['date_added']).dt.month.astype('Int32')
```

In [88]:

```
new_df
```

Out[88]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_a
0	s1	1	Dick Johnson Is Dead	2021-09-25	2020	PG-13	90	As her father nears the end of his life, filmm...	
1	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	
2	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	
3	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	
4	s2	0	Blood & Water	2021-09-24	2021	TV-MA	2 Seasons	After crossing paths at a party, a Cape Town t...	
...	...	...	...	...	...	...	...	...	
202060	s8807	1	Zubaan	2019-03-02	2015	TV-14	111	A scrappy but poor boy worms his way into a ty...	
202061	s8807	1	Zubaan	2019-03-02	2015	TV-14	111	A scrappy but poor boy worms his way into a ty...	
202062	s8807	1	Zubaan	2019-03-02	2015	TV-14	111	A scrappy but poor boy worms his way into a ty...	
202063	s8807	1	Zubaan	2019-03-02	2015	TV-14	111	A scrappy but poor boy worms his way into a ty...	
202064	s8807	1	Zubaan	2019-03-02	2015	TV-14	111	A scrappy but poor boy worms his way into a ty...	

202065 rows × 14 columns

In [89]:

```
new_df.loc[new_df.title == 'A Young Doctor\'s Notebook and Other Stories']
```

Out[89]:

	show_id	type	title	date_added	release_year	rating	duration	description	year_added	directo
136940	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	2013	na
136941	s6067	0	A Young Doctor's Notebook and Other Stories	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic ...	2013	na
136942	s6067	0	A Young Doctor's Notebook and	NaT	2013	TV-MA	2 Seasons	Set during the Russian Revolution, this comic	2013	na

In [90]:

```
new_df.month=new_df.month.fillna(0)
```

In [91]:

```
new_df.month.isna().sum()
```

Out[91]:

```
0
```

In [92]:

```
df['date_added'] = pd.to_datetime(df['date_added'])
```

In [93]:

```
df['month'] = pd.to_datetime(df['date_added']).dt.month
```

In [94]:

```
month_release=df.groupby('month')['year_added'].count().reset_index()
```

In [95]:

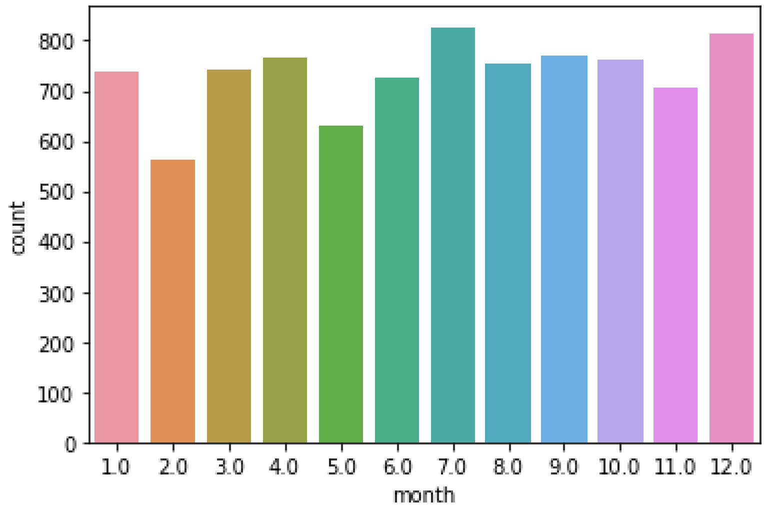
```
month_release.columns=['month','count']
```

In [96]:

```
sns.barplot(x="month", y="count", data=month_release)
```

Out[96]:

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

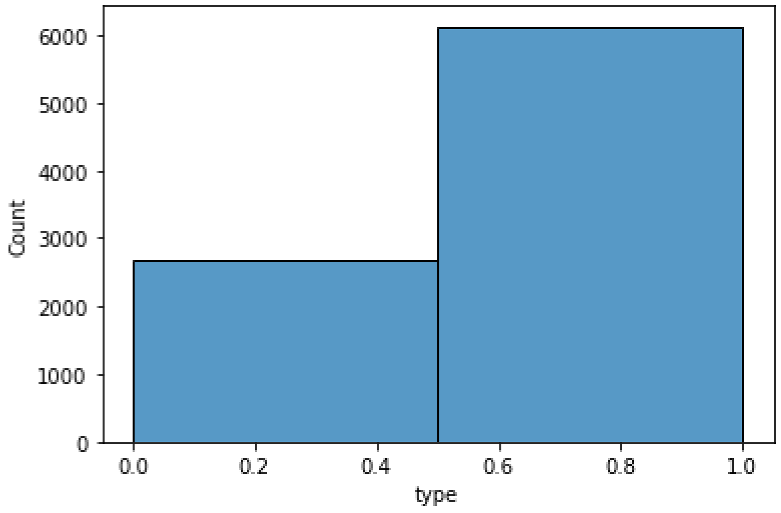


In [97]:

```
sns.histplot(df.type,bins=2)
```

Out[97]:

```
<AxesSubplot:xlabel='type', ylabel='Count'>
```



In [98]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 14 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   show_id       8807 non-null   object
 1   type          8807 non-null   int32
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   datetime64[ns]
 7   release_year  8807 non-null   int64
 8   rating        8803 non-null   object
 9   duration      8807 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
 12  year_added    8807 non-null   int32
 13  month         8797 non-null   float64
dtypes: datetime64[ns](1), float64(1), int32(2), int64(1), object(9)
memory usage: 894.6+ KB
```

In [99]:

```
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 202065 entries, 0 to 202064
Data columns (total 14 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       202065 non-null  object
 1   type          202065 non-null  int32
 2   title         202065 non-null  object
 3   date_added    201907 non-null  datetime64[ns]
 4   release_year  202065 non-null  int64
 5   rating        201998 non-null  object
 6   duration      202065 non-null  object
 7   description   202065 non-null  object
 8   year_added    202065 non-null  int32
 9   director      202065 non-null  object
 10  cast          202065 non-null  object
 11  country       202065 non-null  object
 12  listed_in     202065 non-null  object
 13  month         202065 non-null  Int32
dtypes: Int32(1), datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 29.1+ MB
```

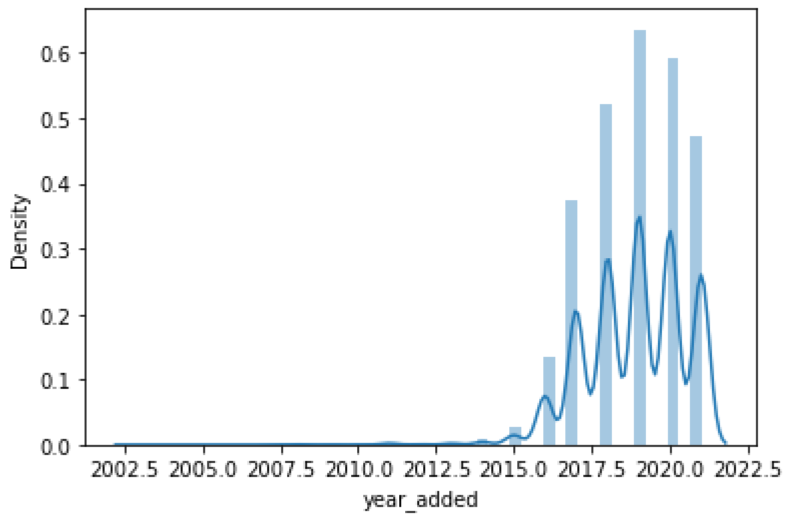
In [100]:

```
sns.distplot(df.year_added)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2619: Fu
tureWarning: `distplot` is a deprecated function and will be removed in a fu
ture version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

Out[100]:

```
<AxesSubplot:xlabel='year_added', ylabel='Density'>
```



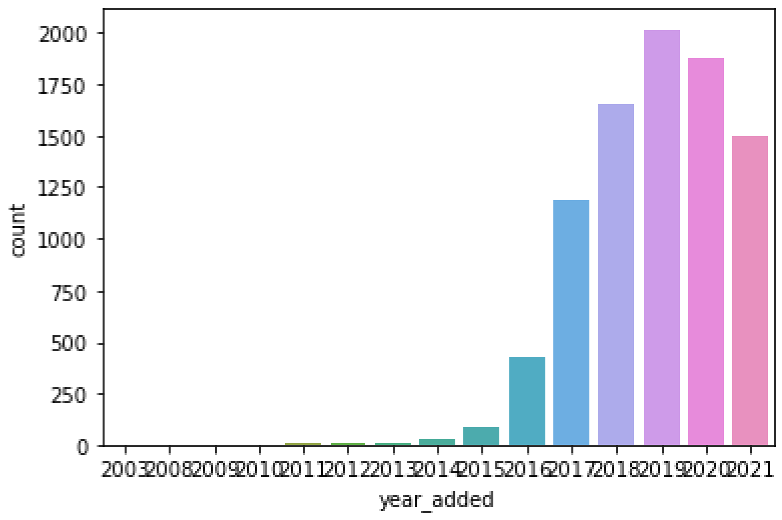
In [101]:

```
sns.countplot(df.year_added)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\_decorators.py:36: Future
Warning: Pass the following variable as a keyword arg: x. From version 0.12,
the only valid positional argument will be `data`, and passing other argumen
ts without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[101]:

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

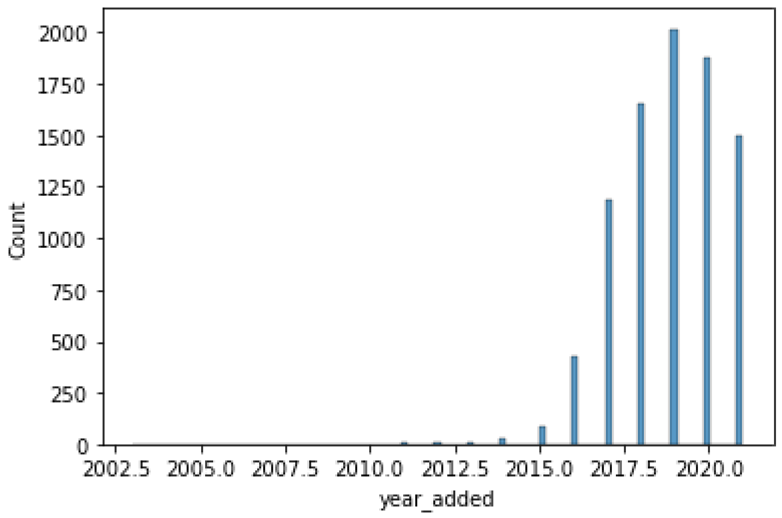


In [102]:

```
sns.histplot(df.year_added)
```

Out[102]:

```
<AxesSubplot:xlabel='year_added', ylabel='Count'>
```



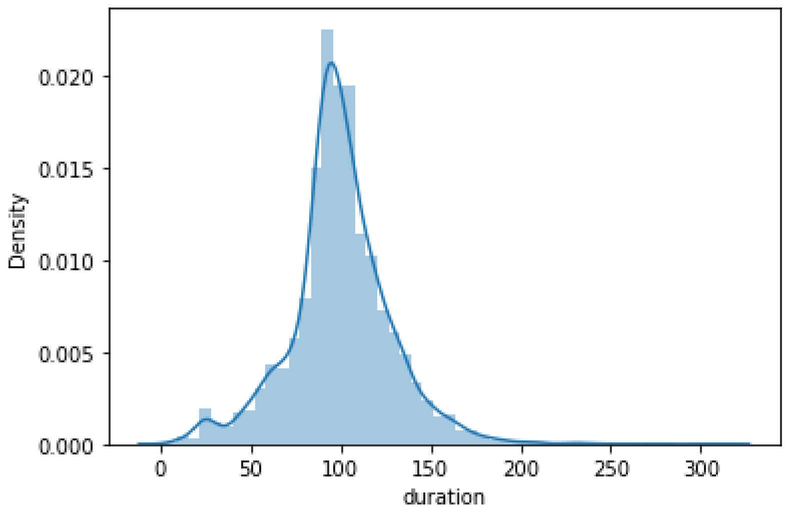
In [103]:

```
sns.distplot(duration_df.duration)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2619: Fu
tureWarning: `distplot` is a deprecated function and will be removed in a fu
ture version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

Out[103]:

```
<AxesSubplot:xlabel='duration', ylabel='Density'>
```

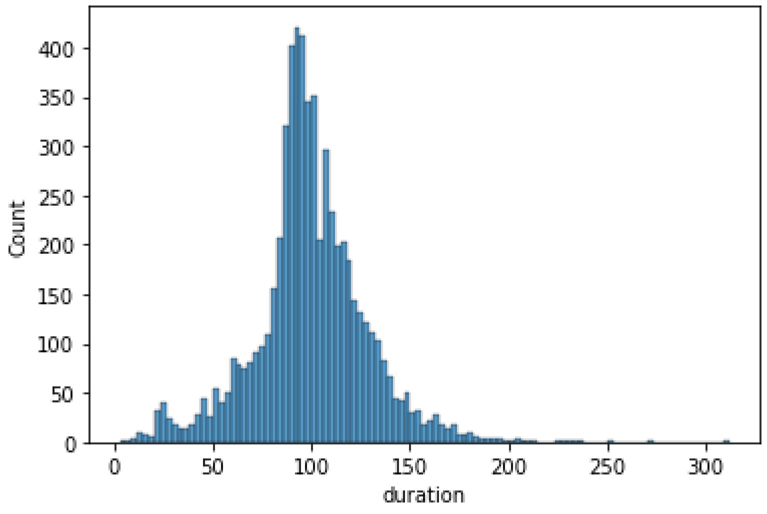


In [104]:

```
sns.histplot(duration_df.duration)
```

Out[104]:

```
<AxesSubplot:xlabel='duration', ylabel='Count'>
```

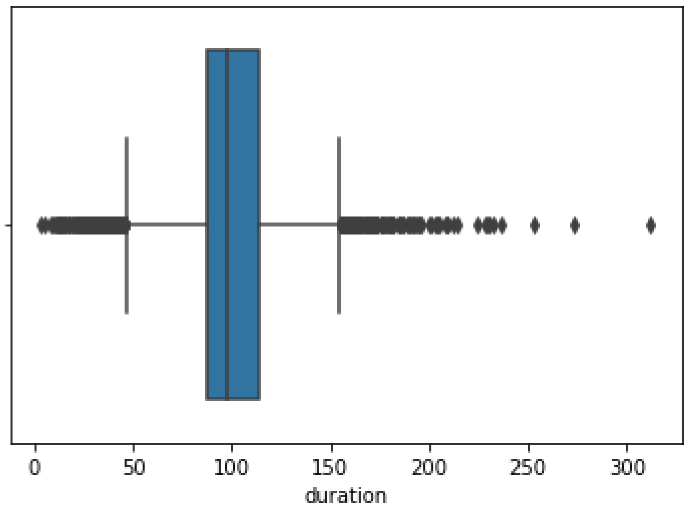


In [120]:

```
sns.boxplot(x=duration_df['duration'])
```

Out[120]:

```
<AxesSubplot:xlabel='duration'>
```



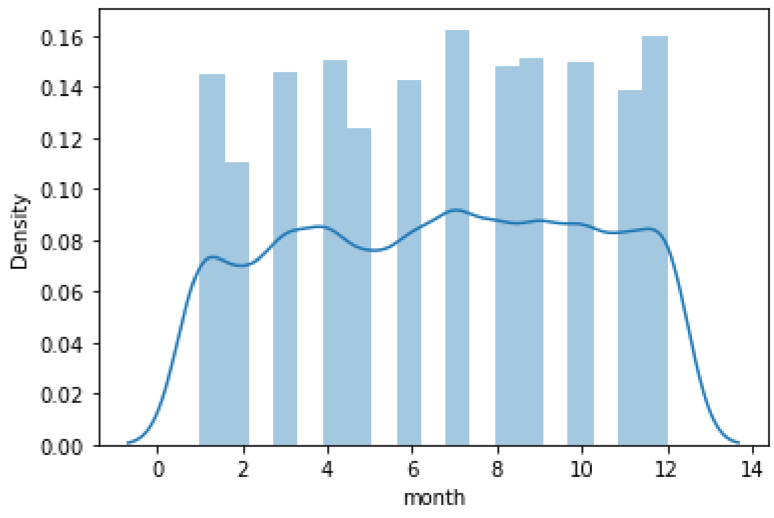
In [105]:

```
sns.distplot(df.month)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2619: Fu
tureWarning: `distplot` is a deprecated function and will be removed in a fu
ture version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

Out[105]:

```
<AxesSubplot:xlabel='month', ylabel='Density'>
```



In [ ]:

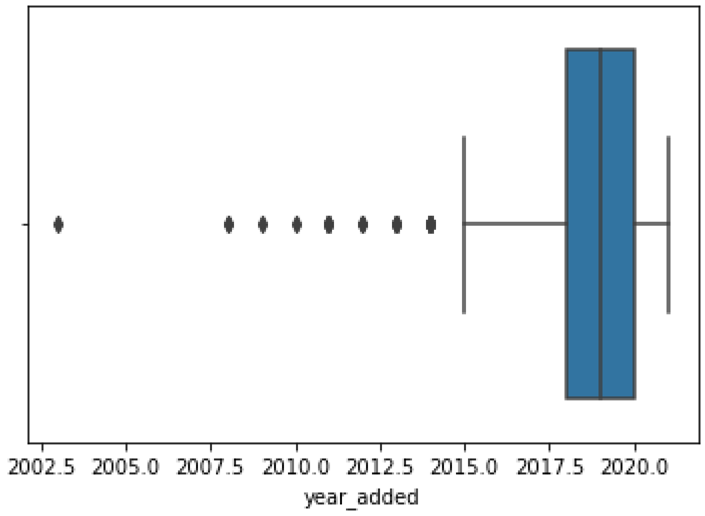
```

```

In [106]:

```
sns.boxplot(x=df["year_added"])
```

Out[106]:

```
<AxesSubplot:xlabel='year_added'>
```

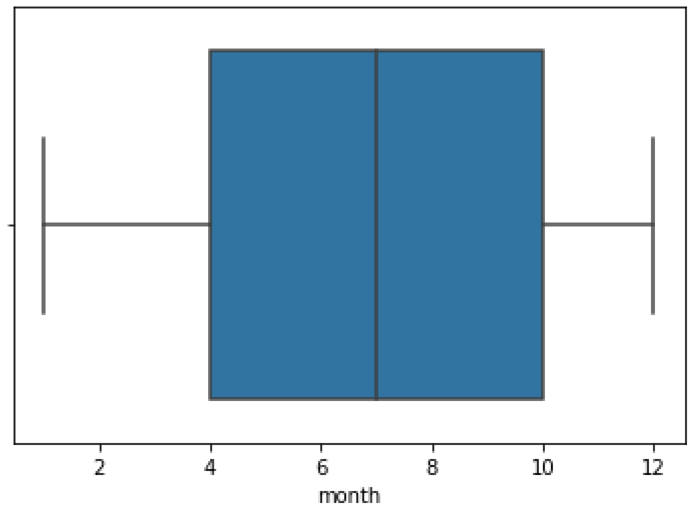


In [107]:

```
sns.boxplot(x=df["month"])
```

Out[107]:

```
<AxesSubplot:xlabel='month'>
```

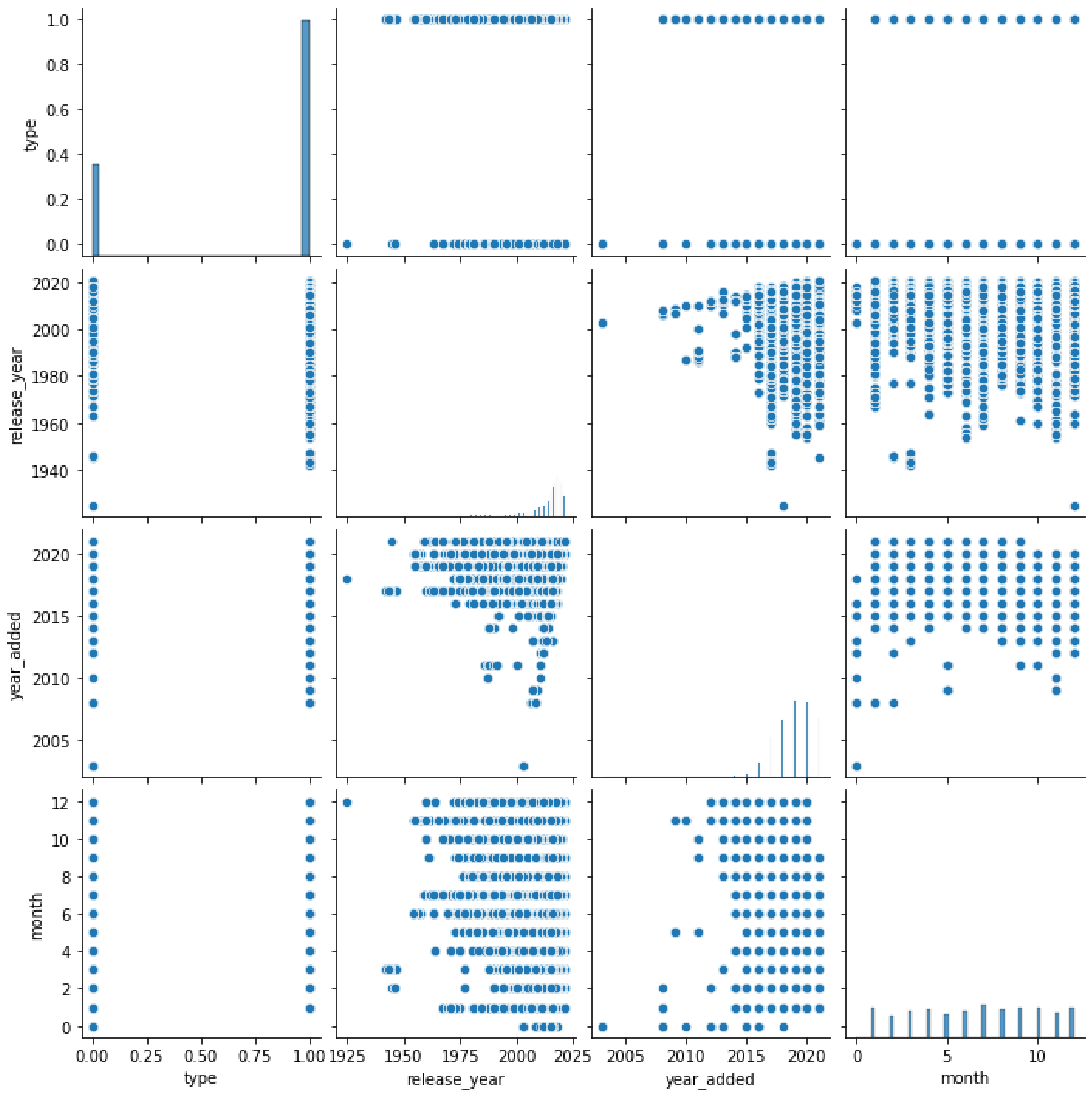


In [108]:

```
sns.pairplot(new_df)
```

Out[108]:

```
<seaborn.axisgrid.PairGrid at 0x1e791ba3910>
```



In [ ]:

In [109]:

```
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 202065 entries, 0 to 202064
Data columns (total 14 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       202065 non-null  object
 1   type          202065 non-null  int32
 2   title         202065 non-null  object
 3   date_added    201907 non-null  datetime64[ns]
 4   release_year  202065 non-null  int64
 5   rating        201998 non-null  object
 6   duration      202065 non-null  object
 7   description   202065 non-null  object
 8   year_added    202065 non-null  int32
 9   director      202065 non-null  object
 10  cast          202065 non-null  object
 11  country       202065 non-null  object
 12  listed_in     202065 non-null  object
 13  month         202065 non-null  Int32
dtypes: Int32(1), datetime64[ns](1), int32(2), int64(1), object(9)
memory usage: 29.1+ MB
```

In [110]:

```
heat_df = new_df[['type','release_year','year_added']]
```

Missing Value & Outlier check (Treatment optional) (10 Points)

In [111]:

```
df.release_year.value_counts().reset_index().sort_values('index').head()
```

Out[111]:

	index	release_year
70	1925	1
67	1942	2
58	1943	3
54	1944	3
53	1945	4

we can see that after 1925 there are no movies/tv shows released till 1942, so we can consider that 1925 as an outlier and take possible actions

In [112]:

```
outlier_year = df.year_added.value_counts().reset_index()
```

In [113]:

```
outlier_year.head()
```

Out[113]:

	index	year_added
0	2019	2016
1	2020	1879
2	2018	1650
3	2021	1498
4	2017	1188

In [114]:

```
outlier_year.sort_values('index')
```

Out[114]:

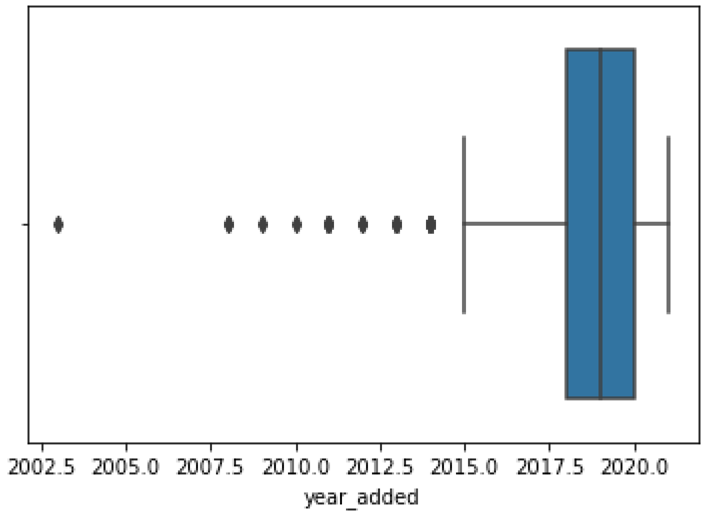
	index	year_added
13	2003	2
11	2008	3
12	2009	2
14	2010	2
8	2011	13
10	2012	4
9	2013	12
7	2014	24
6	2015	84
5	2016	430
4	2017	1188
2	2018	1650
0	2019	2016
1	2020	1879
3	2021	1498

In [119]:

```
sns.boxplot(x=df["year_added"])
```

Out[119]:

```
<AxesSubplot:xlabel='year_added'>
```



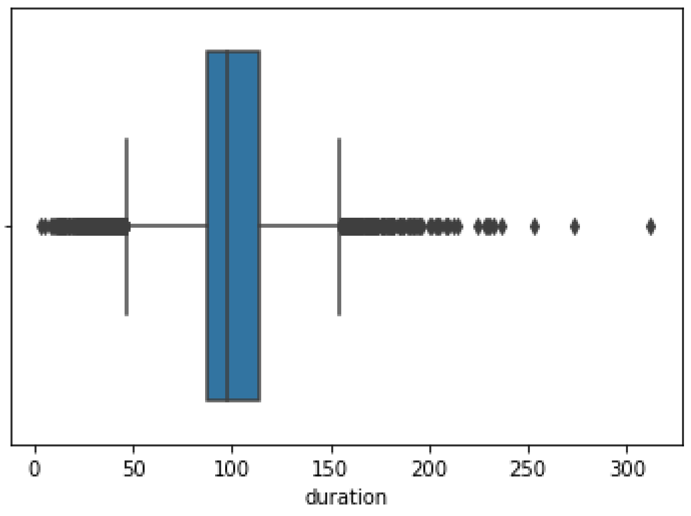
From above we can say that no content was upoloaded to Netflix during 2004-2007, so we can consider 2003 as an outlier and in above plot we can see outliers till 2015

In [121]:

```
sns.boxplot(x=duration_df['duration'])
```

Out[121]:

```
<AxesSubplot:xlabel='duration'>
```



we can see there are many outliers in the duration of the movies

6. Insights based on Non-Graphical and Visual Analysis (10 Points)

6.1 Comments on the range of attributes

6.2 Comments on the distribution of the variables and relationship between them

6.3 Comments for each univariate and bivariate plot

```
-->Data present in the dataset are ranging from 2003 to 2021.
-->Netflix consists of more movies than TV Shows.
-->Most of them are produces in United States,India and United Kingdom.
-->It is more likely to released in netflix after an year or two of the actual release
date of the Movie/TV Show.
-->Netflix Mostly contains content related to International
Movies,Dramas,Comedies,International TV Shows.
-->Netflix consists of movies/TV Shows from 1942 and a movie from 1925.
-->There are 4900 movies with multi-starrer out of 6131 movies.
--> Anupam Kher was the most successful actor.
-->Rajiv Chilaka is the most successful director with 22 movies/TV Shows.
-->Movie/ TV Show releases are evenly distributed all over the months and people likes to
watch them in July mostly.
-->There are more number of movies than the TV Shows in Netflix
-->Most number of movies were added in the year of 2018-2019
-->The mean duration of watchtime is 98 mins for movies.
```

7. Business Insights (10 Points) - Should include patterns observed in the data along with what you can infer from it

```
--> The count of movies released in netflix are gradually decreasing from the year 2019
--> Users are more intrested in movies rather than TV Shows
--> Users prefer Multi-starrer rather than cast in it.
--> Users intrested in the content from United States, India and United Kingdom.
--> The most currated type of content are Dramas and Comedy.
```

8. Recommendations (10 Points) - Actionable items for business. No technical jargon. No complications. Simple action items that everyone can understand

```
--> We can collaborate with some of the top actors and directors like Anupam Kher,Shah Rukh Khan.Julie Tejwani,
    Naseeruddin Shah, Suhas Kadav,Raúl Campos,Jan Suter,Rajiv Chilaka and upload content from them as people were
    intrested in them.
--> we can also try to make some multi starrer movies with them in comedy or drama actions.
--> The duration of the movie should be around 98 mins.
--> Users are more intrested in the content from United States, India, and United Kingdom.
```