Final Report

2023-06-12

README and GitHub Repository:

Link to GitHub Repository - organized data, README, code

1. Introduction

The research question at hand focuses on the relationship between childhood adversity and functional resilience in early adulthood. This analysis aims to contribute to the broader understanding of the long-term consequences of childhood adversity by investigating its impact on an individual's ability to adapt and function effectively in early adulthood. Childhood adversity encompasses a range of hardships, and its effects can extend throughout an individual's life, influencing their well-being and functioning.

The primary objective of this analysis is to explore how various types of adversities experienced during childhood shape an individual's profile of functional resilience during early adulthood. By examining different types of adversities, we aim to identify potential variations and distinctions in their influence on an individual's capacity to cope and thrive. This research endeavor is crucial as it can provide valuable insights that inform interventions and support strategies for individuals who have faced childhood adversity, ultimately improving their long-term outcomes.

This research approach distinguishes itself from previous studies by introducing a novel and unprecedented profile-building methodology. Unlike previous research, which has primarily focused on examining the impact of childhood adversity on functional resilience in a general sense, our analysis goes a step further by constructing individualized profiles that capture the unique effects of different types of hardships on various aspects related to functional resilience.

Our research utilizes an innovative approach of developing individualized profiles to understand how specific adversities shape functional resilience. By categorizing and assessing different types of childhood adversities, such as abuse, neglect, economic hardship, and familial instability, we aim to uncover their distinct impacts on various aspects of functioning, including psychological well-being, social relationships, education, employment, and overall quality of life. This groundbreaking methodology sets our research apart from previous studies and provides valuable insights for targeted interventions and support strategies for individuals who have experienced childhood adversities.

Conducting this analysis poses several challenges, primarily due to its longitudinal nature, requiring the tracking of individuals from childhood to early adulthood. Additionally, the measurement and analysis of complex constructs related to childhood adversity and functional resilience necessitate advanced statistical methods and rigorous control of potential confounding factors. However, overcoming these challenges could yield valuable insights into the long-term effects of childhood adversity on functional resilience, paving the way for interventions that enhance outcomes for individuals who have experienced such adversities.

In summary, this analysis addresses the research question by investigating the connection between childhood adversity and functional resilience in early adulthood. By considering the diverse types of adversities, we aim to gain insights into their respective effects and inform targeted interventions. Through the use of advanced statistical methods and careful control of confounding factors, this analysis has the potential to contribute significantly to the understanding of the long-term consequences of childhood adversity and to guide interventions that promote functional resilience for those affected.

2. Data overview:

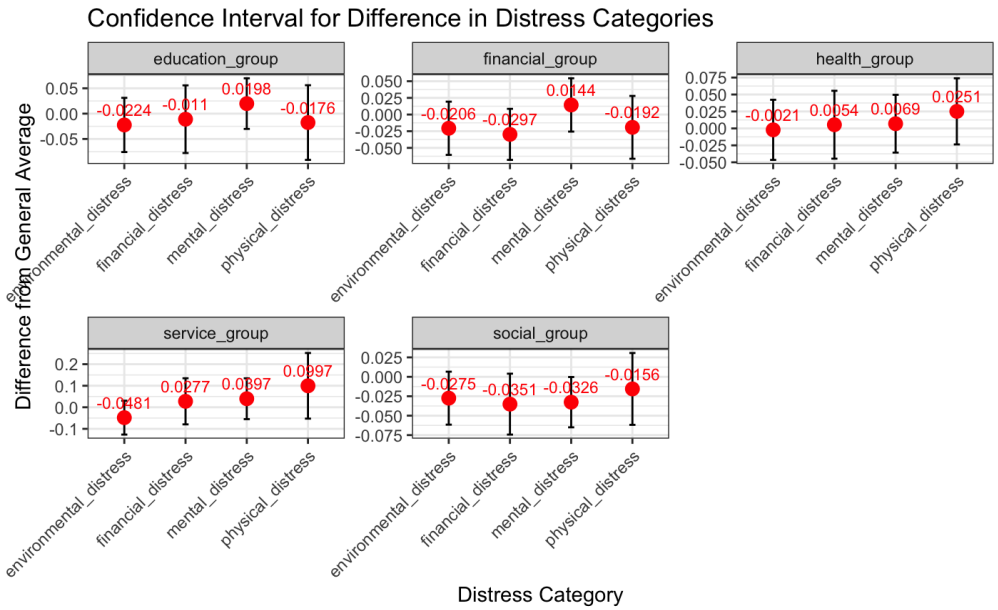
Our data set consists of 127 rows and 39 columns, representing individuals who have experienced childhood adversity. After the initial assignment of data, we applied filters to remove unnecessary columns, resulting in a refined data set for analysis. This step was taken to ensure the relevance of the data and to focus specifically on the features or feature families relevant to the problem at hand.

Within each row, we have constructed nine entities that capture the normalized data representing different aspects of distress and functional resilience. Each entity encompasses multiple columns that were selected based on their relevance to specific feature families. By normalizing and combining these columns within each entity using standardization, we obtain a comprehensive representation of the specific variables we are investigating. This process re scaled the values within each column to a common scale, ensuring that all variables within the entity contribute equally to the analysis. By standardizing the data, we eliminated the potential influence of differing scales and allowed for meaningful comparisons across variables.

In this manner, each entity represents a distinct domain of functional resilience, incorporating the relevant features within that domain. By structuring the data in this way, we can analyze the collective impact of the normalized variables on an individual's functional resilience and gain insights into the relationship between childhood adversity and various aspects of functioning.

3.Methods and results:

Initially, we conducted an analysis by calculating the mean differences and confidence intervals for each distress category, comparing them to the general average. However, the initial analysis did not yield statistically significant results, indicating that the observed differences might be due to random variation. The graph we generated based on this analysis is shown here:



Conclusions from the graphs: Social status- is adversely affected by all distress groups, with each group performing below the general average in terms of social status. Health status- is negatively affected by environmental adversity, but positively affected by other forms of adversity. Military Service- is adversely affected by environmental distress, but positively affected by other forms of distress. Education status- is positively affected by mental distress, but negatively affected by other forms of distress. Economic situation is positively affected by mental distress, but negatively affected by other forms of distress.

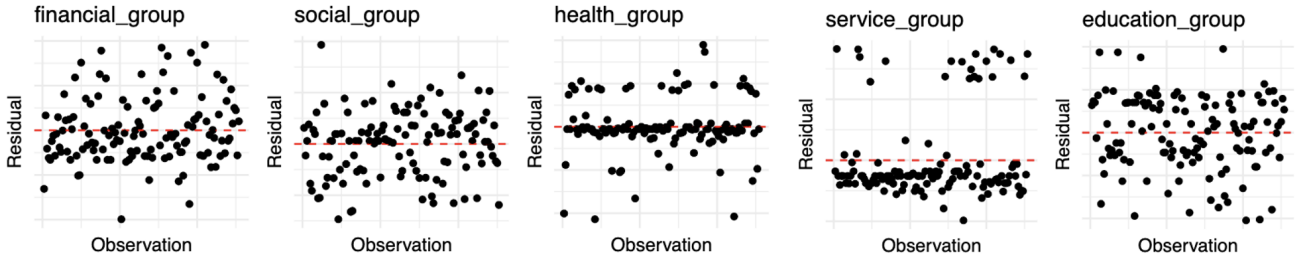
We can see partial overlap in the intervals, it suggests a possibility of a difference, but it is less conclusive. In this case, additional statistical tests or analyses is needed to further assess the significance of the differences.

Therefore, in order to delve deeper into the relationship between distress categories and group types, we decided to employ linear regression models. By fitting these models, we aimed to determine the significance of the independent variables (distress categories) in influencing the resilience categories. The final results of the regression analysis are shown here:

	Significant Independent Variables			Additional Statistics	
Group Variable	Significant Independent Variables	Coefficients	p-values	F-Statistic	F-Table Value
financial_group	environmental_distress	financial_distress=-0.0481854402899871, environmental_distress=-0.146930522657989, mental_distress=0.0748935425040771, physical_distress=0.0307558175387066	financial_distress=0.2839, environmental_distress=0.0653, mental_distress=0.3532, physical_distress=0.749	1.567972	3.703006
social_group	financial_distress, mental_distress	financial_distress=-0.0674649964809333, environmental_distress=0.0175565661859322, mental_distress=-0.132922928317903, physical_distress=0.00804026267791817	financial_distress=0.0944, environmental_distress=0.8009, mental_distress=0.0601, physical_distress=0.9232	2.583142	3.703006
health_group	environmental_distress	financial_distress=0.00598647389933611, environmental_distress=-0.164982638394802, mental_distress=0.106988508692657, physical_distress=0.143338187121422	financial_distress=0.9037, environmental_distress=0.0607, mental_distress=0.2297, physical_distress=0.1778	1.263062	3.703006
service_group	environmental_distress	financial_distress=0.128678437316703, environmental_distress=-0.485209260523706, mental_distress=0.297085196593251, physical_distress=0.310762156122532	financial_distress=0.2377, environmental_distress=0.0125, mental_distress=0.1295, physical_distress=0.1834	2.171196	3.703006
education_group	mental_distress	financial_distress=-0.0259936381784278, environmental_distress=-0.127491483611246, mental_distress=0.209892987333158, physical_distress=-0.153475590066011	financial_distress=0.6959, environmental_distress=0.2784, mental_distress=0.0805, physical_distress=0.2823	1.132268	3.703006

The resulting linear regression models provided essential statistical summaries, including coefficients and p-values. By considering the coefficients, we gained insights into the direction and magnitude of the effect of each distress categories on the resilience categories. The p-values helped us determine the statistical significance of these effects.

Additionally, residual graphs were generated to provide further insights into the relationship between the distress categories and resilience categories.The residual graphs allowed us to visually assess the fit of the linear regression models and identify any patterns or deviations in the observed data.The final results of the residual graphs are shown here:



The Financial Group showed a sparse pattern with widely varied and poorly aligned predictions. The Social Group had closer and relatively more accurate predictions. The Health Group had mostly accurate predictions but with some significant outliers. The Service Group exhibited a consistent negative bias in predictions. The Education Group had predictions generally close to the regression line. These findings highlight the variability and alignment of predictions within each group.

4. The Limitations of your approach and Future Work:

Our approach and findings are limited in their generalizability due to the small sample size and reliance on self-reported data. Caution should be exercised when extending our results to larger populations. Given additional time, future directions include replicating the study with larger and diverse samples to enhance generalizability. Incorporating additional covariates and conducting longitudinal studies would provide a more comprehensive understanding of the relationship between childhood adversity and functional resilience.

To address limitations, predictive models could be developed using specific adversities as inputs to personalize interventions for individuals who have experienced childhood adversity.

In summary, while our approach and findings have limitations, future work involves replicating the study with larger samples, incorporating covariates, conducting longitudinal studies, and developing predictive models to enhance understanding and support interventions for individuals who have experienced childhood adversity.