



# Analyzing Unemployment Trends by Education Level

A data engineering project for MADE module

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# Table of contents

01

## Introduction

The proposed question and motivation

02

## Data Overview

Data structure and pipeline

03

## Key Findings

Graphs and what they reveal

04

## Conclusion

Final answer and future work

01



# Introduction



3

**How do unemployment rates correlate to educational attainment levels among adults aged 18 and older in U.S. from 2017 to 2022?**





# Data Overview



# Source Data vs. Transformed Data

Table 1. Educational Attainment of the Population 18 Years and Over, by Age, Sex, Race, and Hispanic Origin: 2022  
(Numbers in thousands. Civilian noninstitutionalized population.¹)  
All Races

Characteristic	Educational attainment																											
	Total	None	1st - 4th grade	5th - 6th grade	7th - 8th grade	9th grade	10th grade	11th grade²	High school graduate³	Some college, no degree	Associate's degree, occupational	Associate's degree, academic	Bachelor's degree	Master's degree	Professional degree	Doctoral degree												
Both Sexes																												
18 years and over	255.255	770	1.518	2.812	3.201	2.926	3.340	9.826	74.530	42.099	10.662	14.726	56.350	24.160	3.478	4.859												
18 to 24 years	28.981	43	42	80	200	203	459	3.432	10.065	9.113	634	1.080	3.305	279	34	11												
25 years and over	226.274	727	1.476	2.732	3.001	2.723	2.880	6.394	64.465	32.986	10.028	13.645	53.045	23.881	3.444	4.848												
25 to 29 years	21.747	14	36	82	188	149	Table 501.80. Unemployment rates of persons 16 to 64 years old, by age group and highest level of educational attainment																					
30 to 34 years	22.836	25	58	142	187	217											[Standard errors appear in parentheses]											
35 to 39 years	21.992	73	85	164	244	240	Age group and highest level of educational attainment					1975	1980	1985	1990	1995	2000											
40 to 44 years	21.198	47	124	314	282	321	1					2		3		4												
45 to 49 years	19.430	48	107	305	280	273	16 to 19 years old, all education levels\1\					---	(+)	---	(+)	17,0	(1,83)	21,0	(2,06)	17,2	(1,8)							
50 to 54 years	20.700	54	133	297	299	297	Less than high school completion					---	(+)	---	(+)	---	(+)	26,2	(3,54)	30,3	(3,67)	21,4	(3,2)					
55 to 59 years	21.004	111	168	248	258	243	High school completion\2\					---	(+)	---	(+)	---	(+)	11,7	(2,05)	15,1	(2,59)	15,3	(2,6)					
60 to 64 years	21.174	74	150	277	260	223	At least some college					---	(+)	---	(+)	---	(+)	±	(+)	12,4	(5,19)	±	(1,2)					
65 to 69 years	18.533	73	134	253	271	225	20 to 24 years old, all education levels\1\					---	(+)	---	(+)	---	(+)	8,2	(0,63)	10,7	(0,72)	9,2	(0,6)					
70 to 74 years	15.171	47	173	212	194	193	Less than high school completion					---	(+)	---	(+)	---	(+)	17,4	(2,15)	19,5	(2,37)	16,6	(2,2)					
75 years and over	22.489	161	308	438	537	341	High school completion\2\					---	(+)	---	(+)	---	(+)	7,8	(0,88)	12,0	(1,18)	10,0	(1,1)					
							Some college, no bachelor's degree\3\					---	(+)	---	(+)	---	(+)	4,8	(1,09)	7,3	(1,13)	5,2	(1,1)					
							Bachelor's or higher degree					---	(+)	---	(+)	---	(+)	3,1	(1,12)	4,1	(1,26)	5,0	(1,2)					
							25 to 64 years old, all education levels\1\										---	(+)	---	(+)	---	(+)	---	(+)	---	(+)	---	(+)

Table 501.80. Unemployment rates of persons 16 to 64 years old, by age group and highest level of educational attainment: Selected years, 1975 through 2022																					
[Standard errors appear in parentheses]																					
Age group and highest level of educational attainment		1975		1980		1985		1990		1995		2000		2005		2010		2015		2021	
1		2		3		4		5		6		7		8		9		10		11	
16 to 19 years old, all education levels\1\		---	(t)	---	(t)	---	(t)	17.0	(1.83)	21.0	(2.06)	17.2	(1.89)	22.8	(1.39)	31.9	(1.59)	22.5	(1.35)	14.8	(1.35)
Less than high school completion		---	(t)	---	(t)	---	(t)	26.2	(3.54)	30.3	(3.67)	21.4	(3.23)	30.3	(2.34)	41.7	(3.14)	25.6	(2.67)	21.7	(2.91)
High school completion\2\		---	(t)	---	(t)	---	(t)	11.7	(2.05)	15.1	(2.59)	15.3	(2.54)	19.1	(2.02)	29.6	(2.08)	23.3	(1.90)	12.6	(1.44)
At least some college		---	(t)	---	(t)	---	(t)	4	(1.2)	4	(1.9)	4	(1.5)	8	(3.54)	18.1	(3.65)	13.2	(2.96)	9.2	(2.55)
20 to 24 years old, all education levels\1\		---	(t)	---	(t)	---	(t)	8.2	(0.63)	10.7	(0.72)	9.2	(0.70)	10.9	(0.48)	18.8	(0.66)	12.3	(0.53)	8.1	(0.43)
Less than high school completion		---	(t)	---	(t)	---	(t)	17.4	(2.15)	19.5	(2.37)	16.6	(2.18)	18.9	(1.24)	32.3	(1.80)	19.9	(1.99)	16.0	(2.10)
High school completion\2\		---	(t)	---	(t)	---	(t)	7.8	(0.88)	12.0	(1.18)	10.0	(1.12)	12.0	(0.73)	22.3	(0.95)	15.8	(0.92)	9.7	(0.80)
Some college, no bachelor's degree\3\		---	(t)	---	(t)	---	(t)	4.8	(1.09)	7.3	(1.13)	5.2	(1.02)	7.3	(0.76)	14.2	(1.07)	9.6	(0.89)	6.4	(0.75)
Bachelor's or higher degree		---	(t)	---	(t)	---	(t)	3.1	(1.12)	4.1	(1.26)	5.0	(1.43)	5.4	(0.91)	7.9	(1.15)	5.1	(0.72)	4.7	(0.76)
25 to 64 years old, all education levels		6.8	(0.21)	5.0	(0.17)	6.1	(0.18)	3.6	(0.14)	4.8	(0.15)	3.3	(0.13)	4.4	(0.09)	9.1	(0.13)	4.7	(0.10)	3.9	(0.09)
Less than high school completion		10.5	(0.49)	8.4	(0.48)	11.4	(0.61)	7.7	(0.55)	10.0	(0.66)	7.9	(0.63)	9.0	(0.36)	16.8	(0.54)	9.2	(0.44)	8.3	(0.45)
High school completion\2\		6.8	(0.34)	5.1	(0.27)	6.9	(0.31)	3.8	(0.23)	5.2	(0.28)	3.8	(0.25)	5.5	(0.17)	12.1	(0.26)	6.2	(0.21)	5.2	(0.18)
Some college, no bachelor's degree\3\		5.5	(0.50)	4.3	(0.38)	4.7	(0.37)	3.1	(0.29)	4.5	(0.29)	3.0	(0.24)	4.2	(0.17)	8.8	(0.23)	4.9	(0.16)	3.8	(0.16)
Bachelor's or higher degree		2.4	(0.30)	1.9	(0.23)	2.4	(0.24)	1.7	(0.19)	2.5	(0.21)	1.5	(0.16)	2.3	(0.13)	4.7	(0.15)	2.4	(0.11)	2.3	(0.11)
25 to 34 years old, all education levels		8.6	(0.41)	6.8	(0.32)	7.3	(0.33)	4.8	(0.27)	5.8	(0.30)	4.0	(0.27)	5.8	(0.18)	10.8	(0.28)	5.9	(0.20)	4.9	(0.20)
Less than high school completion		17.2	(1.36)	13.7	(1.24)	15.5	(1.38)	12.0	(1.21)	12.9	(1.32)	10.3	(1.23)	11.6	(0.69)	20.3	(1.02)	12.5	(1.01)	13.2	(1.16)
High school completion\2\		9.4	(0.67)	7.9	(0.55)	9.1	(0.57)	5.1	(0.44)	6.8	(0.56)	4.8	(0.54)	7.7	(0.41)	15.9	(0.62)	8.9	(0.50)	7.2	(0.44)
Some college, no bachelor's degree\3\		6.7	(0.85)	6.0	(0.64)	5.4	(0.60)	3.8	(0.51)	5.0	(0.52)	3.6	(0.49)	5.4	(0.36)	10.6	(0.44)	6.5	(0.39)	4.4	(0.34)
Bachelor's or higher degree		2.9	(0.50)	2.5	(0.39)	2.8	(0.41)	1.9	(0.34)	2.7	(0.40)	1.6	(0.31)	2.6	(0.26)	4.5	(0.28)	2.4	(0.20)	2.5	(0.22)
35 to 44 years old, all education levels		6.4	(0.41)	4.3	(0.31)	5.6	(0.33)	3.3	(0.24)	4.6	(0.27)	3.5	(0.23)	4.2	(0.14)	9.2	(0.24)	4.4	(0.17)	4.0	(0.16)
Less than high school completion		11.2	(1.02)	9.0	(1.00)	12.4	(1.29)	8.3	(1.17)	10.5	(1.28)	8.4	(1.14)	8.7	(0.63)	17.8	(1.07)	8.4	(0.74)	6.9	(0.61)
High school completion\2\		5.7	(0.60)	4.2	(0.48)	6.1	(0.55)	3.7	(0.41)	5.1	(0.48)	3.9	(0.43)	5.2	(0.31)	11.9	(0.51)	6.3	(0.41)	5.7	(0.41)
Some college, no bachelor's degree\3\		4.6	(0.95)	3.1	(0.64)	4.8	(0.69)	2.8	(0.47)	4.7	(0.49)	3.1	(0.41)	3.9	(0.25)	9.2	(0.42)	4.5	(0.31)	4.4	(0.35)
Bachelor's or higher degree		2.3	(0.59)	1.6	(0.41)	2.2	(0.39)	1.6	(0.31)	2.2	(0.34)	1.8	(0.31)	2.0	(0.19)	4.6	(0.26)	2.1	(0.20)	2.3	(0.21)
45 to 54 years old, all education levels		5.9	(0.39)	3.9	(0.32)	5.4	(0.39)	2.5	(0.26)	3.9	(0.29)	2.4	(0.22)	3.9	(0.16)	8.4	(0.22)	4.1	(0.15)	3.3	(0.17)

# Source Data vs. Transformed Data

Age group and level of educational ...		2017	#	2018	#	2019	#	2020	#	2021	#	2022	#
Filter...		Filter...		Filter...		Filter...		Filter...		Filter...		Filter...	
1	18 to 24 Bachelor's or higher degree		3355		3449		3662		4017		3705		3629
2	18 to 24 High school completion		8658		8683		8688		8602		9194		10065
3	18 to 24 Less than high school completion		4641		4764		4586		4421		4282		4459
4	18 to 24 Some college, no bachelor's degree		12750		12468		12150		12019		11656		10827
5	18 to 24 Total		29404		29363		29085		29059		28838		28981
6	25 to 34 Bachelor's or higher degree		16482		17501		18037		18591		18498		18318
7	25 to 34 High school completion		11494		11459		11638		11797		11932		12104
8	25 to 34 Less than high school completion		3481		3391		3265		2694		2852		2670
9	25 to 34 Some college, no bachelor's degree		12792		12500		12269		12179		12002		11493
10	25 to 34 Total		44250		44855		45209		45260		45283		44583

Age group and highest level of edu...		2017	2018	2019	2020	2021	2022
Filter...		Filter...	Filter...	Filter...	Filter...	Filter...	Filter...
1	18 to 24 all education levels	15.543847956859846, 0.0...	16.4295738638575, 0.85...	14.735014539848796, 0.0...	18.509865113972374, 0.0...	19.4729991076568, 0.839...	16.0721497612927, 0.8...
2	18 to 24 Less than high school completion	26.85032528905666, 2.5...	27.598135327564748, 2.0...	24.237907185938333, 2.0...	29.900528229436542, 3.0...	23.4873140414106, 2.793...	21.29967047653725, 2.0...
3	18 to 24 High school completion	16.037840212683214, 1.0...	19.459989248952915, 1.0...	16.096735354665903, 0.0...	21.089660392904804, 1.0...	21.926065210874448, 1.1...	17.07018531225087, 1.0...
4	18 to 24 Some college, no bachelor's degree	10.94031815888394, 1.4...	10.05925346738719, 1.7...	12.196599052663334, 1.0...	15.102218362866756, 1.0...	15.216995845784623, 1.5...	15.28938808235773, 2.0...
5	18 to 24 Bachelor's or higher degree	4.670097335686188, 0.7...	5.283055759655791, 0.8...	3.3298358073264547, 0.0...	5.132465652546796, 0.8...	8.02805566026661, 1.064...	5.24212616451149, 0.9...
6	25 to 34 years old, all education levels	4.915824660752511, 0.1...	4.252805784923526, 0.1...	4.077624704712796, 0.1...	5.4542312912281545, 0.0...	6.9538266566924, 0.2624...	4.36657556386403, 0.2...
7	25 to 34 Less than high school completion	13.238416200032468, 1.0...	9.079280116338149, 0.9...	9.563116065602594, 1.0...	8.732829071180069, 1.1...	11.0556394547164, 1.472...	9.6895789303139, 1.24...
8	25 to 34 High school completion	7.219520098566516, 0.4...	6.394987623269579, 0.3...	5.591682759663928, 0.4...	8.84591730150137, 0.58...	10.1021627718697, 0.579...	6.7553931533147, 0.48...
9	25 to 34 Some college, no bachelor's degree	4.42612436477067, 0.34...	4.677381479212899, 0.3...	4.672929435484463, 0.3...	5.769013655697091, 0.4...	8.53338322603395, 0.543...	4.55691980490993, 0.4...
10	25 to 34 Bachelor's or higher degree	2.5359327959616826, 0.0...	2.04581698708692, 0.19...	2.13088345530746, 0.2...	3.0778528495078543, 0.0...	3.89530535741329, 0.260...	2.30016234332805, 0.2...



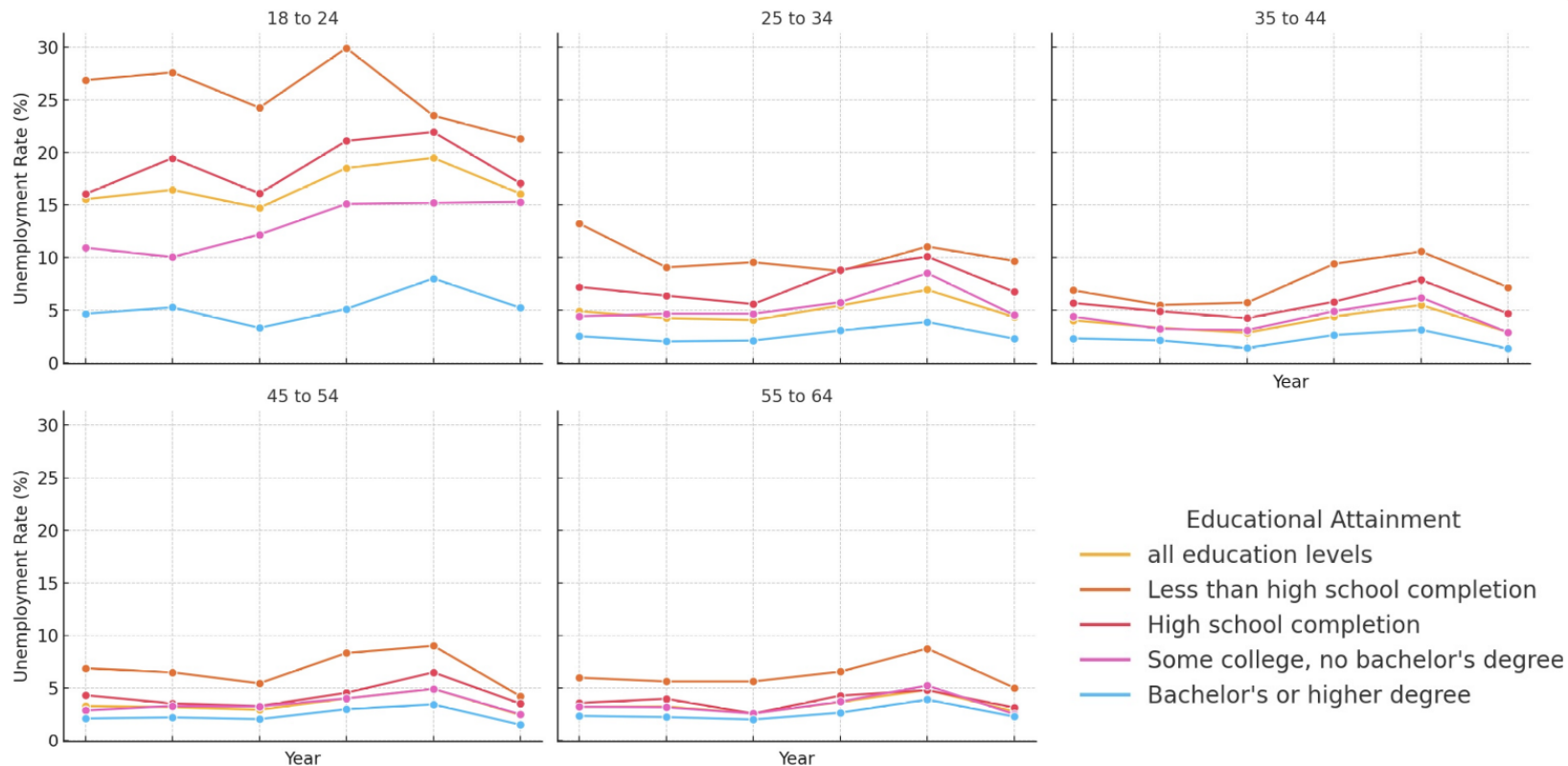
# Key Findings



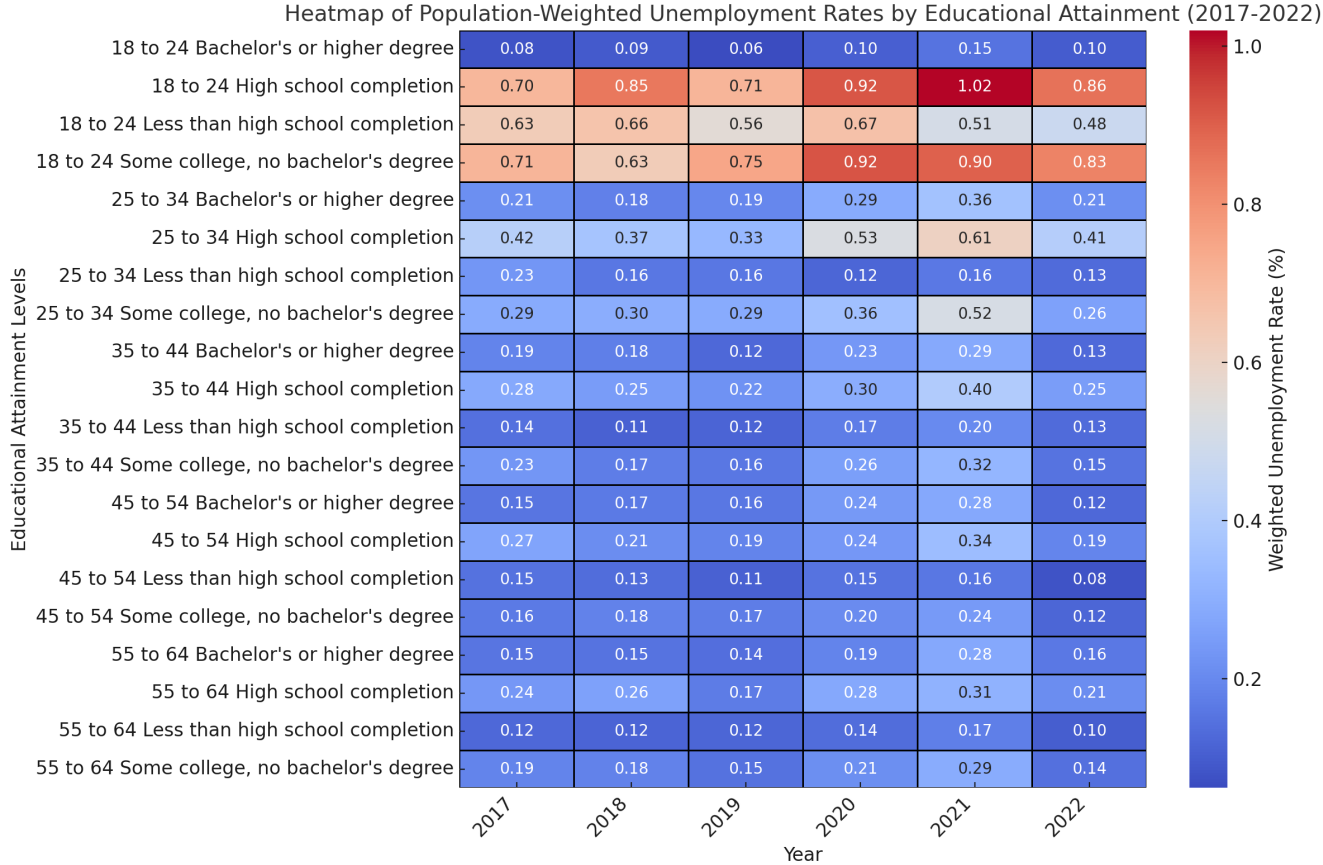


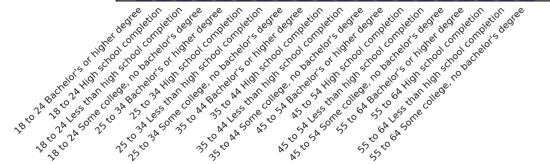
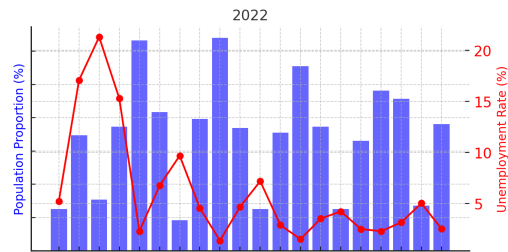
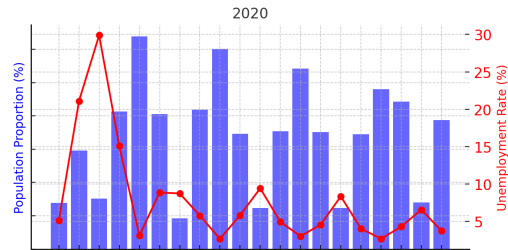
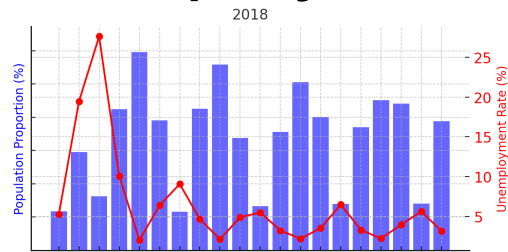
# Trends over time

Unemployment Rates by Educational Attainment Over Time, Faceted by Age Group



# Heatmap Analysis





04



# Conclusion



12

# Conclusion

- **Higher Education Reduces Risk:** Bachelor's degree holders have the lowest unemployment rates; less education leads to higher rates, especially among younger adults.
- **Age Effects:** Younger adults (18–24) face higher unemployment across all education levels, reflecting early career challenges.
- **Economic Shocks:** During downturns like 2020, unemployment spikes affected lower-educated groups more severely.
- **Population Dynamics:** Highly educated individuals form a larger proportion of the population but consistently show lower unemployment.

## Considerations

- **Aggregated data and Standard errors:** Totals and standard errors were excluded, leaving space for future works.



# Thank You!

