



Start of Block: required_student_info

s_somads

Student Survey of Motivational Attitudes toward Data Science

first First Name (as it would appear on a class roster):

last Last Name (as it would appear on a class roster):



email Your **School** Email Address:

End of Block: required_student_info

Start of Block: optional_instructor_consent



Display this question:

If If False

instructor_consent Click to write the question text

- ☐ Yes: I agree to participate (1)
- ☐ No: I do not agree to participate (2)

End of Block: optional_instructor_consent

Start of Block: required_masder_consent



masder_consent **Title of research study:** Developing Validated Instruments to Measure Student/Faculty Attitudes in Undergraduate Statistics and Data Science Education **IRB #:** IRB-FY2025-79 **Investigator:** Michael A. Posner, Professor of Statistics and Data Science, michael.posner@villanova.edu, 610-519-3016 **Key Information:** This study involves research and is voluntary. You can stop at any time without penalty. **Purpose of the Research:** We are gathering data on attitudes toward data science. We are interested in (1) what these attitudes are, and (2) how attitudes relate to student and instructor characteristics and classroom environment. The following survey asks demographic information and about your attitudes towards data science. The long term goal of this research is to improve instruction in data science courses. **Procedures:** The entire survey should take about 15 minutes to complete. We request that you complete every item, but you are not required to do so. Participants must be at least 18 years of age. You have been asked to give us your name and email address so that we can link your pre-class survey responses with your post-class survey responses. Your survey responses may be linked with other data collected as a part of this study. Your instructor may request a list of student names who have completed the survey in order to award credit (as a required assignment or for extra credit). Students who do not consent and stop before completing the survey will still be eligible for this credit and will be included in this list. Your instructor will have access to the complete data for their class, including your name and email address. However, access to this data will not be granted until the course is over. A dataset that



excludes all personal identifying information will be made publicly available for educational researchers. The study investigator may grant access to approved researchers to use identifiable data for validated studies after a Data Use Agreement has been signed. **Risks / Discomforts:** This study is educational research and does not have any known associated risks. **Benefits to Prospective Subjects and/or to Others:** By filling out this attitudes survey, you may be better able to identify your feelings toward data science. Your responses may also aid your instructor and data science education researchers in improving instruction in data science courses. For Villanova-specific resources and other mental health resources, visit the Villanova IRB website. To view these online, navigate to irb.villanova.edu and click "Participating in a Research Study." As a participant in research, you have rights. Visit the Villanova IRB website to read the Participant Bill of Rights. To read online, navigate to irb.villanova.edu and click "Participating in a Research Study." **Consent will be given through clicking "I accept" on Qualtrics surveys, by selecting one of the following options:** I have read and understand the terms and conditions of this research study and agree to participate. I understand my participation is voluntary and that I may withdraw at any time without penalty. By clicking "yes" I am indicating my permission to participate in this study.

- ☐ Yes: I agree to participate AND am 18 years or older (1)
- ☐ No: I do not agree to participate, OR I am under 18 years old (0)

End of Block: required_masder_consent

Start of Block: required_constructs

construct_directions

DIRECTIONS The statements below are designed to identify your attitudes toward data science. Each item has 7 possible responses. The responses range from "Strongly Disagree" through "Neither Agree Nor Disagree" to "Strongly Agree". Please read each statement. Mark the ONE response that most clearly represents your degree of agreement or disagreement with that statement. Try not to think too deeply about each response. Record your answer and move quickly to the next item. Please respond to all the statements.



items

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree Nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I would feel good about myself if I helped a friend or peer with data science. (sd_attain_1)	☐	☐	☐	☐	☐	☐	☐
Completing a data science project gives me a sense of satisfaction. (sd_attain_2)	☐	☐	☐	☐	☐	☐	☐
I would feel proud if someone told me that I was good at data science. (sd_attain_3)	☐	☐	☐	☐	☐	☐	☐
Learning data science is important to me. (sd_attain_4)	☐	☐	☐	☐	☐	☐	☐
Understanding data science makes me feel good about myself. (sd_attain_5)	☐	☐	☐	☐	☐	☐	☐
Doing well in data science is important to my sense of self. (sd_attain_6)	☐	☐	☐	☐	☐	☐	☐
I have good time management skills. (sd_acadsc_1)	☐	☐	☐	☐	☐	☐	☐



When I do not understand
a concept or skill, I often
ask for help.
(sd_acadsc_2)

☐	☐	☐	☐	☐	☐	☐
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I know how to prioritize
my time to accomplish
goals. (sd_acadsc_3)

☐	☐	☐	☐	☐	☐	☐
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I seek out additional
information when I do not
understand something.
(sd_acadsc_4)

☐	☐	☐	☐	☐	☐	☐
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I find myself to be an
overachiever when it
comes to academics.
(sd_acadsc_5)

☐	☐	☐	☐	☐	☐	☐
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I know how to take good
notes. (sd_acadsc_6)

☐	☐	☐	☐	☐	☐	☐
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I avoid working on things
that are intimidating to
me. (sd_acadsc_7)

☐	☐	☐	☐	☐	☐	☐
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I am willing to seek help
when I am struggling
academically (e.g., asking
a
tutor/professor/colleague).
(sd_acadsc_8)

☐	☐	☐	☐	☐	☐	☐
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I am willing to seek help
from others when I am
struggling academically.
(sd_acadsc_9)

☐	☐	☐	☐	☐	☐	☐
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Learning data science is
worth being frustrated at
times. (sd_worth_1)

☐	☐	☐	☐	☐	☐	☐
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I would rather learn any subject other than data science. (sd_worth_2)

☐	☐	☐	☐	☐	☐	☐
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Improving my data science skills is worth the effort. (sd_worth_3)

☐	☐	☐	☐	☐	☐	☐
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The time I spend learning data science is time well spent. (sd_worth_4)

☐	☐	☐	☐	☐	☐	☐
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Learning data science is worth spending money on. (sd_worth_5)

☐	☐	☐	☐	☐	☐	☐
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I have more important things to do than learning data science. (sd_worth_6)

☐	☐	☐	☐	☐	☐	☐
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Learning data science is hard for me. (sd_difficulty_1)

☐	☐	☐	☐	☐	☐	☐
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I have trouble understanding data science. (sd_difficulty_2)

☐	☐	☐	☐	☐	☐	☐
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Making sense of statistical results is difficult for me. (sd_difficulty_3)

☐	☐	☐	☐	☐	☐	☐
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Explaining data science to others is difficult for me. (sd_difficulty_4)

☐	☐	☐	☐	☐	☐	☐
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It is challenging to solve a problem that requires using data science. (sd_difficulty_5)

☐	☐	☐	☐	☐	☐	☐
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I have to work hard to understand data science. (sd_difficulty_6)	☐	☐	☐	☐	☐	☐	☐
I am interested in learning more about data science. (sd_intenj_1)	☐	☐	☐	☐	☐	☐	☐
I love using data science to solve real-world problems. (sd_intenj_2)	☐	☐	☐	☐	☐	☐	☐
I find satisfaction in completing a data science task. (sd_intenj_3)	☐	☐	☐	☐	☐	☐	☐
I want to learn data science. (sd_intenj_4)	☐	☐	☐	☐	☐	☐	☐
I get excited to share things I have learned from data. (sd_intenj_5)	☐	☐	☐	☐	☐	☐	☐
I enjoy using data to answer questions. (sd_intenj_6)	☐	☐	☐	☐	☐	☐	☐
Doing data science is a lot of fun. (sd_intenj_7)	☐	☐	☐	☐	☐	☐	☐
Conversations about data science are stimulating. (sd_intenj_8)	☐	☐	☐	☐	☐	☐	☐
Playing with data is exciting. (sd_intenj_9)	☐	☐	☐	☐	☐	☐	☐
I can make a difference in the world using data science. (sd_goals_1)	☐	☐	☐	☐	☐	☐	☐



If I learn data science, I
will look smart.
(sd_goals_2)

☐	☐	☐	☐	☐	☐	☐
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Making a new discovery
from data is personally
rewarding. (sd_goals_3)

☐	☐	☐	☐	☐	☐	☐
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Data science helps me
better understand media
and news reports that use
data. (sd_goals_4)

☐	☐	☐	☐	☐	☐	☐
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Being good at data
science gives me great
satisfaction. (sd_goals_5)

☐	☐	☐	☐	☐	☐	☐
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I am afraid I will look
incompetent if I cannot do
data science.
(sd_goals_6)

☐	☐	☐	☐	☐	☐	☐
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Data science helps me to
make informed choices
for myself. (sd_utility_1)

☐	☐	☐	☐	☐	☐	☐
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Being good at data
science will give me
financial security.
(sd_utility_2)

☐	☐	☐	☐	☐	☐	☐
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Knowing data science will
help me look more
appealing to employers.
(sd_utility_3)

☐	☐	☐	☐	☐	☐	☐
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A lack of data science
knowledge will limit my
career choices.
(sd_utility_4)

☐	☐	☐	☐	☐	☐	☐
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I need to know data science because it will be expected of me in the future. (sd_utility_5)

I will rarely use data science in the future. (sd_utility_6)

Data science is helpful for understanding the world around me. (sd_utility_7)

I am able to explain results using data to others. (sd_expectancy_1)

I can identify appropriate data science methods for a given problem. (sd_expectancy_2)

I can create appropriate data visualizations. (sd_expectancy_3)

I know how to convert data into a usable format. (sd_expectancy_4)

I can identify unethical data science practices. (sd_expectancy_5)

I can recognize when false claims are made using data. (sd_expectancy_6)

I can explain how the data collection process

☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
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☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐



impacts the interpretation
of the results.

(sd_expectancy_7)

I can explain why it is
important to explore
confounding variables
before making
conclusions.

(sd_expectancy_8)

I can write code to
accomplish a data
science task.

(sd_expectancy_9)

☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

End of Block: required_constrcuts

Start of Block: optional_teach_stud

Display this question:

If SurveyInstance = 2



live_meet Did your data science course have live meetings?

- ☐ Yes, this class had live meetings (in person and/or online) (1)
- ☐ No, this class did not have live meetings (it was only asynchronous) (0)



tsr_grid For each item given, indicate the amount to which you agree with each statement.

Display this choice:

If Did your data science course have live meetings? = Yes, this class had live meetings (in person and/or online)

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Display this choice: If Did your data science course have live meetings? = Yes, this class had live meetings (in person and/or online) I feel comfortable asking my instructor questions during class. (tsr_class) I would feel comfortable contacting my instructor with questions outside of class. (tsr_outside)	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐



My instructor cares about me. (tsr_care)	☐	☐	☐	☐	☐	☐	☐
All interactions I have with my instructor are positive. (tsr_interact)	☐	☐	☐	☐	☐	☐	☐
My instructor knows me individually. (tsr_individual)	☐	☐	☐	☐	☐	☐	☐
My instructor creates opportunities for students to build community in class. (tsr_community)	☐	☐	☐	☐	☐	☐	☐

End of Block: optional_teach_stud

Start of Block: required_personal_demographics





gender What gender do you identify with?

- ☐ Woman (1)
- ☐ Man (2)
- ☐ Non-binary (3)
- ☐ Prefer not to disclose (4)
- ☐ Prefer to self-describe: (5)



age What is your age in years? Please enter an integer.





race What is your race, ethnicity, or origin? Select all that apply.

- ☐ **White:** German, Irish, English, French, etc. (1)
- ☐ **Black or African-American:** African American, Haitian, Nigerian, etc. (2)
- ☐ **Hispanic, Latino or Spanish origin:** Mexican, Mexican-American, Puerto Rican, Cuban, Argentinean, Dominican, Salvadoran, Spaniard, etc. (3)
- ☐ **Middle Eastern or North African:** Lebanese, Egyptian, Turkish, Iranian, etc. (4)
- ☐ **American Indian or Alaskan Native:** Navajo, Mayan, Tlingit, etc. (5)
- ☐ **Asian:** Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Hmong, Laotian, Thai, Pakistani, Cambodian, etc. (6)
- ☐ **Native Hawaiian or Pacific Islander:** Native Hawaiian, Guamanian, Samoan, Fijian, etc. (7)
- ☐ **Other race or origin:** Provide race(s) or origin(s) below. (8)

- ☐ **Prefer not to answer** (9)
-



first_gen Are you a first-generation college student? (A first-generation college student is a student whose parents did not complete a four-year college degree.)

- ☐ Yes (1)
- ☐ No (2)
- ☐ Prefer not to answer (3)

End of Block: required_personal_demographics

Start of Block: optional_course_demographics



fluency This course is taught in a language in which

- ☐ I am a native speaker. (1)
- ☐ I am fluent, but not a native speaker. (2)
- ☐ I am proficient. (3)
- ☐ I am conversant at an intermediate level. (4)
- ☐ I have only basic or little knowledge. (5)
- ☐ I have no knowledge. (6)





class_level Which of the following best classifies you as a student?

- ☐ High school student (1)
 - ☐ Freshman (First Year) (2)
 - ☐ Sophomore (Second Year) (3)
 - ☐ Junior (Third Year) (4)
 - ☐ Senior (Fourth Year) (5)
 - ☐ Fifth or more years in college (6)
 - ☐ Part-time student in college (7)
 - ☐ Graduate student (8)
 - ☐ Other: (9) _____
-



why_take Which of the following best describes why you are taking this class? Select all that apply.

- ☐ It is required for my major. (1)
- ☐ It is an elective for my major. (2)
- ☐ It is required for my minor. (3)
- ☐ It is an elective for my minor. (4)
- ☐ If fulfills a general education requirement. (5)
- ☐ It is not part of my major or minor or general education program, but it gives me additional credits needed to graduate. (6)
- ☐ Other: (7) _____



success_ds Have you successfully completed a data science class before?

- ☐ Yes (1)
 - ☐ No (0)
-



Display this question:

If Have you successfully completed a data science class before? = Yes



ds_where Where did you take that data science course? Select all that apply.

☐

High school (1)

☐

College (2)

☐

Other (3) _____



success_stat Have you successfully completed a statistics class before?

☐ Yes (1)

☐ No (0)

Display this question:

If Have you successfully completed a statistics class before? = Yes



stat_where Where did you take this statistics course? Select all that apply.

- ☐ High School non-Advanced Placement (1)
- ☐ High School Advanced Placement Statistics (2)
- ☐ One other college-level statistics course (3)
- ☐ More than one other college-level statistics course (4)



success_cs Have you successfully completed a computer science class before?

- ☐ Yes (1)
- ☐ No (0)

Display this question:

If Have you successfully completed a computer science class before? = Yes





cs_where Where did you take this computer science course? Select all that apply.

- ☐ High School non-Advanced Placement (1)
- ☐ High School Advanced Placement Computer Science A (2)
- ☐ High School Advanced Placement Computer Science Principles (3)
- ☐ One other college-level computer science course (4)
- ☐ More than one other college-level computer science course (5)

Display this question:

If Have you successfully completed a data science class before? = No



cs_other Which of the following best describes your programming experience?

- ☐ I have no programming experience. (1)
- ☐ I have a little programming experience. (2)
- ☐ I have learned one language, but do not use it frequently. (3)
- ☐ I am very familiar with one programming language. (4)
- ☐ I know multiple programming languages well. (5)
- ☐ Other (6) _____



expected_grade What grade do you anticipate to receive in this course?

- ☐ A (1)
- ☐ A or B (not sure which one) (2)
- ☐ B (3)
- ☐ C (4)
- ☐ D (5)
- ☐ F (6)



gpa_have Do you have a college GPA?

- ☐ Yes (1)
- ☐ No (0)

Skip To: gpa_college If Do you have a college GPA? = Yes

Skip To: gpa_hs If Do you have a college GPA? = No



gpa_college Please give your cumulative college GPA. For example, "My cumulative college GPA is 2.87 out of 4.0."

	Please provide numeric values below. (1)
My cumulative college GPA is (1)	
out of (maximum GPA possible) (2)	

Display this question:

If Do you have a college GPA? = No

gpa_hs Please give your cumulative **high school** GPA. For example, "My cumulative high school GPA was 2.87 out of 4.0" or "3.56 out of 5.0."

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Please provide numeric values below. (1)

My cumulative high school GPA was (1)

out of (maximum GPA possible) (2)

End of Block: optional_course_demographics

Start of Block: optional_major_minor

major1 Pick the field that **best** describes your major or intended major.

First Major Category (1)

Field of Study (2)

▼ Undecided (1) ... Other ~ Other (Please Specify) (71)

Display this question:

If Pick the field that best describes your major or intended major. = Other ~ Other (Please Specify)

major1_other Please specify your major or intended major.



major2 If you have a second major, pick the field that **best** describes your second major or second intended major.

Second Major Category (1)

Field of Study (2)

▼ None (1) ... Other ~ Other (Please Specify) (73)

Display this question:

If If you have a second major, pick the field that best describes your second major or second intend... = Other ~ Other (Please Specify)

major2_other Please specify your second major or second intended major.

minor1 If you have a minor, pick the field that **best** describes your minor.

First Minor Category (1)

Field of Study (2)

▼ None (1) ... Other ~ Other (Please Specify) (73)

Display this question:

If If you have a minor, pick the field that best describes your minor. = Other ~ Other (Please Specify)

minor1_other Please specify your minor.



minor2 If you have a second minor, pick the field that **best** describes your second minor or second intended minor.

Second Minor Category (1)

Field of Study (2)

▼ None (1) ... Other ~ Other (Please Specify) (73)

Display this question:

*If If you have a second minor, pick the field that best describes your second minor or second intend...
= Other ~ Other (Please Specify)*

minor2_other Please specify your second minor.

feedback You are welcome to provide any other comments about your attitudes toward data science.

End of Block: optional_major_minor

Start of Block: optional_add_questions