
Project Graduation: The Digital Advantage Resiliency Skills and Tier Data Analysis (Sunnyside HS)

Prepared for Sunnyside Unified School District

Using a cohort of 370 ninth-graders at Sunnyside High School in the Sunnyside Unified School District (SUSD), this report describes the characteristics of students within five SUSD-defined Tiers. We also examine relationships between these Tiers and various academic and attendance data. A significant relationship between Tiers and average resiliency score, as measured by the *Success Highways Revving Up* survey, is also described. Finally, we show that resiliency scores predict the Tiers into which students will fall.

Key Findings

- ❖ Thirty-eight percent of ninth-graders in this cohort belonged to Tier 1, the target group to which laptops are given through the Digital Advantage program.
- ❖ Tier 1 students attained the highest average G.P.A (3.22), followed by Tier 2 (2.94), Tier 4 (2.01), Tier 3 (1.81) and Tier 5 (0.97)
- ❖ Students in Tier 5 recorded the highest average of failing grades (3.22) while those in Tier 1 recorded the fewest number (0.03).
- ❖ Students in Tier 5 recorded an average of 34.19 unexcused absent periods, the highest of all Tiers, while those in Tier 1 recorded the lowest average (4.15).
- ❖ At the significance level of $\alpha = 0.001$, there is enough evidence to suggest that there is a difference among the average resiliency scores based Tier number.
- ❖ Average resiliency scores may be useful as predictors of future Tier number for SUSD students.
- ❖ At the significance level of $\alpha = 0.05$, there is enough evidence to suggest that the individual resiliency scores, Confidence and Stress, are useful as predictors of future Tier number for SUSD students.

Background

Digital Advantage

In an effort to improve graduation rates, Sunnyside Unified School District (SUSD) has launched Project Graduation, a comprehensive effort which has received the Arizona Commission for Postsecondary Education's 2009 Pathways to Higher Education Award.

Digital Advantage is an initiative within Project Graduation and is a multifaceted, comprehensive and research-based approach. Through Digital Advantage, SUSD awards a laptop to every ninth-grader who maintains the following Four A's:

1. Attendance (a 95% or better attendance rate - no more than four absences, no unexcused absences and attendance on the first day of school)
2. Achievement (2.5 or higher grade point average)
3. extracurricular Activity (participation in at least one extracurricular activity)
4. Attitude (no out-of-school suspensions).¹

Description of the Data

Hanover Research was provided with data for Sunnyside High School ninth-graders from the first semester of the 2009-10 school year. This data may be divided into three categories as is demonstrated in the table below

Table 1: Description of Data

Category	Subcategories
1. Academic	G.P.A.
	Number of Failing Grades
2. Attendance	All Periods Absent
	Excused Absent Periods
	Unexcused Absent Periods
3. Resiliency	Education
	Confidence
	Connections
	Stress
	Well-being
3. Resiliency	Motivation

Below is a brief description of these variables. We explain what they measure and how they are used in this report:

¹ "The Digital Advantage." Sunnyside Unified School District. Project Graduation. <http://www.susd12.org/node/1274>

- ❖ G.P.A: this variable measures the average grade earned by a student during a given period. Sunnyside’s 4-point scale for categorizing grades is used in this report and is detailed in the table below.²

Table 2: Grade Average and Corresponding Grade Level

Grade Average	GPA Level
A average	4.00
B average	3.00 - 3.99
C average	2.00 - 2.99
D average	1.00 - 1.99

- ❖ Failing grades measures the student’s total number of failed grades for the semester.
- ❖ All Periods Absent” is the sum of both “Excused Absent Periods” and “Unexcused Absent Periods.” In this report we will focus on “Unexcused Absent Periods.”

An additional, important data point was also included: Tier number.

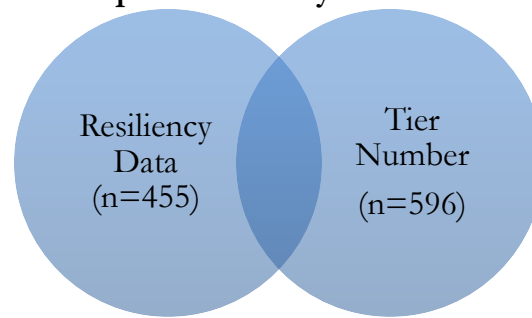
Ninth-grade students in the Sunnyside Unified School District (SUSD) are currently classified into one of five Tiers based on their academic performance and attendance record. It is the students who are in Tier 1 who are eligible to earn a laptop through the Digital Advantage program described above. The criteria for each of the SUSD’s five Tiers are described in the table below.

Table 3: Tier Criteria

Tier	G.P.A		Attendance		Failing a Class	
	2.5 or higher	2.5 or lower	95% Attendance and above	Less than 95% Attendance	0-1 classes failed	2+ classes failed
1	X		X			
2	X			X		
3		X	X			
4		X		X	X	
5				X		X

An examination of the data revealed a critical overlap between students for whom we had both Tier and resiliency information.

² “Graduation Requirements.” Sunnyside Unified School District.
<http://www.sunnysideud.k12.az.us/content/graduation-requirements>

Chart 1: Overlap of Resiliency Data and Tier number

Indeed, there were 370 ninth-graders with both resiliency data and Tier number; these 370 students will be the focus of the remainder of this report.

Success Highways Revving Up Survey

Student resiliency scores are generated from the *Success Highways Revving Up* survey administered by ScholarCentric. According to the company website, “Students with these skills have been shown to perform better in school than similarly situated students who struggle in these areas.”³ *Success Highways Revving Up* is specifically designed to measure the following six key academic resiliency skills:

1. Importance of Education (Education)
2. Academic Confidence (Confidence)
3. Connections to Educators and Positive Role Models (Connections)
4. Ability to Handle Academic Anxiety (Stress)
5. Sense of Well-Being (Well-being)
6. Intrinsic Motivation (Motivation)

This data is available, not as raw scores, but as difference from the national norm. The following table describes five rating scores associated with.

Table 4: Resiliency Score Rating Criteria

Rating	Number of standard deviations away from the National Mean
1	1 Below
2	1/2 Below
3	Within
4	1/2 Above
5	1 Above

The standard deviation of a population is the square root of its variance. Standard deviation is widely used and is a measure of the variability.

³“Frequent Questions.” Success Highways: Proven Dropout Solutions. <http://scholarcentric.com/faq.html>

Research Questions

After a close examination of the data available to us, we have formulated the following questions which we will in turn address in the subsequent “Analysis” section of this report.

Question #1: What are the characteristics of each Tier?

Question #2: How do Tiers compare with respect to academic and attendance data? Is there a significant relationship between Tier number and academic and/or attendance data?

Question #3: Is there a significant relationship between Tier number and resiliency status? Do resiliency scores predict any academic data?

Analysis

Question 1: What are the characteristics of each Tier?

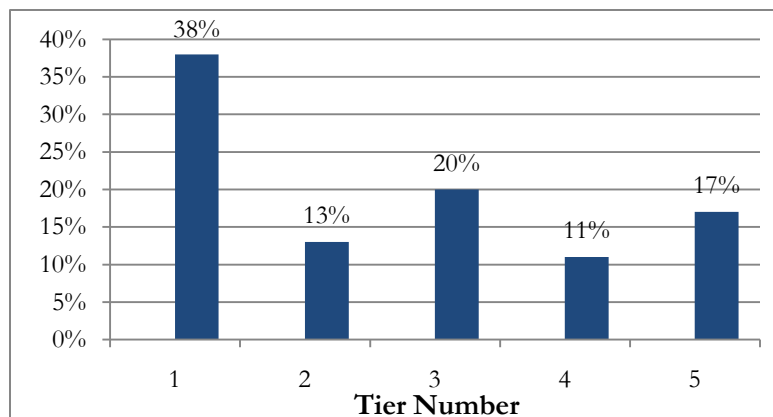
Recall that SUSD aims to have the greatest number of students possible in the targeted Tier 1. In fact, Tier 1 did contain the greatest number of students in this sample (n=141, 38%), followed by Tier 3 (n=75, 20%) and Tier 5 (n=63, 17%), see the Table below.

Table 5: Percentage of Sunnyside HS Ninth-graders in Each of Five Tiers

Tier	Count	Percentage
1	141	38%
2	49	13%
3	75	20%
4	42	11%
5	63	17%
Total	370	100%

The percentage of students in each of the five Tiers is also presented graphically in the chart below.

Chart 2: Percentage of Sunnyside HS Ninth-graders in Each of Five Tiers



Next we turn our attention to describing each Tier individually. As the Tiers were created based on academic and attendance data, we expect to document appropriate patterns and relationships between the Tiers.

Tier 1

Although there was valid data in all categories for 141 students, attendance data was only provided for 124 students. The average G.P.A for Tier 1 was 3.22 (Range: 2.5-4.33). The maximum number of grades failed was 1, with an average of 0.03. The

number of total periods absent ranged from 1 to 28 with a mean of 4.15 periods. Please see the Table below.

Table 6: Tier 1 and Academic, Attendance and Resiliency Data

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
Academic	G.P.A.	141	2.5	4.33	3.22	0.48
	Failing Grades	141	0	1	0.03	0.17
Attendance	All Periods Absent	124	1	28	13.3	8.29
	Excused Absent Periods	124	0	27	9.15	7.48
	Unexcused Absent Periods	124	0	28	4.15	5.73
Resiliency	Education	141	1	4	3.37	0.85
	Confidence	141	1	5	3.16	1.08
	Connections	141	1	5	3.35	1.08
	Stress	141	1	5	2.96	1.09
	Well Being	141	1	5	3.44	1.08
	Motivation	141	1	5	3.52	1.19
	Average Resiliency Score	141	1.17	4.67	3.3	0.66

The average resiliency score from the *Revving Up* survey for Tier 1 is 3.30 which means that students scored within $\frac{1}{2}$ standard deviation away from the National Mean. The lowest average score achieved for this Tier on a sub-resiliency category was 2.96 for Stress and the highest was 3.52 for Motivation. Please see the Table above.

Tier 2

There was valid data in all categories for 49 students. The average G.P.A for Tier 2 was 2.94 (Range: 2.5-4.08). The maximum number of grades failed was 1, with an average of 0.02. The number of total periods absent ranged from 29-91 with a mean of 48.90 periods.

Table 7: Tier 2 and Academic, Attendance and Resiliency Data

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
Academic	G.P.A.	49	2.5	4.08	2.94	0.36
	Failing Grades	49	0	1	0.02	0.14
Attendance	All Periods Absent	49	29	91	48.9	17.67
	Excused Absent Periods	49	7	72	31.53	13.99
	Unexcused Absent Periods	49	0	54	17.37	14.36
Resiliency	Education	49	1	4	3.53	0.77
	Confidence	49	1	5	3.02	1.28
	Connections	49	1	5	3.35	1.05
	Stress	49	1	5	2.96	1.1
	Well Being	49	1	5	3.16	1.18
	Motivation	49	1	5	3.8	1.19
	Average Resiliency Score	49	1.83	4.83	3.3	0.75

The average resiliency score from the *Success Highways Revving Up* survey for Tier 2 is 3.30 which means that students scored within $\frac{1}{2}$ standard deviation away from the National Mean. The lowest average score achieved for this Tier on a sub-resiliency category was 2.96 for Stress and the highest was 3.80 for Motivation.

Tier 3

Although there was valid data in all categories for 75 students, attendance data was only provided for 74 students. The average G.P.A for Tier 3 was 1.81 (Range: 0.33-2.41). The maximum number of grades failed was 4, with an average of 1.31. The number of total periods absent ranged from 1 to 28 with a mean of 15.41 periods.

Table 8: Tier 3 and Academic, Attendance and Resiliency Data

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
Academic	G.P.A.	75	0.33	2.41	1.81	0.48
	Failing Grades	75	0	4	1.31	1.21
Attendance	All Periods	74	1	28	15.41	8.18

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
	Absent					
	Excused Absent Periods	74	0	26	8.43	6.94
	Unexcused Absent Periods	74	0	25	6.97	5.86
Resiliency	Education	75	1	4	3.07	0.96
	Confidence	75	1	5	2.75	1.25
	Connections	75	1	5	2.95	1.29
	Stress	75	1	5	2.49	1.14
	Well Being	75	1	5	3.21	1.13
	Motivation	75	1	5	3.21	1.26
	Average Resiliency Score	75	1.33	4.83	2.95	0.79

The average resiliency score from the *Success Highways Revving Up* survey for Tier 3 is 2.95 which means that students scored slightly below $\frac{1}{2}$ standard deviation away from the National Mean. The lowest average score achieved for this Tier on a sub-resiliency category was 2.49 for Stress and the highest was 3.21 for both Motivation and Well-being.

Tier 4

There was valid data in all categories for 42 students. The average G.P.A for Tier 4 was 2.01 (Range: 1.2-2.41). The maximum number of grades failed was 1, with an average of 0.48. The number of total periods absent ranged from 31 to 179 with a mean of 62.10 periods.

Table 9: Tier 4 and Academic, Attendance and Resiliency Data

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
Academic	G.P.A.	42	1.2	2.41	2.01	0.32
	Failing Grades	42	0	1	0.48	0.51
Attendance	All Periods Absent	42	31	179	62.1	29.21
	Excused Absent Periods	42	7	126	40.52	22.07

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
	Unexcused Absent Periods	42	1	68	21.57	18.51
Resiliency	Education	42	1	4	3.24	0.98
	Confidence	42	1	5	2.79	1.07
	Connections	42	1	5	2.88	1.19
	Stress	42	1	5	2.79	1.09
	Well Being	42	1	5	2.98	1.22
	Motivation	42	1	5	3.52	1.4
	Average Resiliency Score	42	1.17	4.67	3.03	0.78

The average resiliency score from the *Reving Up* survey for Tier 4 is 3.03 which means that students scored within $\frac{1}{2}$ standard deviation away from the National Mean. The lowest average score achieved for this Tier on a sub-resiliency category was 2.79 for Confidence and Stress and the highest was 3.52 for Motivation.

Tier 5

There was valid data in all categories for 63 students. The average G.P.A for Tier 5 was 0.97 (Range: 0-2.00). The maximum number of grades failed was 5, with an average of 3.22. The number of total periods absent ranged from 29 to 187 with a mean of 72.32 periods.

Table 10: Tier 5 and Academic, Attendance and Resiliency Data

	Variable	N	Minimum	Maximum	Mean	Standard Deviation
Academic	G.P.A.	63	0	2	0.97	0.48
	Failing Grades	63	2	5	3.22	1.1
Attendance	All Periods Absent	63	29	187	72.32	35.83
	Excused Absent Periods	63	5	114	38.13	25.96
	Unexcused Absent Periods	63	2	123	34.19	23.17
Resiliency	Education	63	1	4	3	0.97
	Confidence	63	1	5	2.46	1.35

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Connections	63	1	5	2.68	1.31
Stress	63	1	5	2.21	1.03
Well Being	63	1	5	2.76	1.17
Motivation	63	1	5	3.24	1.29
Average Resiliency Score	63	1	4.67	2.72	0.82

The average resiliency score from the *Revving Up* survey for Tier 5 is 2.72 which means that students scored $\frac{1}{2}$ standard deviation away from the National Mean. The lowest average score achieved for this Tier on a sub-resiliency category was 2.21 for Stress and the highest was 3.24 for Motivation.

Question #2: How do Tiers compare with respect to academic and attendance data? Is there a significant relationship between Tier number and academic and/or attendance data?

In order to examine answers to Question #2, we will first consider the following Table which compares four average student data points across each of the five Tiers.

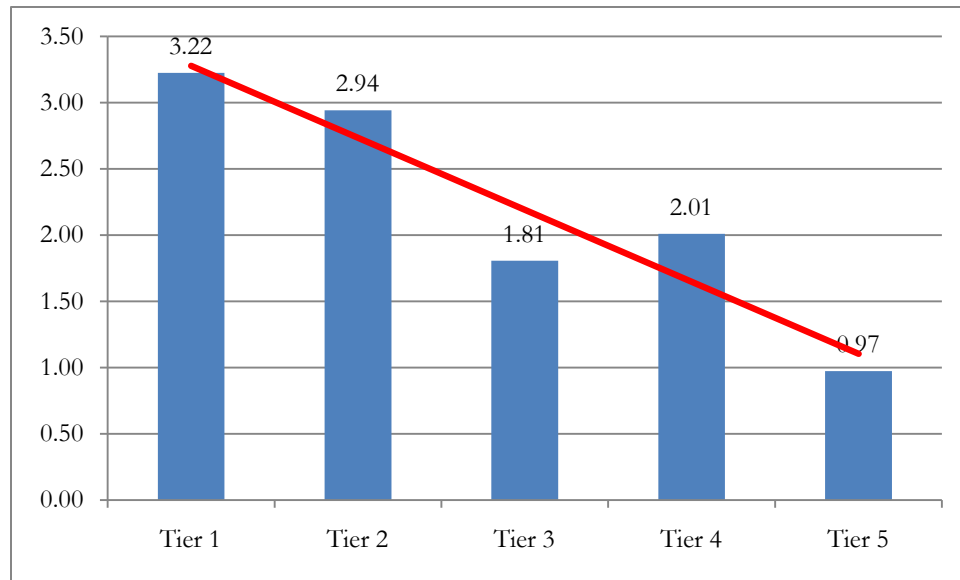
Table 11: Tiers and Academic and Attendance Data

Tier	Statistic	Academic Performance		Unexcused Absent Periods
		G.P.A	# Failing Grades	
Tier 1	Mean	3.22	0.03	4.15
	N	141	141	124
Tier 2	Mean	2.94	0.02	17.37
	N	49	49	49
Tier 3	Mean	1.81	1.31	6.97
	N	75	75	74
Tier 4	Mean	2.01	0.48	21.57
	N	42	42	42
Tier 5	Mean	0.97	3.22	34.19
	N	63	63	63
Total	Mean	2.38	0.88	14.04
	N	370	370	352

Tiers and G.P.A

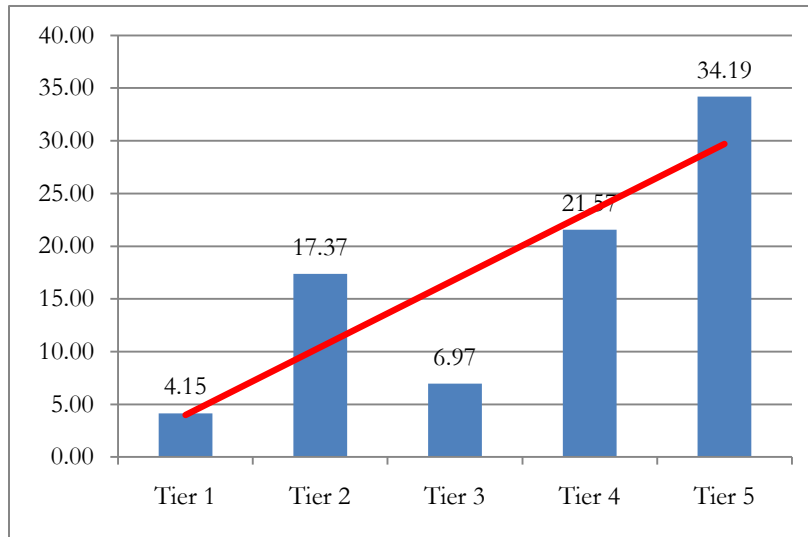
From the table above and the chart below, we demonstrate that average G.P.A of Sunnyside students across different Tiers reflects the design of the Tier system, as G.P.As can generally be seen to be decreasing with each Tier. The only exception to the trend is Tier 3, which has a lower average G.P.A than Tier 4. Students in higher Tiers are clearly performing better in school.

Chart 3: Tiers and G.P.A

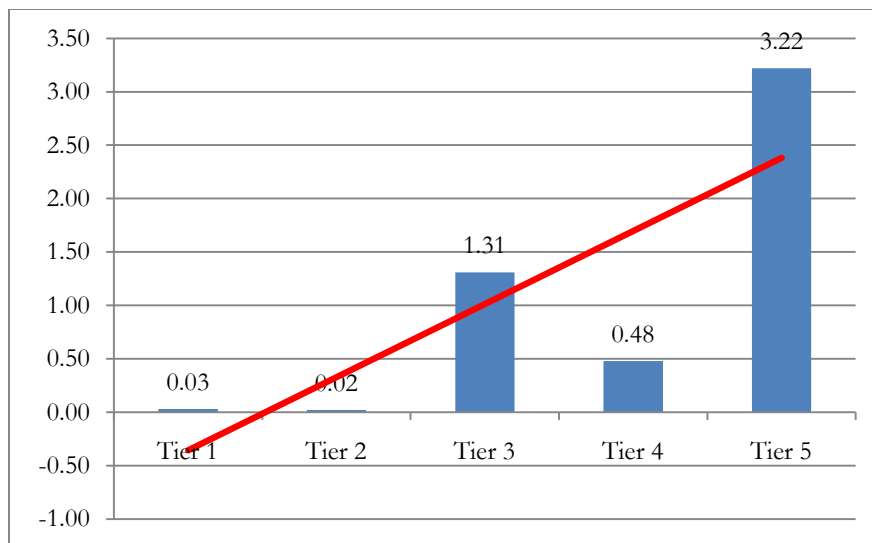


Tiers and Attendance

The average number of unexcused absences for each Tier, which are described in Table 11 above and the Chart below, show that students in higher Tiers generally have more unexcused absences. Tier 3 offers a notable exception, as students in this group have fewer unexcused absences than Tier 2.

Chart 4: Tiers and Unexcused Absences**Tiers and Number of Failing Grades**

Tiers 1 and 2 have about the same average number of failing grades, with both of these figures far below those of other Tier groups. The higher the Tier, the greater number of failing grades.

Chart 5: Tiers and Number of Failing Grades*Significance*

Using the Kruskal-Wallis test, at the significance level of $\alpha = 0.001$, there is enough evidence to suggest that there is a difference among G.P.A, number of failing grades and unexcused absent periods, based on Tier number. Because the Tiers are defined

in terms of G.P.A, number of failing grades and attendance, it is not surprising that these relationships are statistically significant. The trend-lines in the three charts above are given as a visual reference to these significant relationships.

Question #3: Is there a significant relationship between Tier number and Resiliency Status? Do Resiliency scores predict any academic data?

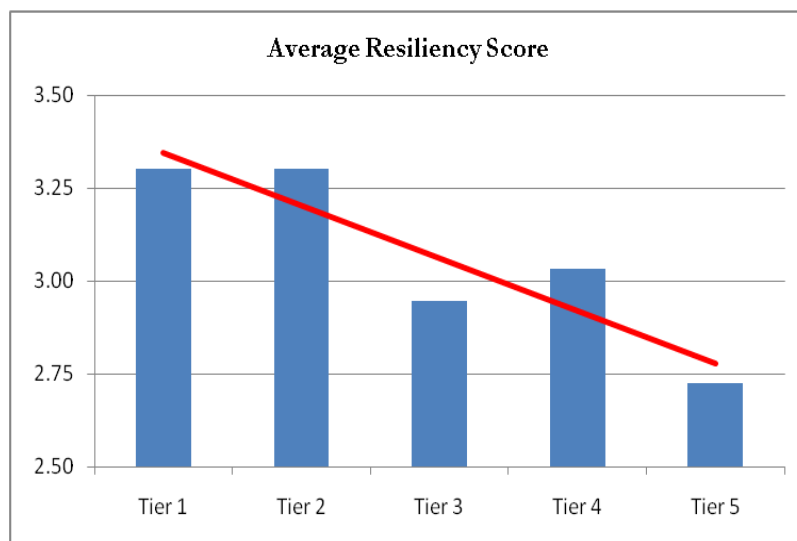
As an introduction to addressing this third question, we first examine the relationship between Tier number and average resiliency score. The Table below shows the average resiliency score according to Tier number

Table 12: Tiers and Average Resiliency Scores

Tier	Average Resiliency Score
1	3.30
2	3.30
3	2.95
4	3.03
5	2.72
Total	3.10

The Chart below demonstrates a visual negative relationship between average resiliency score and Tier number. Using the Kruskal-Wallis test, at the significance level of $\alpha = 0.001$, there is enough evidence to suggest that there is a difference among the average resiliency scores based Tier number. The red trend line in the chart below gives a visual reference to this significant relationship.

Chart 6: Tiers and Average Resiliency Score



Because resiliency scores were gathered in October of 2009 and Tier number was calculated at the end of the semester an important question emerges:

Could Average Resiliency Scores be used to predict into which Tiers a student will fall?

In order to examine this question using statistical methods, we chose Multinomial Logistic Regression, a regression model that generalizes logistic regression and allows more than two discrete outcomes. Using the Multinomial Logistic Regression, at the significance level of $\alpha = 0.05$, there exists enough evidence to conclude that the average resiliency score is useful as a predictor of future Tier number for SUSD students.

There are potential applications for this finding. For example, if a student achieves a low average resiliency score on the *Revving Up* survey in October, then it may be likely that he/she will place in a low Tier at the end of the semester. Possessing this knowledge in advance may help SUSD identify at-risk students.

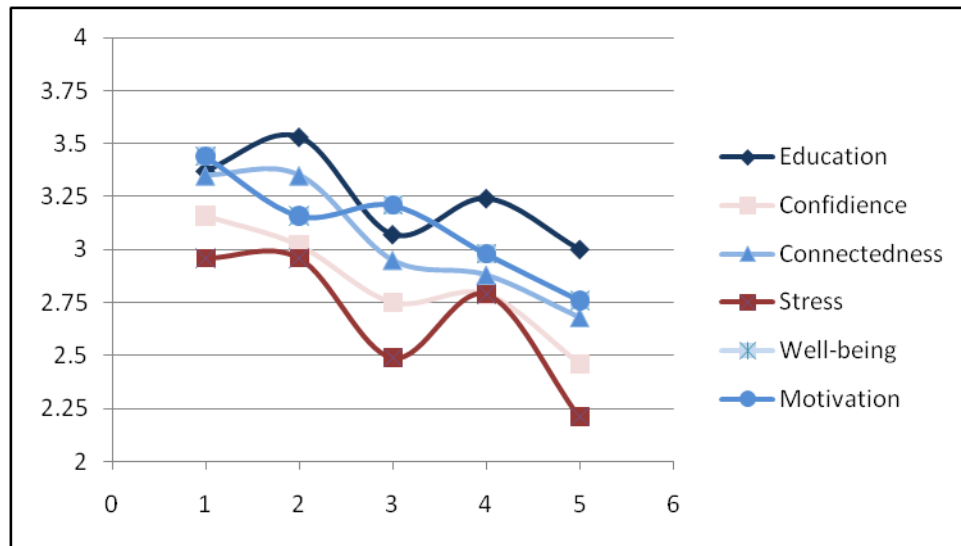
Individual Resiliency Scores

Because there is a significant relationship between Tier number and average resiliency score, we now turn our attention to examining potential significance of individual resiliency scores in predicting Tier number.

The Table plots average individual resiliency scores according to each Tier.

Table 13: Individual Resiliency Scores and Tier Number

Tier	Education	Confidence	Connections	Stress	Well-being	Motivation
1	3.37	3.16	3.35	2.96	3.44	3.52
2	3.53	3.02	3.35	2.96	3.16	3.8
3	3.07	2.75	2.95	2.49	3.21	3.21
4	3.24	2.79	2.88	2.79	2.98	3.52
5	3	2.46	2.68	2.21	2.76	3.24
Total	3.25	2.89	3.1	2.72	3.19	3.45

Chart 7: Individual Resiliency Scores and Tier Number

Could individual resiliency scores be used to predict into which Tiers a student will fall?

In order to examine this question using statistical methods, we again chose Multinomial Logistic Regression. Using the Multinomial Logistic Regression, at the significance level of $\alpha = 0.05$, there exists enough evidence to conclude that Confidence and Stress (marked in pink and burgundy above) are useful as predictors of future Tier number for SUSD students.

There are potential applications for this finding. Possessing this knowledge in advance may help SUSD put interventions in place for students who achieve low scores in Confidence and Stress.

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