

How has socioeconomic deprivation, as measured by the Index of Multiple Deprivation, influenced drug-related crimes in London over recent years?

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1. Research Question

London ranks highest in drug-related crimes among UK regions, with 360 drug misuse deaths in 2023 compared to 203 in 2013 (Office for National Statistics, 2024). This paper explores the relationship between socioeconomic deprivation measured by the Index of Multiple Deprivation (IMD) and high drug-related offences in London. The research question is: How has socioeconomic deprivation, as measured by the IMD, influenced drug-related crimes in London over recent years?

By analyzing drug offence data from the Metropolitan Police Service at the borough and Lower-layer Super Output Area (LSOA) levels, this study aims to identify areas with the highest growth in drug offences and which deprivation factors may be targeted for improvement. The research tests two hypotheses:

1.1. Comparing drug offences from 2011 to 2019:

We hypothesize that drug offences will increase across all boroughs.

1.2. Deprivation in relation to the biggest drug offences:

We hypothesize that deprivation factors (e.g., health, income, and crime) in Newham will show a positive correlation with the increase in drug offences in 2019, meaning IMD are responsible for the increase in drug-offences.

This research examines government data for London; these offences in London boroughs are reported as total cases rather than rates per head of population (Allen and Tunnicliffe, 2021).

2. Literature Review

Research on the relationship between socioeconomic deprivation (IMD) and only drug offences in specific London boroughs were surprisingly limited however, broader studies have been explored looking at multiple crime patterns in relation to socioeconomic inequalities. It was difficult to find information for solely the Newham borough as well as research for drug usage and offences. Especially when having to look for previous research which explicitly examines how IMD factors intersect with drug-offence crime in each London borough. Highlighting a gap which needs further investigating to better understand the causes for these offenses.

However with the current broader existing literature available, it suggests that socioeconomic deprivation can play a role with drug offences. According to Allen and Tunnicliffe (2021), total numbers of drug offences in London increased by 16%, from 47,806 in 2019/20 to 50,901 in 2020/21. This increase shows how drugs are becoming prevalent, and it's imperative to find out why, and where, so this can be further inspected, so changes can be made in London. This was why the first hypothesis was created. To see if drug-offences were increasing everywhere in London or if it is just in certain boroughs, and then to find out which borough was the most impacted.

Furthermore, Trust for London (2023) have found that drugs and weapons offences, as well as Anti-social behaviour, public order and miscellaneous offences, are 2.2 times more prevalent in the most income-deprived 10% of areas compared to the least income-deprived 10%. The findings support the notion that income-deprived areas are a hotspot for harbouring crime, in this instance, drug-offences. Knowing this, the Index of Multiple Deprivation (IMD) can be a useful tool to test the correlation between deprivation factors and rate of drug-offences in London, hence supporting the relevancy for the second hypothesis.

3. Data

This study utilizes crime data from London spanning April 2010 to November 2022, comprising 14,460 cells across 932 rows. Focused on drug-related crimes (labelled as ‘DRUG OFFENCES’), the data was filtered to exclude other major crime categories like ‘THEFT’, ‘VIOLENCE’, and ‘SEXUAL OFFENCES’, as well as any blank cells. To measure changes in drug offences, only data from 2011 and 2019 were analysed. 2011 was selected for its completeness, as it was the earliest year with full data, while 2019 was chosen for its relevance in identifying trends, plus being the most recent year unaffected by the impact of COVID-19 (unlike 2021 or 2022).

Table 1: London borough variables

Variable	Type	Description
DRUG OFFENCES (Dependent variable)	Numeric	Total drug-related incidents recorded in each brough (2011 and 2019).
Borough Name	Categorical	Names of all London boroughs.
Year	Numeric	The years used to measure the rate of drug offences.

After identifying the borough with the most growth in drug offences (Newham), the IMD dataset, which contained 656,900 cells, was filtered to focus on the LSOA for Newham, reducing the data to 3,300 cells. This subset was then used to assess the correlation between Newham’s drug offences and various deprivation domains.

Table 2: LSOA variables in relation to IMDs

Variable	Type	Description
LSOA code (2011)	Numeric	LSOA for 2011
LSOA name (2011)	Categorical	Names for LSOA foe 2011
Local Authority District code (2019)	Numeric	2019 Local Authority District code
Local Authority District name (2019)	Categorical	2019 Local Authority District name
Index of Multiple Deprivation (IMD) Rank (where 1 is most deprived)	Numeric	Ranked Index of Multiple Deprivation
Index of Multiple Deprivation (IMD)	Numeric	Index of Multiple Deprivation
Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Decile of 10% of LSOAs
Income Rank (where 1 is most deprived)	Numeric	Income Rank
Income Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Income Decile
Employment Rank (where 1 is most deprived)	Numeric	Employment Rank
Employment Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Employment Decile
Education, Skills and Training Rank (where 1 is most deprived)	Numeric	Education, Skills and Training Rank

Education, Skills and Training Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Education, Skills and Training Decile for LSOAs
Health Deprivation and Disability Rank (where 1 is most deprived)	Numeric	Health Deprivation and Disability Rank
Health Deprivation and Disability Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Health Deprivation and Disability Decile for LSOAs
Crime Rank (where 1 is most deprived)	Numeric	Crime Rank
Crime Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Crime Decile for LSOAs
Barriers to Housing and Services Rank (where 1 is most deprived)	Numeric	Barriers to Housing and Services Rank
Barriers to Housing and Services Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Barriers to Housing and Services Decile for LSOAs
Living Environment Rank (where 1 is most deprived)	Numeric	Living Environment Rank
Living Environment Decile (where 1 is most deprived 10% of LSOAs)	Numeric	Living Environment Decile for LSOAs

4. Methodology

This study employs an empirical, quantitative approach, utilizing datasets from the Ministry of Housing, Communities and Local Government (2019) and the Metropolitan Police Service (2018).

Exploratory data analysis (EDA) is conducted to examine drug-related offences across all London boroughs to identifying patterns.

First, drug offence data for each borough between 2011 and 2019 is analyzed and visualized using scatter plots (Figure 1) to identify trends and address the first hypothesis. The borough with the highest total drug offences is selected for further investigation.

To assess drug-offence dynamics, the borough with the highest growth in drug offences is broken down monthly into two subcategories: ‘possession drug offences’ and ‘trafficking drug offences’ (Figure 2) determining which offence type is most prevalent and how they fluctuate over time.

To explore the relationship between drug offences and socioeconomic deprivation, 2019 drug offence data is plotted against the IMD (Figure 3).

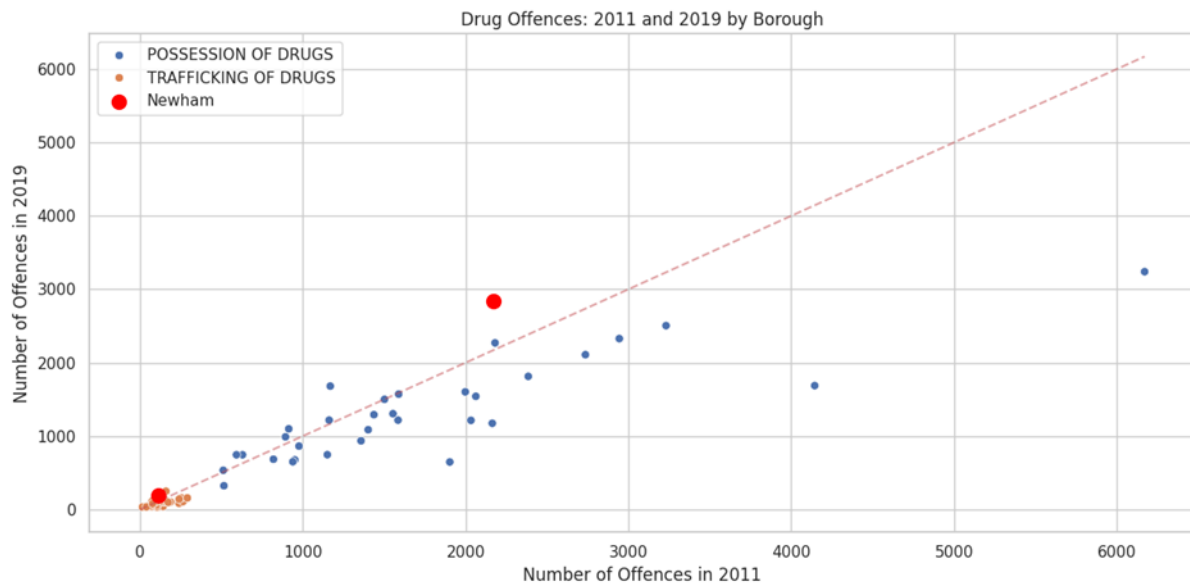
A correlation matrix (Figure 4) is then generated to assess relationships between drug offences and various IMD domains, identifying the strongest predictors.

Further analysis (Figure 5) explores interrelationships between the highest-correlating deprivation factors, assessing their potential influence on drug-related crime.

Finally, an R-squared test (Figure 6) is conducted to measure the coefficient of determination, identifying how well the deprivation variables explain the difference in drug offences, as well as evaluating the statistical significance of these relationships (e.g., IMD variables).

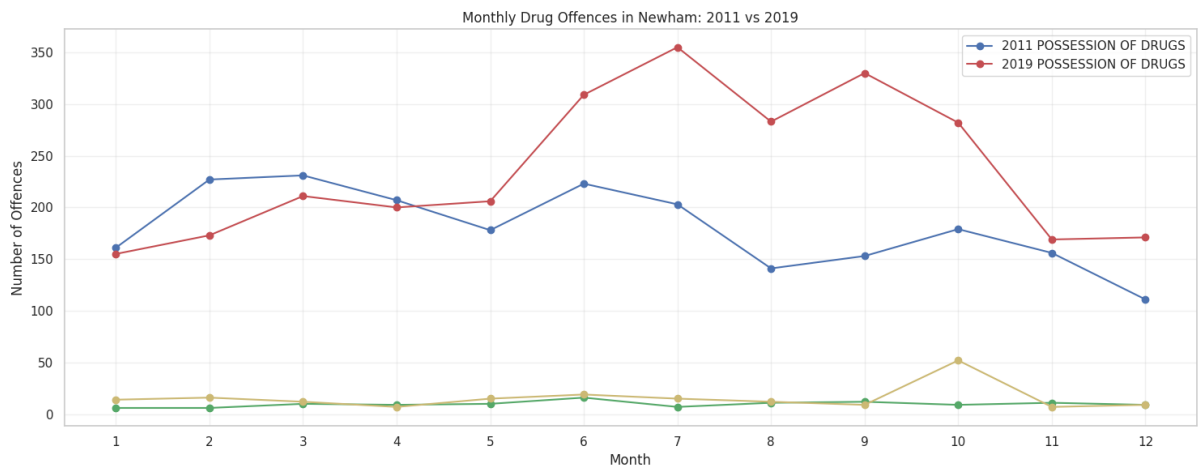
This methodological approach provides a structured framework to analyze the impact of deprivation on drug-related crime in London, offering insights for policy and urban planning.

FIGURE 1: Borough Comparison (2011 vs 2019)



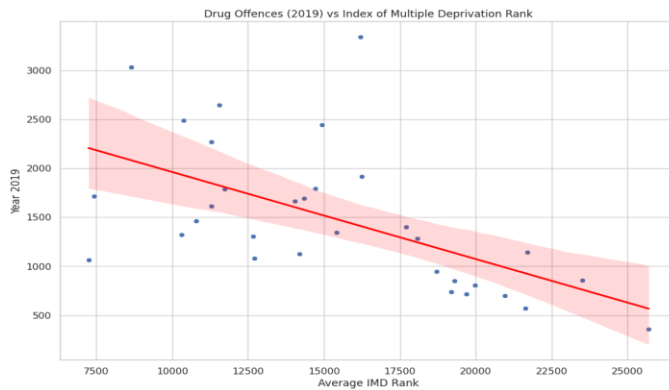
A comparison of drug offences across London boroughs (2011–2019) showing varied trends. The red dashed line highlights overall changes, with Newham (in red) experiencing the highest increase. Barnet, for example, saw a -32.53% decrease, dropping from 1,260 total cases in 2011 to 850 in 2019 (-410 cases). These findings reject the initial hypothesis, as drug-related offences are not rising uniformly but are concentrated in select boroughs like Newham.

FIGURE 2: Newham Monthly Analysis



In 2011, drug-possession offences averaged 180.8 cases per month, rising to 237.0 cases per month in 2019. Similarly, drug trafficking offences increased from 9.7 cases per month in 2011 to 15.6 cases per month in 2019. These trends indicate a notable rise in both possession and trafficking offences over the period.

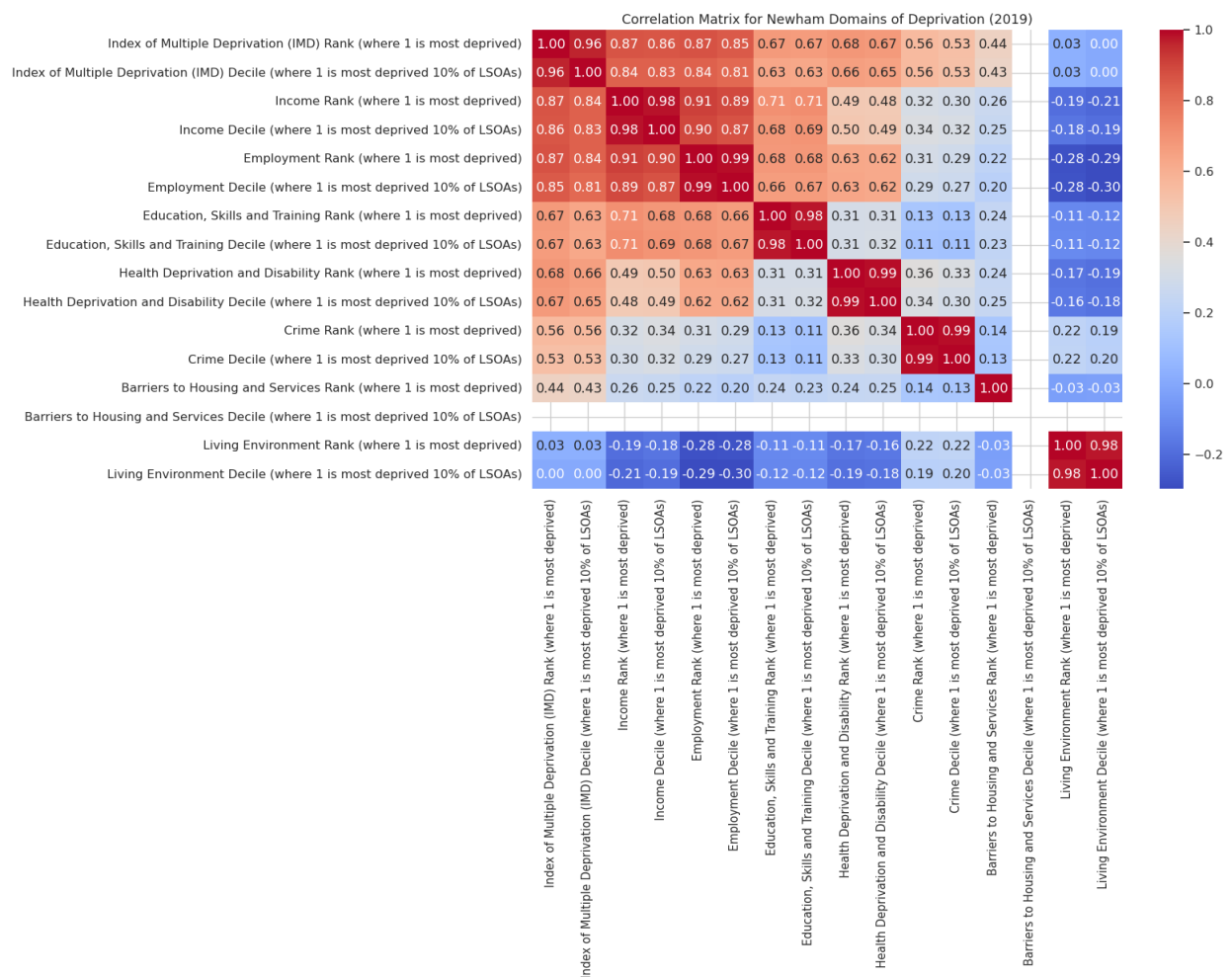
FIGURE 3: Drug Offences vs IMD Analysis



The correlation coefficient of -0.59 indicates a moderate negative correlation, with higher deprivation linked to more drug offences.

Highly deprived areas average 1,926 offences, while low-deprivation areas average 816, a 2.36:1 ratio, confirming that drug crime is over twice as high in deprived areas.

FIGURE 4: Correlation Matrix

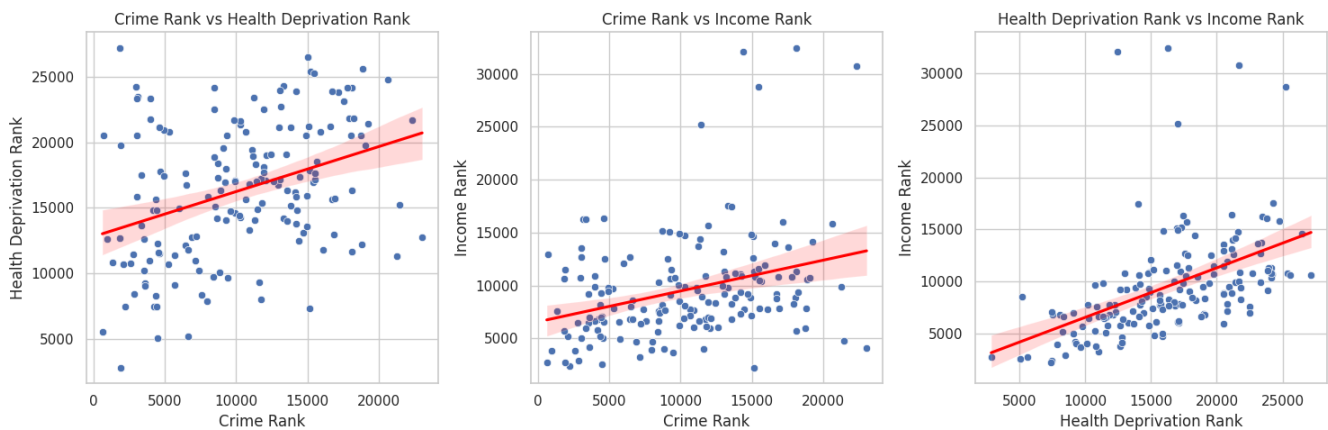


Newham's correlation matrix shows relationships between deprivation domains (-1 to 1). Positive values mean both ranks increase (less deprived), while negative values indicate an inverse relationship

Understanding Correlation Values:

- 1: Perfect positive correlation (both increase).
- -1: Perfect negative correlation (one increases, the other decreases).
- 0: No correlation.

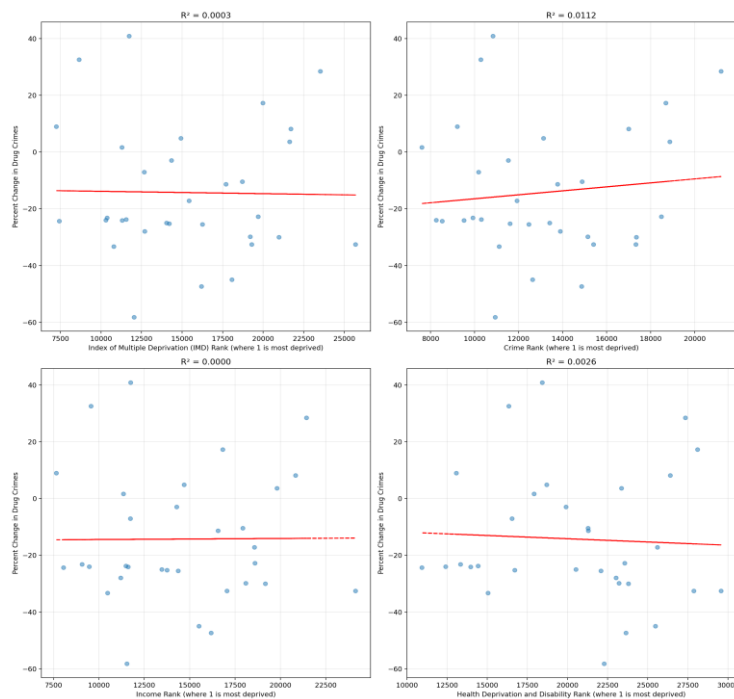
FIGURE 5: Domains of deprivation



- Crime vs. Health Deprivation: 0.36 (moderate positive correlation).
- Crime vs. Income Deprivation: 0.32 (moderate positive correlation).
- Health vs. Income Deprivation: 0.49 (strongest correlation).

Findings suggest deprivation factors are interrelated, with multiple forms of deprivation increasing susceptibility to drug offences. However, no single factor fully predicts crime levels.

FIGURE 6: R-squared Correlation Analysis



Deprivation measures show weak or no relationship with changes in drug crime, as R-squared values are close to zero:

- IMD Rank: 0.0003 (no meaningful relationship)
- Crime Rank: 0.0112 (slightly stronger but negligible)
- Income Rank: 0.0000 (no correlation)
- Health Deprivation Rank: 0.0026 (no significant relationship)

Findings suggest other factors drive drug crime changes, with scatterplots confirming the lack of strong trends.

5. Results

Equation 1:

$$y = \beta_0 + \beta_1 x + \epsilon$$

E.g. Percentage change in drug crime = Intercept + Coefficient of independent variable IDM Rank + ϵ

Where:

y: Percentage change in drug crimes

x: Deprivation measure (IMD Rank, Crime Rank, Income Rank, Health Deprivation, Rank)

β_0 : Intercept

β_1 : Coefficient of the independent variable

ϵ : Error term

Figure 1 shows that not all boroughs experienced an increase in drug offences, rejecting the first hypothesis. However, Newham saw significant growth, skewing the overall London data. Figure 3 indicates a moderate negative correlation (-0.59) between deprivation and drug offences, with highly deprived areas averaging 1,926 offence cases compared to 816 in low-deprivation areas, suggesting drug offences are more prevalent in deprived areas. The second hypothesis proposed that IMD factors drives crime. Figure 3 then showed that there was a moderate negative correlation, with higher deprivation linked to more drug offences (correlation coefficient of -0.59) with highly deprived areas averaging 1,926 offences, while low-deprivation areas averaging 816 offences, indicating that drug-offences were a more likely occurrence in deprived areas.

4 (Correlation Matrix) showed that many domains of deprivation like Crime, Income, and Health ranging from 0.96-0.99, so the closer to 1, it's a positive correlation with both factors increasing. Those three domains were then evaluated for their interrelationships, Figure 5 further explores these relationships.

'Crime and Health Deprivation' had a moderate positive correlation of '0.36', 'Crime and Income Deprivation' also had a moderate positive correlation of '0.32', but 'Health and Income Deprivation' had the highest of '0.49' showing the strongest correlation.

However, when testing the Deprivation measures through R-squared testing, Index of Multiple Deprivation (IMD) Rank: R-squared = 0.0003, suggesting no meaningful relationship. Crime Rank has a R-squared = 0.0112, showing a slightly stronger but still negligible relationship. Income Rank: R-squared = 0.0000, indicating no correlation. Health Deprivation and Disability Rank had a R-squared = 0.0026, also showing no significant relationship. The scatterplots in Figure 3 shows that drug crime does occur in deprived boroughs however these IMD domains are not the sole cause of the drug-offences in Newham. The R-squared values are close to zero, suggesting weak or no relationship with changes in drug crime changes, rejecting the second hypothesis.

6. Discussion and Conclusions

The findings reject the first hypothesis, as not all boroughs experienced growth in drug offences, it was specific boroughs like Newham. There was moderate negative correlation (-0.59) linking deprivation to drug offences, with highly deprived areas averaging 1,926 cases versus 816 in low-deprivation areas. R-squared values however indicated weak or no predictive power as IMD domains were close to zero, rejecting the second hypothesis. This highlights the need for further research. New research should explore into socio-environmental factors like policing strategies to help better understand the dynamics influencing drug crime in London.

7. Reference list

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