Pattern Identification

Patterns were identified using **rule-based filtering in Python**.

Pattern 1: High Stress + Low Productivity

Condition:

- stress_level ≥ 8
- productivity_score ≤ 4

```
# Pattern 1 - High Stress + Low Productivity

pattern_1 = df[df["stress_level"] >= 8 & (df["productivity_score"] <= 4)]
```

```
len(pattern_1)
```

```
50
```

Interpretation:
The cohort reflects a high-pressure academic environment where most students experience elevated stress with reduced productivity, indicating a strong need for wellness and time-management mentoring.

Pattern 2: Low GPA + High Engagement

Condition:

- gpa ≤ 6
- engagement_score ≥ 65

```
# Pattern_2 - Low GPA + High Engagement

pattern_2 = df[(df["gpa"] <= 6) & (df["engagement_score"] >= 65)]

pattern_2
```

	student_id	age	program	semester	gpa	attendance	assignments_completion	stress_level	sleep_hours	mental_wellbeing	productivity_score	distractions	career_clarity
0	S001	24	MBA	5	5.9	72	72	4	6.9	1	4	4	7
11	S012	24	B.Tech	4	5.8	81	50	6	5.5	5	2	7	7
18	S019	25	B.Sc	8	5.2	83	90	8	8.0	9	1	9	5
30	S031	22	B.Sc	1	5.4	69	57	6	5.4	6	7	3	4
31	S032	18	BCA	8	5.8	85	85	3	7.0	9	1	9	6
33	S034	19	B.Sc	2	5.5	75	89	5	4.2	1	8	4	6
45	S046	21	B.Sc	3	5.7	50	84	9	7.2	10	8	9	7

Next steps: Generate code with pattern_2 | New interactive sheet

```
len(pattern_2)
```

```
7
```

Interpretation:
These students are actively engaged but academically underperforming, suggesting motivation without strong academic foundations. They require targeted academic mentoring.

Pattern 3: Strong Academics + Unclear Career Goals

Condition:

- gpa ≥ 7.5
- career_clarity ≤ 5

```
pattern_3 = df[(df["gpa"] >=7.5) &(df["career_clarity"] <= 5)]

pattern_3
```

t_id	age	program	semester	gpa	attendance	assignments_completion	stress_level	sleep_hours	mental_wellbeing	productivity_score	distractions	career_clarity	sl
S010	19	B.Sc	8	7.7	81	98	1	7.5	7	8	2	1	
S016	22	B.Tech	3	7.7	87	86	6	8.6	1	2	1	2	
S020	20	BCA	3	8.1	55	84	2	7.2	8	3	3	5	
S026	23	B.Tech	7	7.9	58	73	4	4.5	7	10	6	4	
S030	21	B.Sc	7	7.6	52	98	5	6.7	5	3	9	4	
S048	24	BCA	1	7.5	77	90	6	8.9	5	9	5	3	

Next steps: Generate code with pattern_3 | New interactive sheet

```
len(pattern_3)
```

```
6
```

Interpretation:
These are high-performing students who lack career direction and are ideal candidates for career guidance and mentoring.

How the Dataset Reflects Real Student Behavior

1. **Multi-Dimensional Student Representation**
   The dataset models students across multiple dimensions including academic performance, wellness, productivity, engagement, and career readiness. This reflects real educational environments where student success is influenced by more than just grades.

2. **Academic Performance Variation**
   Differences in GPA, attendance, and assignment completion capture realistic variations in academic consistency. Some students perform well academically, while others struggle despite regular attendance, which is commonly observed in real classrooms.

3. **Stress and Productivity Relationship**
   Higher stress levels are often associated with lower productivity scores in the dataset. This mirrors real-world student behavior, where increased academic pressure negatively impacts time management and task efficiency.

4. **Engagement Does Not Always Guarantee High Performance**
   A subset of students shows high engagement scores despite having low GPA. This reflects motivated students who actively participate but may lack strong academic foundations or effective learning strategies.

5. **Career Uncertainty Among High-Performing Students**
   The dataset includes students with strong academic performance but low career clarity. This represents high-potential students who perform well academically but are unsure about future career paths, a common real-world scenario.

6. **Realistic Behavioral Pattern Distribution**
   The identified patterns are not equally distributed across the dataset. This imbalance reflects real student populations, where certain behavioral profiles are more prevalent than others.

7. **Support for Mentoring and Intervention**
   By capturing these behavioral variations and patterns, the dataset supports meaningful mentoring decisions such as wellness support, academic guidance, or career counseling.