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The Relationship of Selected Academic and Achievement
Variables with the Consistency of a Health Careers Choice

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Abstract: The purpose of this study was to investigate the consistency of career decision making and its relationship with selected achievement and academic variables. The study analyzed data which were obtained from students who took both the American College Testing Assessment and the American College Testing Plan. It included students who chose a health career and, for the most part, were interested in a traditional four year college education. In addition to selected achievement test scores, the study analyzed (a) sureness of career choice; (b) high school course patterns in mathematics and natural science; (c) high school academic achievement; and (d) gender, race and ethnicity, and states which participants represented.

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The general achievement and academic performance of students interested in health careers is an issue for both educators and employers. **Postsecondary** educators have been **particularly** interested in selecting students who score high on standardized tests and employers increasingly make use of transcripts and test scores in hiring decisions. Consistency of career choice is important for two basic reasons. First, it appears to affect achievement as students with career focus are thought to prepare themselves better than those without such focus (Bean, 1982; Miller, Snider, & Rzonca (1990; Super, 1983). Second, consistency of career choice, or the lack of same, is also important in a **contemporary** sense as it relates to efforts to implement the Tech-Prep concept. **Will** students who make early career choices stay with them and will they have the necessary background to succeed in **postsecondary** programs? **Is** it important for educational programs to be structured to accommodate changes in career choice and late bloomers?

The purpose of this study was to identify students who made a choice in the tenth grade to pursue a **health** major and determine if they persisted in their choice. Further, the study compared persisters with non-persisters and students who later chose a health career in the eleventh or twelfth grade on selected variables of achievement and academic background.

This study analyzed data which were obtained from students who took both the American College Testing Plan in 1990 **and** the American College Testing Assessment **in** 1993. It included students who chose a health career and for the most part were interested in a traditional four year college education. In addition to selected achievement test scores, the study analyzed (a) sureness of career choice, (b) high school course patterns in mathematics

and natural science, (c) high school academic achievement, and (d) gender, race and ethnicity, and states which participants represented.

Methodology

Study Sample

Of the 229,342 students who took both the ACT Assessment in 1993 and the ACT Plan in 1990, 56,637 indicated health careers as a potential major at one or both test administrations. Table 1 provides a frequency distribution describing when students indicated their career choices. Students selected Health in the ACT Plan from among 17 career choices which also provided for other and undecided categories. In the ACT Assessment, students chose from among 26 specific health careers or health sciences and allied health fields. The health category is one of 23 college majors and occupational clusters from which students may chose. Test scores and data from the student profile section of the ACT Assessment as well as the career choice from the ACT Plan were made available for research purposes from the American College Testing Program, Incorporated.

Analysis of Data

The authors sought to investigate the consistency of career decision making and its relationship with selected achievement and academic variables. Four research questions and data used to respond to each are provided later in this section. First, we described the possibilities of the career choice variable. Initially, we sought to describe three categories; (a) students who indicated a choice of a health career on both the ACT Assessment and the Plan, (b) students who selected health careers only at the time they took the Plan, and (c) students who chose a health career at the time they took the ACT Assessment. We termed

Table 1

Initial Health Career Selection and Grade Level when ACT was Taken

Groups	Frequency	Percent
(1) Chose in Plan --ACT taken in 11th grade	4,488	7.9
(2) Chose in Plan and ACT --ACT taken in 11th grade	6,987	12.3
(3) Chose in ACT --ACT taken in 11th grade	7,642	13.5
(4) Chose in Plan --ACT taken in 12th grade	9,507	16.8
(5) Chose in Plan and ACT --ACT taken in 12th grade	12,299	21.7
(6) Chose in ACT --ACT taken in 12th grade	15,714	27.7
Column Totals	56,637	100.0

our categories persisters, non-persisters, and late bloomers. It became apparent during our initial frequency tabulations that while 97.7 % of students took Plan as tenth graders, a third of these same students (33.8%) took their ACT Assessment **while** in the eleventh **grade** and the remaining 66.2 % took the ACT Assessment in the twelfth grade. To provide for

consistency of data analysis and to reflect the distribution identified in the eleventh and twelfth grade ACT Assessment, we (a) eliminated the 2.3% of students who took the Plan in other than the tenth grade and (b) divided each of the three initial categories into two groups according to whether they took the ACT Assessment in either the eleventh or twelfth grade. Our design, therefore, included six categories based on when students indicated health as a career choice and the grade in which they took the ACT Assessment. While somewhat more cumbersome, this classification system also proved more revealing. For example, analyses based on the earlier groupings identified consistency of career choice as directly related to the highest achievement test scores. When using the six values for career choice, consistency of career choice and eleventh grade ACT Assessment emerged as the group of highest achievement. In fact, the tables show that it is the students who take the ACT Assessment in eleventh grade who score the highest in the achievement tests, regardless of career choice consistency.

These six categories for career choice consistency were used in the analysis of data to answer the four research questions. The first research question investigated sureness of career choice; the second, high school achievement; the third, selected high school course patterns; and the fourth, achievement scores in mathematics, natural sciences, and a composite score. Gender, race and ethnicity, and geographic location of the subjects were also analyzed. Analyses were conducted using the Statistical Package for the Social Sciences (SPSS, 1986).

Results

Research Question One:

How Sure are Health Careers Students in Their Selection of a Major?

Of the six groups representing possible times of career selection, the groups who chose health careers at both the ACT Plan and the ACT Assessment test administrations were most sure. While both groups took the **Plan** in the tenth **grade**, those who also took the ACT in the eleventh grade are represented by the percentage of 45.8% and those who took the ACT in twelfth grade are represented by a percentage of 55.1%. Understandably, those students who initially chose health careers in the tenth grade but changed their career choice in the eleventh grade (24.0%) and twelfth grade (31.2%) showed the lowest percentage in the very sure column.

Research Question Two:

Does Consistency of a Health Career Choice Relate to High School Achievement?

Tables 2 and 3 provide data describing self-reported high school rank and grade point average, respectively. The highest percentage indicating top quarter ranking (Table 2) were the groups consistently choosing health careers, the highest being the eleventh grade ACT test takers (63.3%) **followed** by the twelfth grade ACT test takers (61.6%). The remaining percentages were similar. The lowest percentage (52.8%) in the top quarter was recorded by students who chose health careers in the tenth grade, but not when they took the ACT in the twelfth grade. The self-reported data indicated that the vast majority of health careers students are in either the top or second quarter.

Table 2

Quarterly High School Rank by Indication of Initial Career Selection
and Grade Level when ACT was Taken

Count Row Percent	Top Quarter	Second Quarter	Third Quarter	Fourth Quarter	Row Total
(1) Chose in Plan --ACT taken in 1 lth grade	2303 56.5	1236 30.4	476 11.7	55 1.4	4070 7.6
(2) Chose in Plan and ACT --ACT taken in 1 lth grade	4351 63.3	1882 27.4	592 8.6	47 .7	6872 12.9
(3) Chose in ACT --ACT. taken in 11th grade	4355 57.8	2287 30.4	807 10.7	82 1.1	7531 14.1
(4) Chose in Plan --ACT taken in 12th grade	3892 52.8	2265 30.7	1081 14.7	135 1.8	7373 13.8
(5) Chose in Plan and ACT --ACT taken in 12th grade	7466 61.6	3253 26.8	1269 10.5	138 1.1	12126 22.7
(6) Chose in ACT --ACT taken in 12th grade	8367 54.0	4760 30.7	2112 13.6	251 1.6	15490 29.0
Column Total	30734 57.5	15683 29.3	6337 11.9	708 1.3	53462 100.0

Table 3 describes self-reported grade average. As in Table 2, the highest achievers, in this case an “A” **average**, are again students who chose health careers in both the Plan and the ACT; 45.2 % for eleventh grade ACT test takers and 43.3% for twelfth grade test takers. The percentages for those groups who chose health only on the Plan or the ACT were consistently lower and ranged from 38.5 % to 35.7%,

Table 3

Self Reported High School Grade Average by Initial Career Selection
and Grade Level when ACT was Taken

Count Row Percent	"c" Average	"B" Average	"A" Average	Row Total
(1) Chose in Plan --ACT taken in 1 lth grade	531 13.1	2011 49.5	1524 37.5	4066 7.6
(2) Chose in Plan and ACT --ACT taken in 1 lth grade	622 9.0	3165 45.8	3123 45.2	6910 12.9
(3) Chose in ACT --ACT taken in 1 lth grade	881 11.7	3760 49.8	2904 38.5	7545 14.1
(4) Chose in Plan --ACT taken in 12th grade	1057 14.4	3652 49.7	2641 35.9	7350 13.7
(5) Chose in Plan and ACT --ACT taken in 12th grade	1150 9.5	5742 47.3	5258 43.3	12150 22.7
(6) Chose in ACT --ACT taken in 12th grade	2109 13.6	7829 50.7	5517 35.7	15455 28.9
Column Total	6350 11.9	26159 48.9	5517 35.7	53476 28.9

Research Question Three

Does Consistency of a Health Career Choice Relate to Selected High School Course Patterns?

Tables 4 and 5 present self-reported high school course patterns for the subjects of mathematics and natural sciences, respectively. High percentages of students, 96.3% for

mathematics and 88.7% for natural sciences, planned to take three or four years of these high school subjects.

The highest percentages of those students who planned to take four years of mathematics were reported by eleventh grade ACT test takers with the highest (80.1%) being reported by the group choosing health careers in both the Plan and the ACT. Among twelfth grade ACT test takers, the highest percentage (75.5%) planning four years of mathematics were students consistently choosing health careers in both the Plan and the ACT. The highest percentage of students who planned to take four years of natural sciences was reported by students who consistently chose health careers and took the ACT in the eleventh grade (71.2%) followed by students who chose health careers when they took the ACT in the eleventh grade (63.3%). Students who consistently chose health careers and took the ACT in the twelfth grade followed closely with a percentage of 63.0%.

Research Question Four

How Does the Consistency of a Health Careers Choice Relate to Selected Act Achievement Measures?

Tables 6, 7, and 8 present the analysis of variance of ACT Achievement test scores for mathematics, natural sciences and the composite score, respectively, by initial health career choice and grade level when the ACT Assessment was taken. The group means for mathematics ranged from 20.25 to 22.35, for natural sciences from 20.81 to 23.08, and for the composite ACT from 20.94 to 23.14.

The patterns of statistical significance were the same in all three tables. All had a significant F probability at less than the .05 level using one-way analysis of variance. The

Table 4

Years of High School Mathematics Completed by Indication of Initial Career Selection and Grade Level when ACT was Taken

Count Row Percent	One Year	Two Year	Three Year	Four Year	Row Total
(1) Chose in Pkm --ACT taken in 1 lth grade	6 .1	155 3.8	840 20.5	3102 75.6	4103 7.6
(2) Chose in Plan and ACT 15 --ACT taken in 1 lth grade		173 2.5	1198 17.2	5562 80.1	6948 12.9
(3) Chose in ACT --ACT taken in 1 1th grade	12 .2	250 3.3	1503 19.8	5838 76.8	7603 14.1
(4) Chose in Plan --ACT taken in 12th grade	24 .3	275 3.7	1790 24.1	5336 71.9	7425 13.8
(5) Chose in Plan and ACT 21 --ACT taken in 12th grade		361 3.0	2606 21.4	9200 75.5	12188 22.6
(6) Chose in ACT --ACT taken in 12th grade	45 .3	620 3.9	3830 24.6	11104 71.2	15589 28.9
Column Total	123 .2	1824 3.4	11767 21.8	40142 74.5	53856 100.0

.05 level was also selected to determine statistical **significance** between groups using the LSD **Modified** follow-up test. Those students who took the ACT Assessment in the eleventh grade had higher means in all achievement test areas than students who took the ACT Assessment in the twelfth grade. These mean differences were statistically significant and higher regardless of career choice consistency.

Table 5

Years of High School Natural Science Completed by Indication of Initial Career Selection and Grade Level when ACT was Taken

Count Row Percent	One Year	Two Years	Three Years	Four Years	Row Total
(1) Chose in Plan --ACT taken in 11th grade	64 1.6	422 10.4	1295 31.8	2288 56.2	4069 7.6
(2) Chose in Plan and ACT --ACT taken in 11th grade	66 1.0	379 5.5	1542 22.4	4906 71.2	6893 12.9
(3) Chose in ACT --ACT taken in 11th grade	96 1.3	607 8.1	2061 27.3	4775 63.3	7539 14.1
(4) Chose in Plan --ACT taken in 12th grade	145 2.0	1016 13.8	2583 35.0	3631 49.2	7375 13.8
(5) Chose in Plan and ACT --ACT taken in 12th grade	150 1.2	947 7.8	3372 27.9	7624 63.0	12093 22.6
(6) Chose in ACT --ACT taken in 12th grade	335 2.2	1821 11.8	4951 32.1	8321 53.9	15428 28.9
Column Total	856 1.6	5192 9.7	15804 29.6	31545 59.1	53397 100.0

Within the eleventh grade ACT Assessment test takers, statistically significant mean differences were identified among the three groups. The highest mean was reported for the group consistently choosing a health career in both the Plan and the ACT Assessment. The mean for this group was consistently higher than the group means of students choosing a health career in either the Plan or the ACT. The group mean of students who chose a health

Table 6

Analysis of Variance for Mathematics ACT Scores by Initial Career Selection
and Grade Level when ACT was Taken

Source	D.F.	M.S.	F Ratio	F Probability
Between	5	6181.36	285.00	.00
Within	56629	21.69		

Groups	count	Mean	SD	Significant Differences*
(1) Chose in Plan --ACT taken in 1 lth grade	4488	21.94	4.91	1 > 4,5,6
(2) Chose in Plan and ACT --ACT taken in 1 lth grade	6987	22.35	4.86	2 > 1,3,4,5,6
(3) Chose in ACT --ACT taken in 1 lth grade	7642	21.79	4.79	3 > 4, 5, 6
(4) Chose in Plan --ACT taken in 12th grade	9506	20.76	4.72	4 > 6
(5) Chose in Plan and ACT --ACT taken in 12th grade	12299	20.88	4.59	5 > 6
(6) Chose in ACT --ACT taken in 12th grade	15713	20.25	4.44	

* p < .05

Table 7

Analysis of Variance for Natural Science ACT Scores by Initial Career Selection
and Grade Level when ACT was Taken

Source	D.F.	M.S.	F Ratio	F Probability
Between	5	7700.43	408.65	.00
Within	56623	18.84		

Groups	Count	M e a n	SD	Significant Differences*
(1) Chose in Plan --ACT taken in 11th grade	4488	22.63	4.66	1>4,5,6
(2) Chose in Plan and ACT --ACT taken in 11th grade	6987	23.08	4.65	2>1,3,4,5,6
(3) Chose in ACT --ACT taken in 11th grade	7641	22.54	4.58	3>4,5,6
(4) Chose in Plan --ACT taken in 12th grade	9505	21.30	4.33	4 > 6
(5) Chose in Plan and ACT --ACT taken in 12th grade	12299	21.31	4.18	5 > 6
(6) Chose in ACT --ACT taken in 12th grade*	15709	20.81	4.11	

p < .05

Table 8

Analysis of Variance for Composite ACT Scores by Initial Career Selection
and Grade Level when ACT was Taken

Source	D.F.	M s .	F Ratio	F Probability
Between	5	6961.47	384.22	.00
Within	56622	18.12		

Groups	Count	Mean	SD	Significant Differences *
(1) Chose in Plan --ACT taken in 11th grade	4488	22.77	4.52	1>4,5,6
(2) Chose in Plan and ACT --ACT taken in 11th grade	6987	23.14	4.41	2>1,3,4,5,6
(3) Chose in ACT --ACT taken in 11th grade	7641	22.60	4.40	3>4,5,6
(4) Chose in Plan --ACT taken in 12th grade	9504	21.49	4.31	4 > 6
(5) Chose in Plan and ACT --ACT taken in 12th grade	12299	21.56	4.14	5 > 6
(6) Chose in ACT --ACT taken in 12th grade	15709	20.94	4.09	

*p < .05

career in the Plan was **significantly** higher than the group mean of students who chose a health career when taking the ACT Assessment in the eleventh grade.

The pattern for students who took the ACT in the twelfth grade was also the same for all three achievement tests. The mean of the group of students who chose a health career in the Plan did not significantly differ from the group representing students who consistently chose a health career in both the Plan and the ACT. Both of these groups did, however, have **significantly** higher group means than those students who chose a health career when taking the ACT in the twelfth grade.

Sample Description

Tables 9 through 12 briefly describe the sample. Table 9 describes when health careers were chosen, Table 10 the gender of participants, Table 11 the race or ethnicity and Table 12 the states represented in the sample,

Table 9 shows that 34% consistently chose a health career in both the Plan and the ACT. Another 41.2 % chose a health career when taking the ACT in either the eleventh or twelfth grade. The remaining 24.7 % initially chose a health career in the tenth grade when taking the Plan, but then chose a different major when taking the ACT in either the eleventh or twelfth grade. Many factors contribute to ongoing career decisions. **It** is noted that the students (7.9%) who initially chose a health career in **the Plan** and selected another major when they took the ACT in the eleventh grade were the most capable as evidenced by ACT Achievement test scores and high school performance.

Table 10 describes participants by gender. Typical of the health professions, a large percentage (70.8) of the participants are female.

Table 11 displays the race and/or ethnicity of the sample. The vast majority of the sample were Caucasian Americans (77.9%) followed by African Americans (6.5%). Asian-

Table 9

Surety of Occupational Choice by Initial Career Selectionand Grade Level when ACT was Taken

Count Row Percent	Very SUE	Fairly Sure	Not Sure	Row Total
(1) Chose in Plan --ACT taken in 11th grade	976 24.0	1938 47.6	1160 28.5	4074 28.5
(2) Chose in Plan and ACT --ACT taken in 11th grade	3177 45.8	3084 44.4	678 9.8	6939 12.9
(3) Chose in ACT --ACT taken in 11th grade	2480 32.7	3849 50.8	1246 16.4	7575 14.1
(4) Chose in Plan --ACT taken in 12th grade	2294 31.2	3255 44.3	1796 24.5	7345 13.7
(5) Chose in Plan and ACT --ACT taken in 12th grade	6710 55.1	4589 37.7	876 7.2	12175 22.7
(6) Chose in ACT --ACT taken in 12th grade	6586 42.4	7013 45.1	1936 12.5	15535 29.0
Column Total	22223 41.4	23728 44.2	7692 14.3	53643 100.0

Table 10

Gender of Participants

	Frequency	Percent
M a l e	16,555	29.2
Female	40,082	70.8
Total	56,637	100.0

Table 11

Race and Ethnicity of Participants

	Frequency	Percent
African American/Black	3,368	6.5
American Indian, Alaskan Native	571	1.0
Caucasian American	44,126	77.9
Mexican-American/Chicano	1,272	2.2
Asian-American, Pacific Islander	2,089	3.7
Puerto Rican, Cuban, other Hispanic origin	651	1.1
Other	568	1.0
I prefer not to respond	864	1.5
Missing	2,828	5.0
Total	56,637	100.0

Americans and Mexican-Americans are reported at 3.7% and 2.2%, respectively, followed in decreasing percent by Puerto Ricans (1.1%) and American Indians (1.0%).

Table 12 shows the states represented in the study. Even though the 50 states are included the number of test takers varies greatly. The first category of less than 1000 contains the most variability from a few test takers to more than 900. It was difficult to identify a scheme to portray the sample without listing each state with its frequency. Table 12 does, however, identify the states most represented in the study which typify the overall ACT participation.

Table 12

States Represented by Participants

Number of Participants	Alphabetic State Abbreviation
Less than 1,000	AK, AZ, CA, CT, DC> DE, GA, HI, ID, IN, KS, MA, MD, MN, MT, NC, ND, NH, NJ, NM, NV, OR, PA, RI, SC, SD, VA, VT, WA, WY
1,000 to 1,999	AR, CO, FL, IA, NE, NY, OK, UT, WV
2,000 to 2,999	AL, KY, MO, MS, TX, WI
3,000 or more	IL, LA, MI, OH, TN,

Summary

The **findings** tend to support the assumption that consistency of career choice is related to sureness of career choice (Table 9), and academic achievement (Tables **2 and 3**). **The three** tables show that students who are consistent in career choice, as determined by choosing a health **career when** taking both the ACT Plan and the ACT Assessment, are more sure of their career choice, more likely to be in the top quarter of their high school class, and more **likely to** have a 3.5-4.0 for their high school grade point average.

A somewhat different pattern emerges when mathematics and natural science are considered. In the mathematics area, which is very helpful but not critical to a health career, the three groups representing eleventh grade ACT Assessment test takers planned to take four years of mathematics. For this group of eleventh graders, the highest percentage (80.1%) is reflected for those students who consistently chose health careers. The percentage for students who consistently chose health careers but took the ACT Assessment in the twelfth

grade (75.4 %) is close to the **remaining** eleventh grade groups (76.8%, 75.6%). We conclude that consistency in choosing a health career is related to taking four or more years of high school mathematics.

In the natural sciences area, which is more essential than the mathematics area for a health career, the amount of course work taken is more strongly associated with consistency of health careers choice. The highest percentage (71.2%) of students who planned to take four years of high school natural sciences is reflected in the group consistently choosing a health career and taking the ACT Assessment in the eleventh grade. This group is followed by students who indicated a health career when **taking** the ACT Assessment in eleventh grade (63.3 %) and those who consistently choose a health career but took the ACT assessment in the twelfth grade (63.0 %). Given the minor difference in these latter groups we concluded consistency of a **health** careers choice is positively related to the amount of natural science taken.

The analysis of consistency of a health careers choice and achievement test scores provided different results. Three achievement test scores were selected; mathematics, natural sciences and a composite of all test scores. **In** all three tables, the tests of statistical **significance** were the same.

Regardless of when the **career** choice was made, those students who took the **ACT** Assessment in the eleventh grade had **significantly** higher mean scores than students who took the same assessment in the twelfth grade. While the eleventh grade ACT Assessment takers who consistently chose health careers had a higher mean score than those who selected health when taking either the Plan or the ACT Assessment, no difference was found between

these latter groups who chose at either the Plan or the ACT Assessment. For students who took the ACT Assessment while in the twelfth **grade**, those who chose a health **career** when taking the Plan and those who consistently chose health careers had **significantly** higher means than those students who chose health during the twelfth grade.

The **first** cut appeared to have been made by those students who confidently prepared themselves to take the ACT Assessment in the eleventh grade, and within this group, career decision consistency made a **difference**. For twelfth grade students, those who chose a health career in the ACT Assessment had the lowest achievement test scores.

Conclusions

Consistency of career decision making, at least as it relates to health careers, is positively associated with sureness of decision, academic proficiency, and course completion in mathematics and natural sciences. It is also related to achievement test scores among students that take the ACT Assessment in the eleventh **grade**. We conclude that the data support relatively early and stable career decision making. These findings support career decision-making theory and one of the proposed benefits of the Tech-Prep model.

We also feel, however, that the data point to career decision-making as a continual process and that there are dangers in either locking students in or out. In our sample, 34% consistently chose a health career in the tenth grade and again in either the eleventh or twelfth grade. This 34% fits the Tech-Prep model nicely. Then there were 24.7 % who changed their mind. This group fits career decision-making theory in that they likely reassessed their abilities and interests and chose a different career. These non-persisters do not fit the Tech-Prep model as currently advocated and we urge caution as such programs are

evaluated to allow for a balance of individual and program needs. Specifically, students should be allowed to explore programs and programs should not be considered unsuccessful if students change their mind. We acknowledge that our data do not describe students who have participated in a Tech-Prep program, but feel the value of our data lie in describing students whose decision-making, other than being committed to college, were not encumbered by specific occupational program goals.

Last were the groups which chose health careers in either eleventh or twelfth grade (41.2 %). Those in eleventh grade were among the most capable, while those in the twelfth least capable as measured by the achievement test scores. We note that being the lowest in this case is not bad. The scores are respectable, high school ranks, and grade point averages quite good. The vast majority planned on at least three years of high school mathematics and natural sciences. We concluded that these students were very capable and caution against rigid curricula that would prevent their participation in health careers programs.

Implications for Additional Research

Our data point to additional needs in career decision-making and curricula:

1. As the Tech-Prep model develops, we suggest a similar study involving applied learners participating in such programs and a comparison with students in traditional collegiate preparatory programs.
2. There is a need to analyze career interest inventories with respect to the career decisions of students in concert with achievement and academic variables.

3. The curricula of high school, community college, and four year institutions should be analyzed as to their ability to provide ladders and lattices for the not-so-tightly focused student.

4. Regardless of the Federal position on **affirmative** action, data should be analyzed to reflect potential differences related to gender, race and **ethnicity**.

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