

Welcome to the NGCP National Webinar

Connecting Out-of-School-Time (OST) Activities and STEM Identity

Tuesday, April 27, 2021

Please respond to the poll and introduce yourself in the chat.

Use the chat to ask questions, respond to one another, and share resources.



NGCP Vision

The National Girls Collaborative Project **brings together organizations** committed to informing and encouraging girls to pursue careers in science, technology, engineering, and mathematics (STEM).



NGCP Goals

1. **Maximize access** to shared resources within organizations interested in engaging girls in STEM.
2. **Strengthen the capacity** of programs by sharing exemplary practice research and models.
3. **Use the leverage of a network** to achieve gender equity in STEM.



NGCP Activities



Increased Collaboration Benefits Girl-Serving STEM Programs

Helped
us better
serve
girls



82%

Increased
girls'
interest
in STEM



78%

Helped my
program be
more
effective



77%

Increased
girls'
confidence
in STEM



77%

Source: NGCP 2015 Annual Survey

National Network of Collaborative Teams



NATIONAL GIRLS COLLABORATIVE PROJECT

Speakers:



Dr. Susan Sunbury

Educational Researcher and Project Manager at the Science Education department at the Center for Astrophysics | Harvard & Smithsonian



Dr. Chen Chen

Research Associate in the Science Education Department at Harvard-Smithsonian Center for Astrophysics



Connecting Out-of-School-Time (OST) Activities and STEM Identity

Susan Sunbury, Ed.D. and Chen Chen, Ed.D.

April 27, 2020

Female Representation in Out-of- School Time Science (FROSTS)

- Advance understanding of female representation in out-of-school time (OST) activities
- Identify and test the OST-related factors that are hypothesized to strengthen interest, identity and career interest in STEM, particularly for female students
- For this webinar, we will focus on STEM identity

This work was supported by NSF Grant Nos. 1612375 and 1611985 *Collaborative Research: A Study of How Pre-College Informal Activities Influence Female Participation in STEM Careers*

Evaluating large-scale and long-term impacts of OST activities

- Evaluation efforts often:
 - occur on a program-by-program basis
 - have small numbers of subjects limiting statistical power
 - use measures of short-term student satisfaction
- Longitudinal studies can:
 - be expensive
 - take a long time

FROSTS

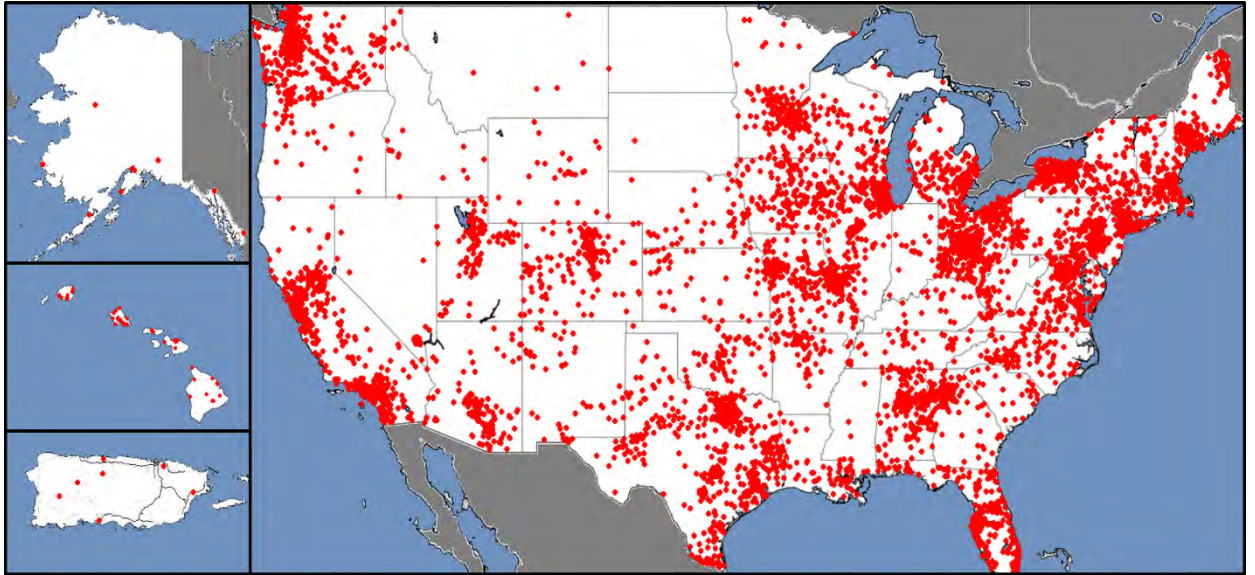
a retrospective cohort study

- Large scale - can obtain representative samples
- More generalizable than small-scale evaluations of specific programs
- Can test the strength of multiple hypotheses
- Can be completed in a short time frame

The FROSTS survey

- Asked students to recall earlier experiences
- Questions based on review of relevant literature, survey of stakeholders and survey students
- Survey pilot tested then sent to over 30,000 students in compulsory first-year courses (English/writing)
- Schools chosen from a stratified random sample of two-year and four-year community colleges and universities

Final nationally representative sample 15,725



Survey questions

- Comprehensive survey - 33 questions (20 minutes)
 - STEM interest
 - **STEM identity**
 - Career interest and motivation
 - Participation in OST activities – structured and unstructured
 - Subjects taken in school/grades/scores
 - Family interest and involvement in STEM
 - Access and barriers to participation
 - Demographics

Measuring STEM identity

	No, Not at all					Yes Very Much
	0	1	2	3	4	5
I see myself as a STEM person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My family sees me as a STEM person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My friends/classmates see me as a STEM person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My classroom STEM teachers see me as a STEM person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My out-of-school teacher see me as a STEM person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel I belong in the STEM community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sample questions about participation in unstructured STEM activities (24 total)

	If you had these experiences, please mark how often and during which grades you participated					
	K-4		5-8		9-12	
	Sometimes	Often	Sometimes	Often	Sometimes	Often
Using tools to tinker with/take apart mechanical devices (e.g., bicycle, watch, door lock)	O	O	O	O	O	O
Playing STEM computer/video games	O	O	O	O	O	O
Baking/cooking/kitchen chemistry	O	O	O	O	O	O
Writing about STEM including creating online blogs/podcasts/videos	O	O	O	O	O	O
Observing clouds or weather patterns						
Indoor/outdoor gardening	O	O	O	O	O	O

Sample questions about participation in structured STEM activities (21 total)

	If you participated in any of these activities, please mark how often and in which grades you participated				This activity increased my interest in STEM
	5-8		9-12		
	Sometimes	Often	Sometimes	Often	Mark if yes
STEM-related extracurricular clubs/teams at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
STEM-related clubs/teams outside of school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Group organization (e.g., Girl Scouts, Boy Scouts, 4H)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maker/DIY STEM activities/events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overnight STEM programs (museums, science centers etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sample questions about opportunities within STEM activities (15 total)

	I experienced this STEM opportunity	This opportunity increased my interest in STEM	This opportunity showed the real-life relevance of STEM
	Mark if yes	Mark if yes	Mark if yes
Interacting with a STEM mentor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interacting with a STEM role model	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Taking on a leadership role	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in hands-on STEM activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using STEM equipment to collect data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning about STEM careers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

60 Activities and Opportunities:

Mechanical tinkering	Electronic tinkering	Cooking and baking	Using STEM equipment	Playing with STEM toys	Puzzles and board games
Read science non-fiction	Read science fiction	Watch STEM TV / movies	online STEM	Play STEM video games	Follow STEM social media
Use STEM apps	Write/blog about STEM	Program games/apps	Train/raise animals	Gardening	Observe animal/bird
Collect nature things	Observe or study stars	Observe or study weather	Photo or video nature	Explore nature	Collect data for scientists
Club or team (school)	Club or team (outside)	Group orgs. (e.g., Scouts)	Maker/DIY STEM events	Overnight programs	STEM cafes
STEM summer camp	‘Citizen science’ prog.	STEM talks or lectures	STEM courses or workshops	STEM leaders conf.	Science fairs
Robotics competitions	Engineering competitions	Computing competitions	STEM research prog.	STEM career days	Tour of STEM settings
STEM job shadowing	STEM internships	or volunteer in	Interact with STEM mentor	Interact with role model	Interact w/ STEM career
Work w/older STEM students	Take on leader role	Mentor/tutor young student	Do hands-on STEM activity	Program with art or design	Real world problems
Use equip. to collect data	Build STEM models	Design/do own project	Work on a team	Present data to others	Learn about STEM careers

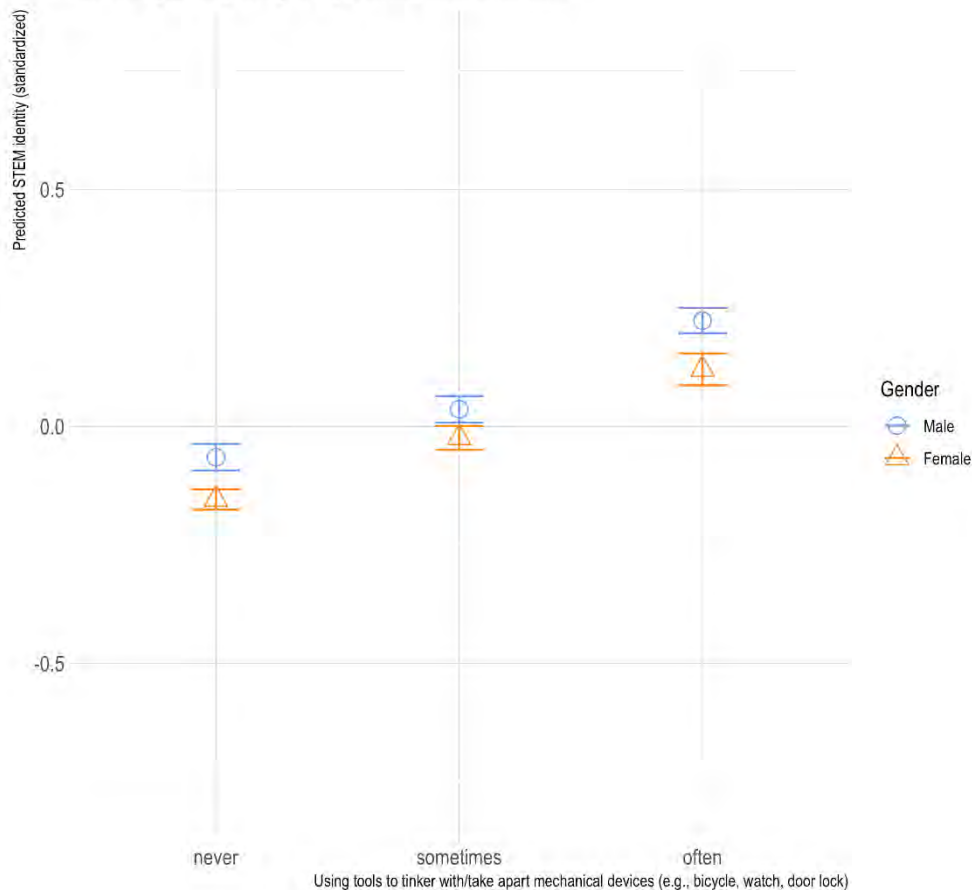
K-4
5-8
9-12

5-8
K-12

Any

Using tools to tinker with/take apart mechanical devices (e.g., bicycle, watch, door lock)
during 9-12 grades
controlling for beginning of high school career interests

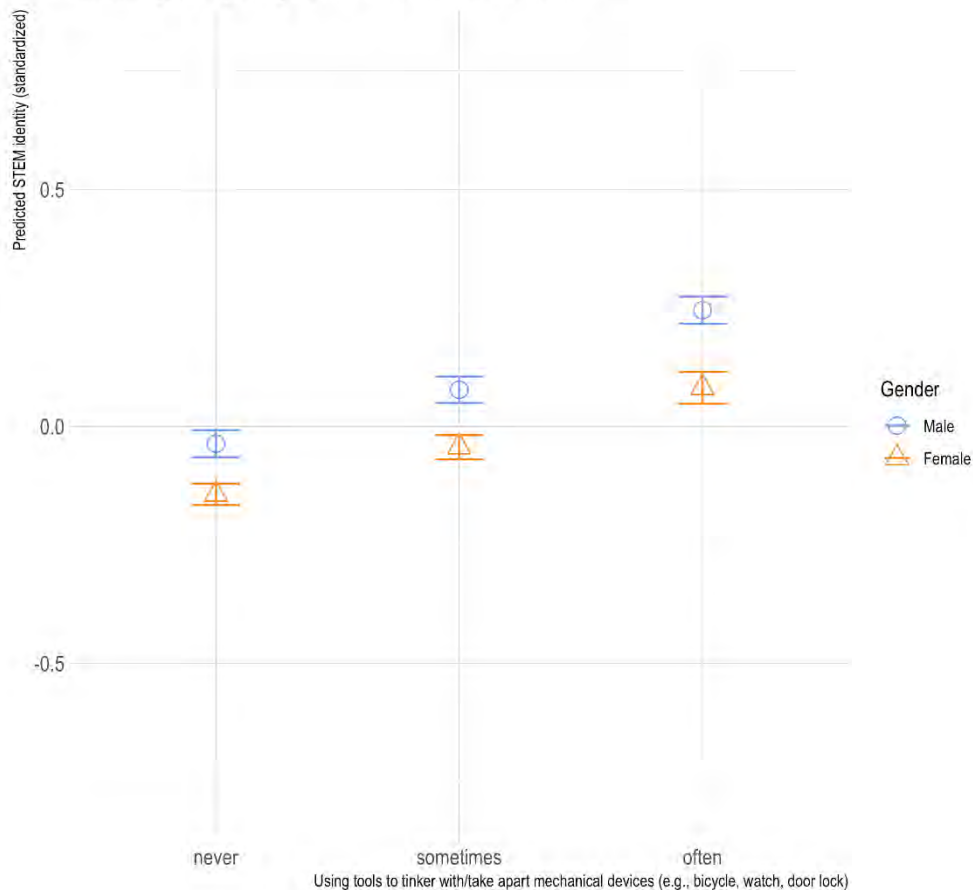
[Back to Index](#)



[Back to Men](#)

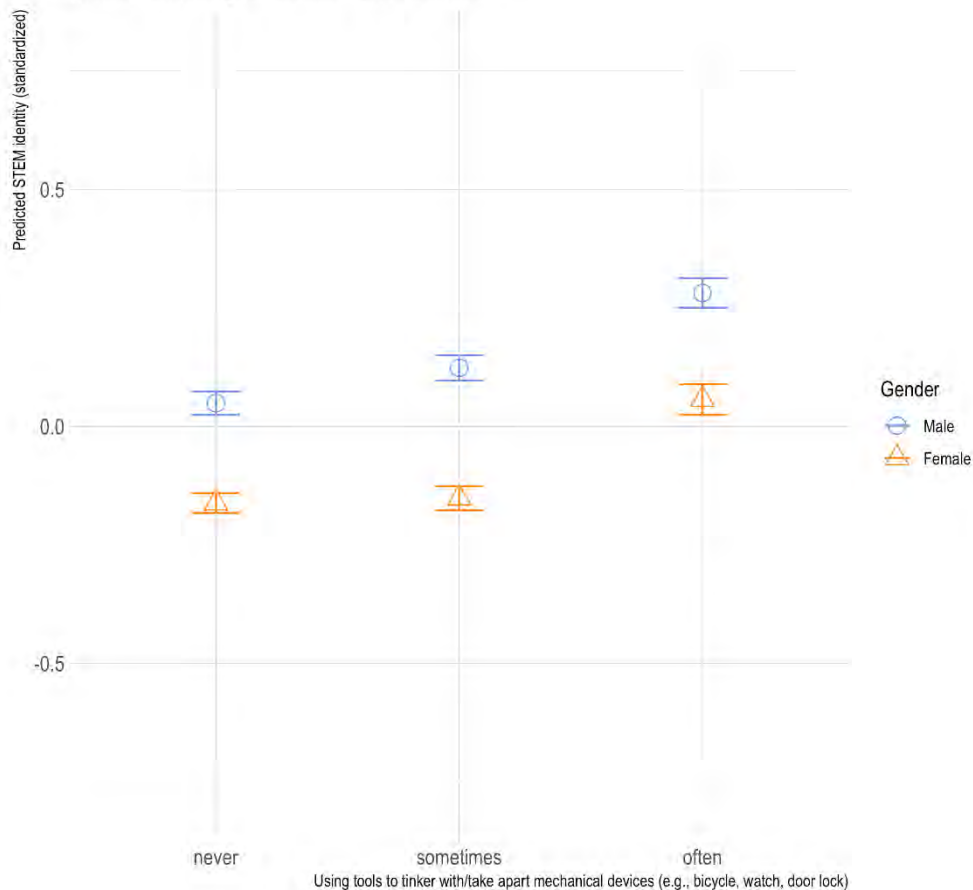
Using tools to tinker with/take apart mechanical devices (e.g., bicycle, watch, door lock)
during 5-8 grades
controlling for beginning of middle school career interests

[Back to Index](#)



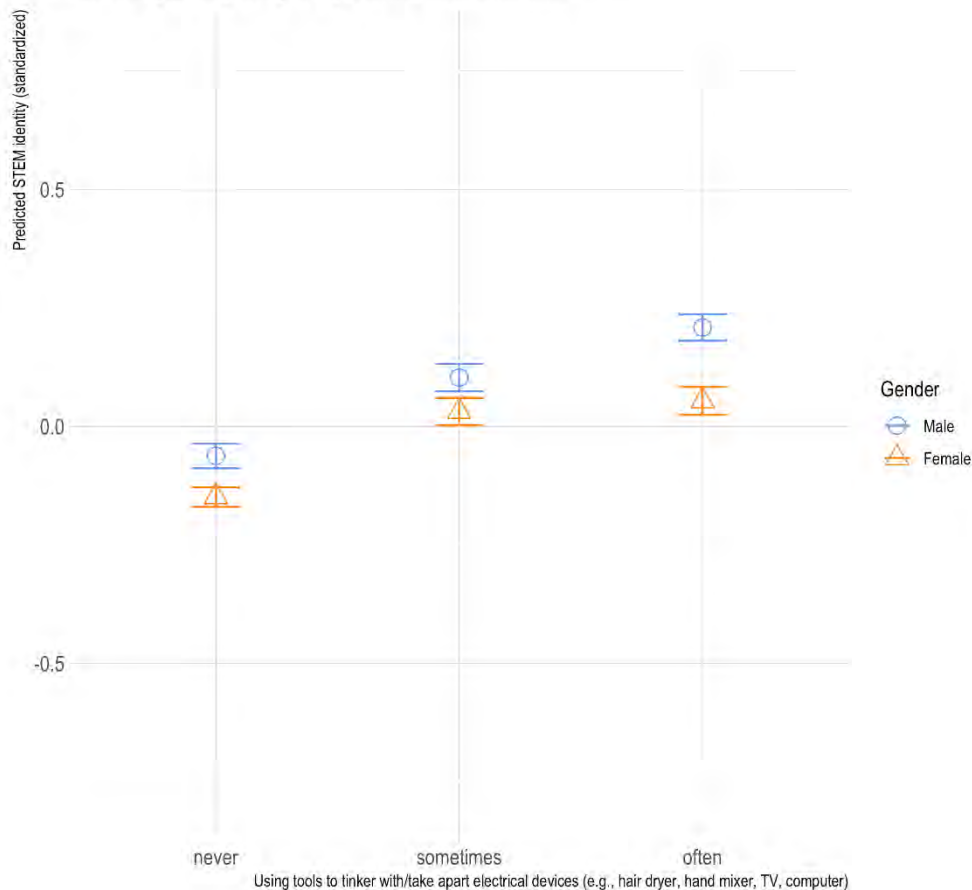
Using tools to tinker with/take apart mechanical devices (e.g., bicycle, watch, door lock)
during K-4 grades
without controlling for baseline career interests

[Back to Index](#)



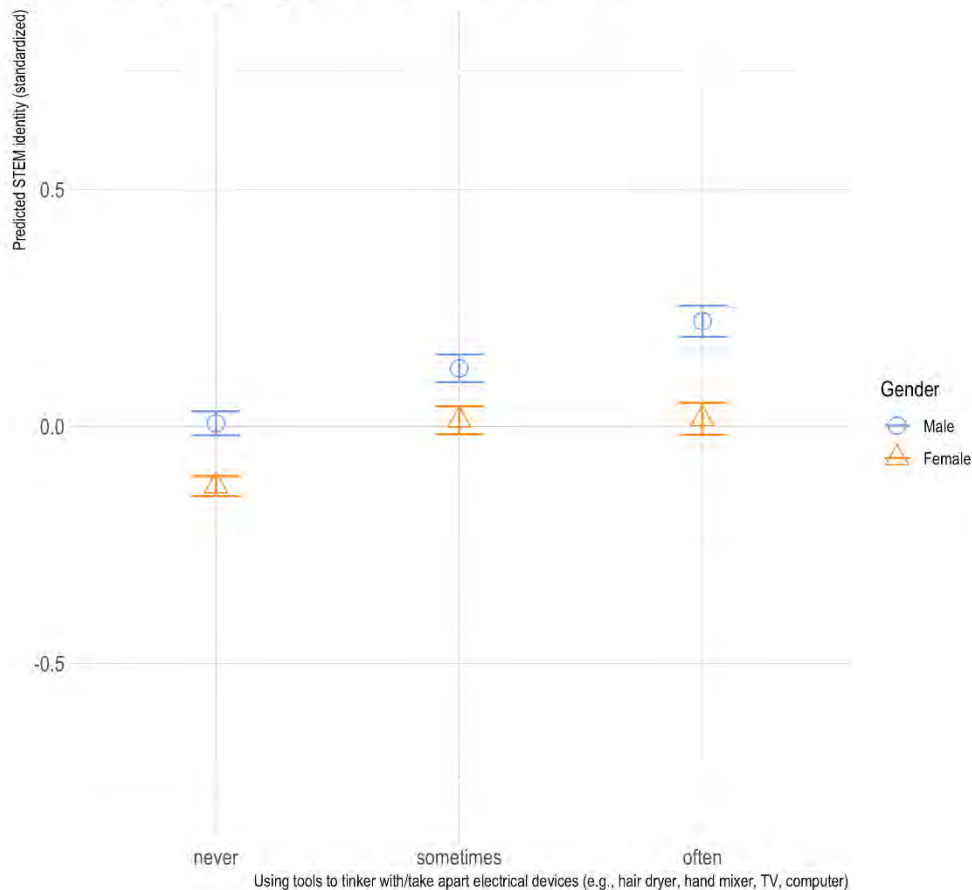
Using tools to tinker with/take apart electrical devices (e.g., hair dryer, hand mixer, TV, computer)
 during 9-12 grades
 controlling for beginning of high school career interests

[to Index](#)



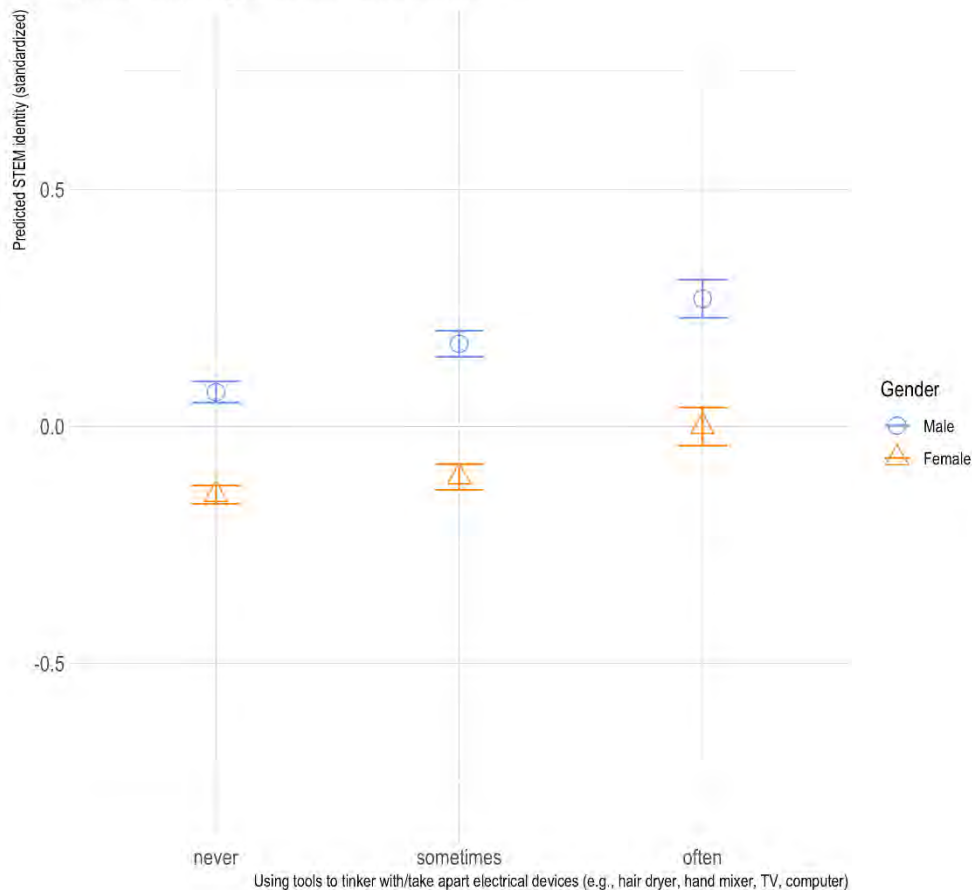
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[to Index](#)



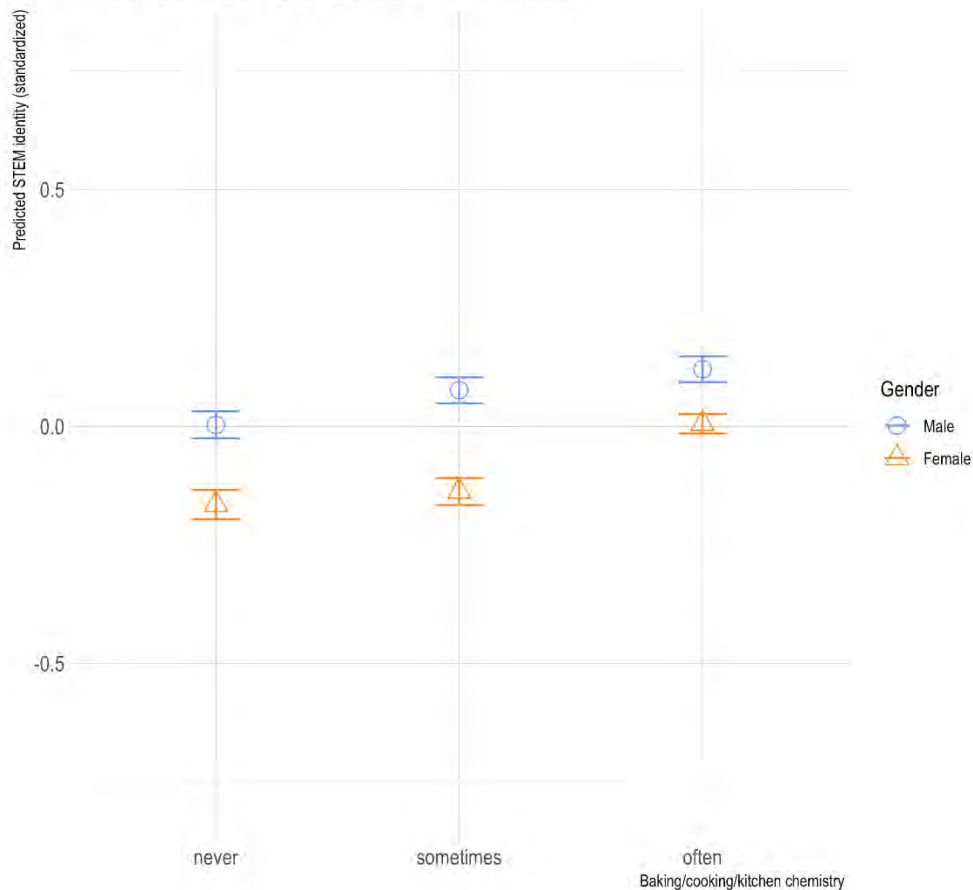
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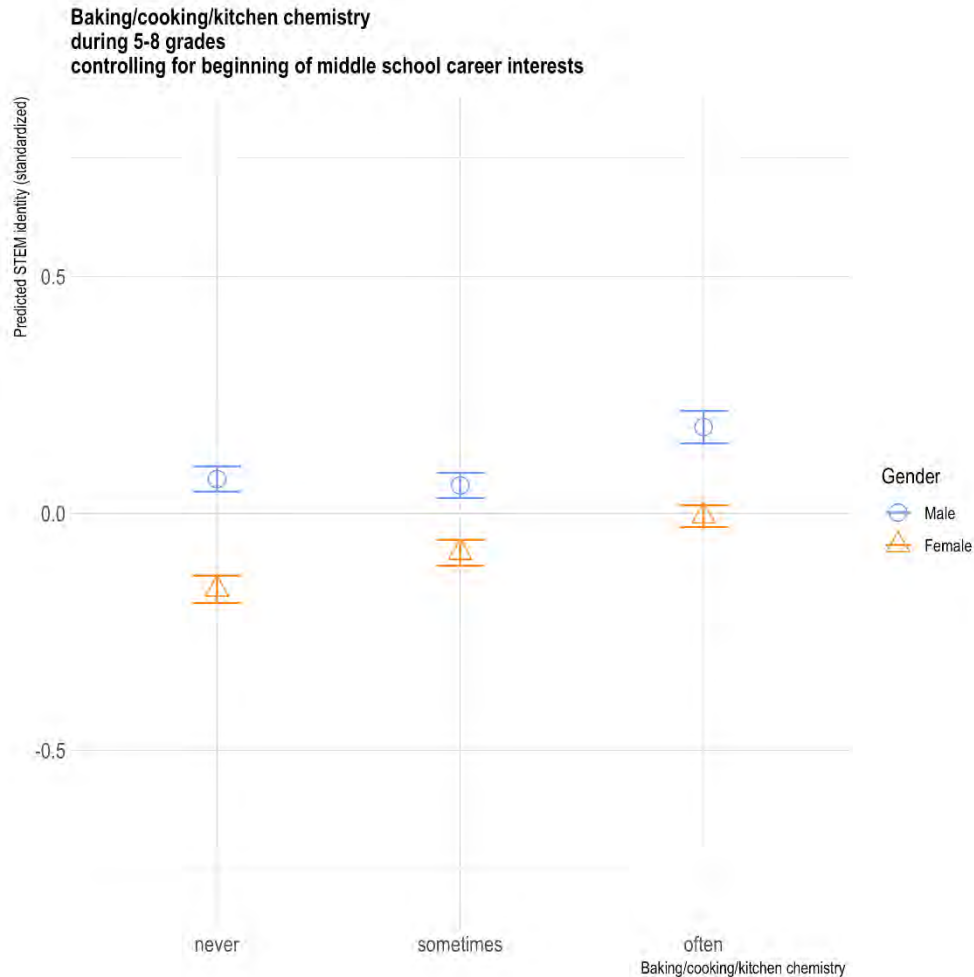
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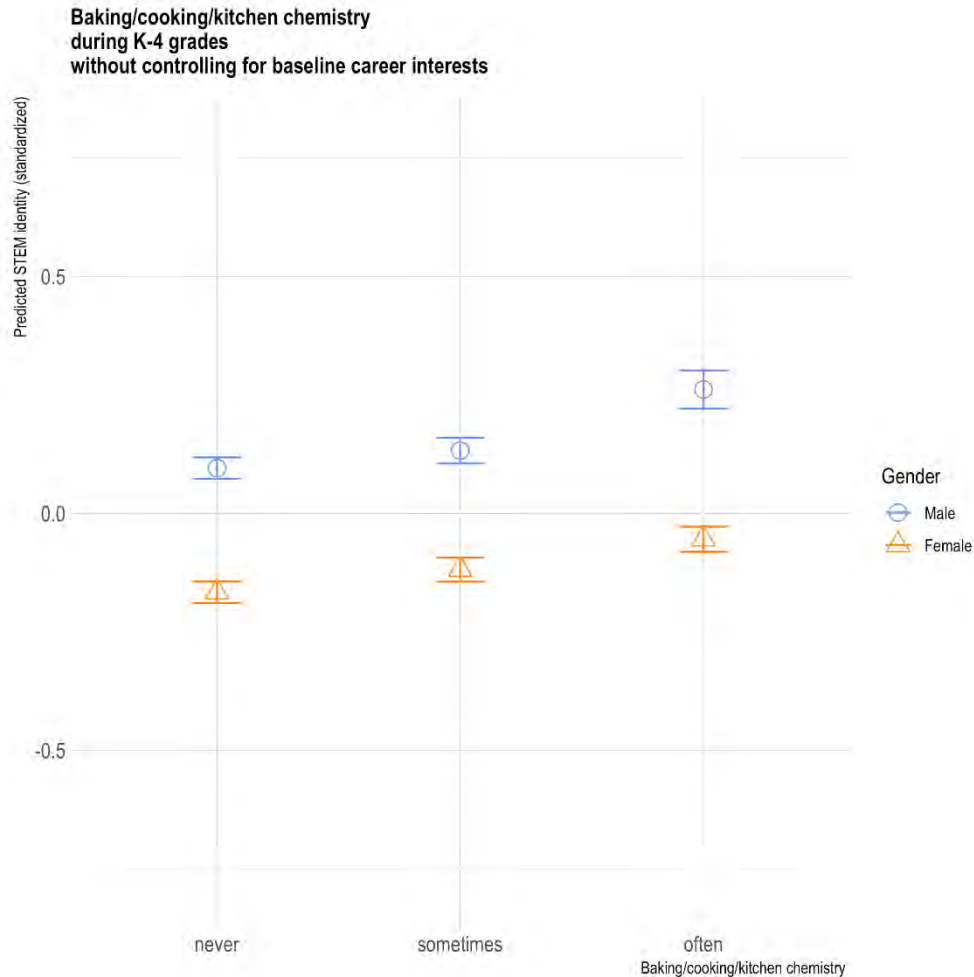


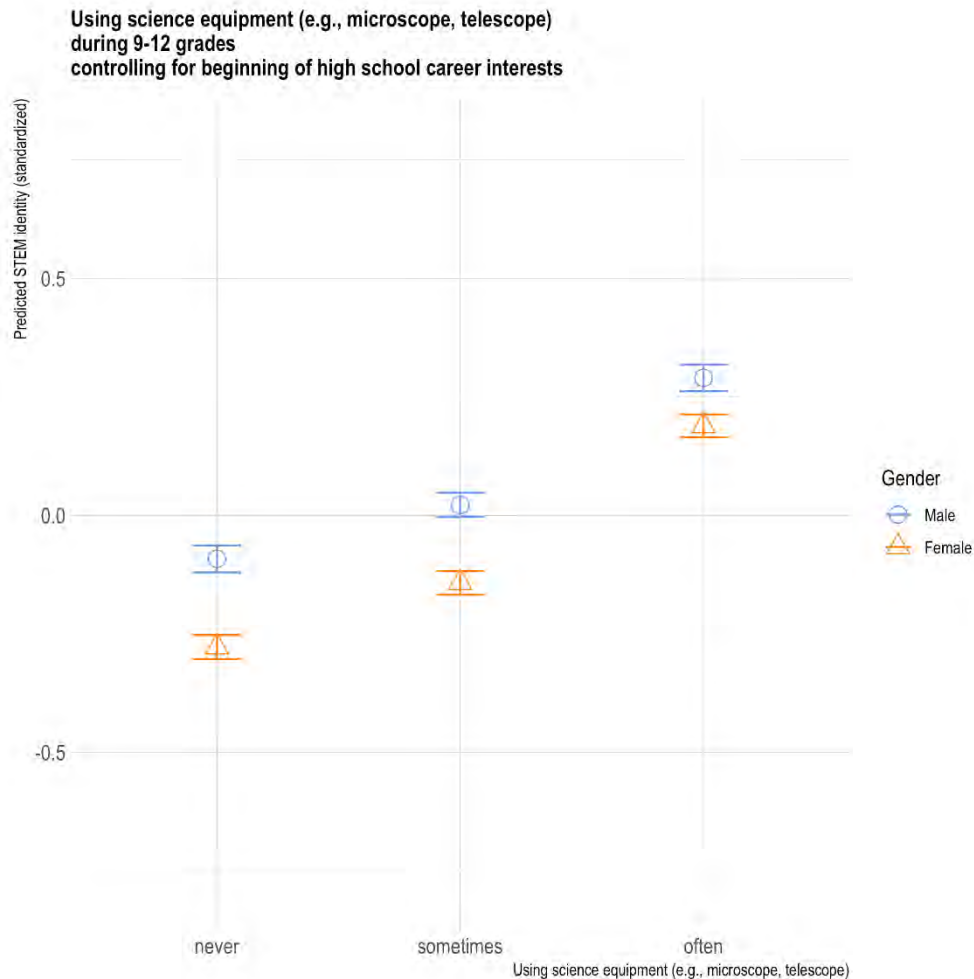
**Baking/cooking/kitchen chemistry
during 9-12 grades
controlling for beginning of high school career interests**

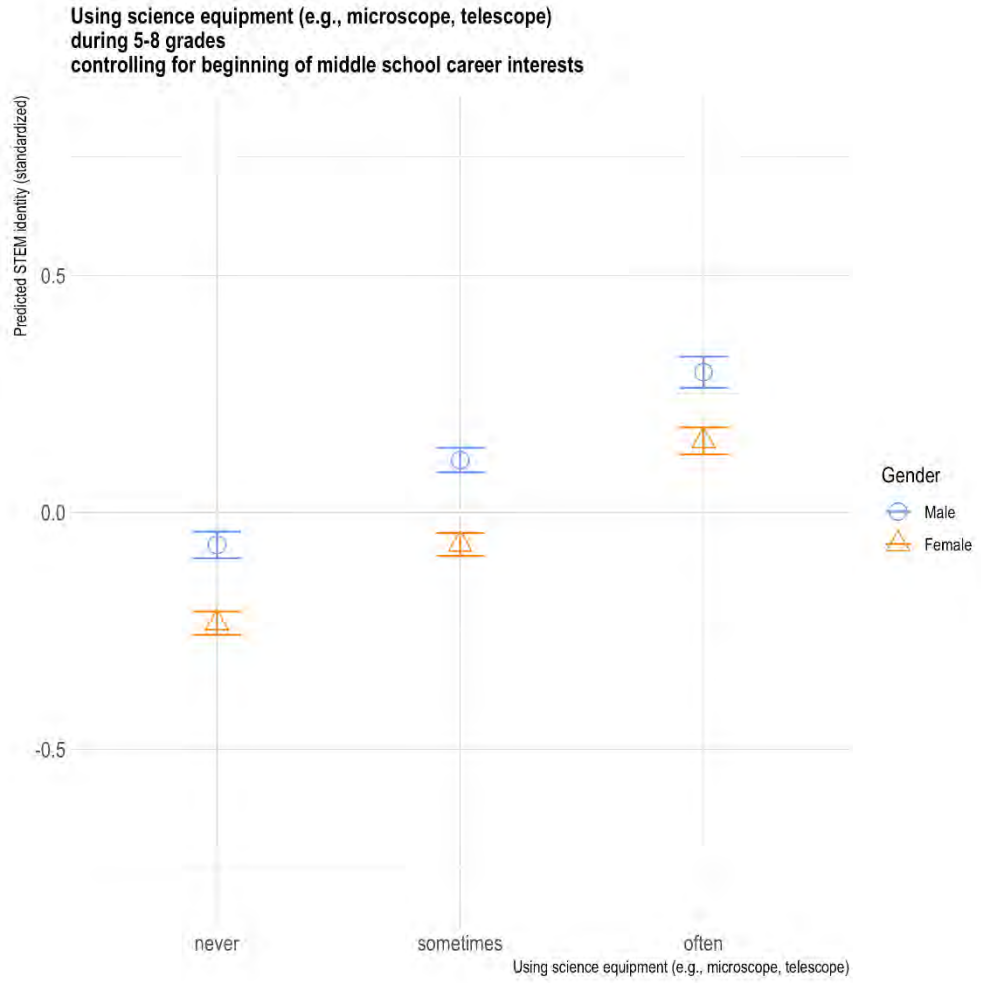
[to Index](#)

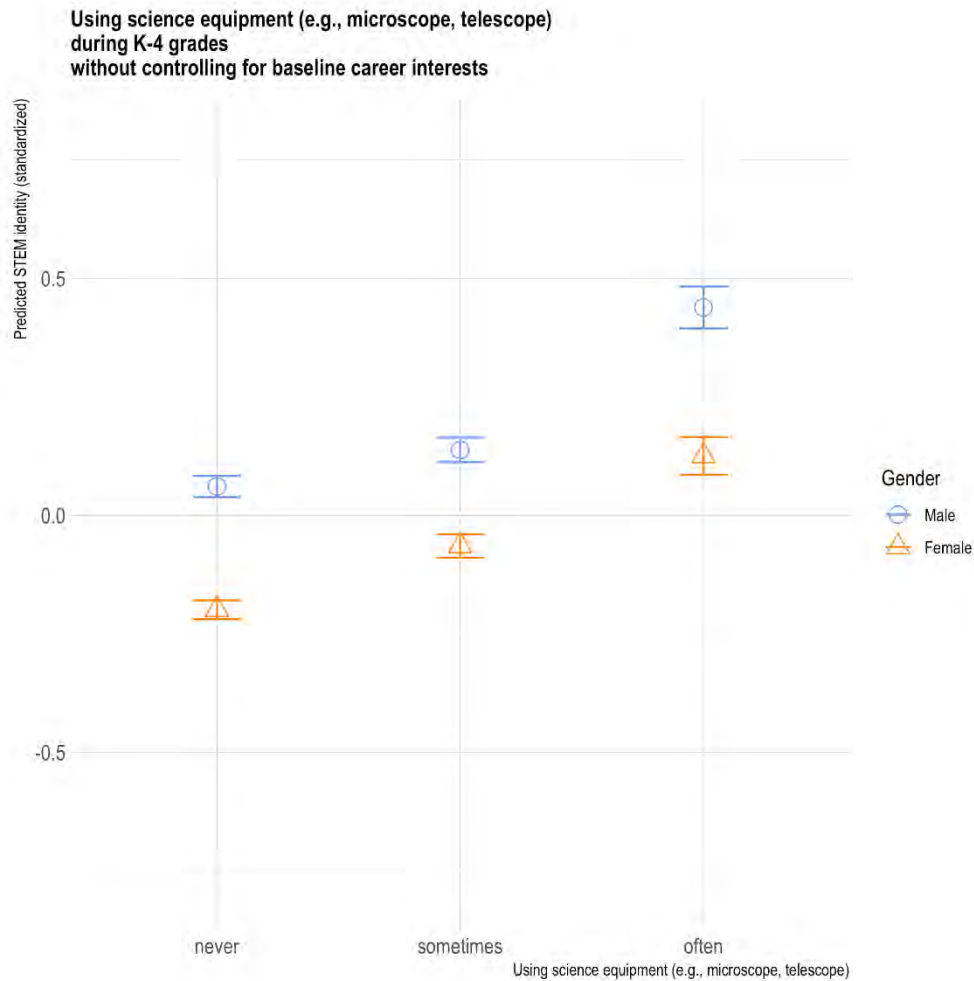






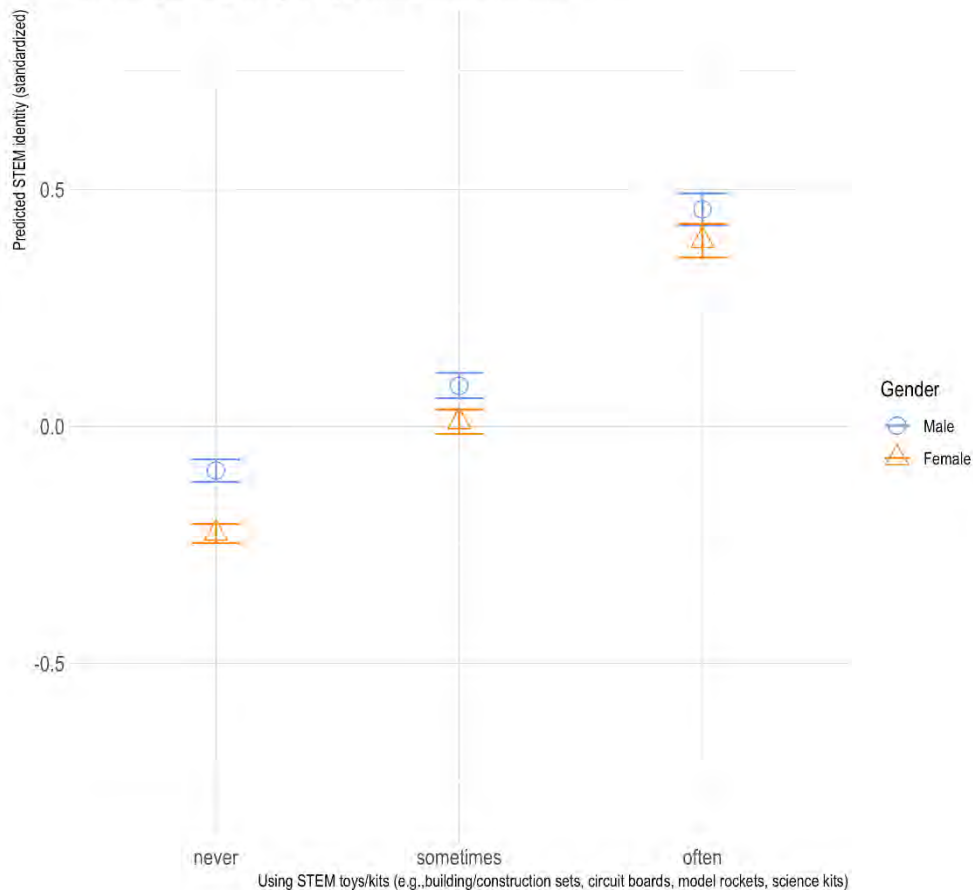






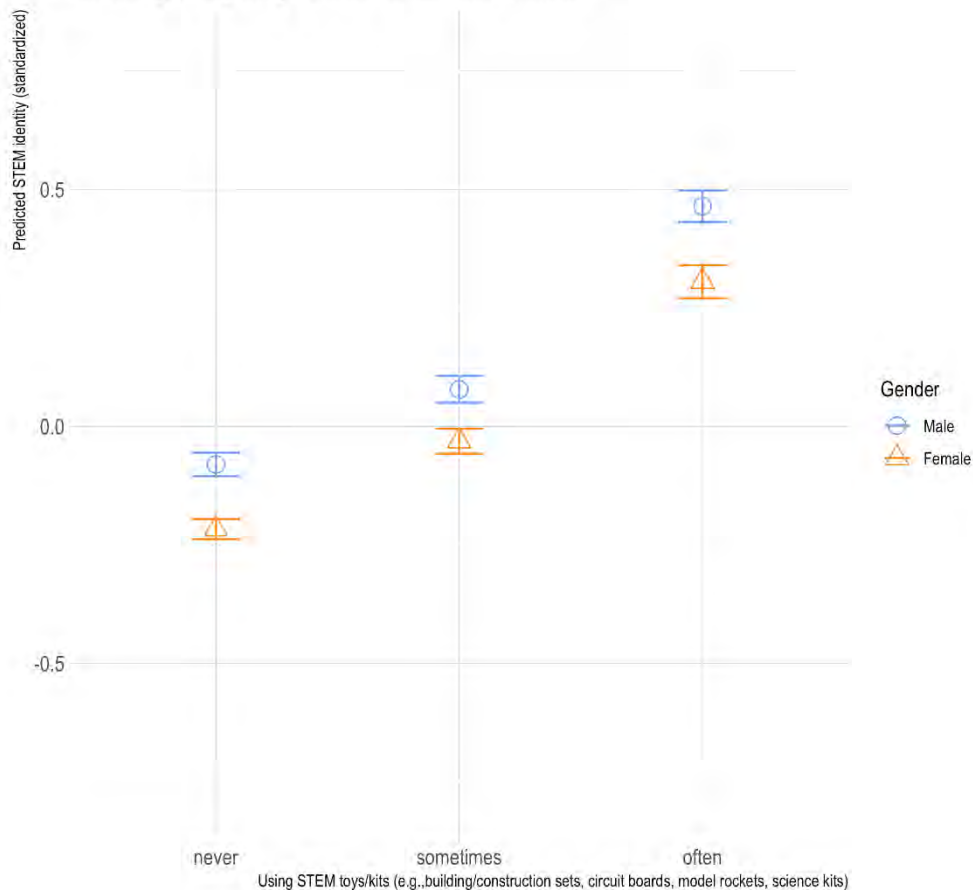
Using STEM toys/kits (e.g., building/construction sets, circuit boards, model rockets, science kits)
during 9-12 grades
controlling for beginning of high school career interests

[to Index](#)



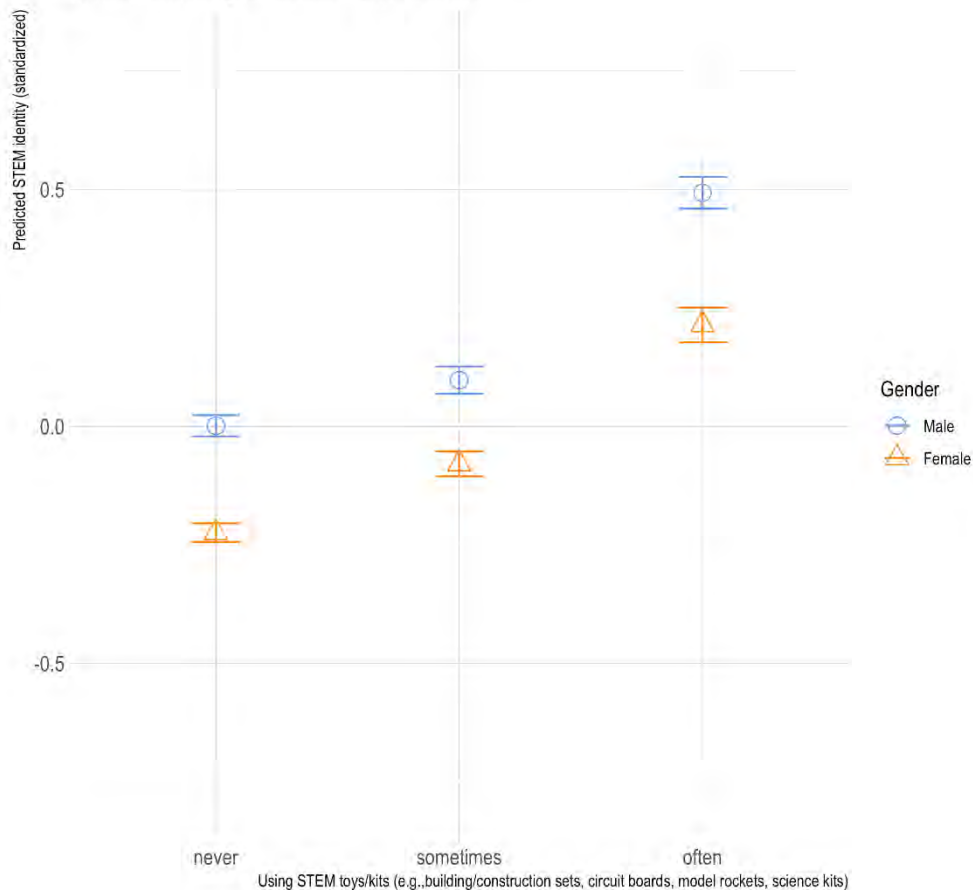
Using STEM toys/kits (e.g., building/construction sets, circuit boards, model rockets, science kits)
during 5-8 grades
controlling for beginning of middle school career interests

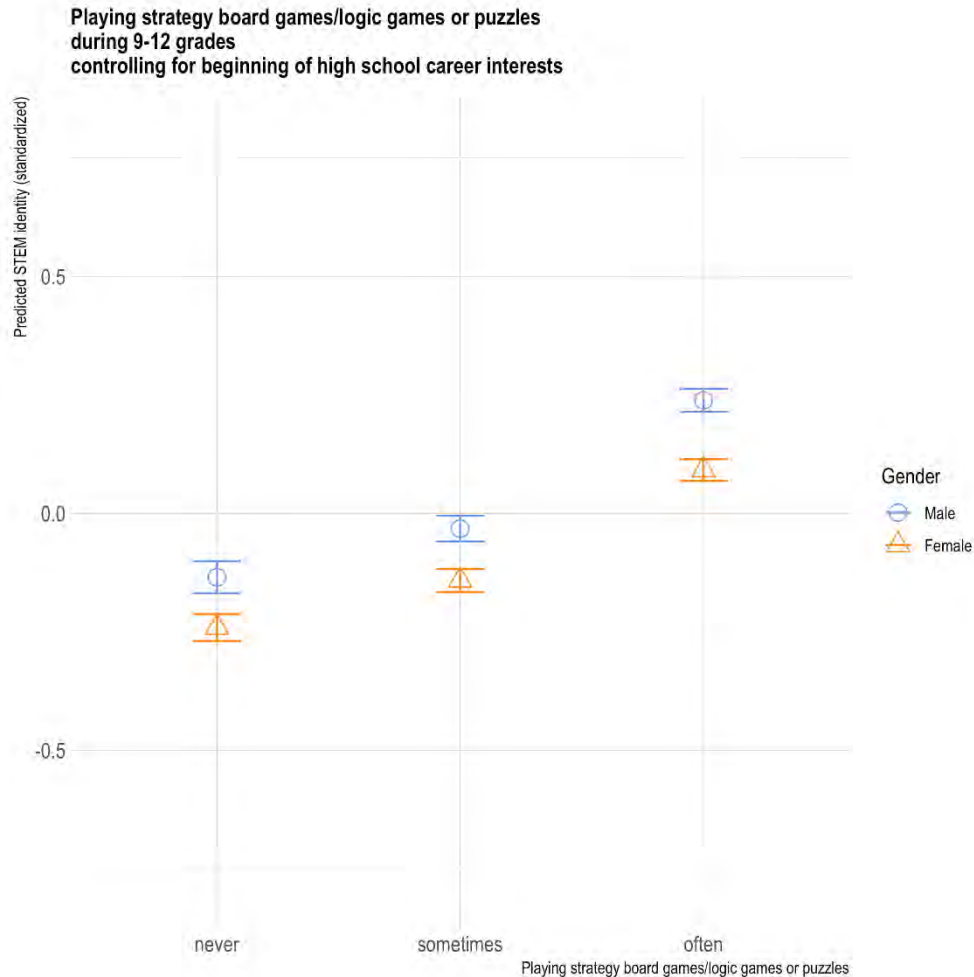
[to Index](#)

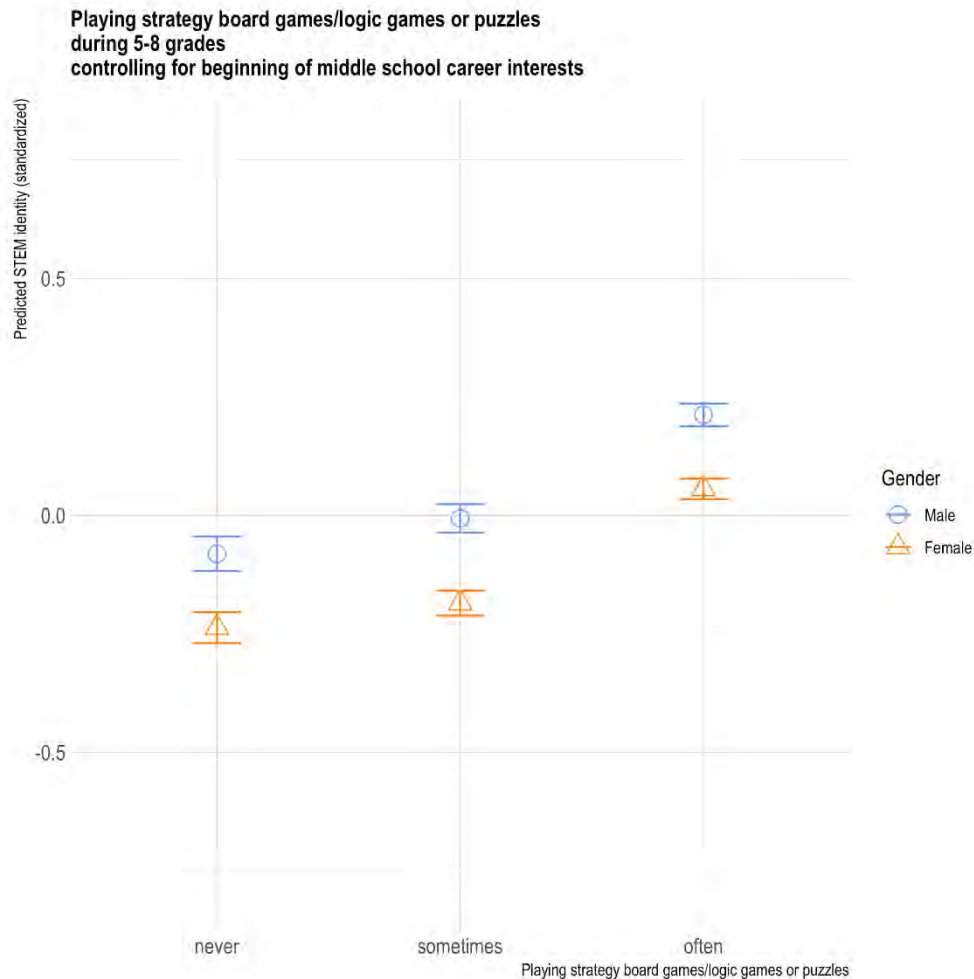


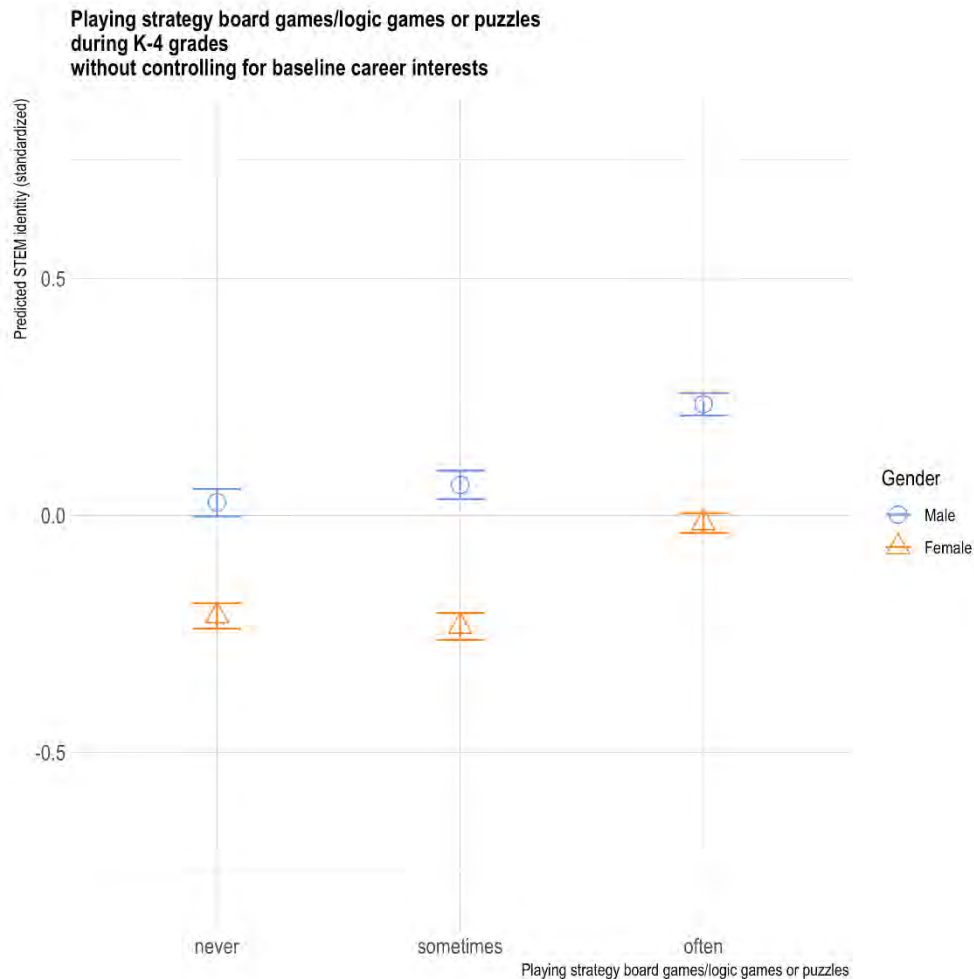
Using STEM toys/kits (e.g., building/construction sets, circuit boards, model rockets, science kits)
during K-4 grades
without controlling for baseline career interests

[to Index](#)



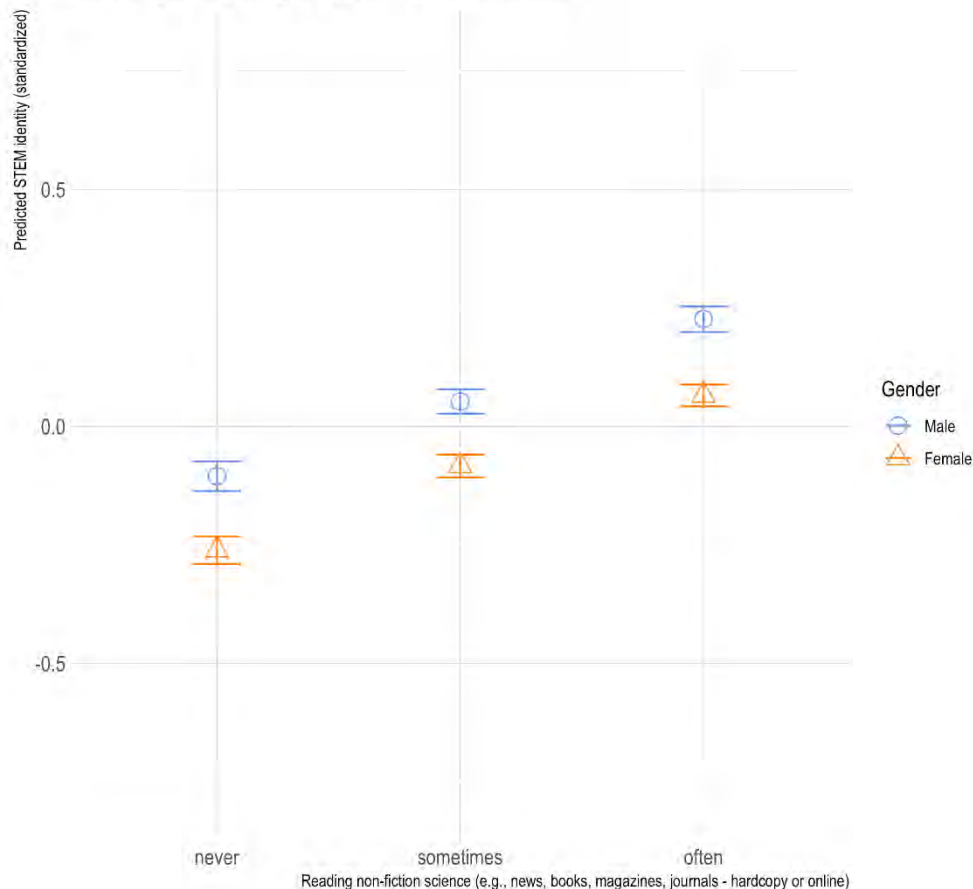


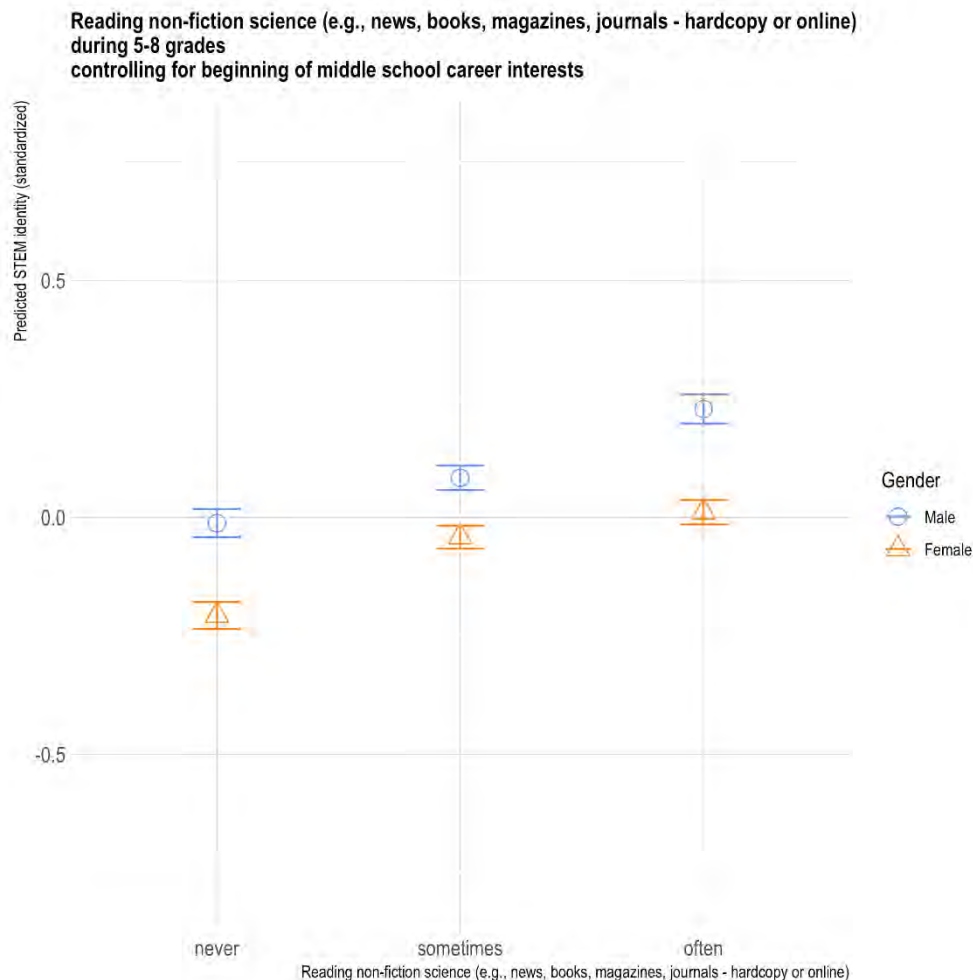




Reading non-fiction science (e.g., news, books, magazines, journals - hardcopy or online)
during 9-12 grades
controlling for beginning of high school career interests

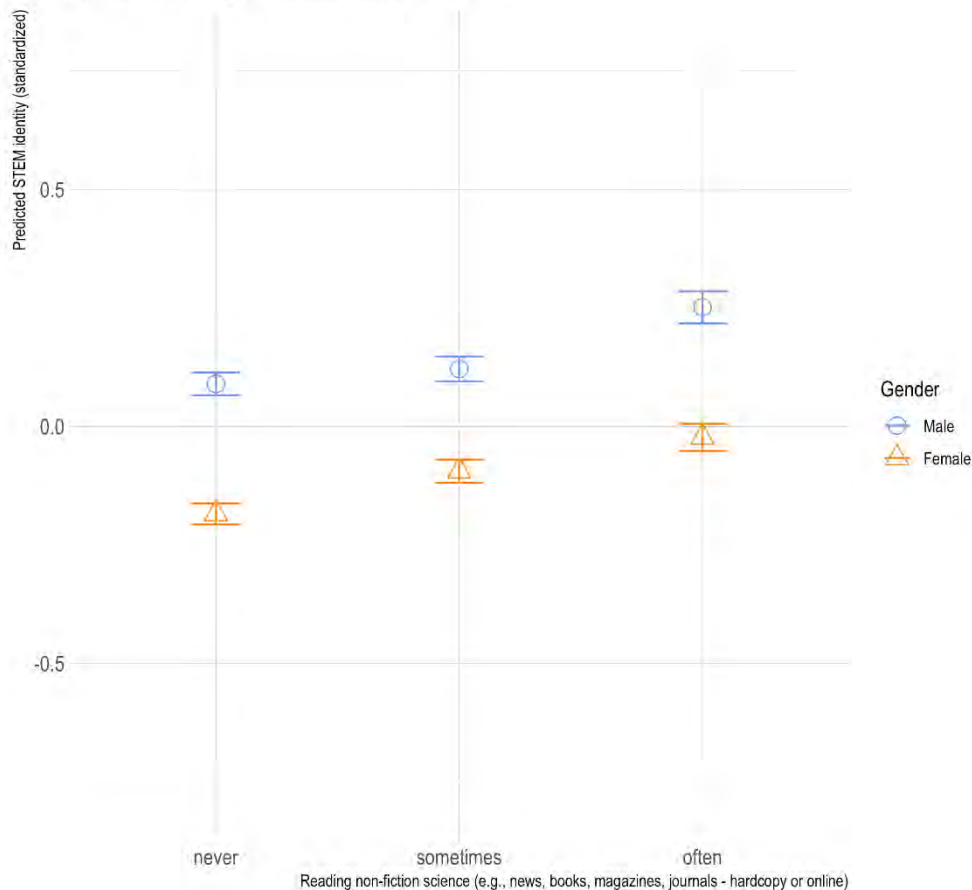
[to Index](#)

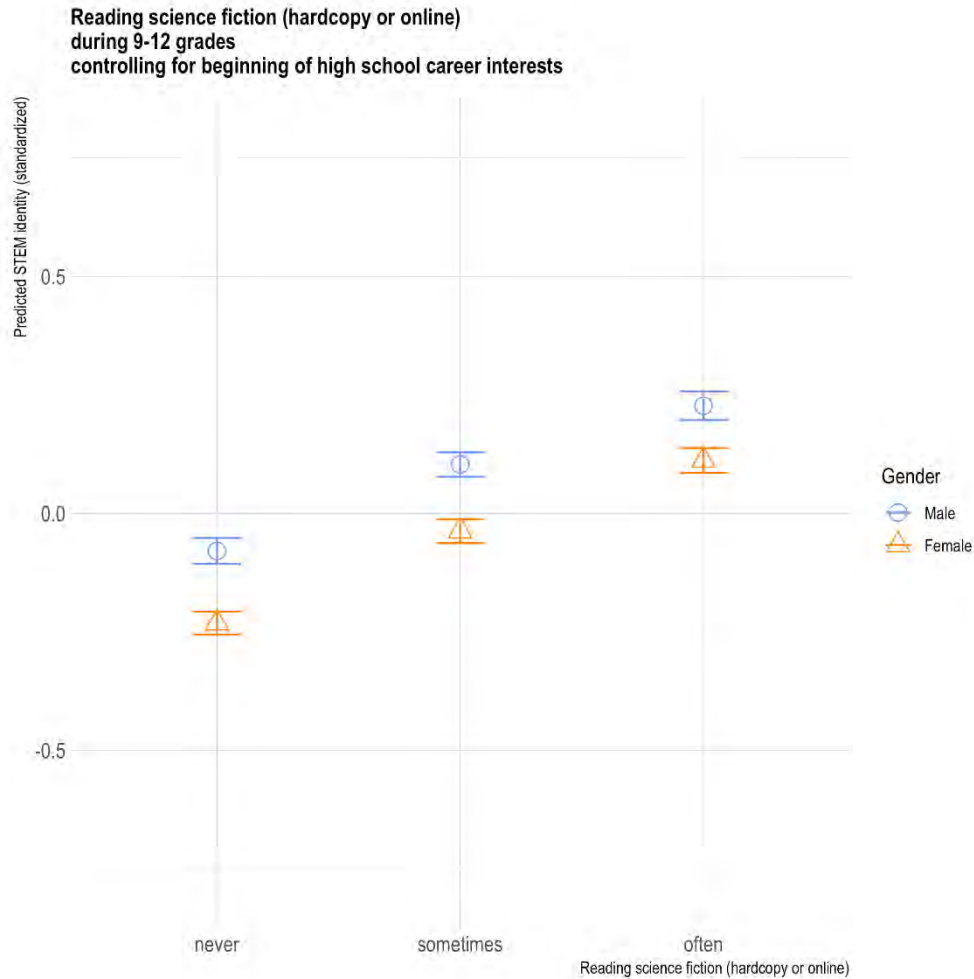


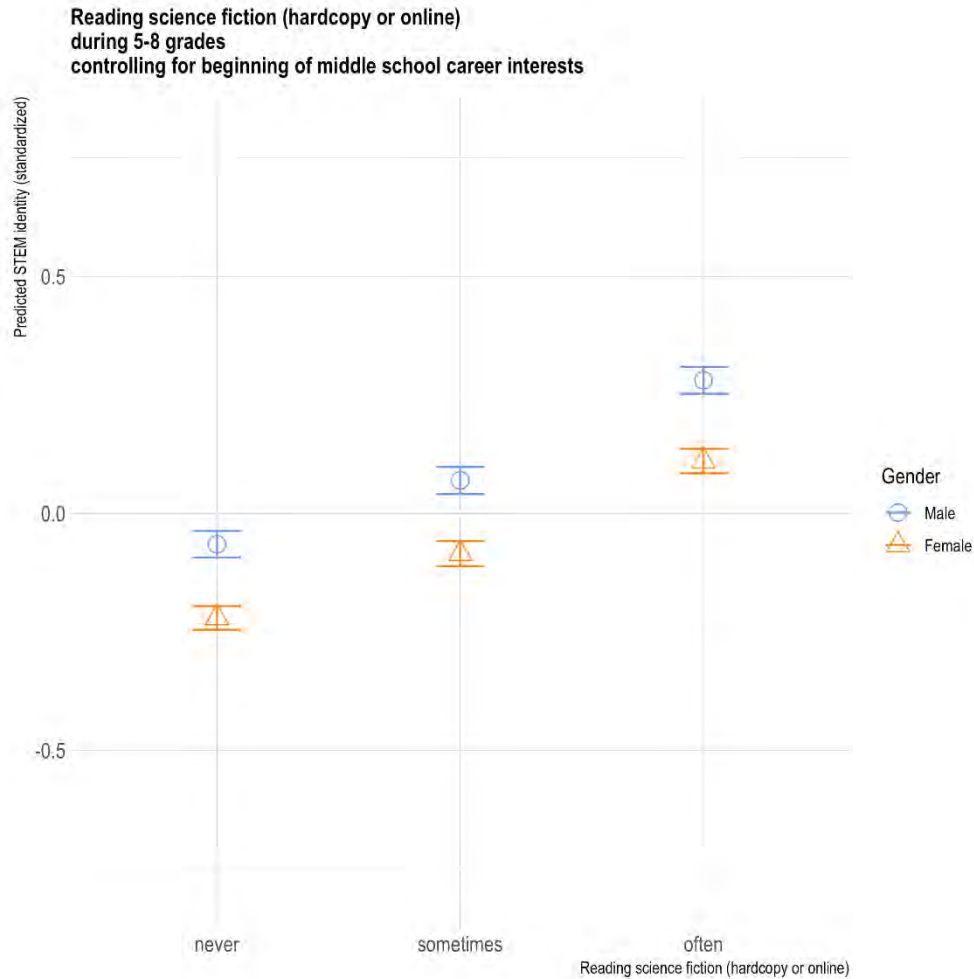


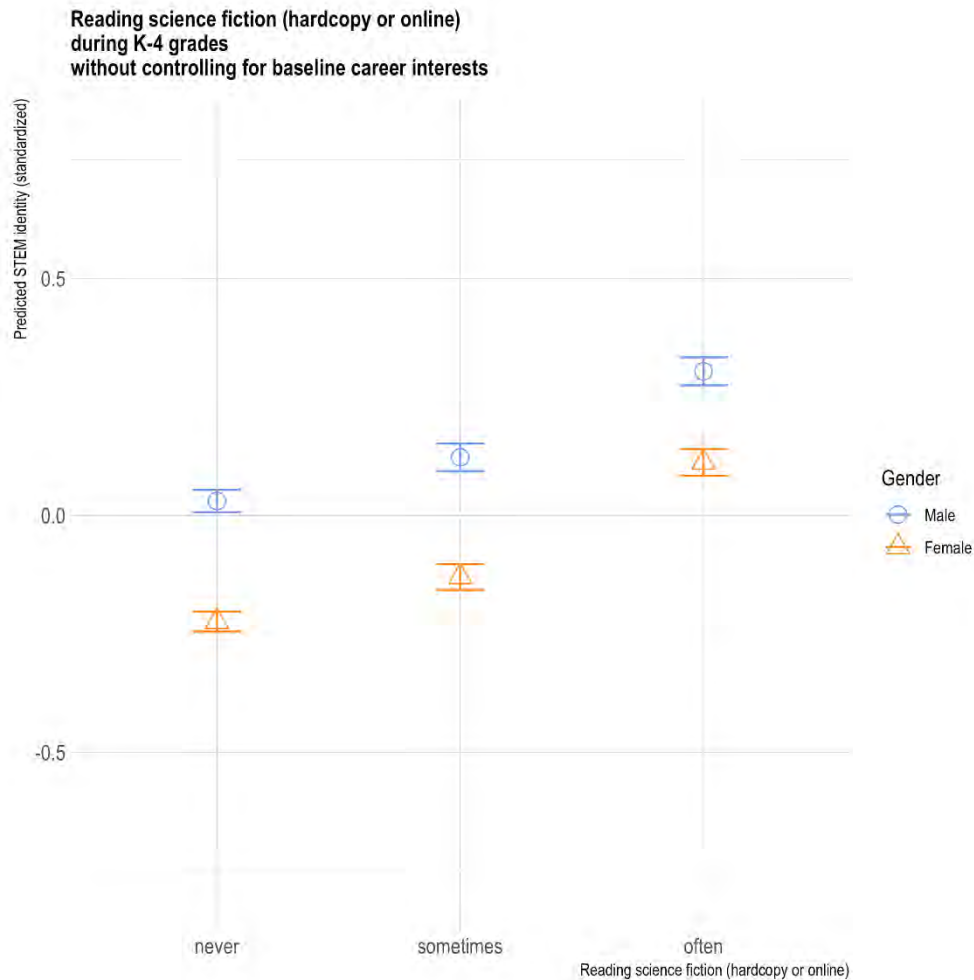
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[to Index](#)



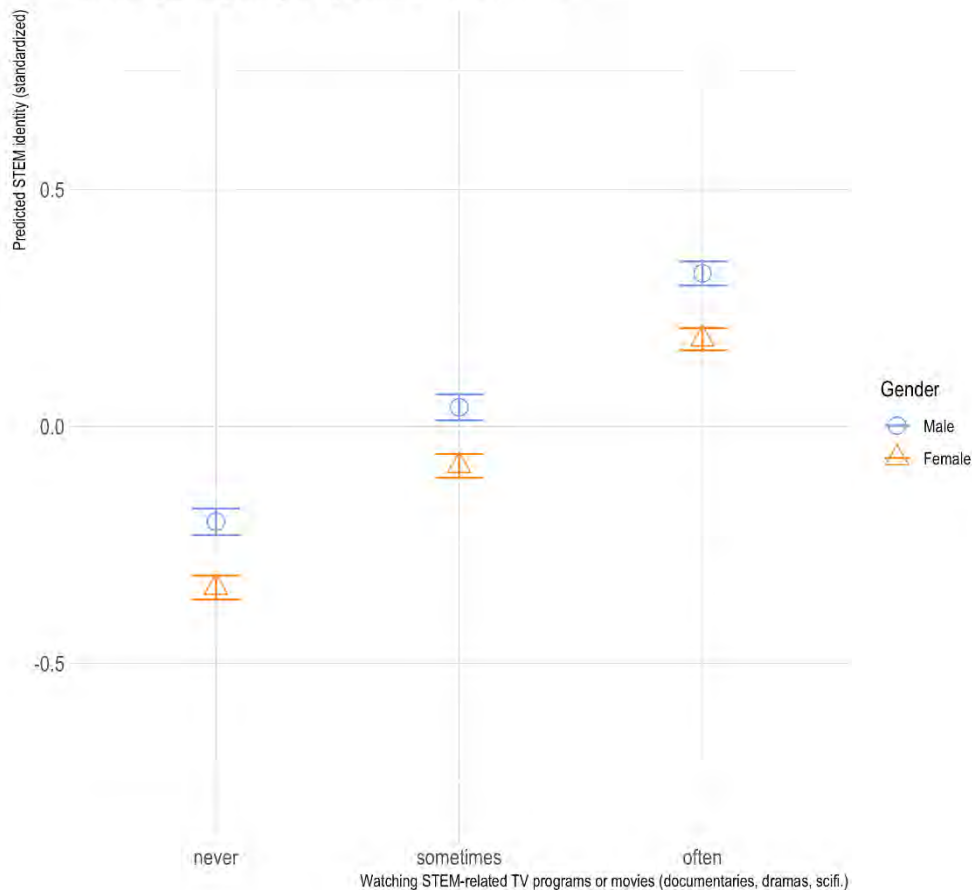






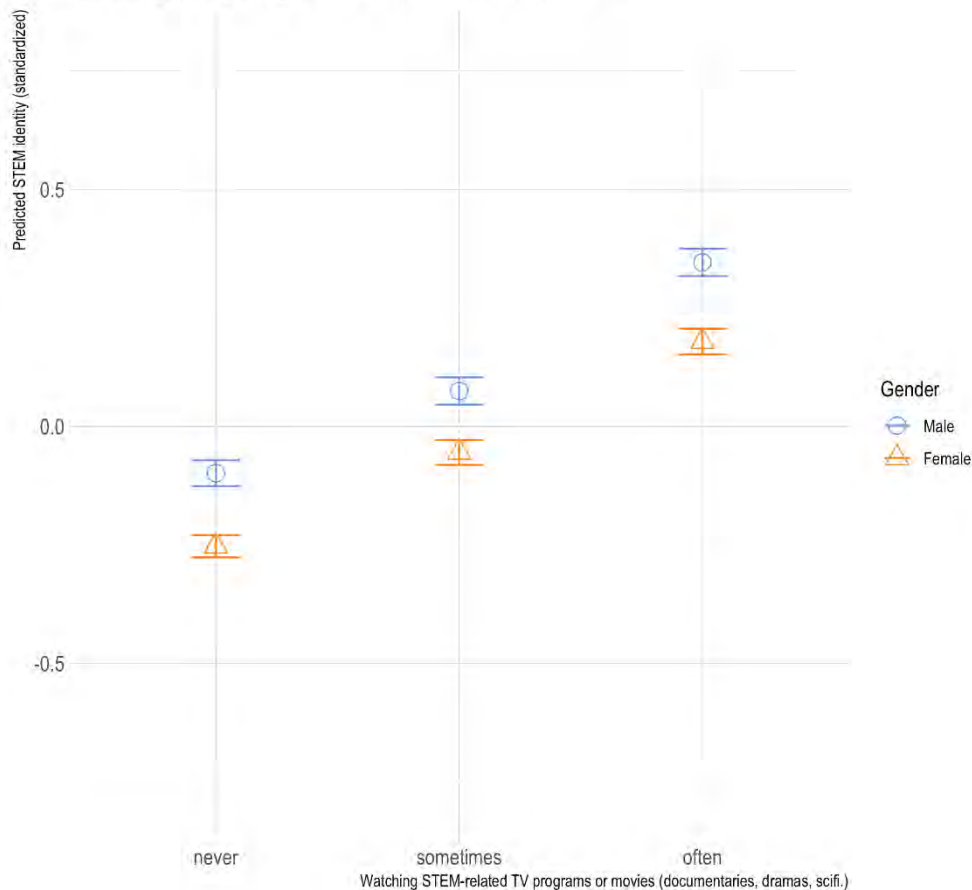
**Watching STEM-related TV programs or movies (documentaries, dramas, scifi.)
during 9-12 grades
controlling for beginning of high school career interests**

[to Index](#)



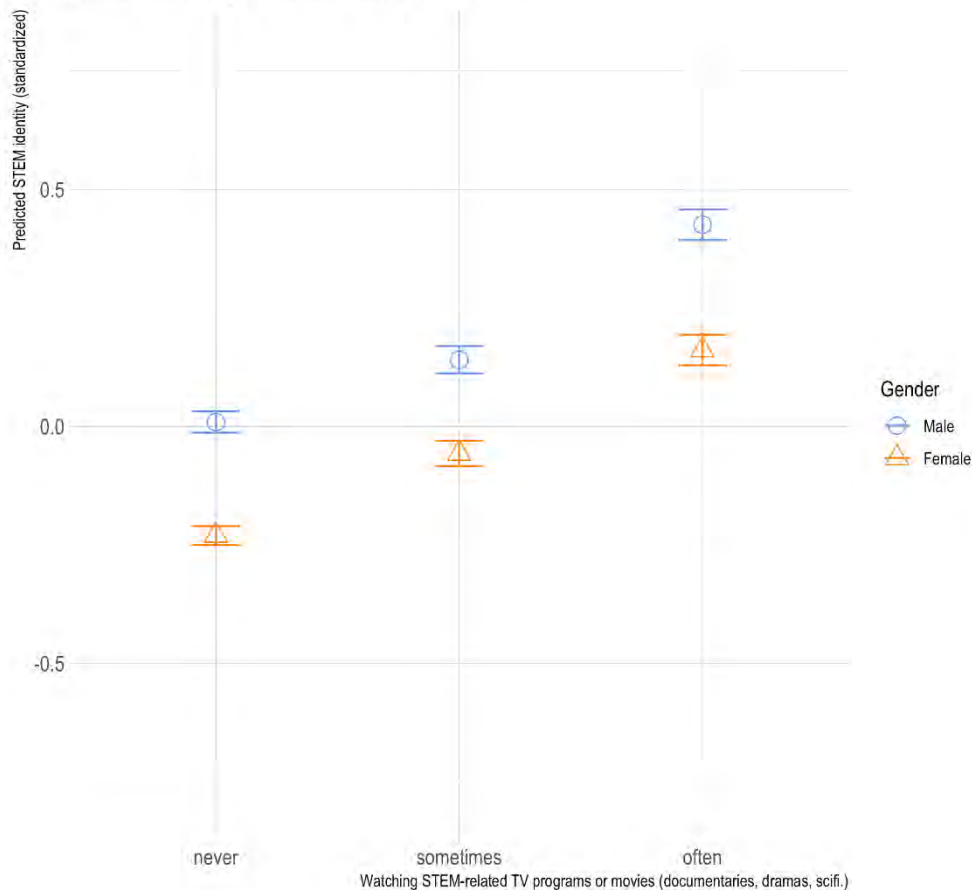
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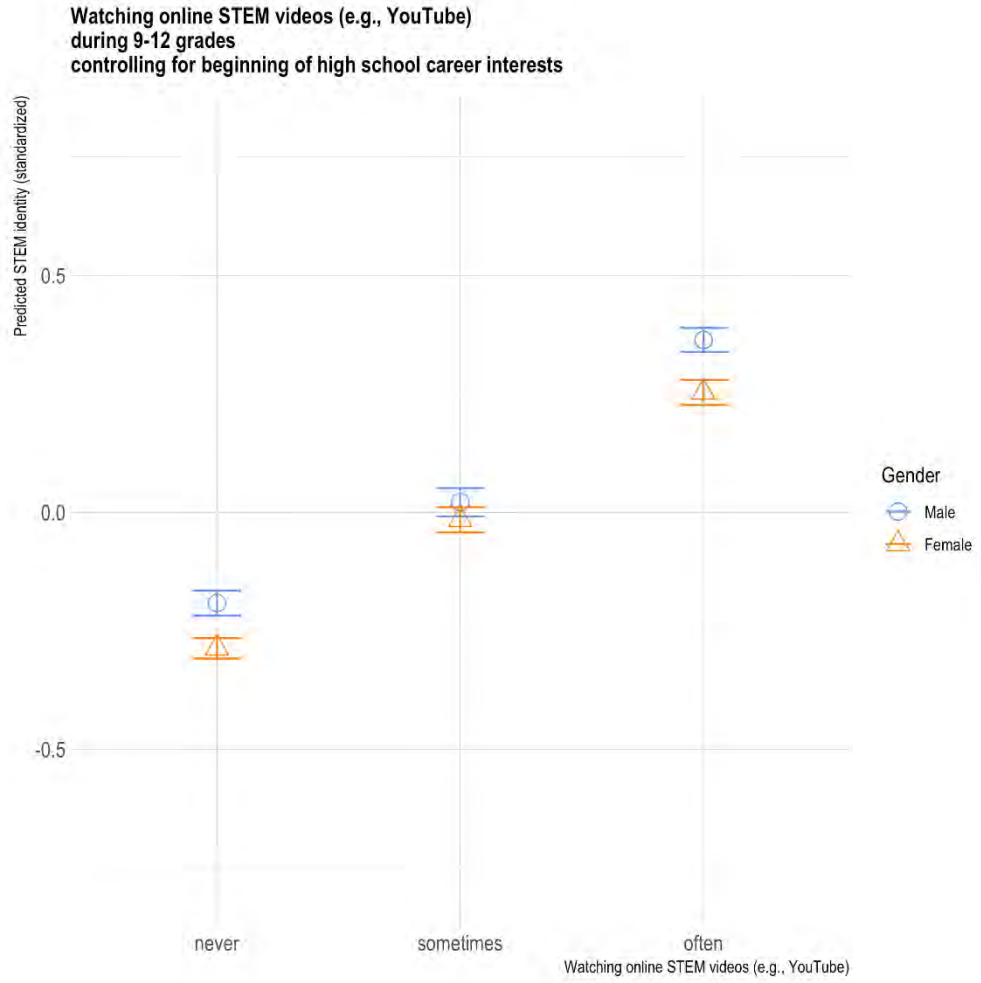
[to Index](#)

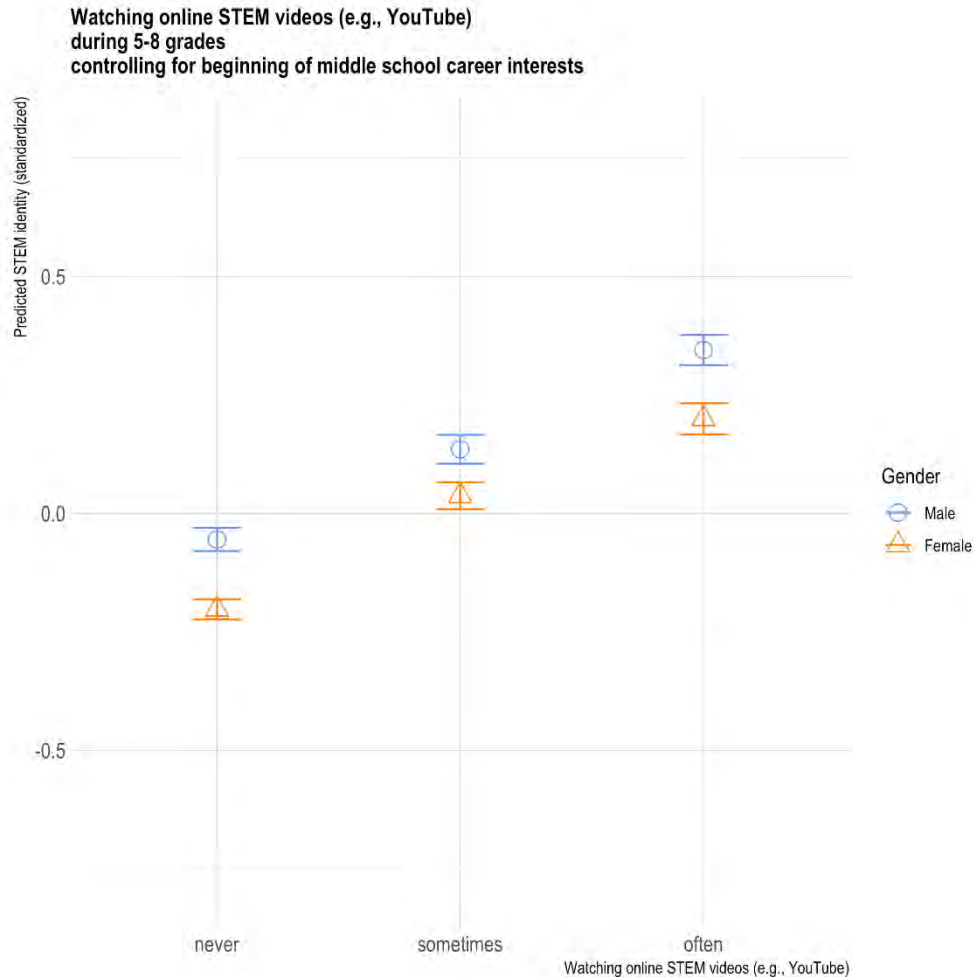


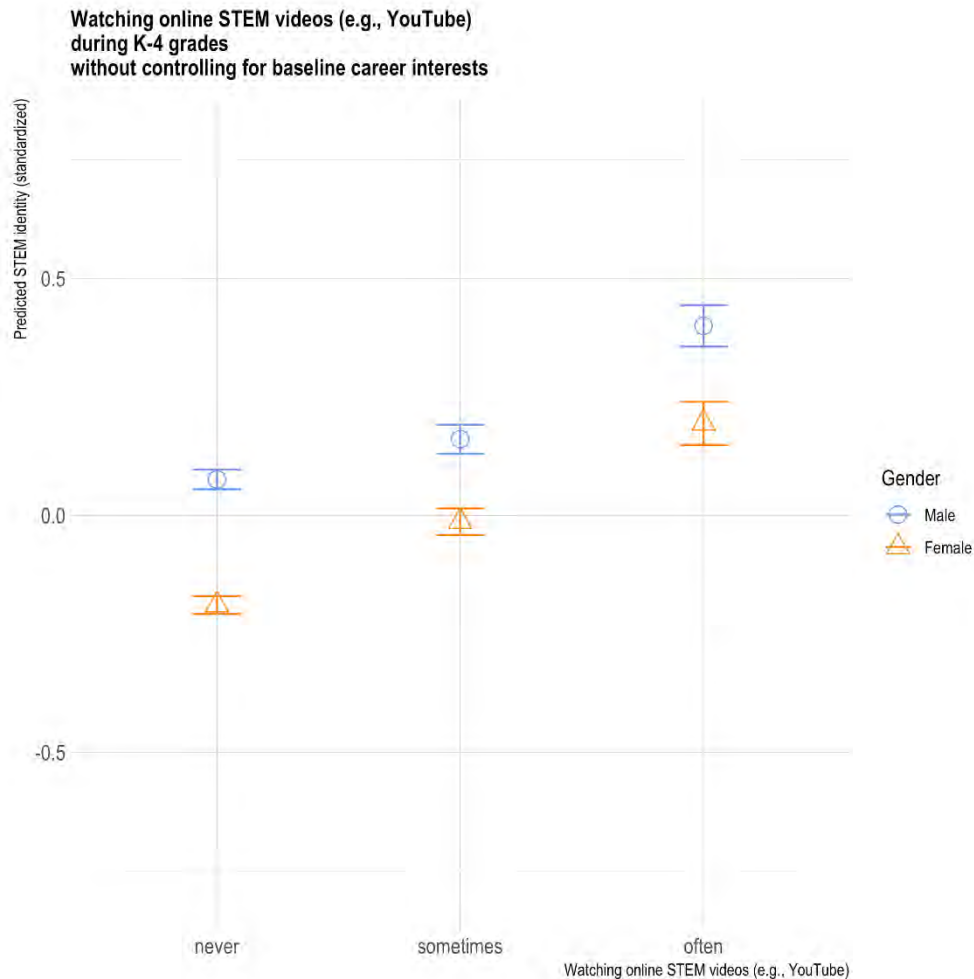
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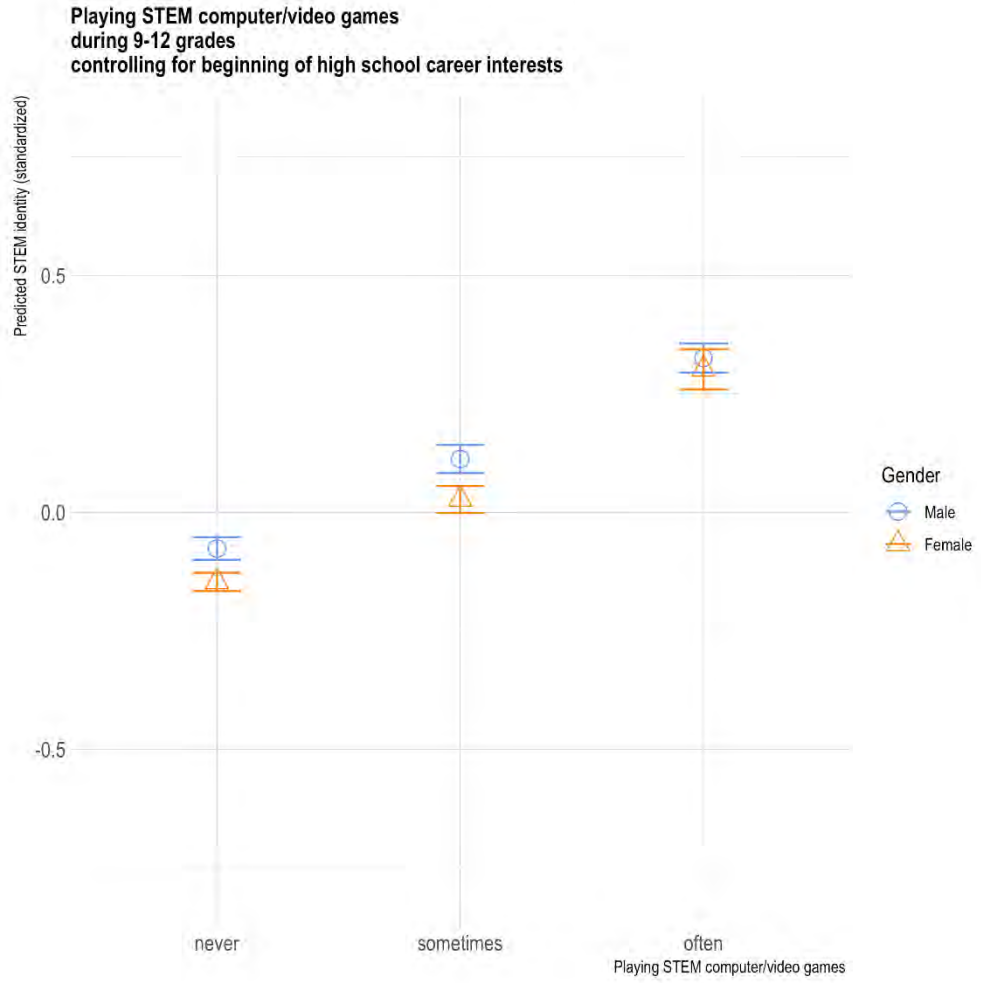
[to Index](#)

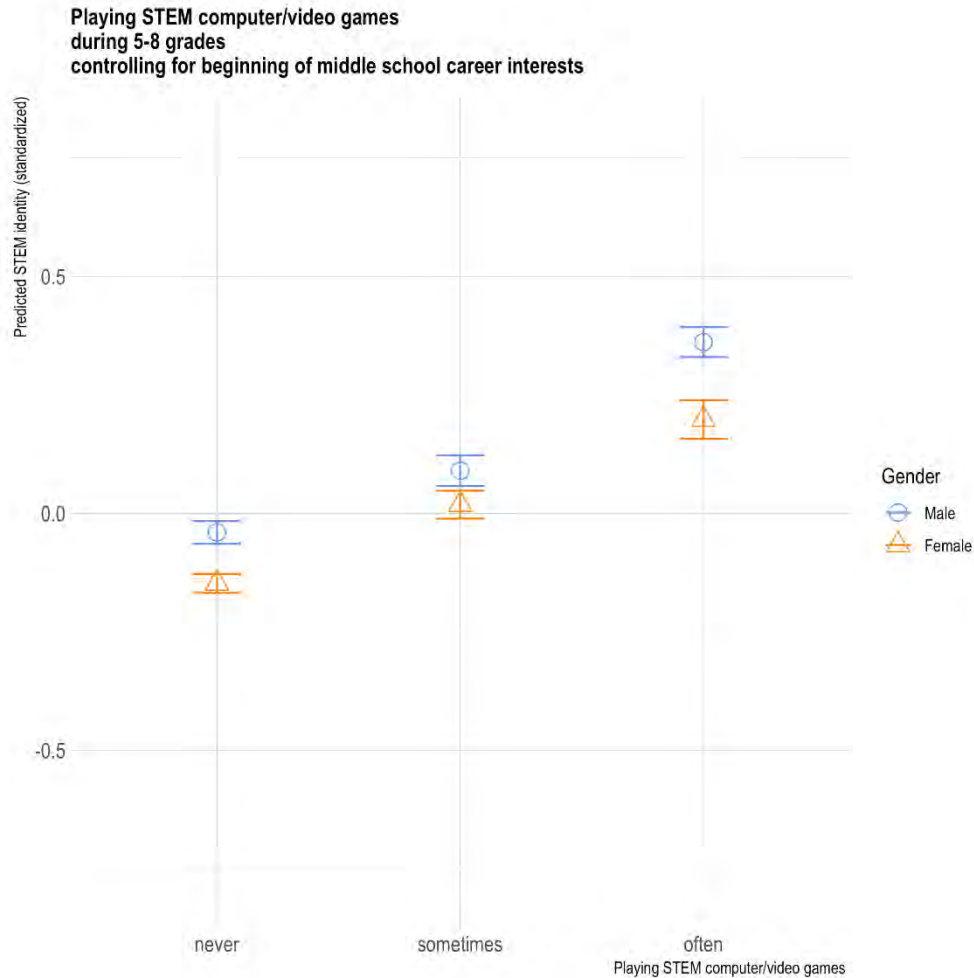


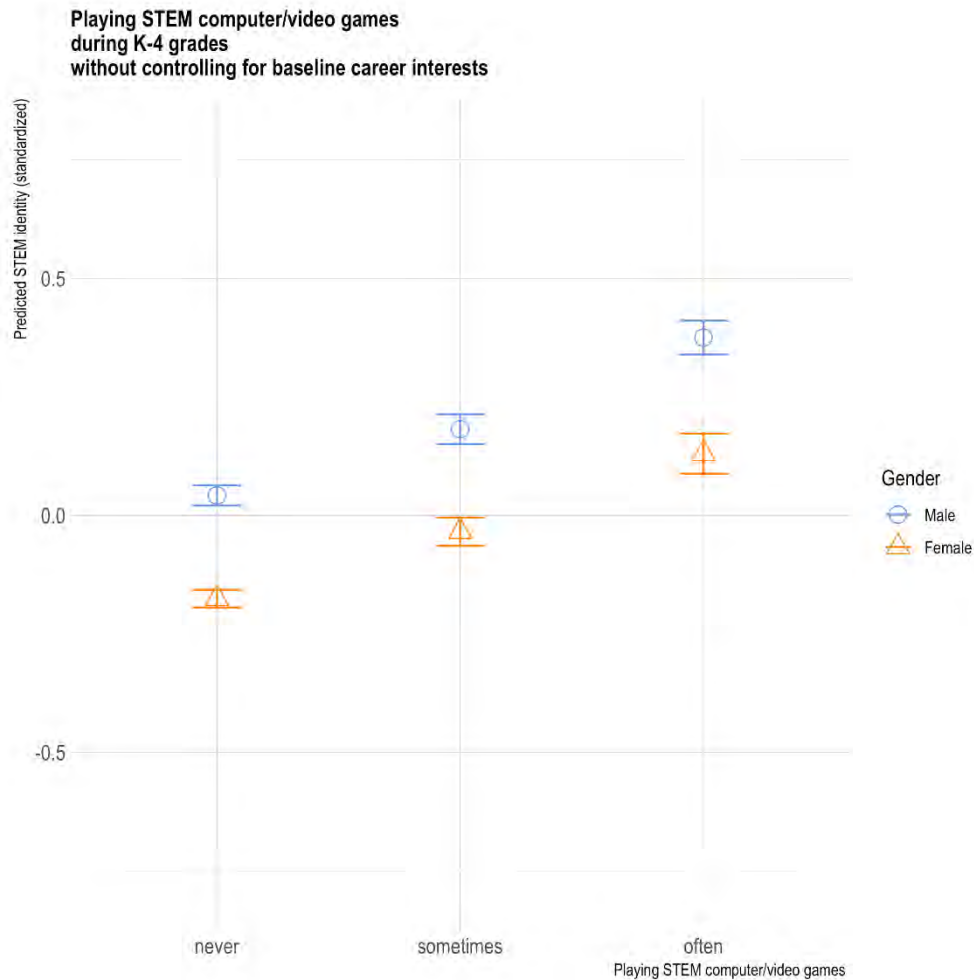


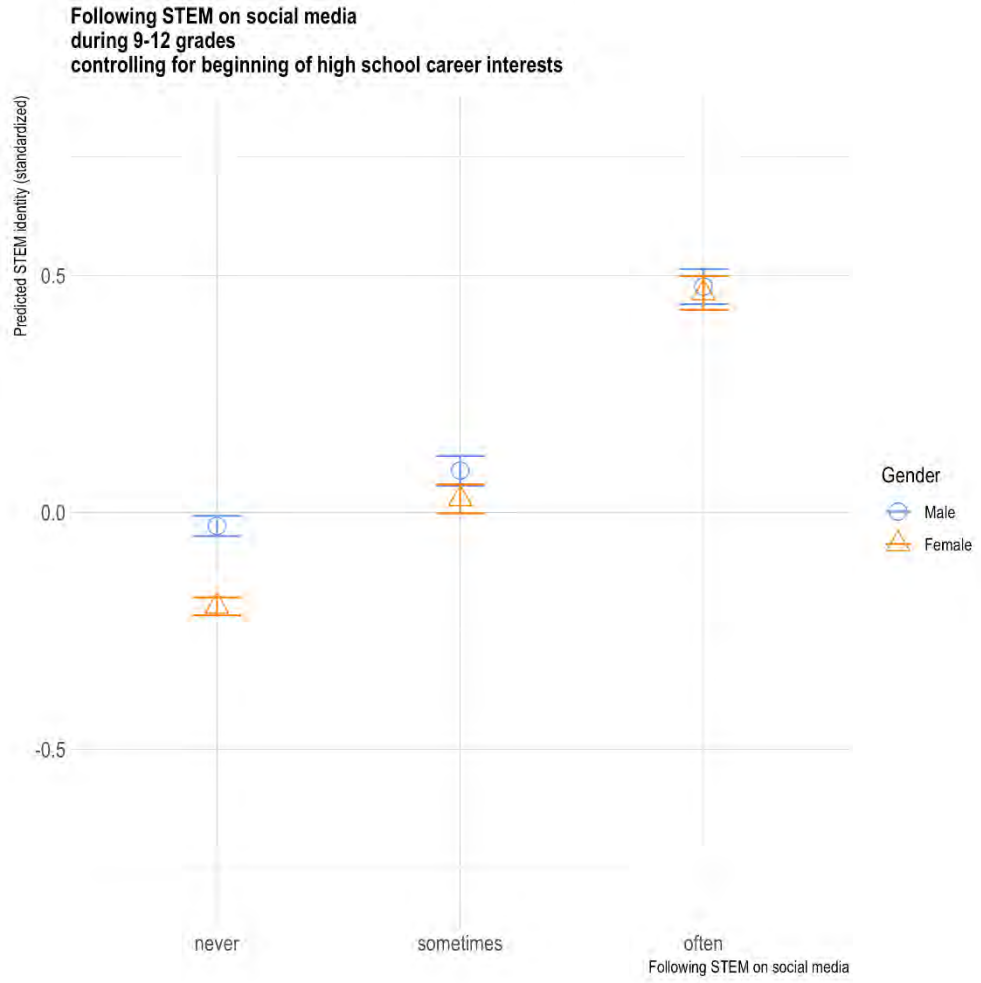


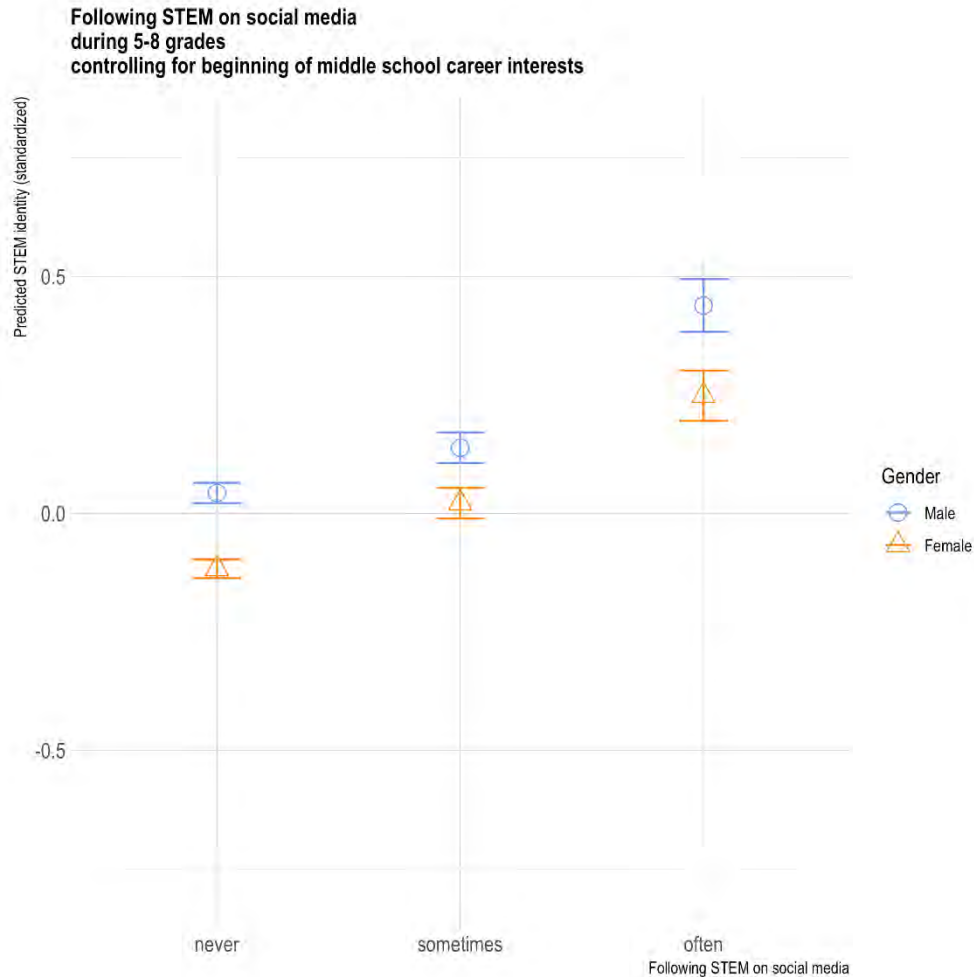


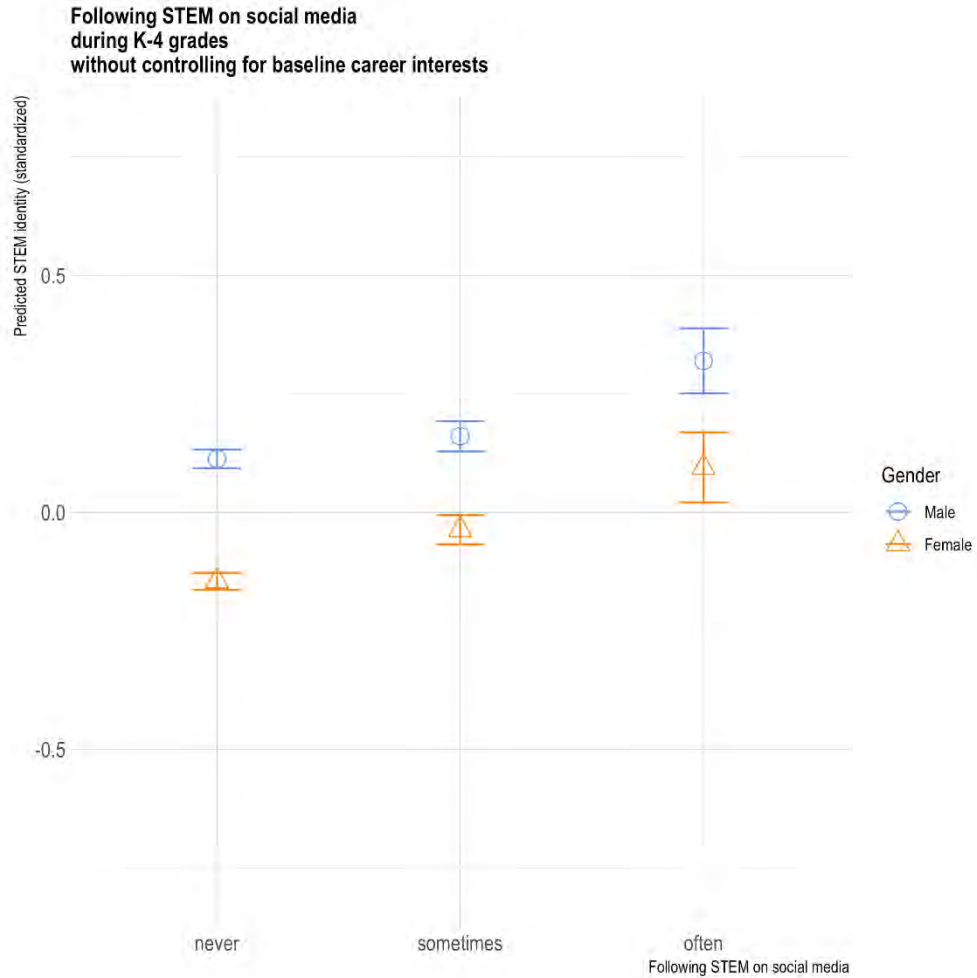


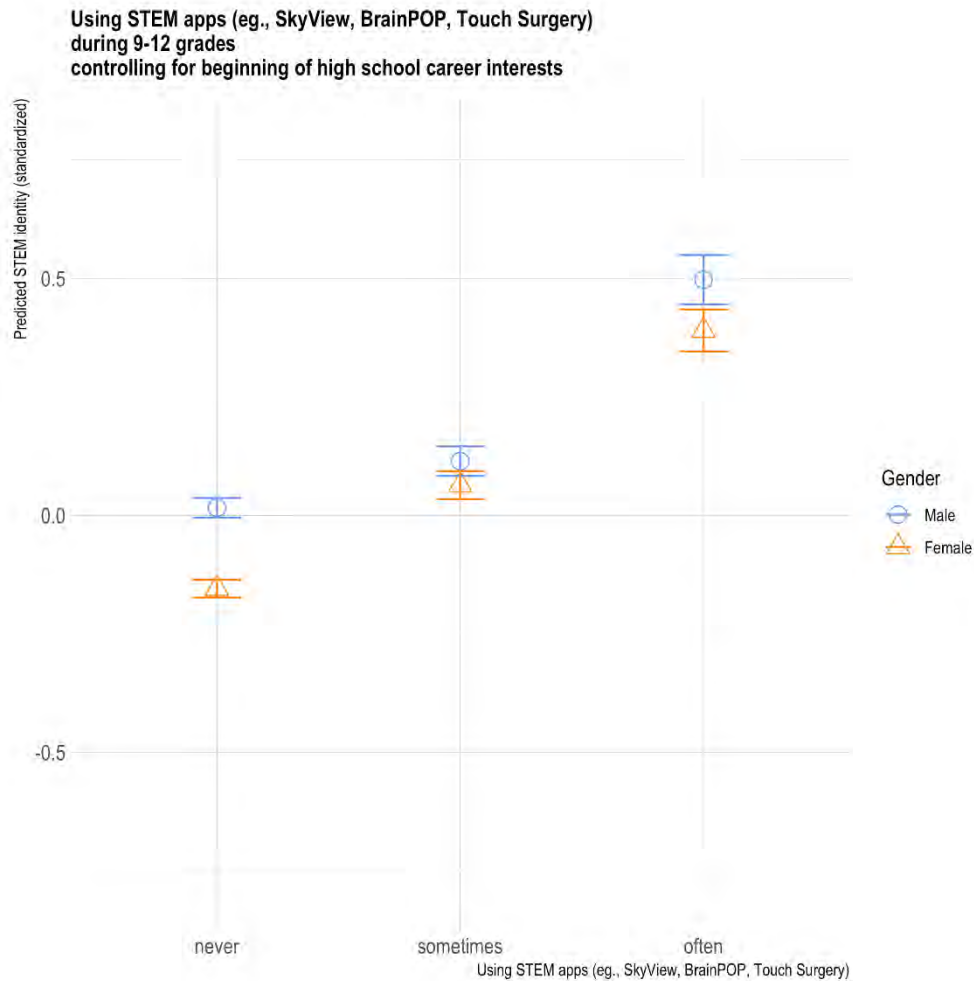


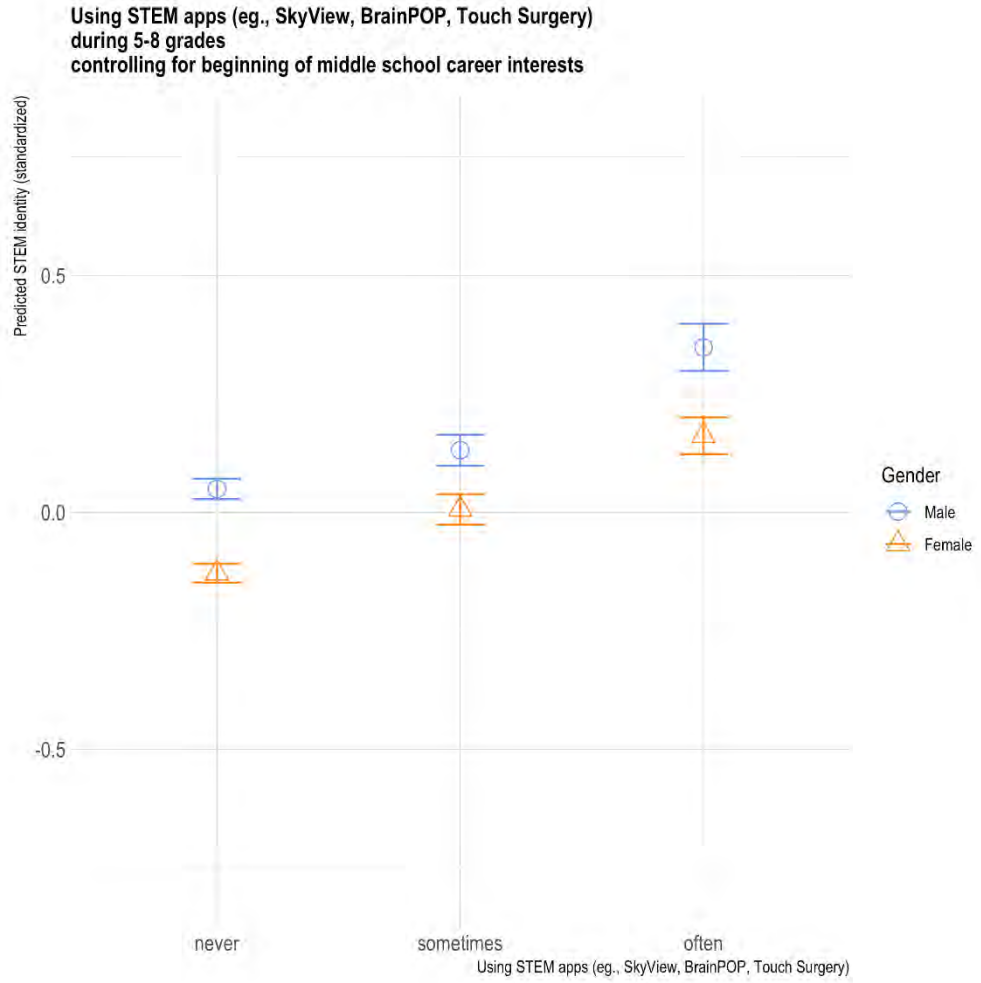


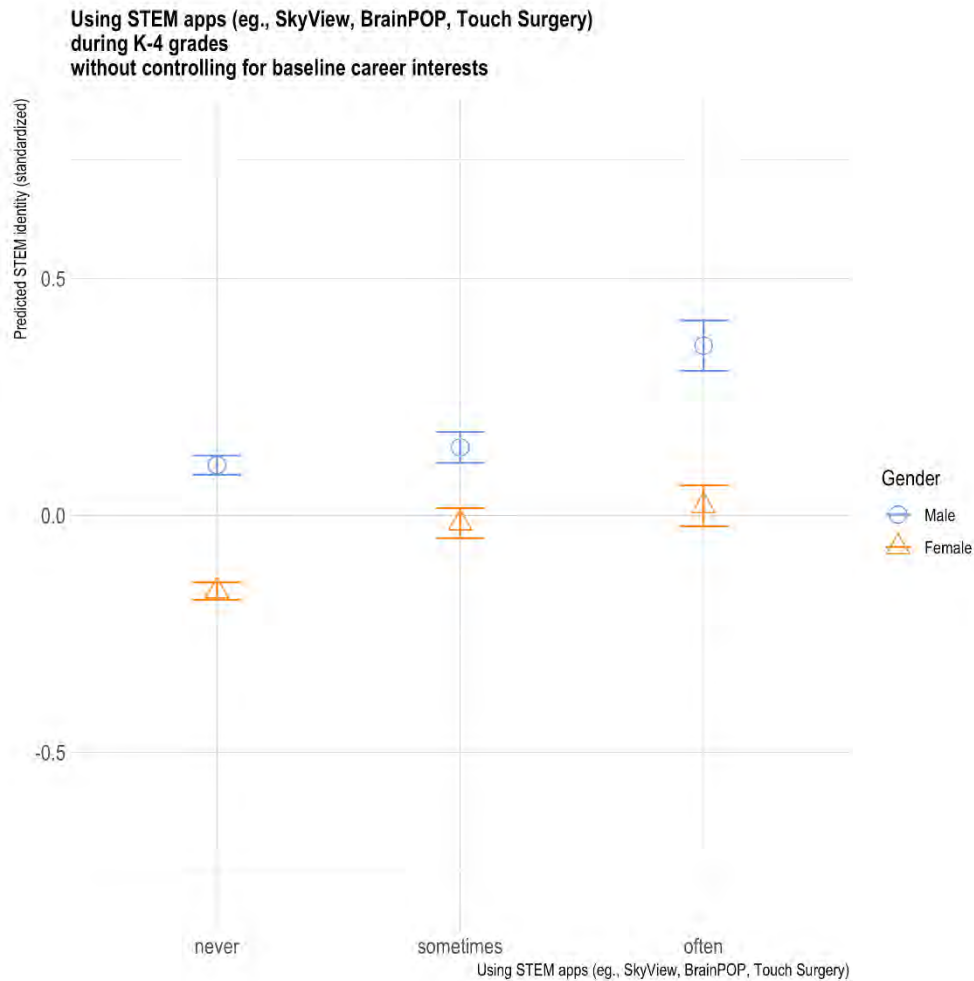






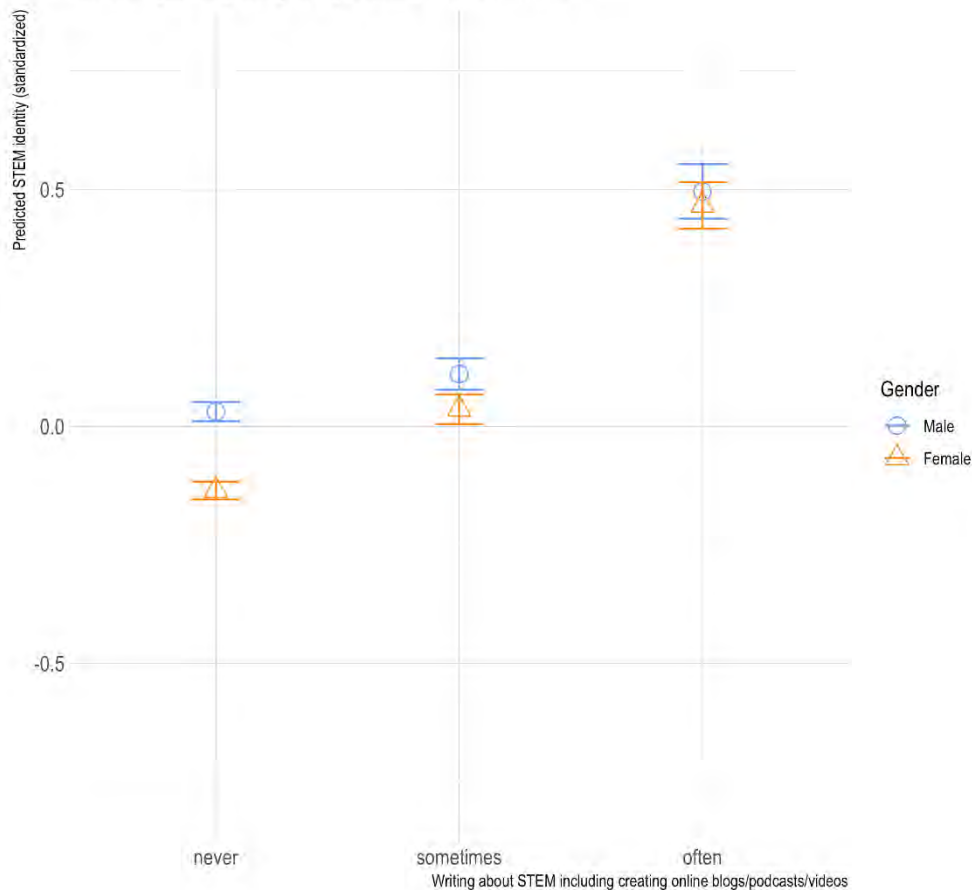


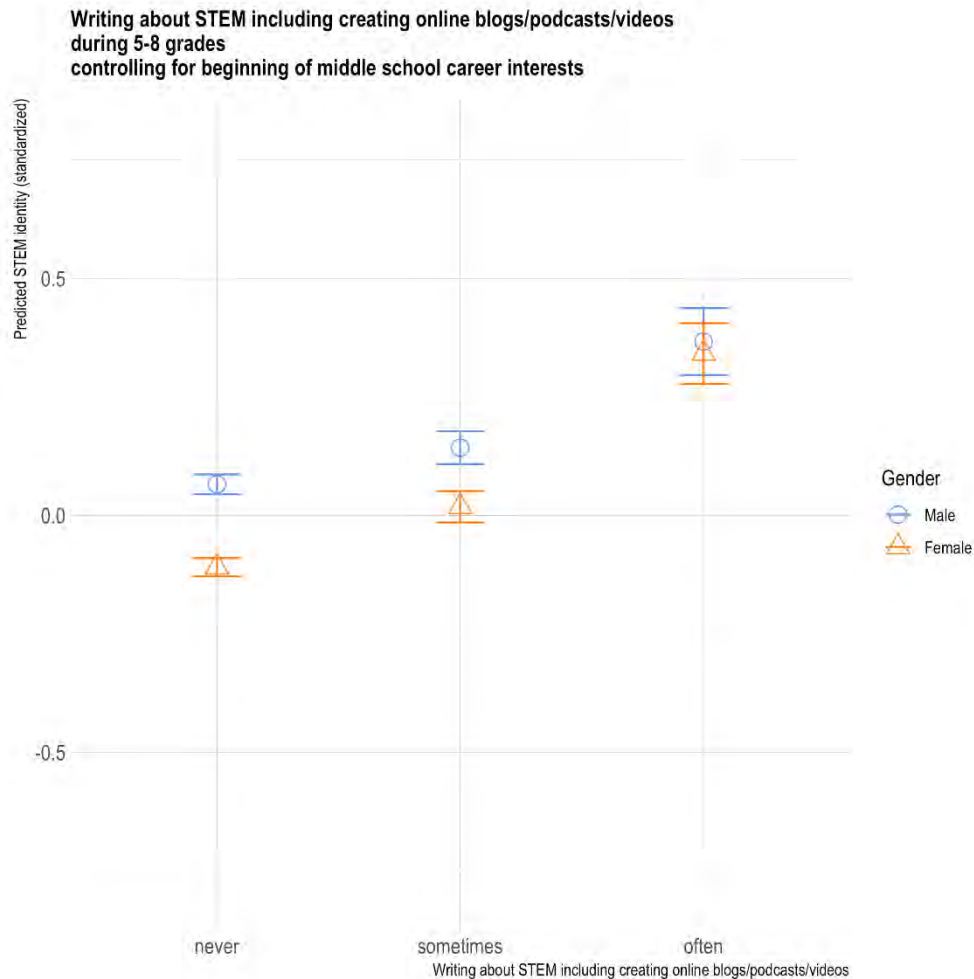


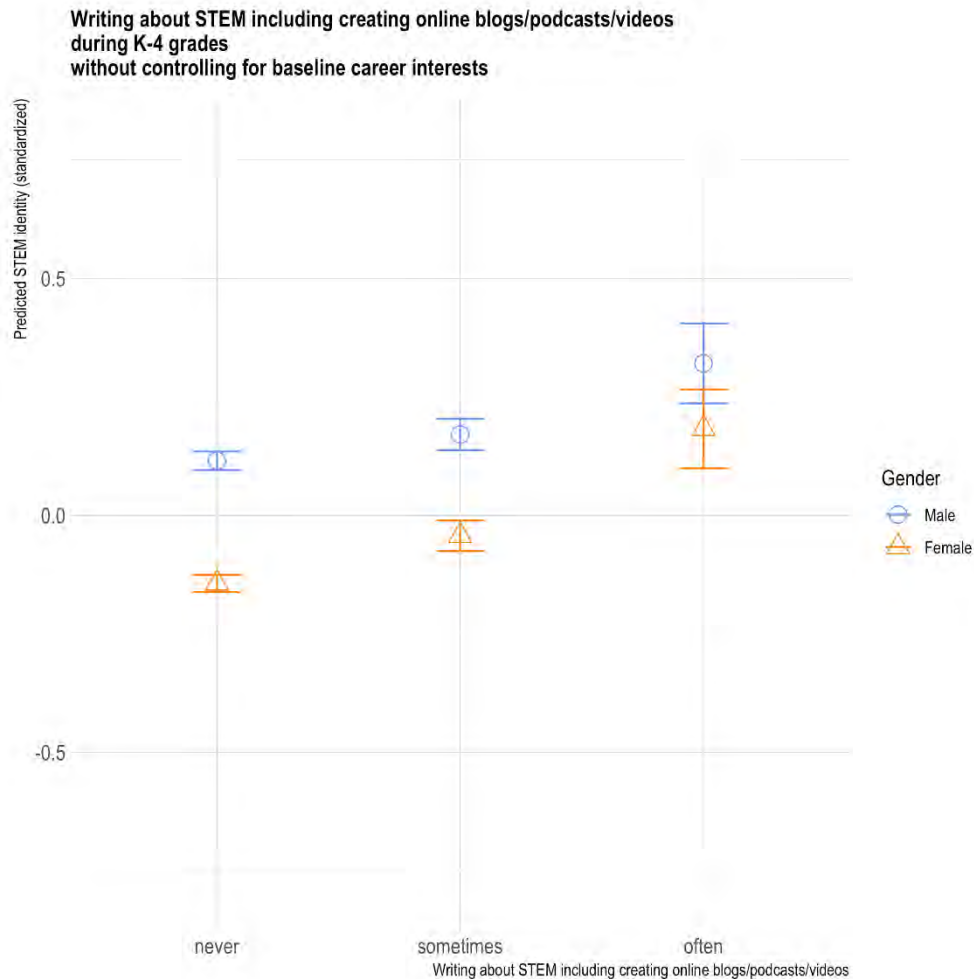


Writing about STEM including creating online blogs/podcasts/videos
during 9-12 grades
controlling for beginning of high school career interests

[to Index](#)

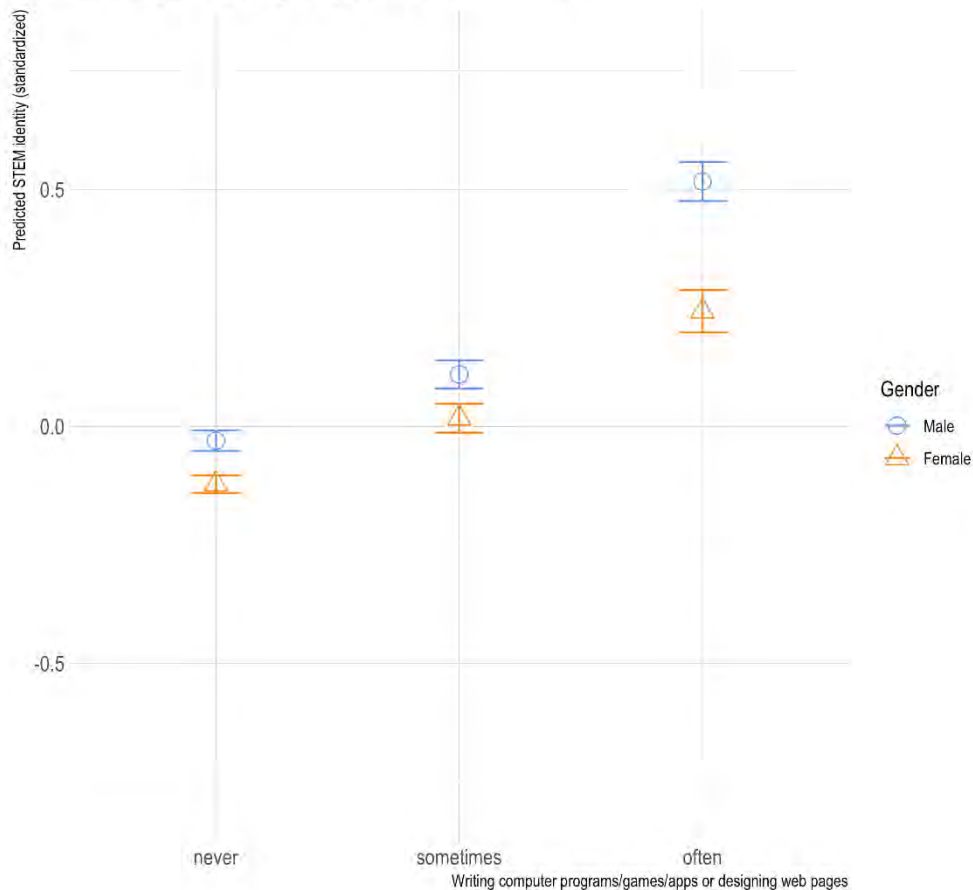


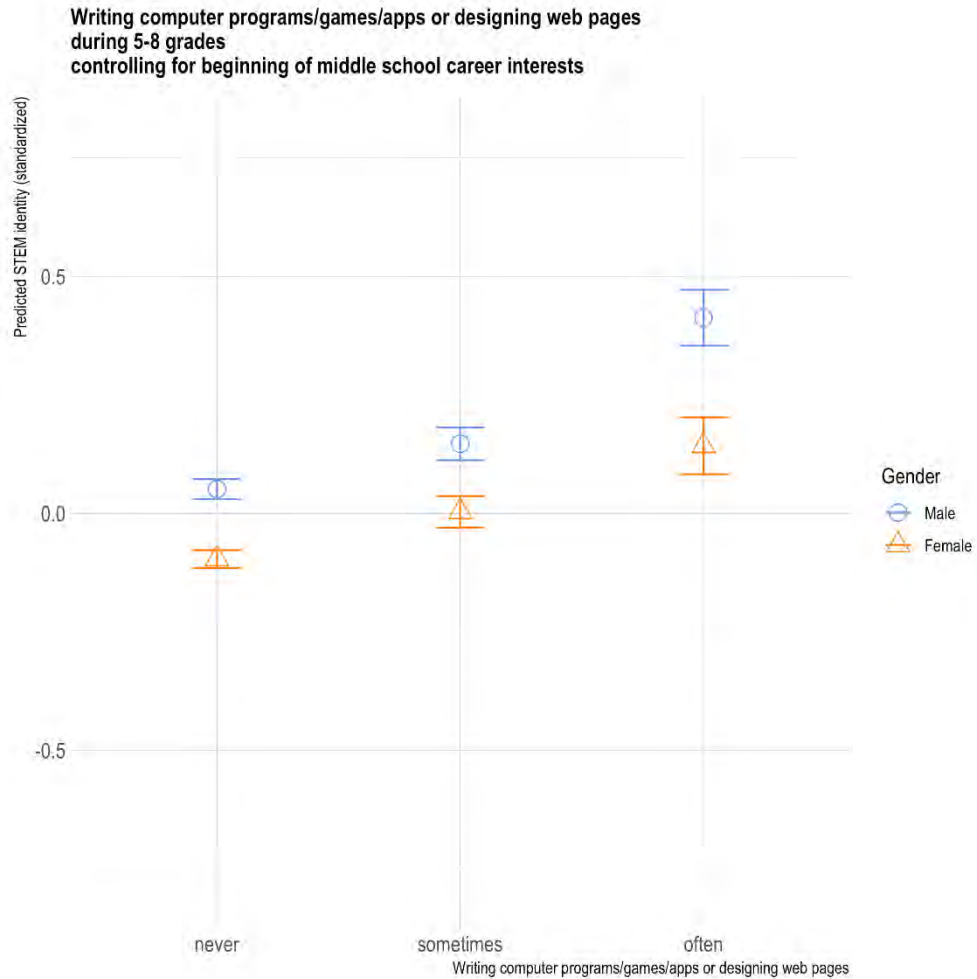


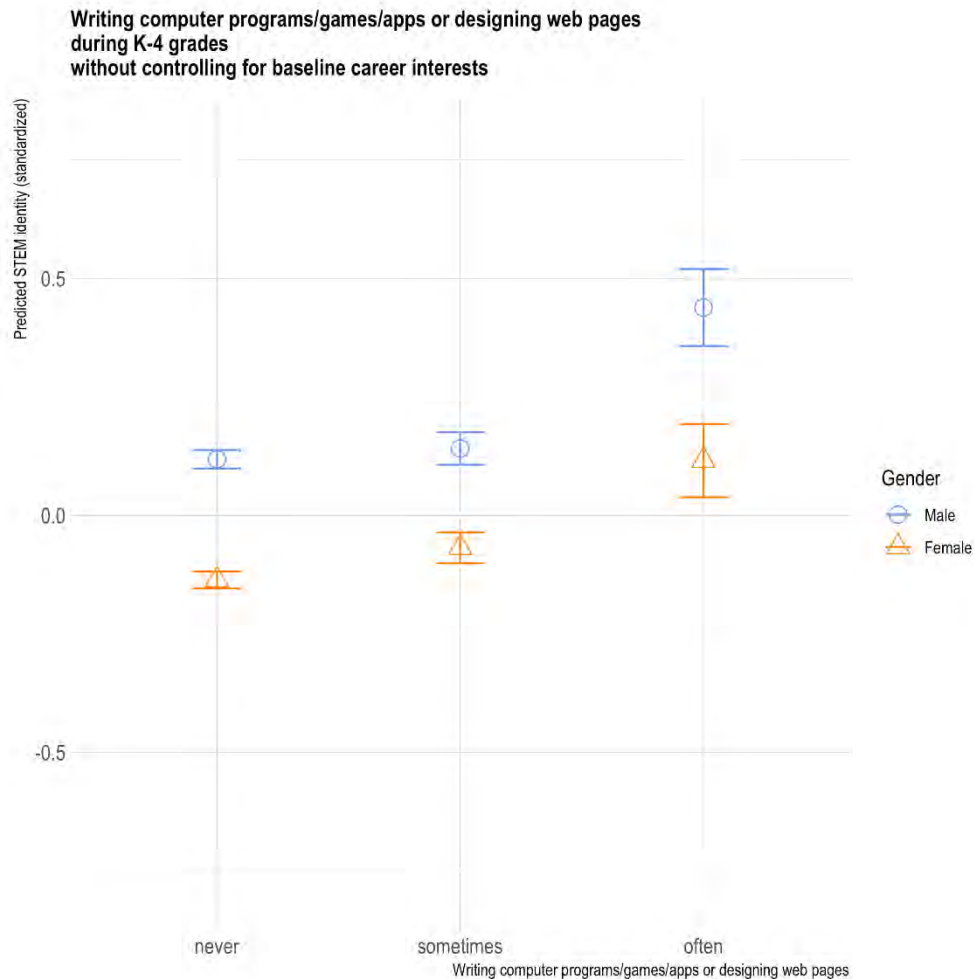


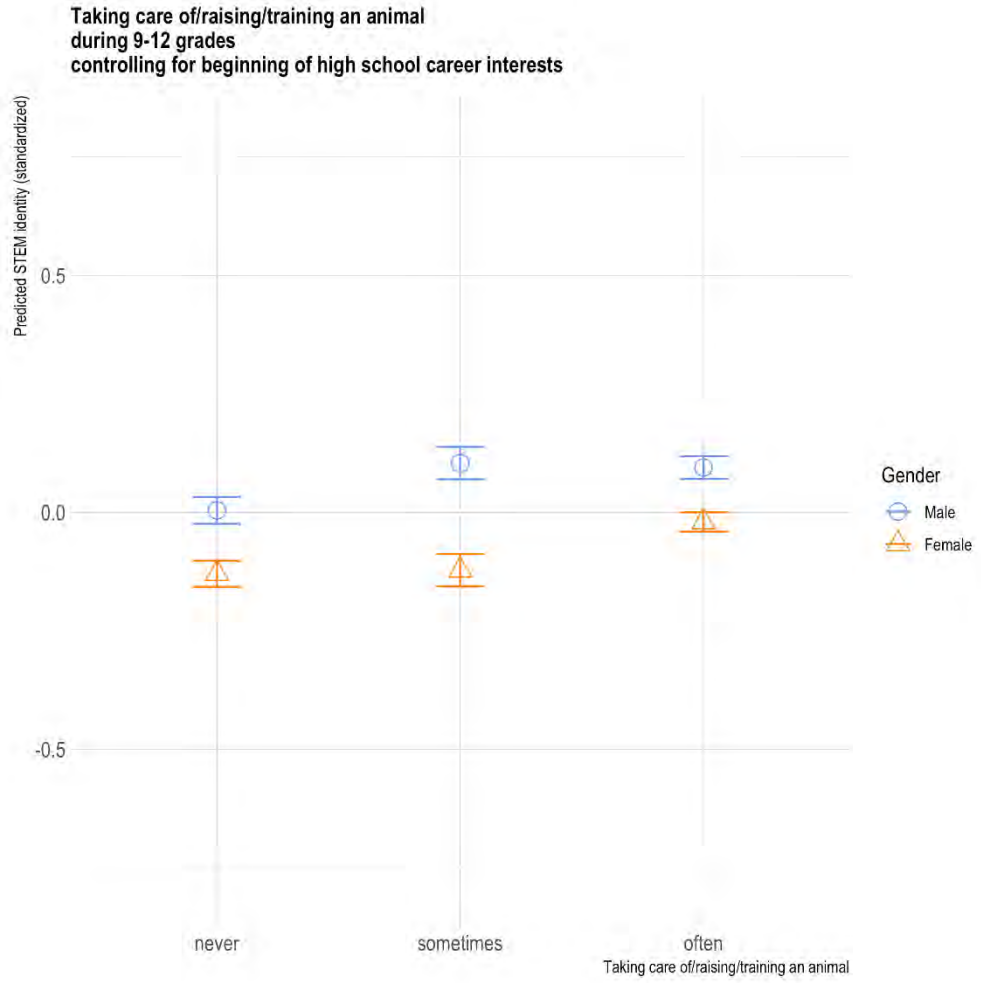
Writing computer programs/games/apps or designing web pages
during 9-12 grades
controlling for beginning of high school career interests

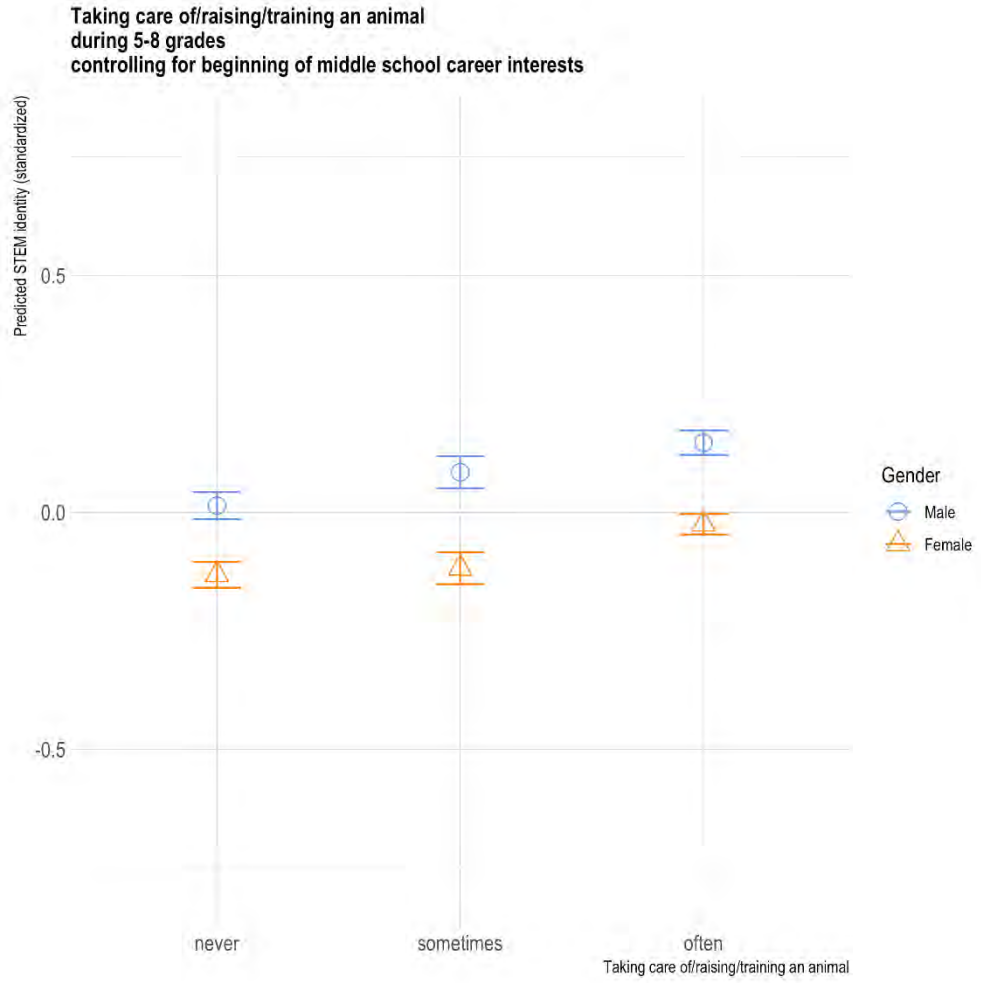
[to Index](#)

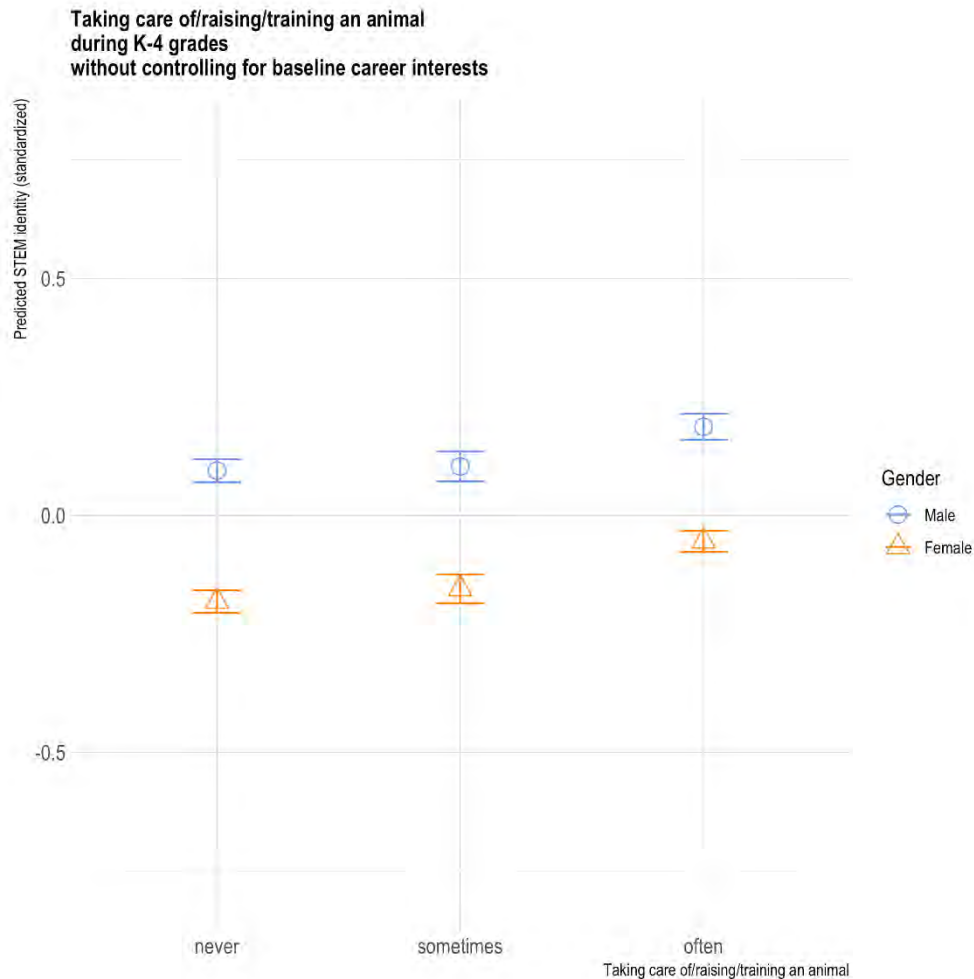


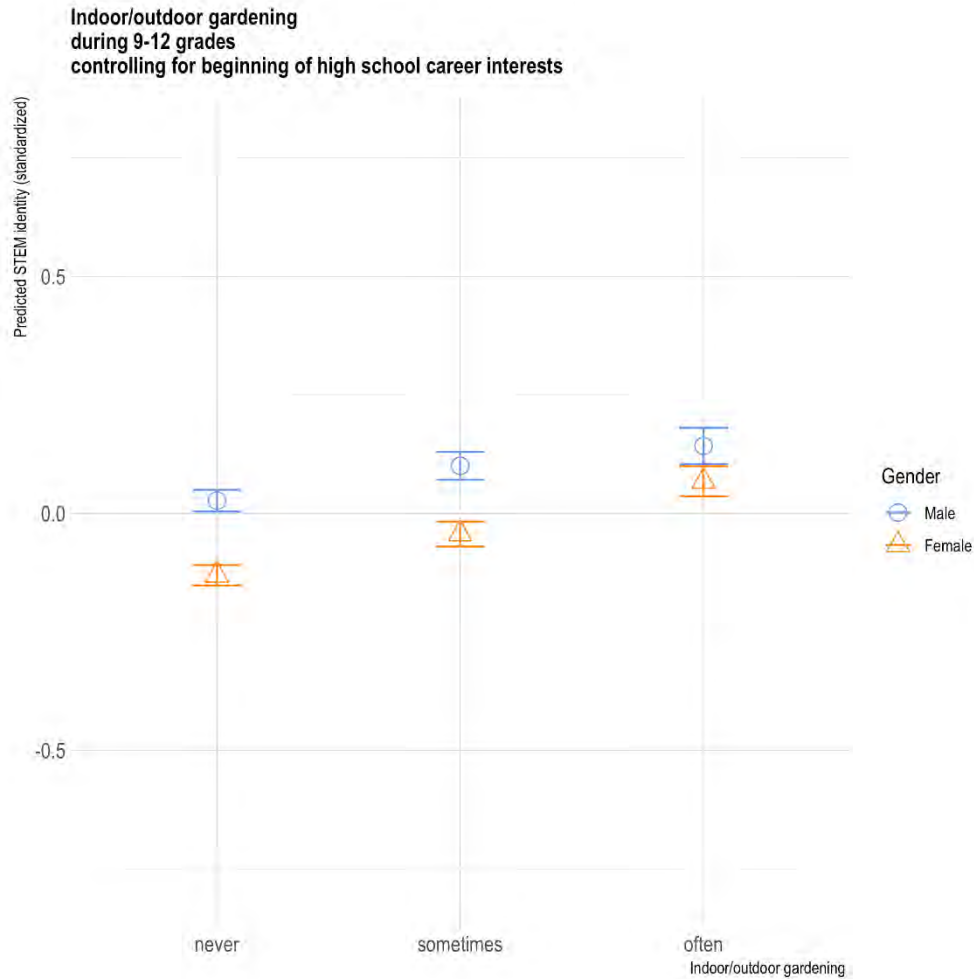


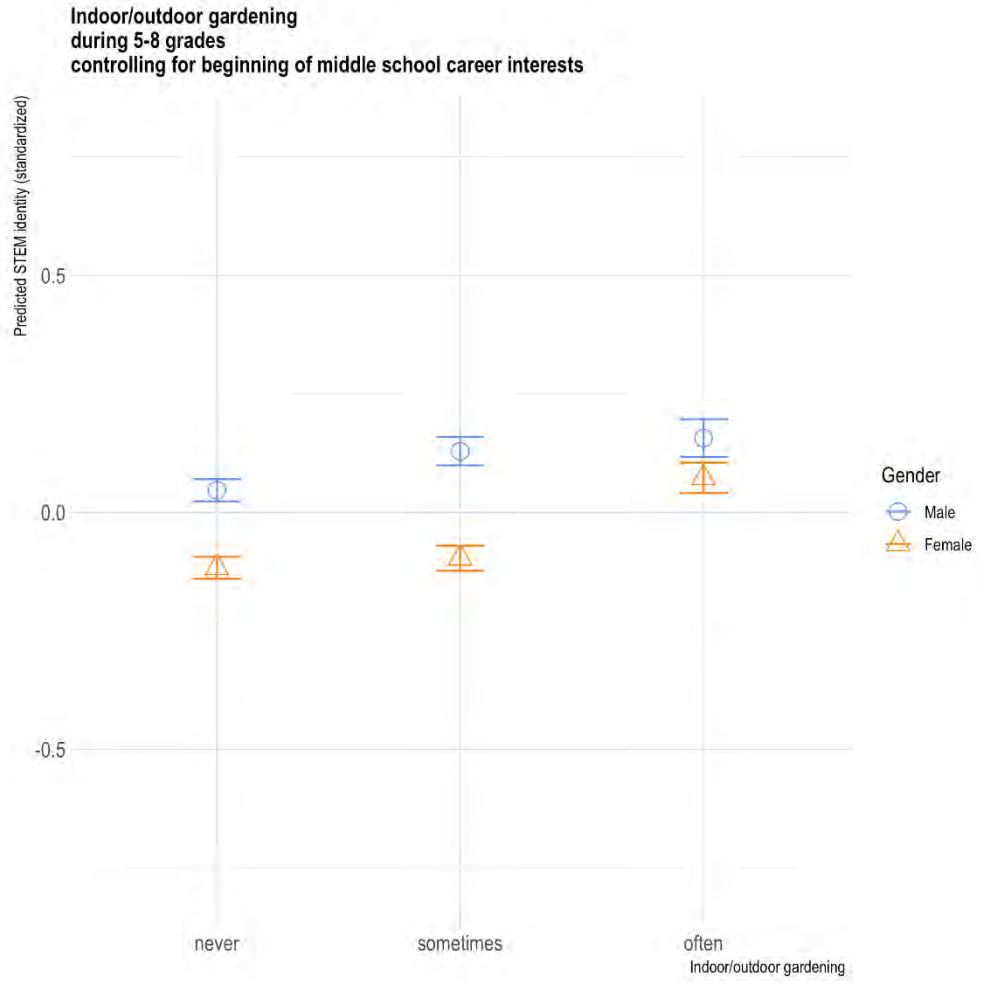


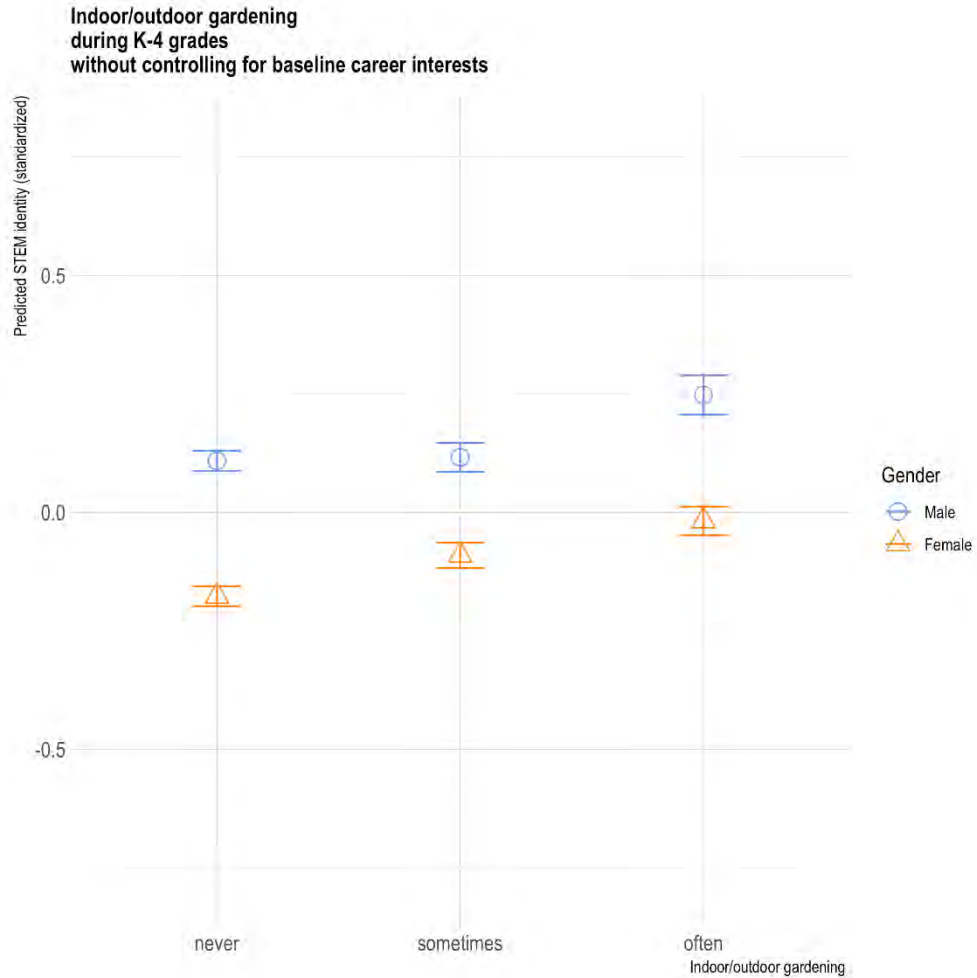


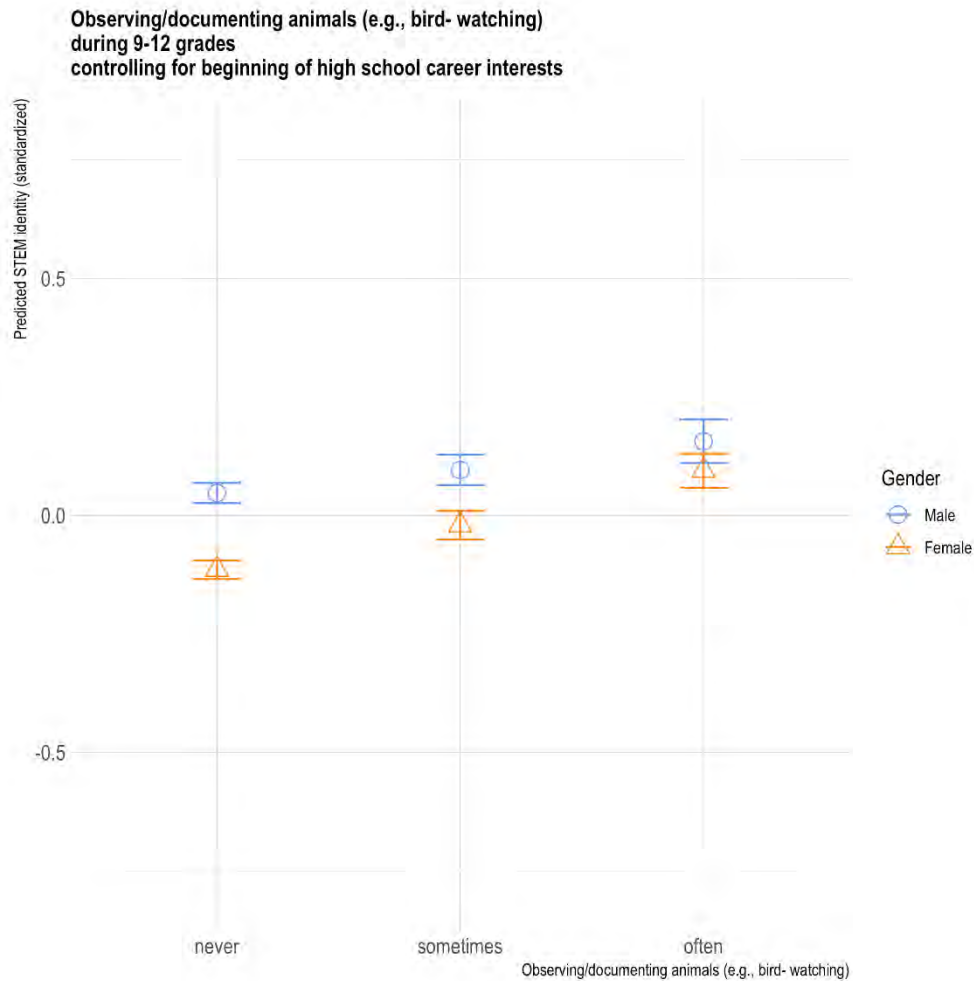


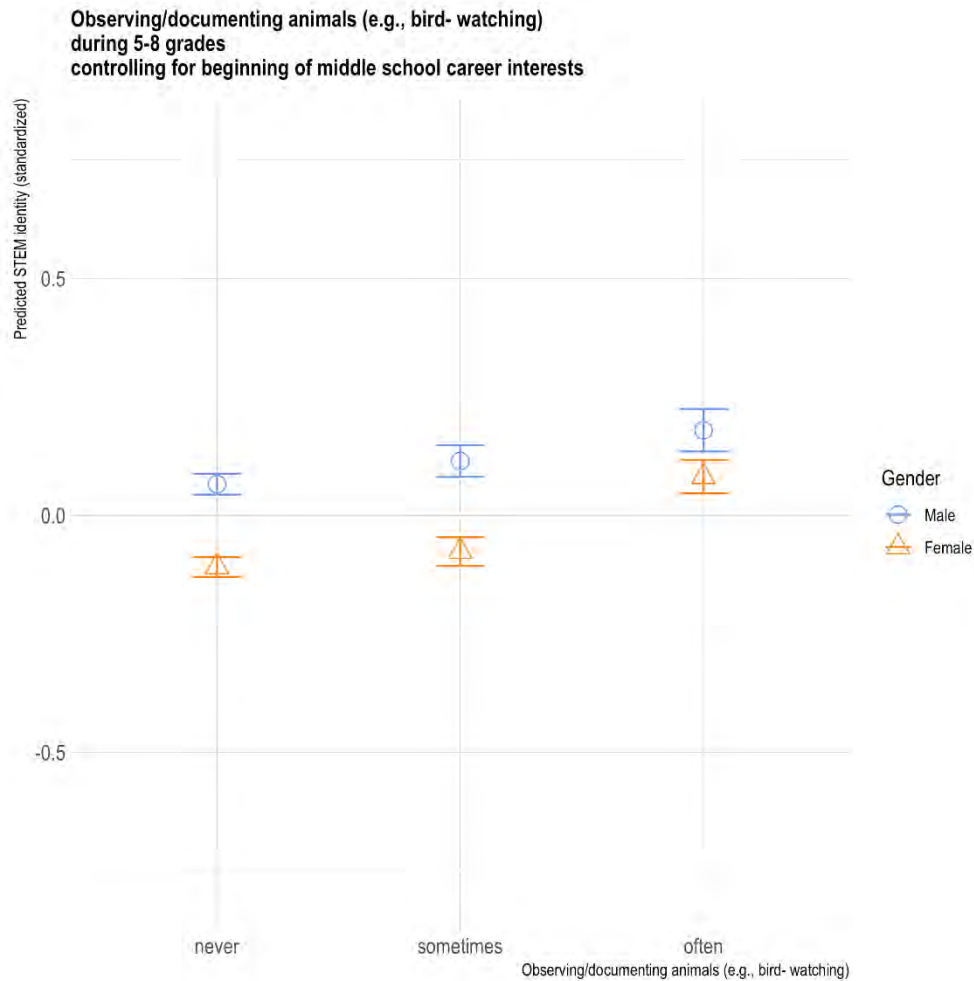


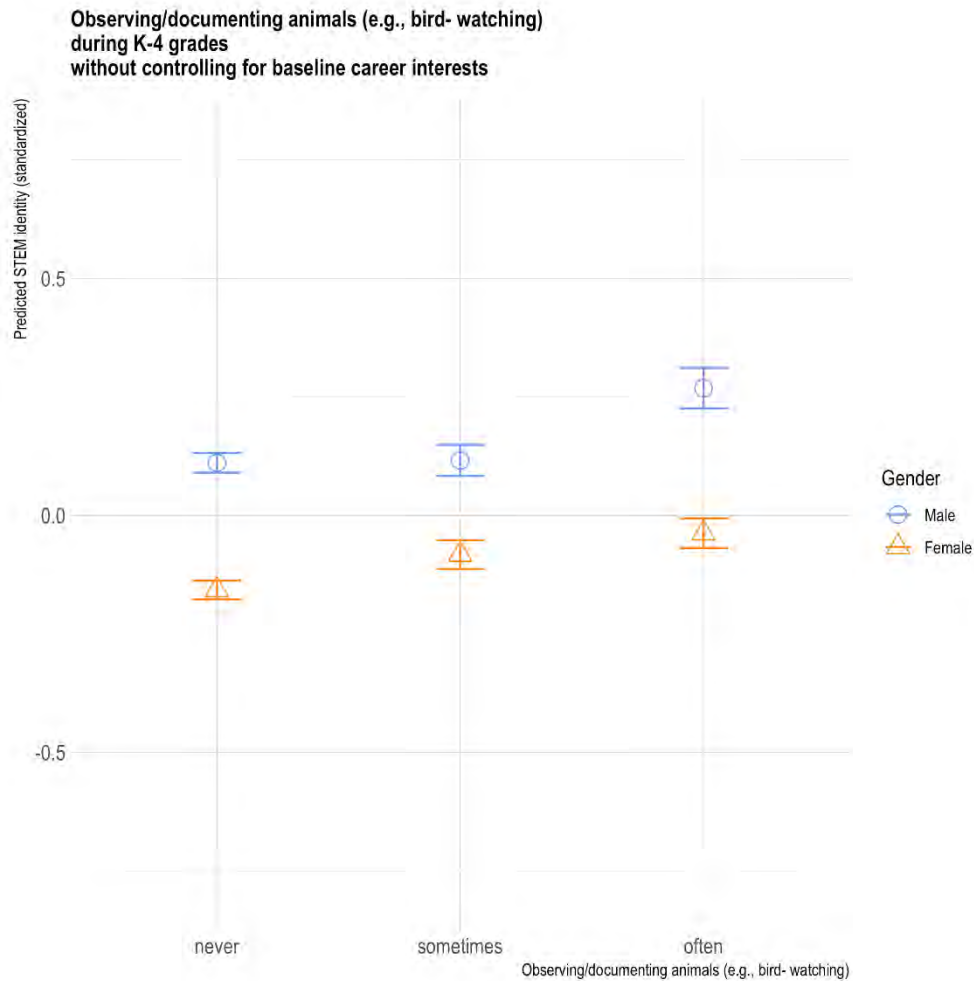


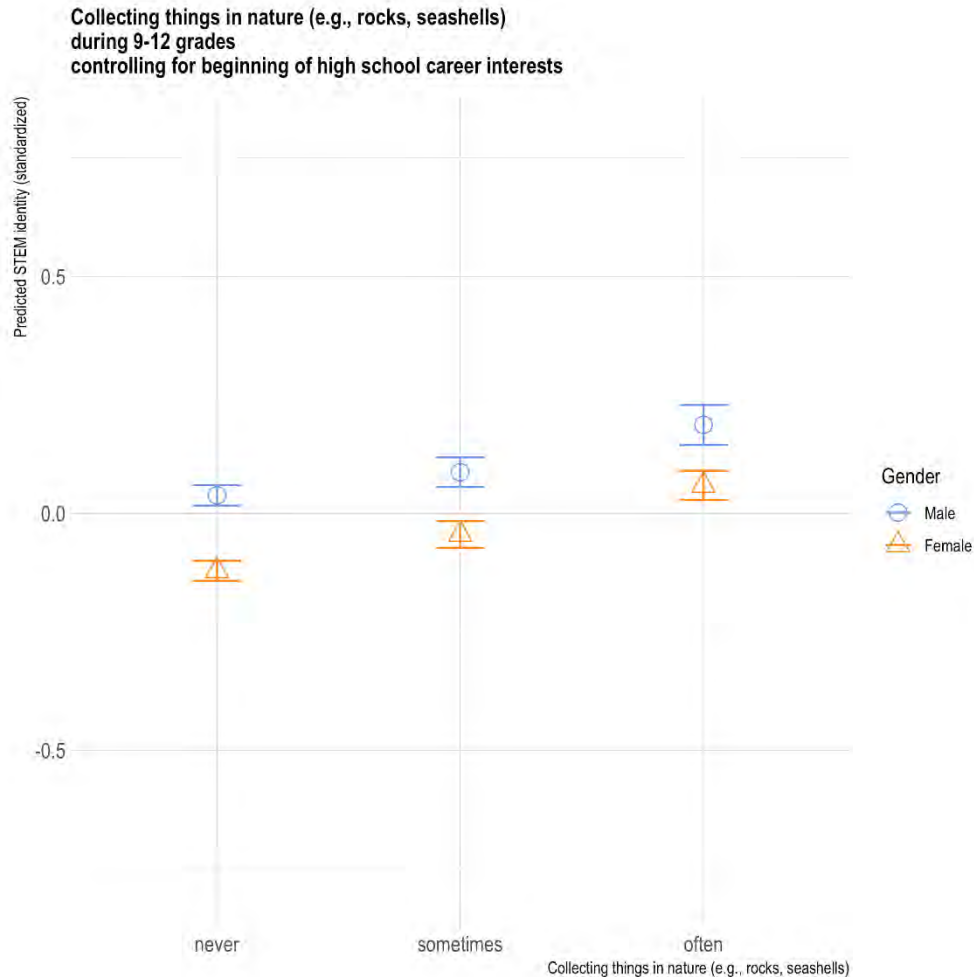


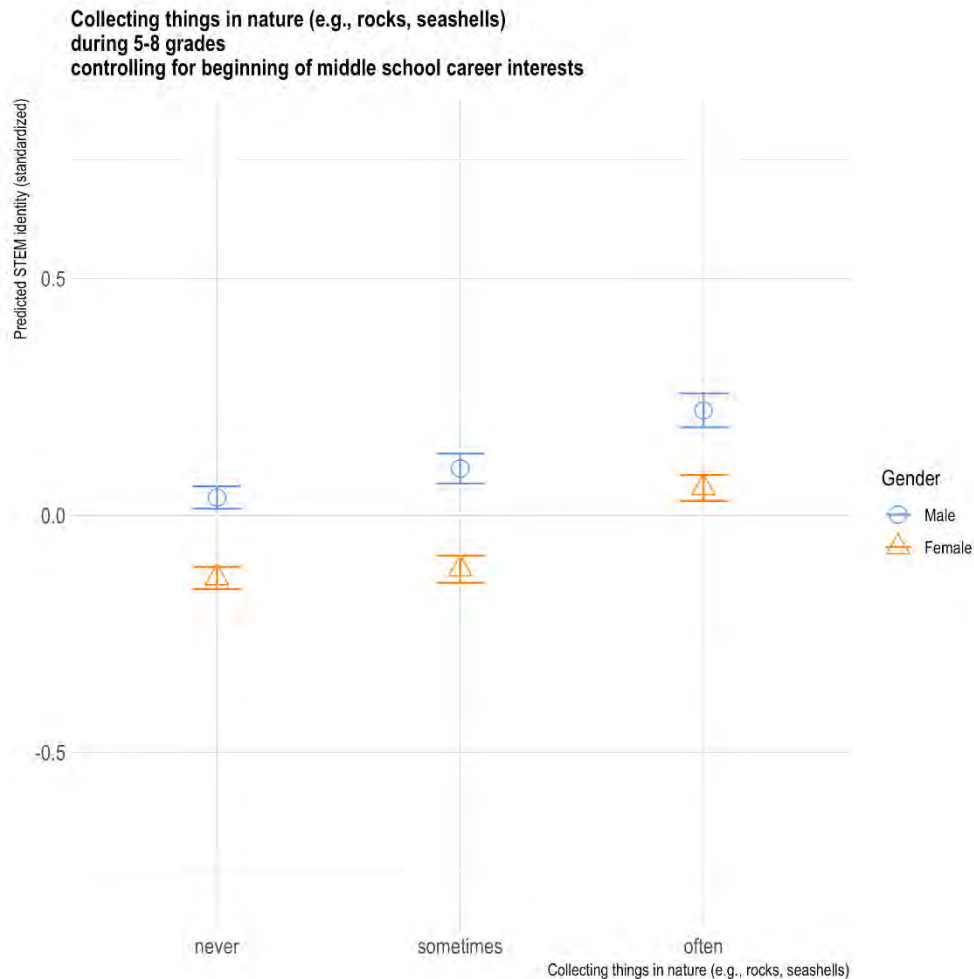


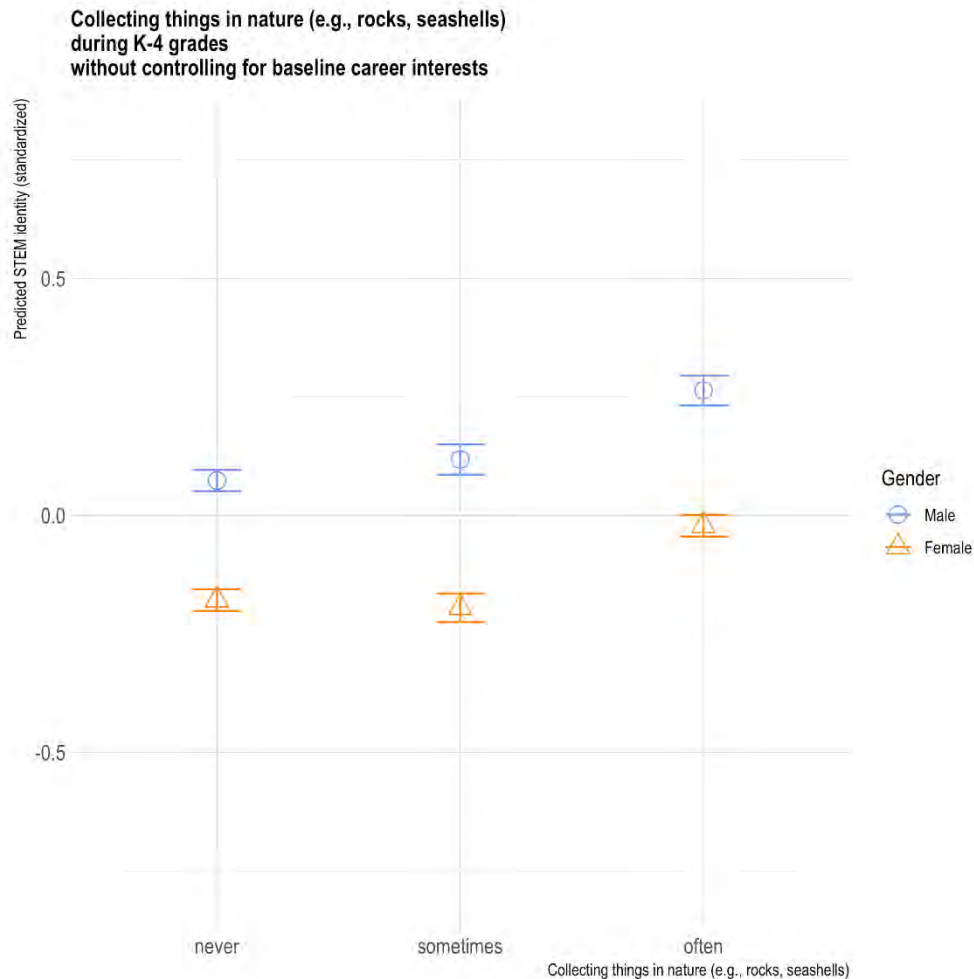






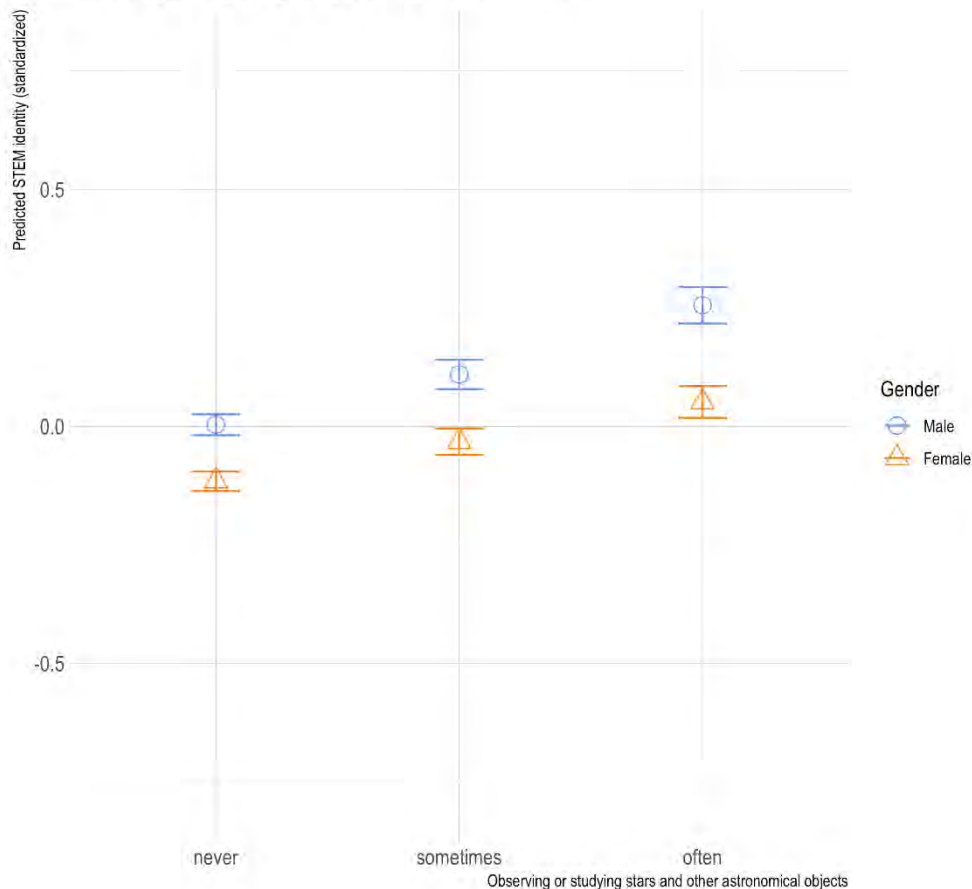


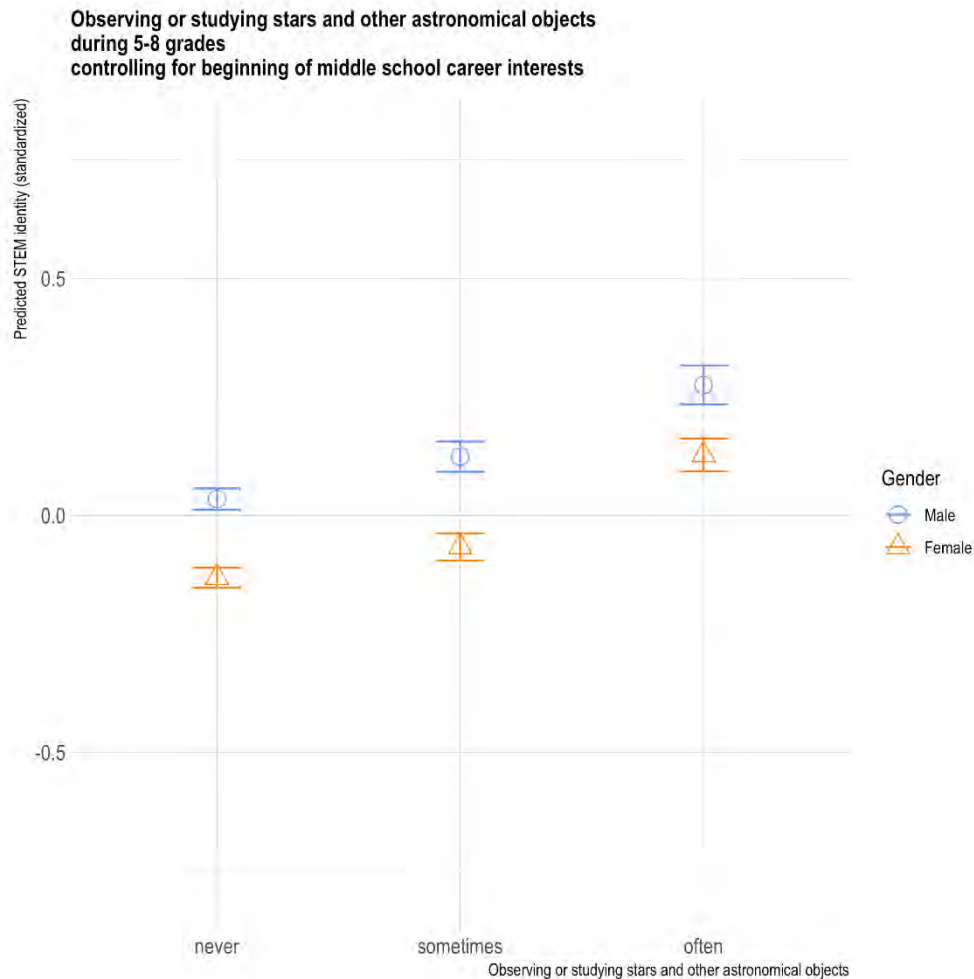




Observing or studying stars and other astronomical objects
during 9-12 grades
controlling for beginning of high school career interests

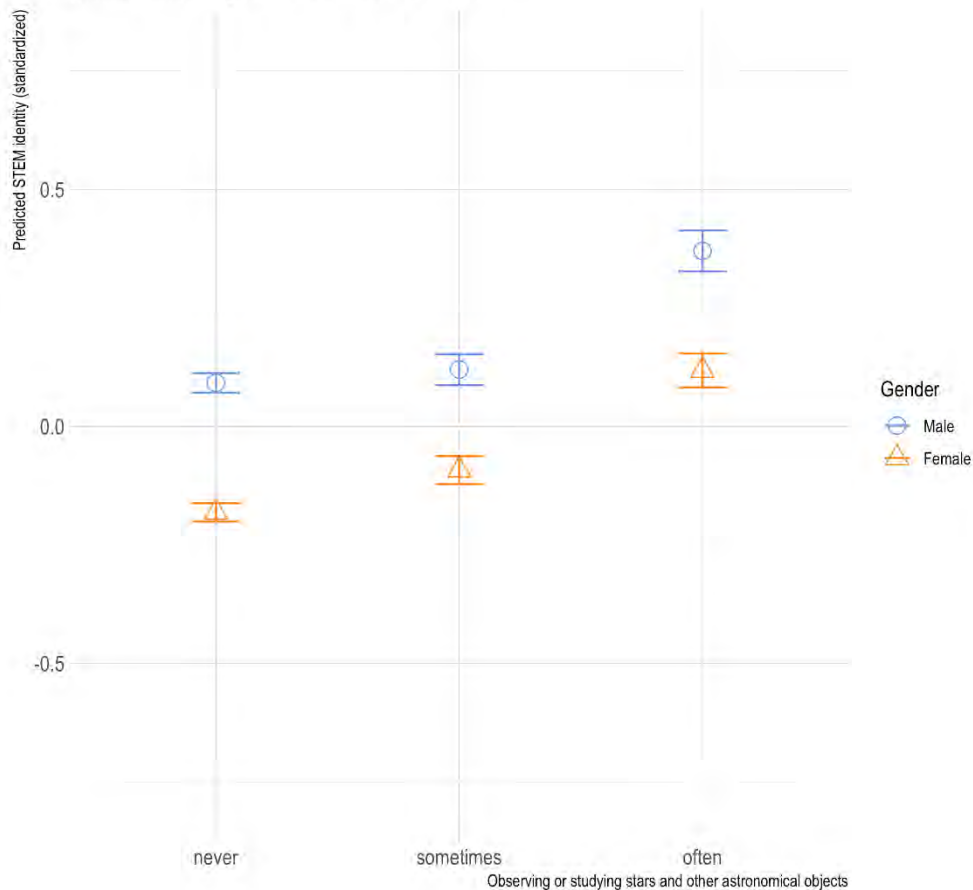
[to Index](#)





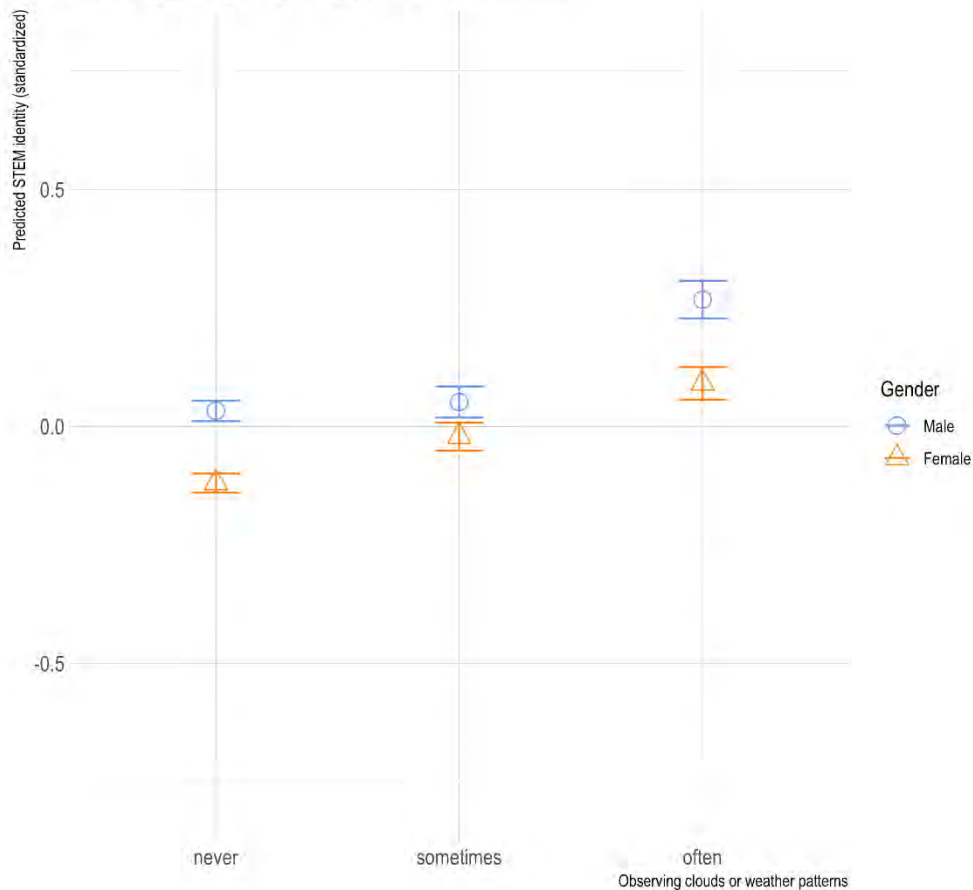
Observing or studying stars and other astronomical objects
during K-4 grades
without controlling for baseline career interests

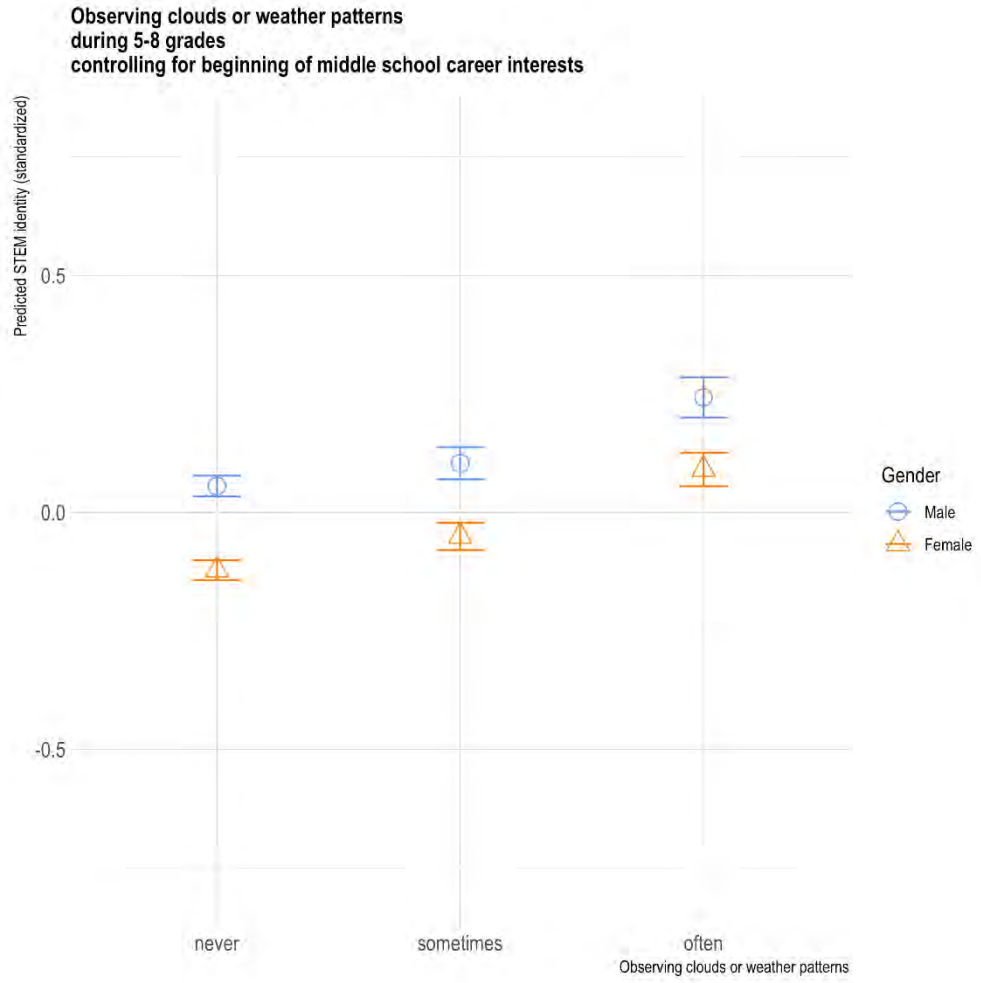
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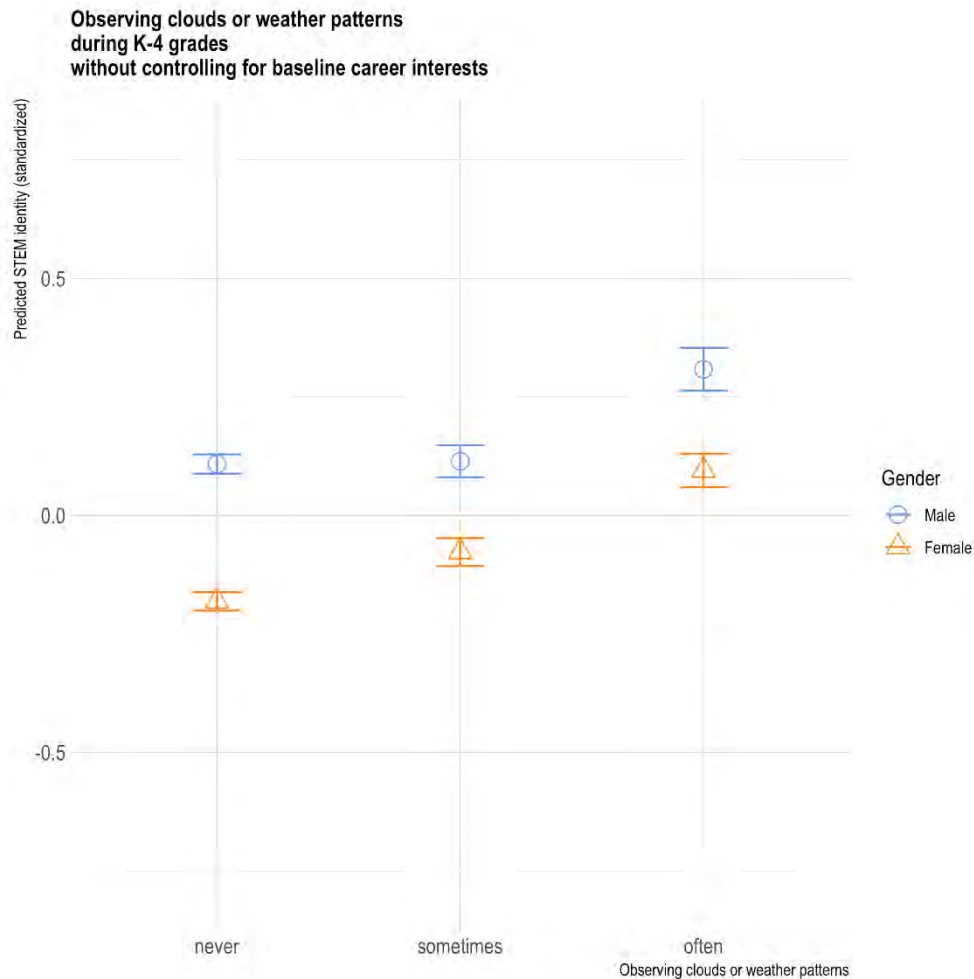


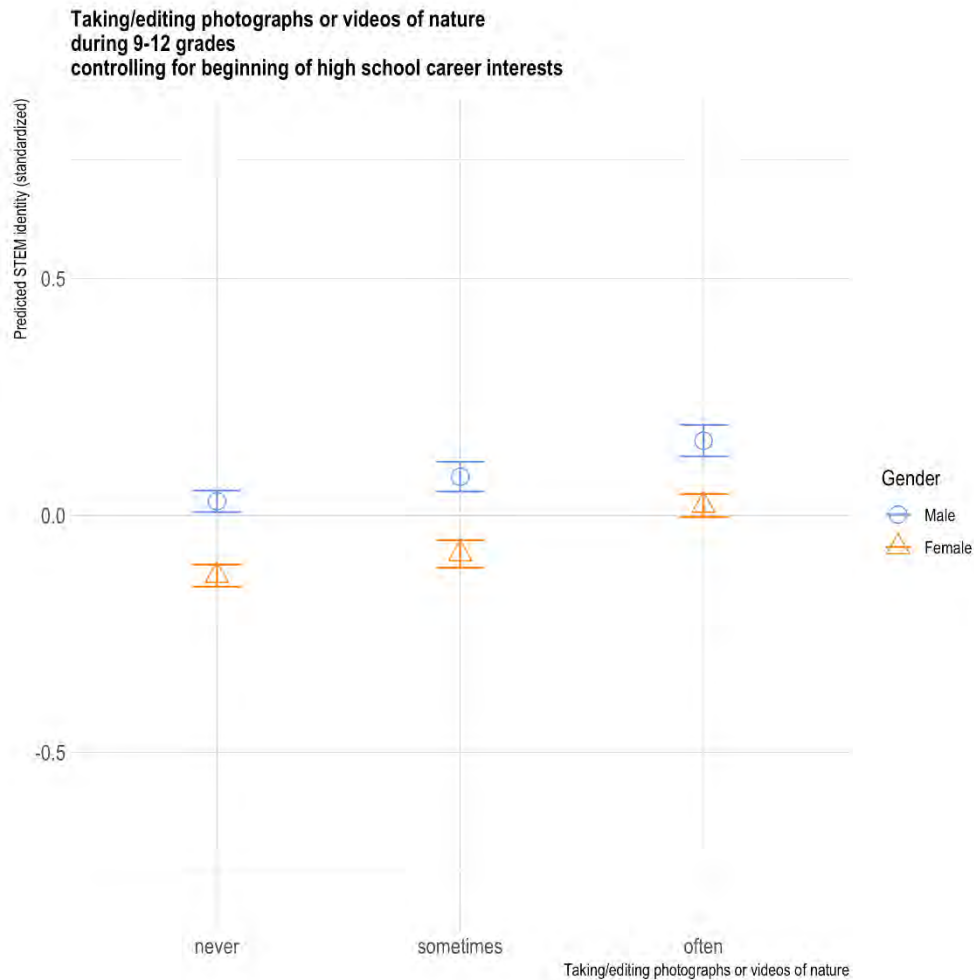
Observing clouds or weather patterns
during 9-12 grades
controlling for beginning of high school career interests

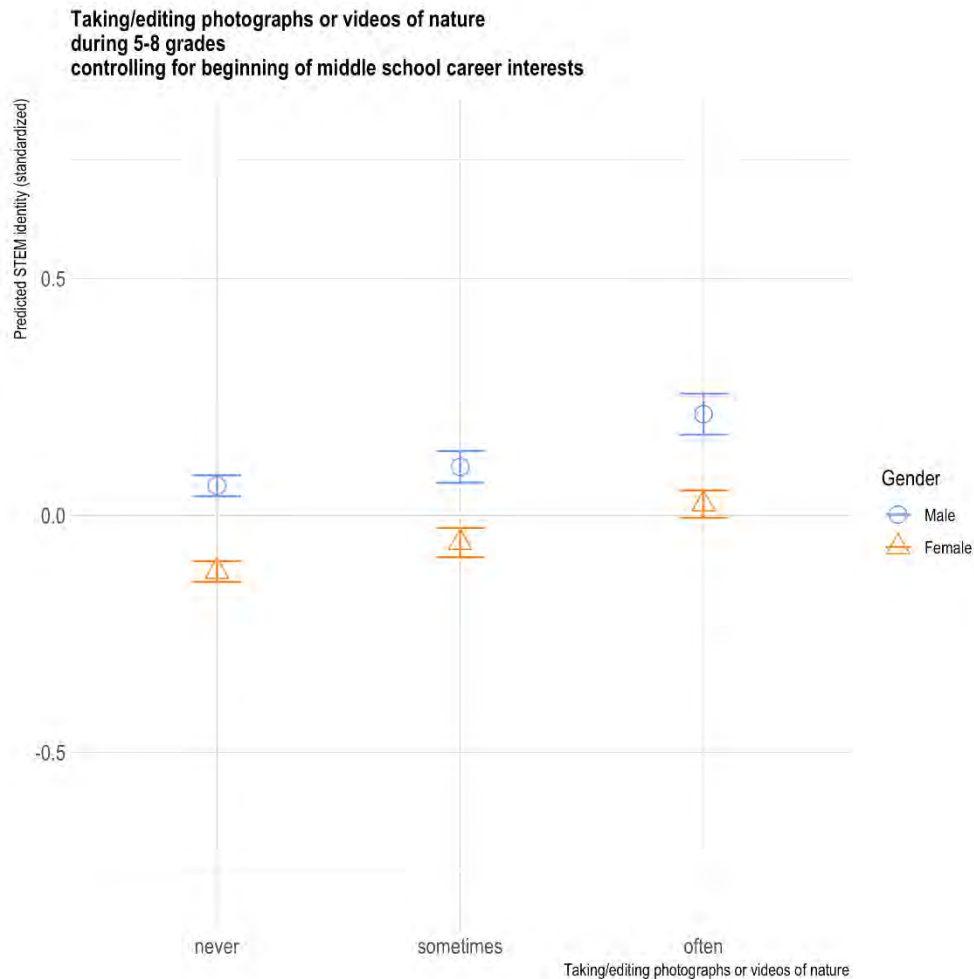
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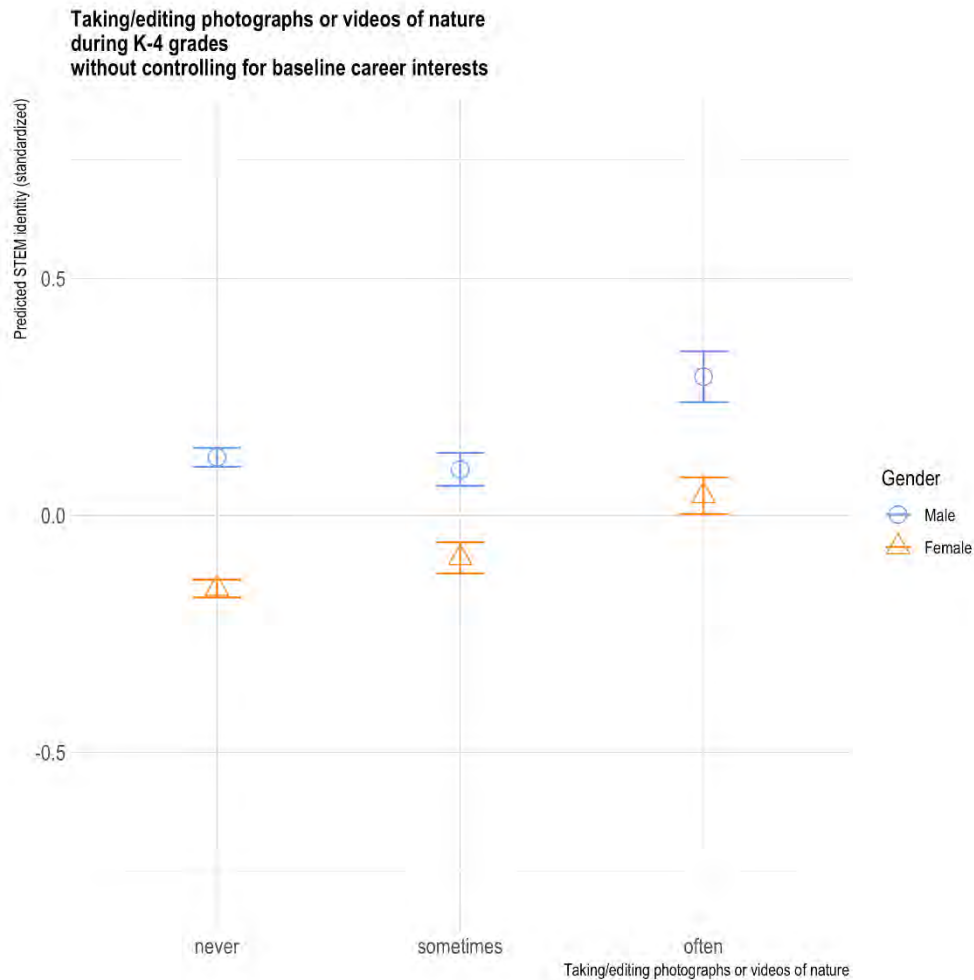






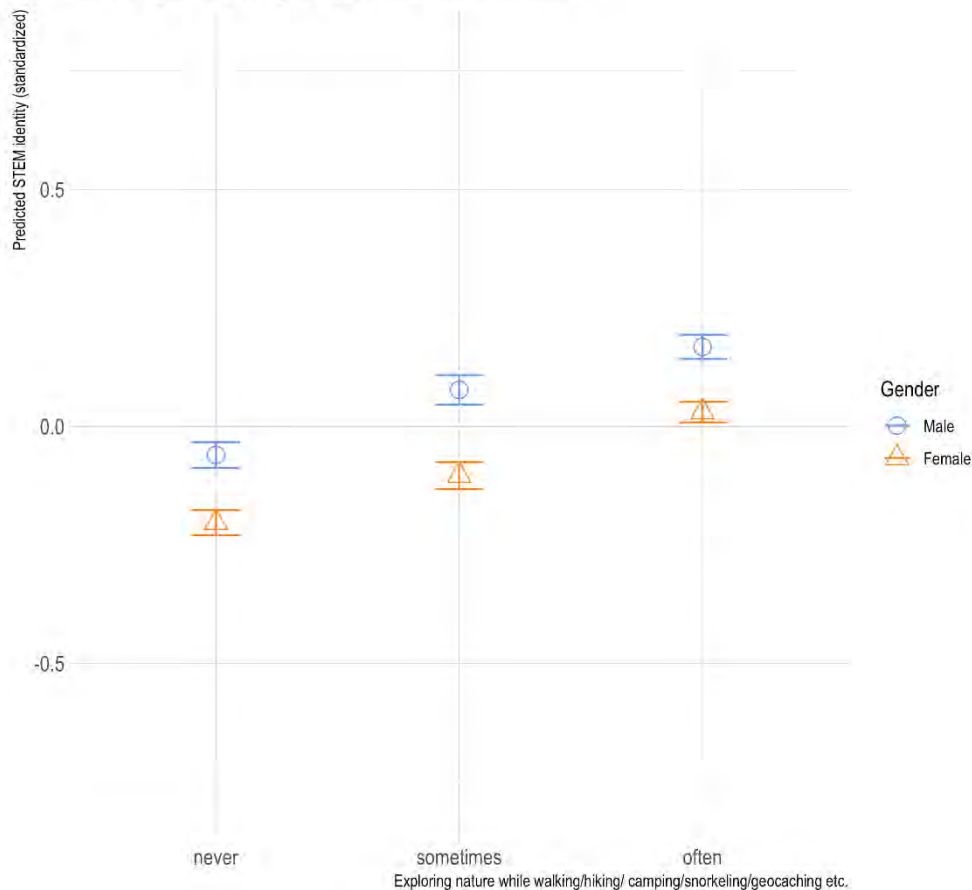






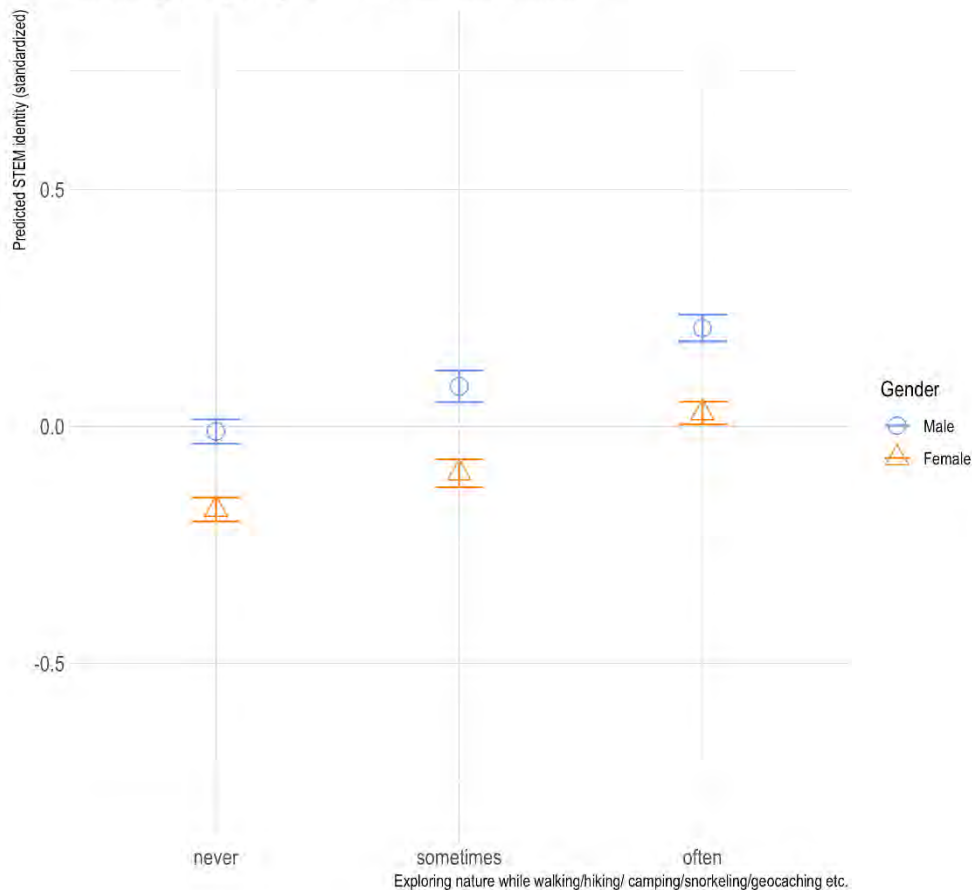
Exploring nature while walking/hiking/ camping/snorkeling/geocaching etc.
during 9-12 grades
controlling for beginning of high school career interests

[to Index](#)



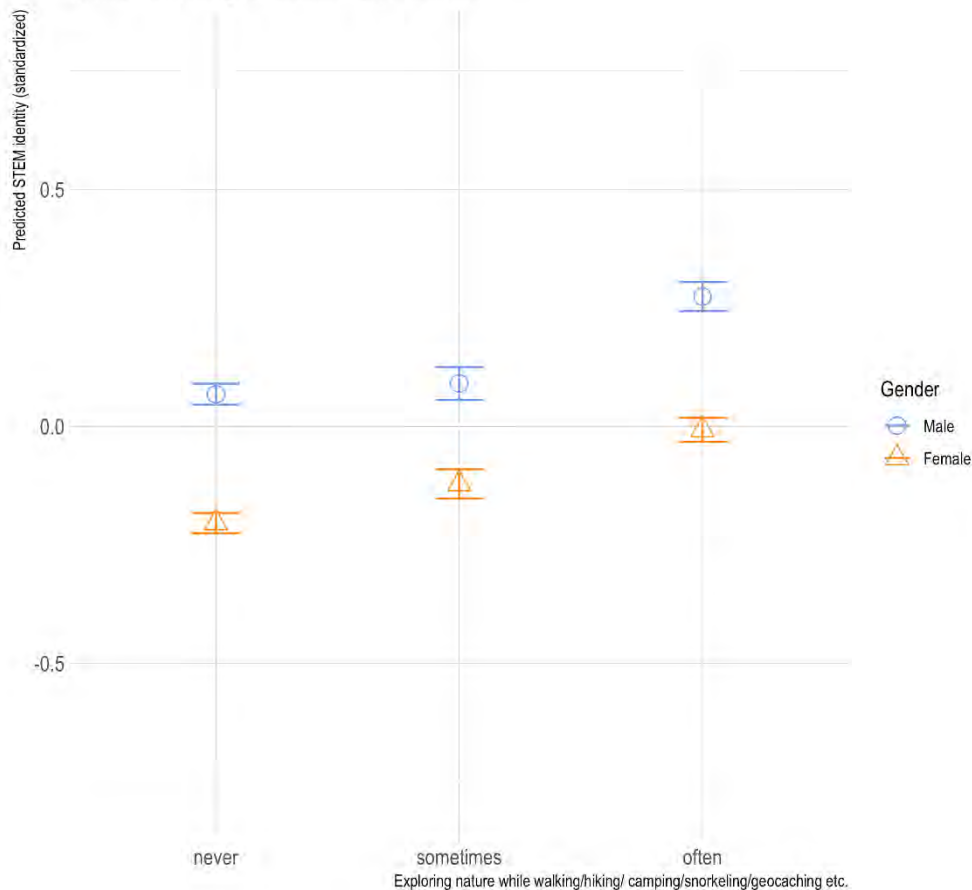
Exploring nature while walking/hiking/ camping/snorkeling/geocaching etc.
during 5-8 grades
controlling for beginning of middle school career interests

[to Index](#)



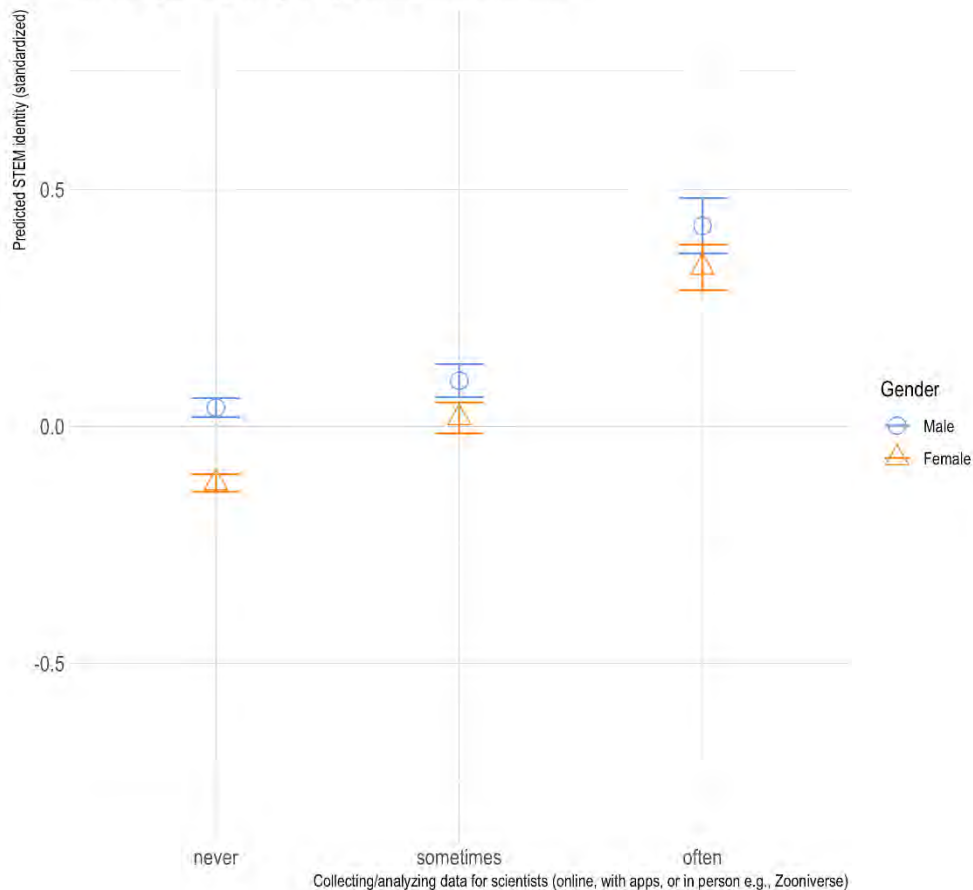
Exploring nature while walking/hiking/ camping/snorkeling/geocaching etc.
during K-4 grades
without controlling for baseline career interests

[to Index](#)



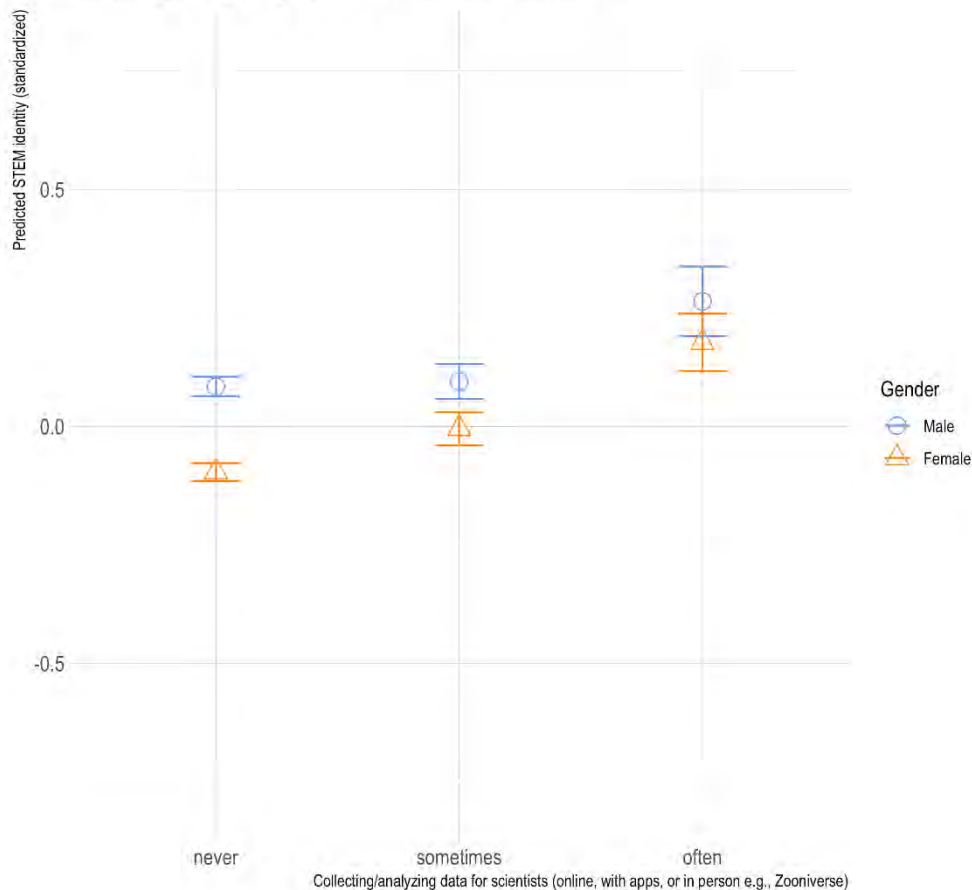
Collecting/analyzing data for scientists (online, with apps, or in person e.g., Zooniverse)
 during 9-12 grades
 controlling for beginning of high school career interests

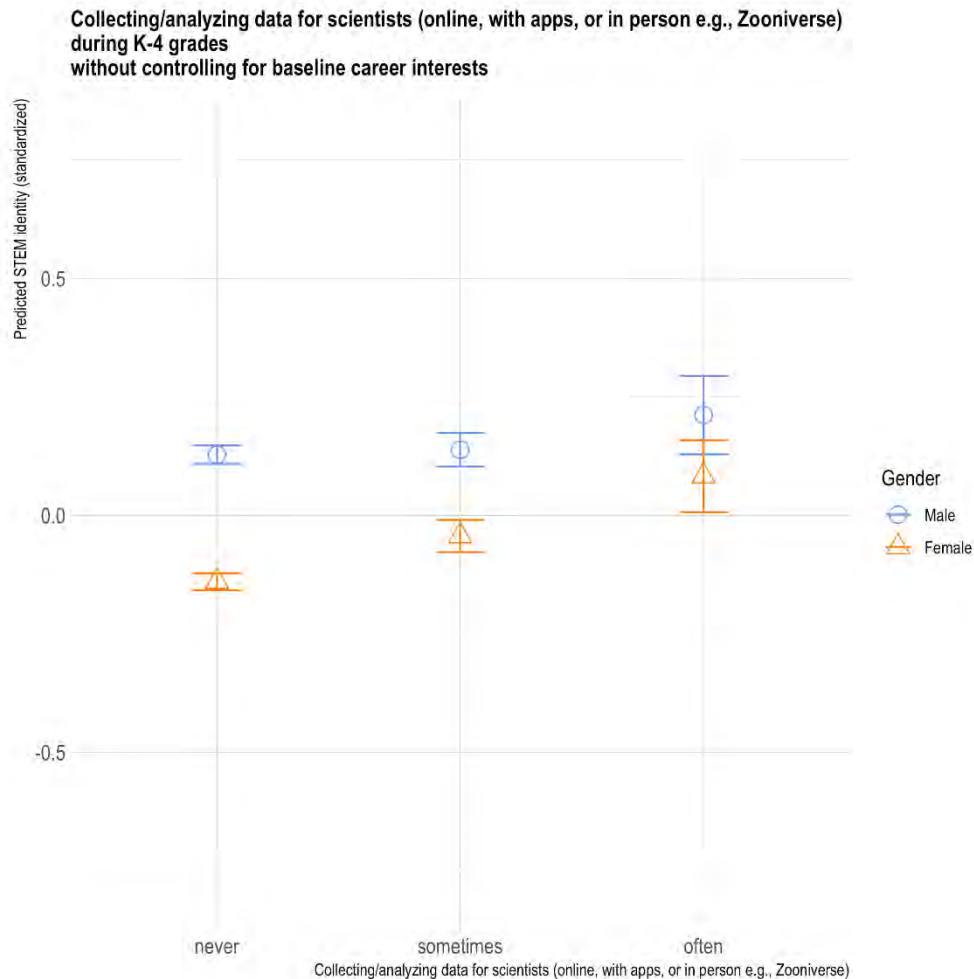
[to Index](#)

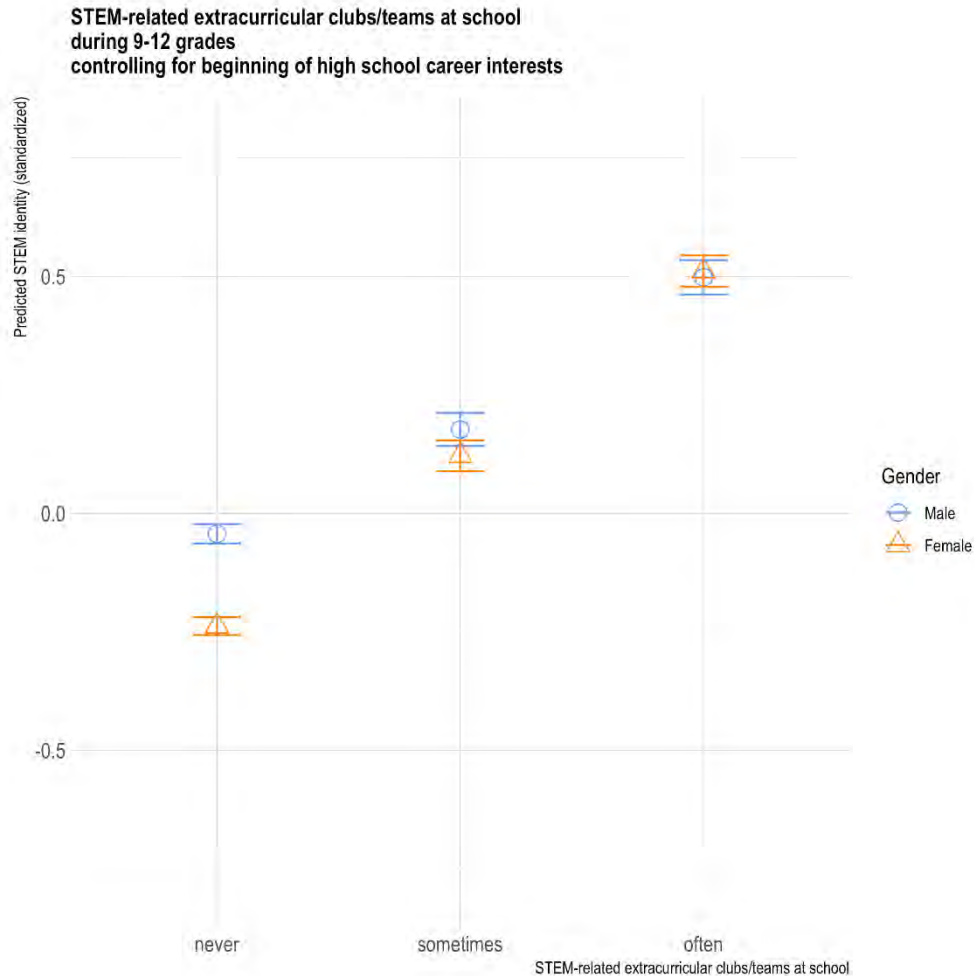


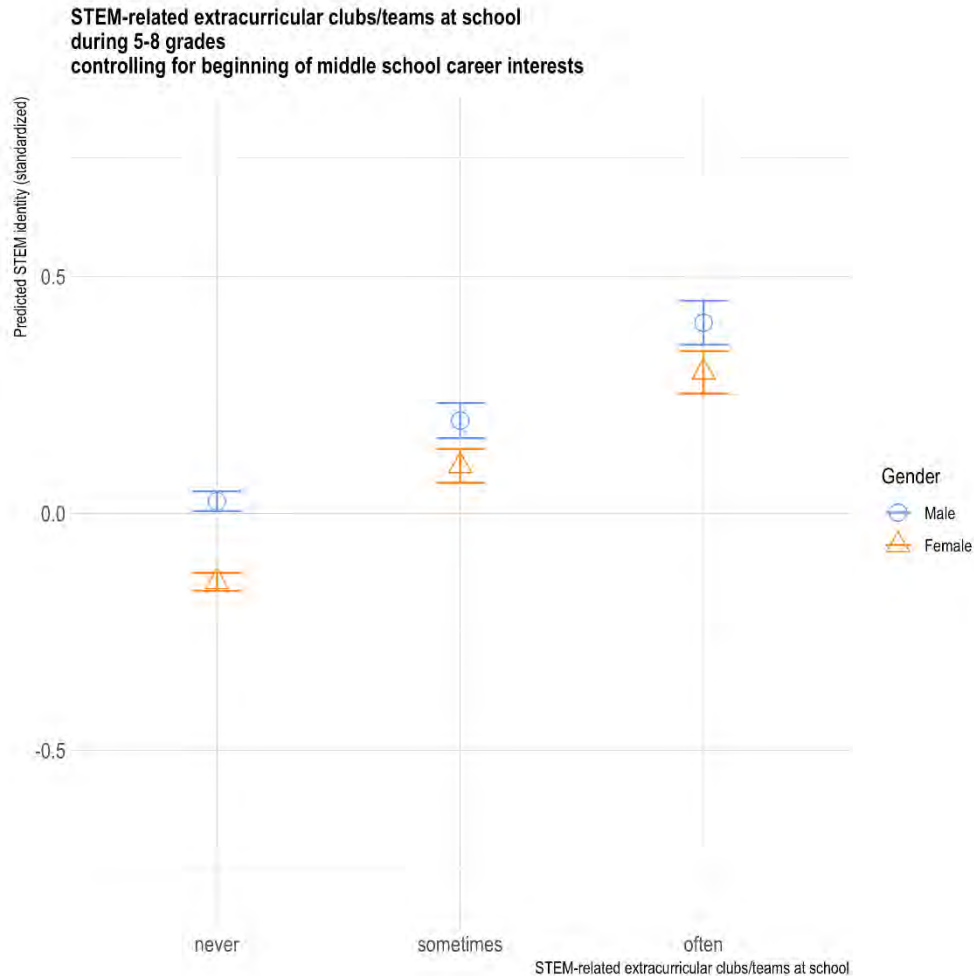
Collecting/analyzing data for scientists (online, with apps, or in person e.g., Zooniverse)
 during 5-8 grades
 controlling for beginning of middle school career interests

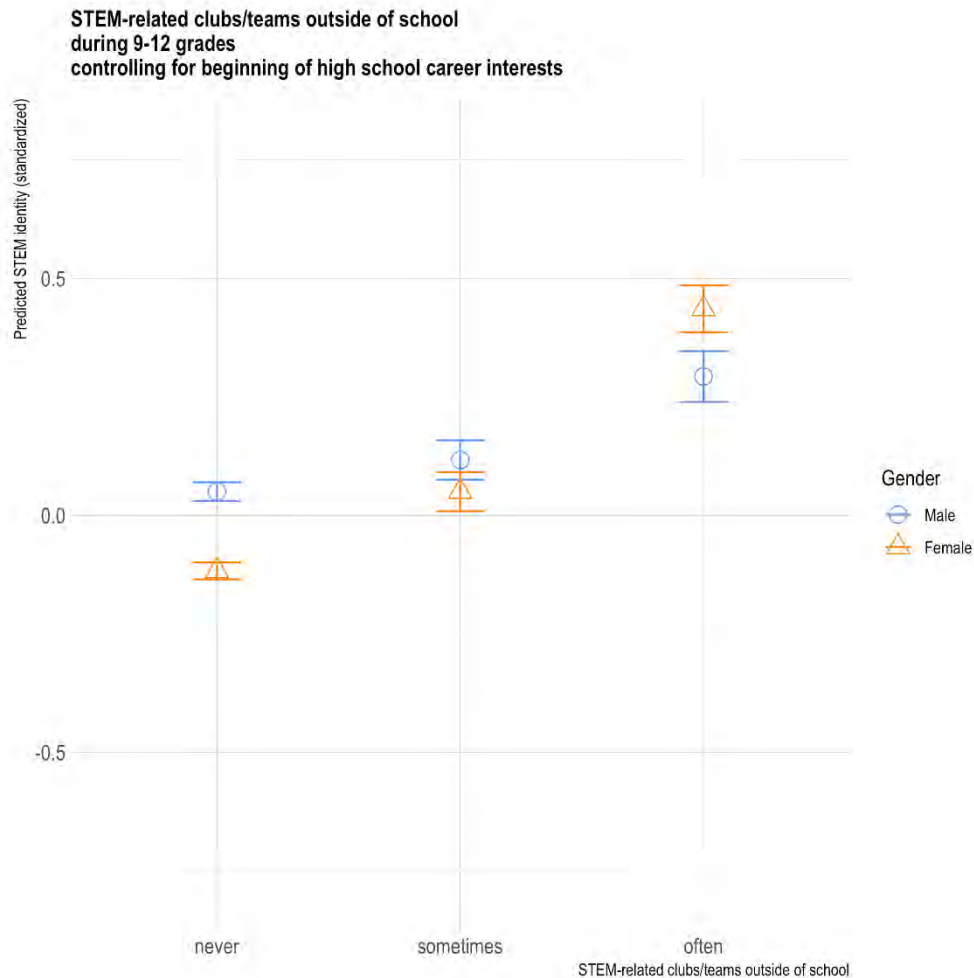
[to Index](#)

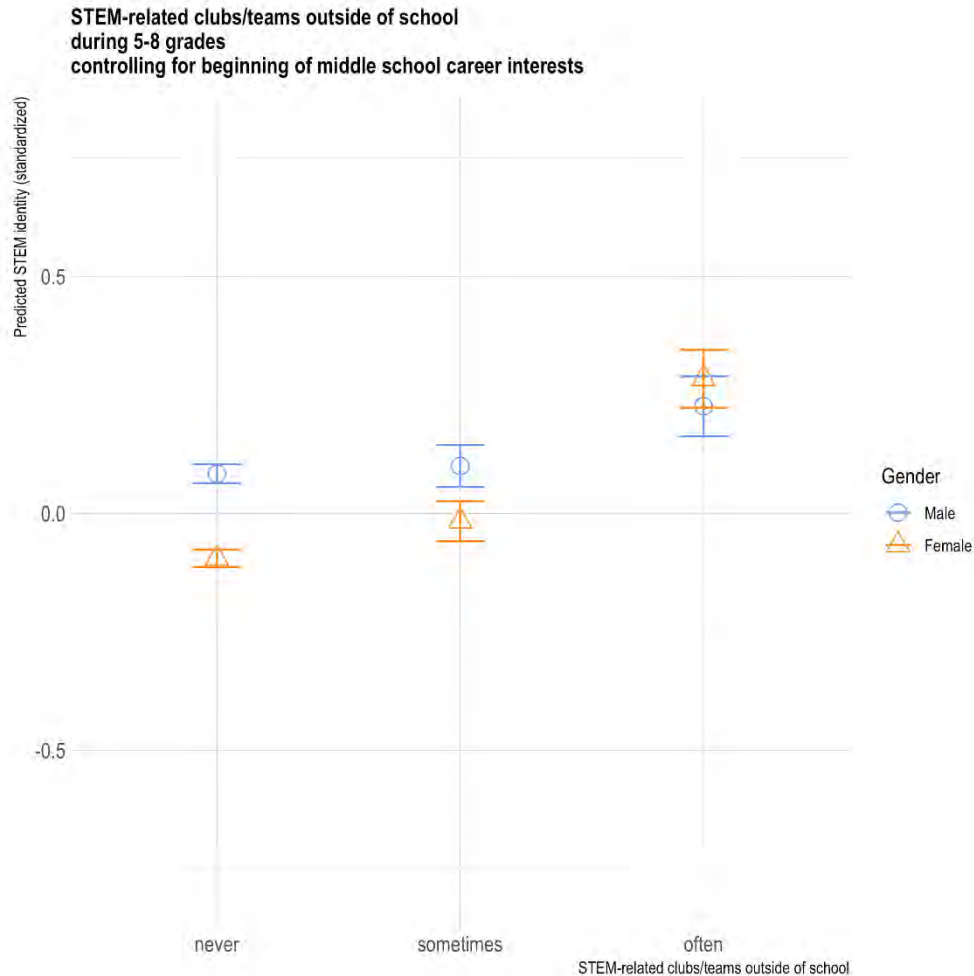


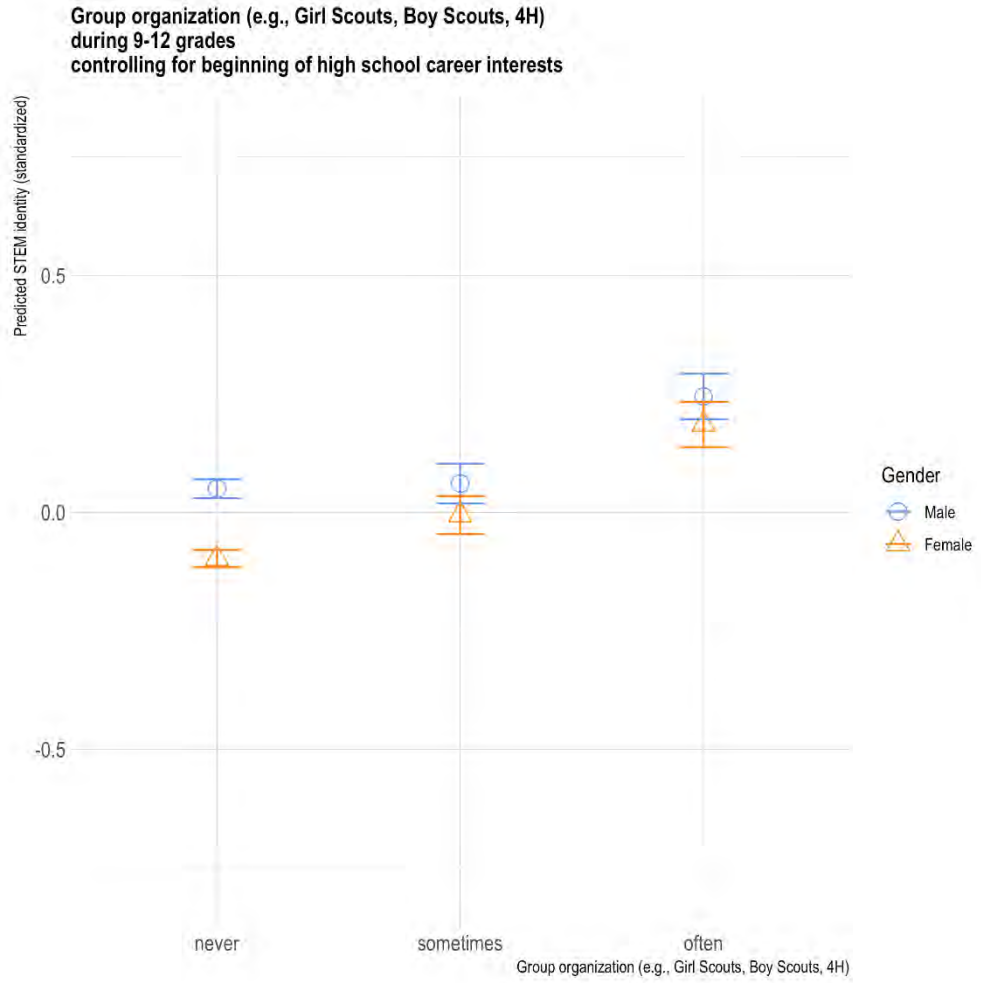


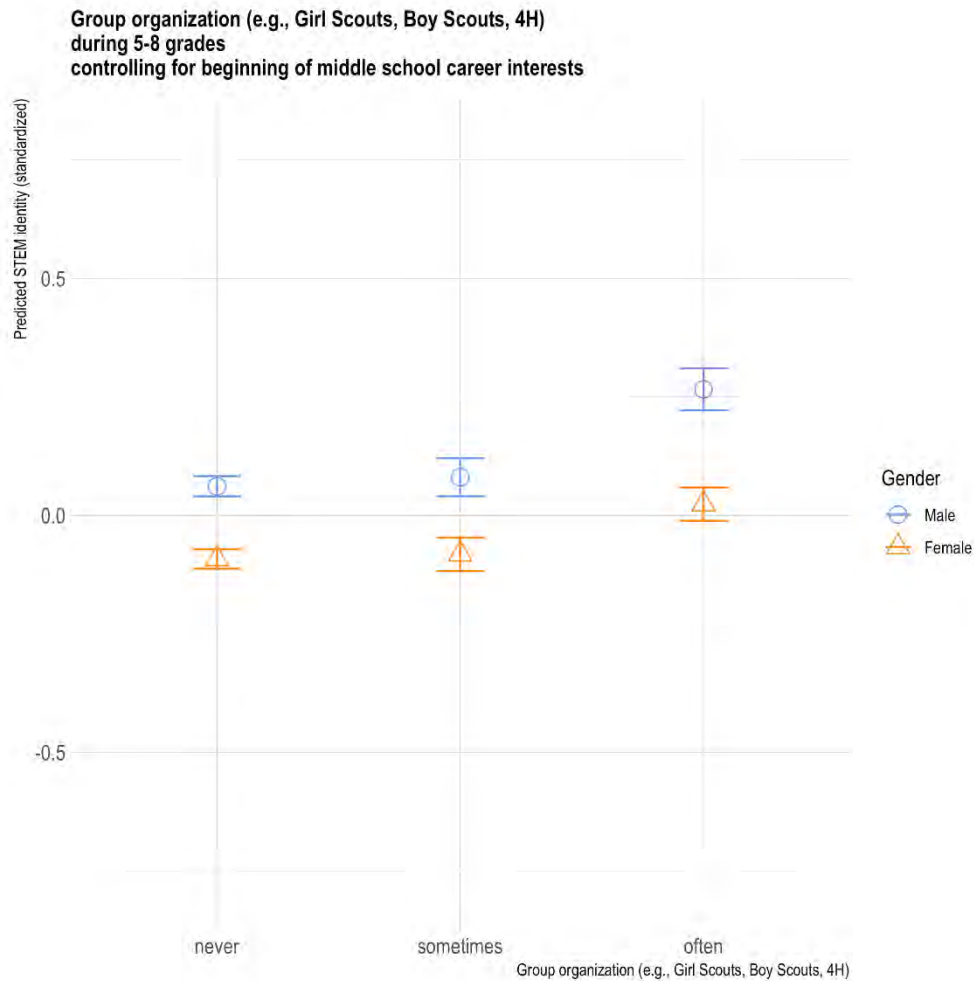


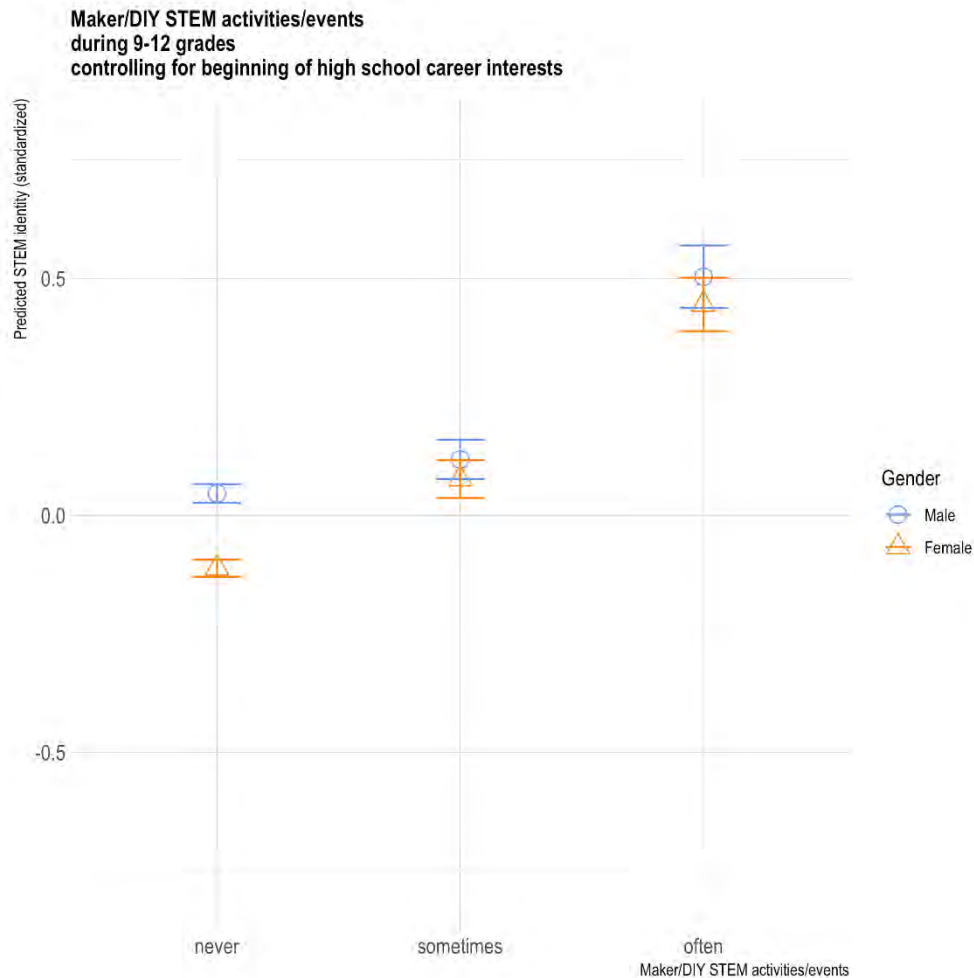


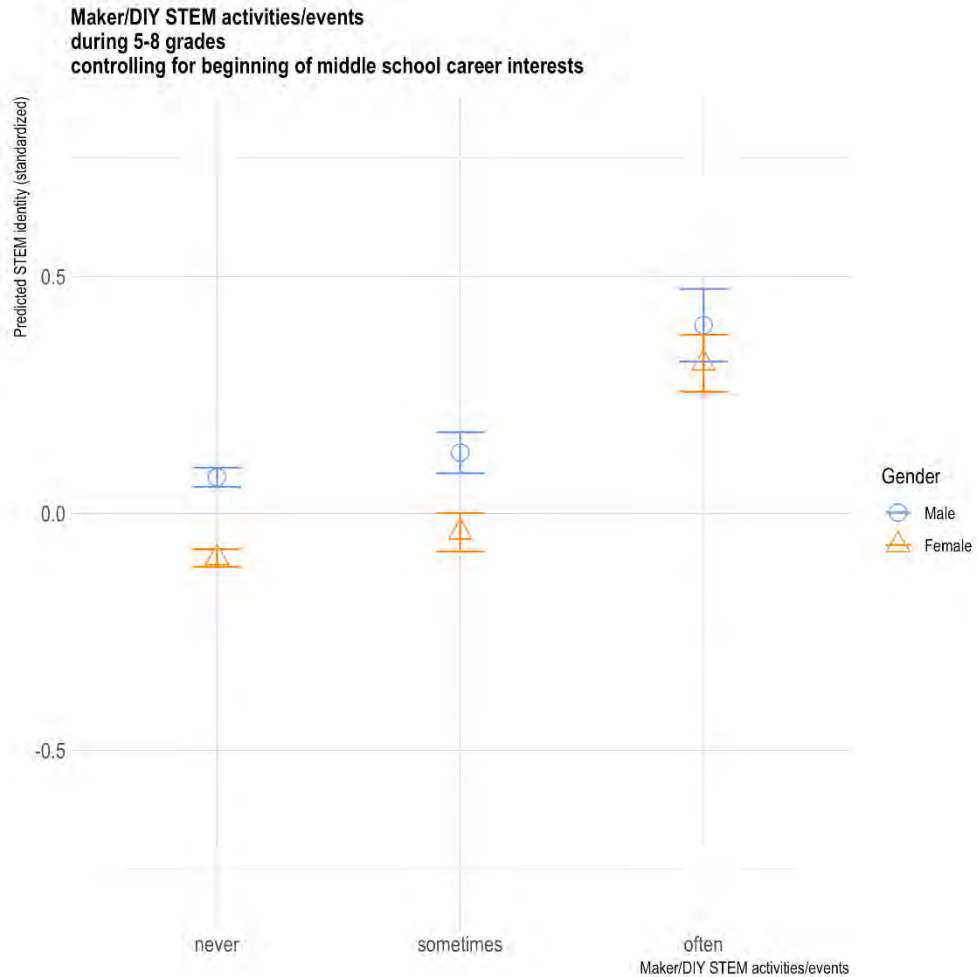


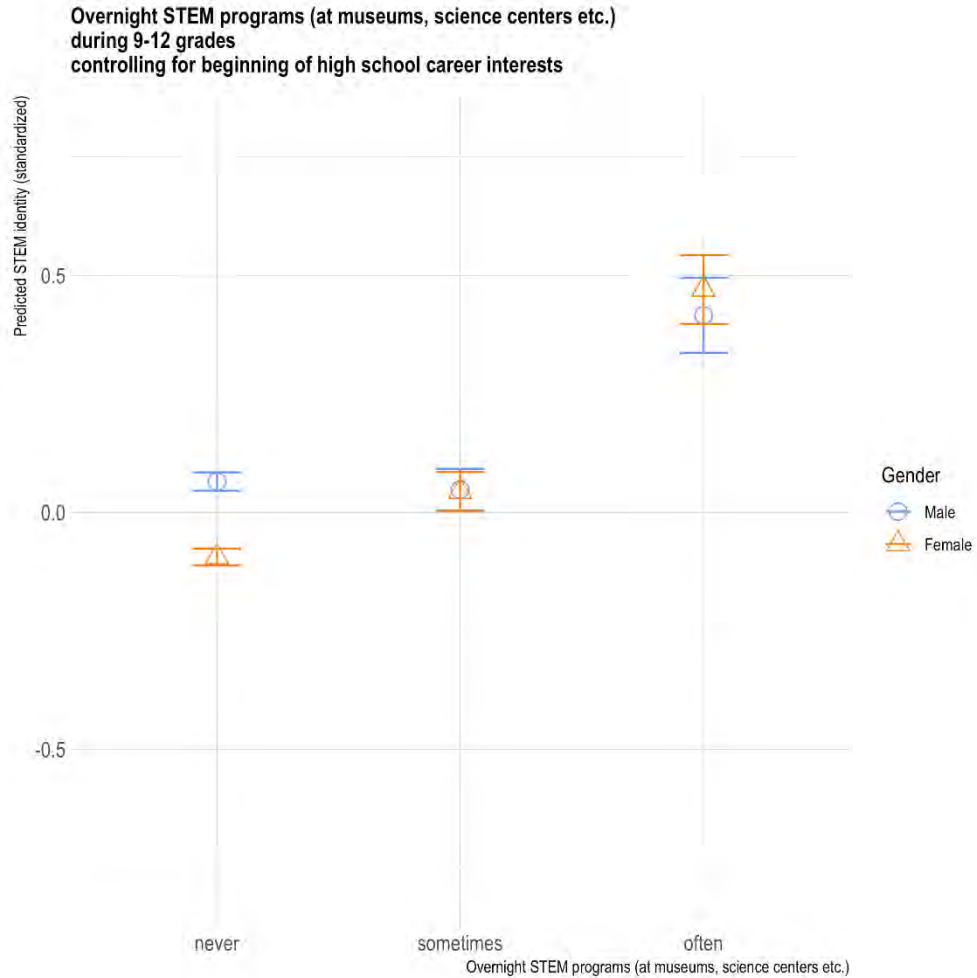


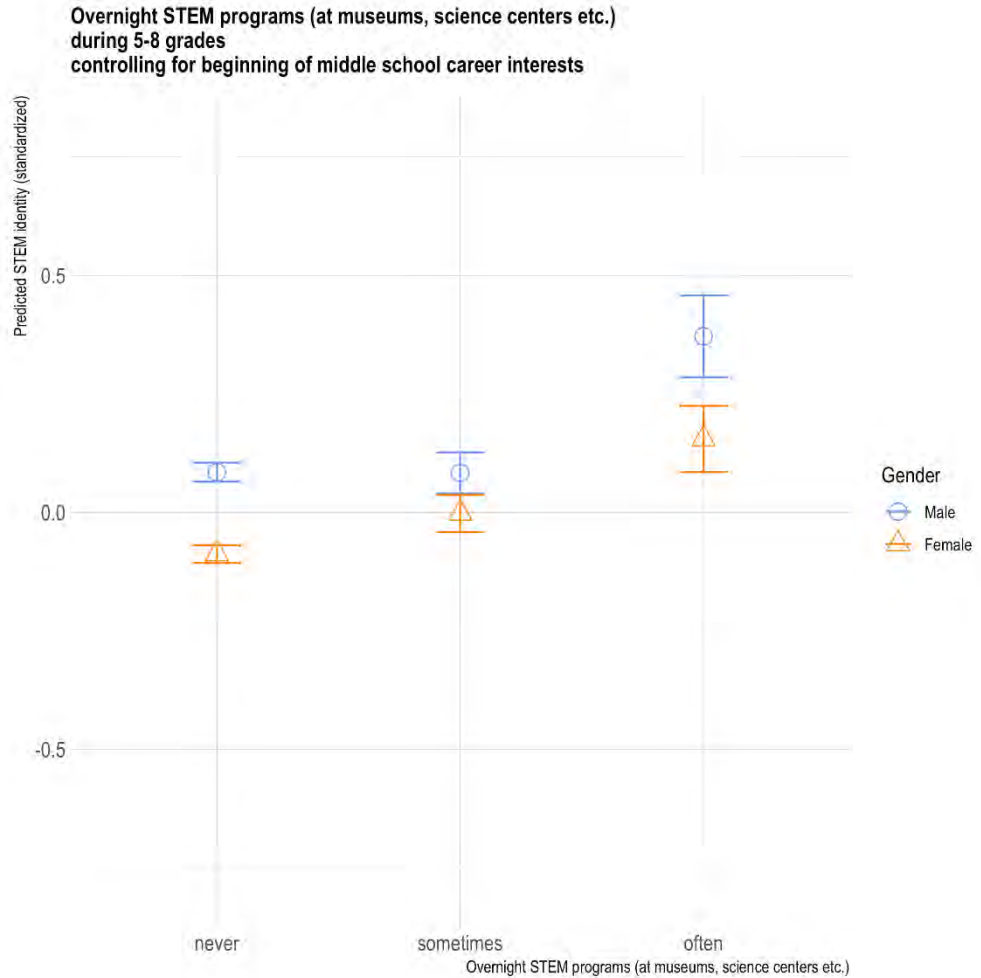






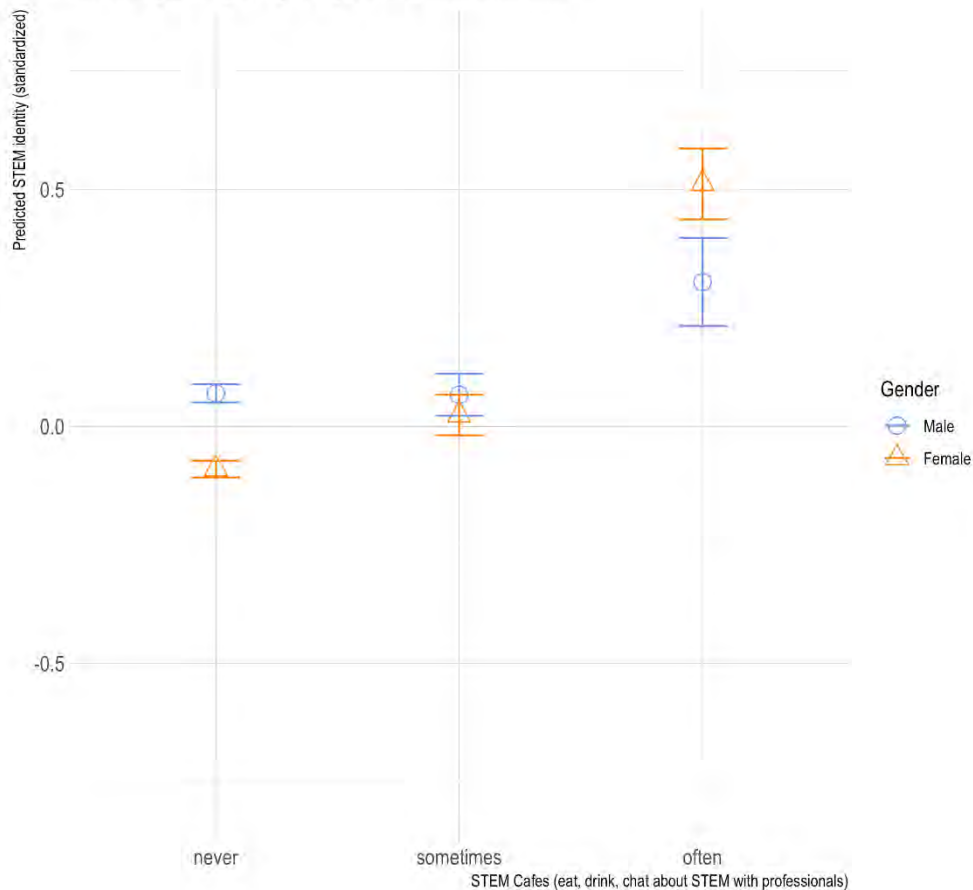




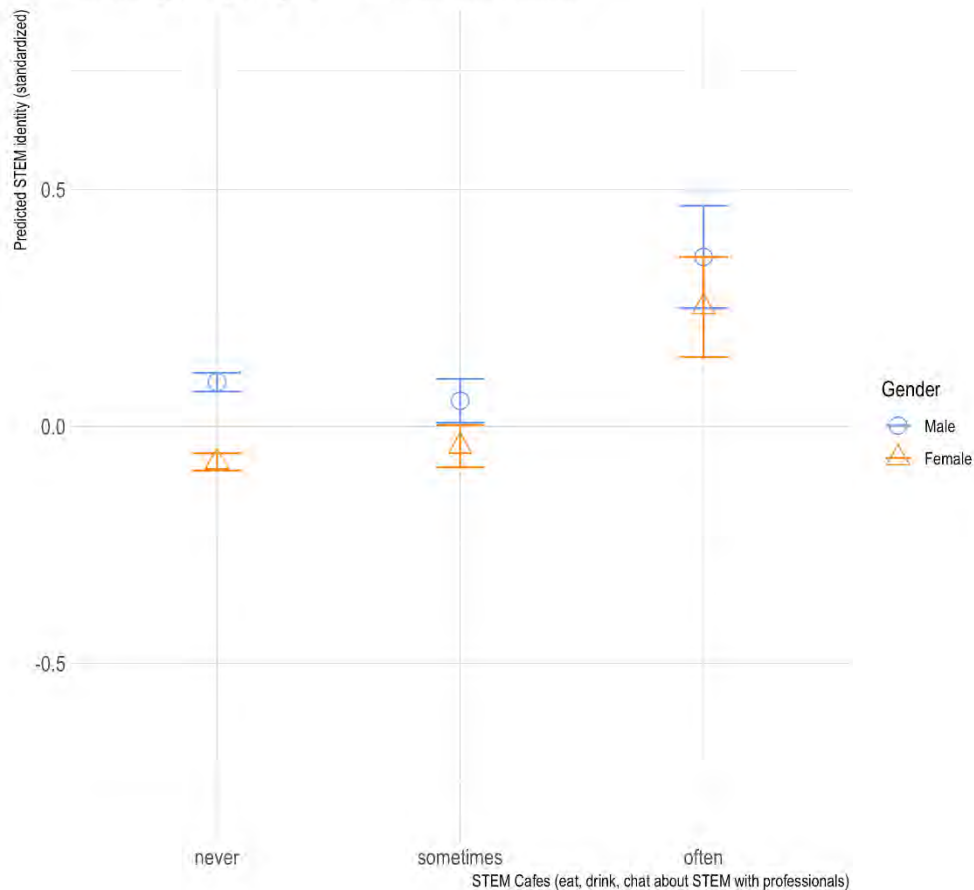


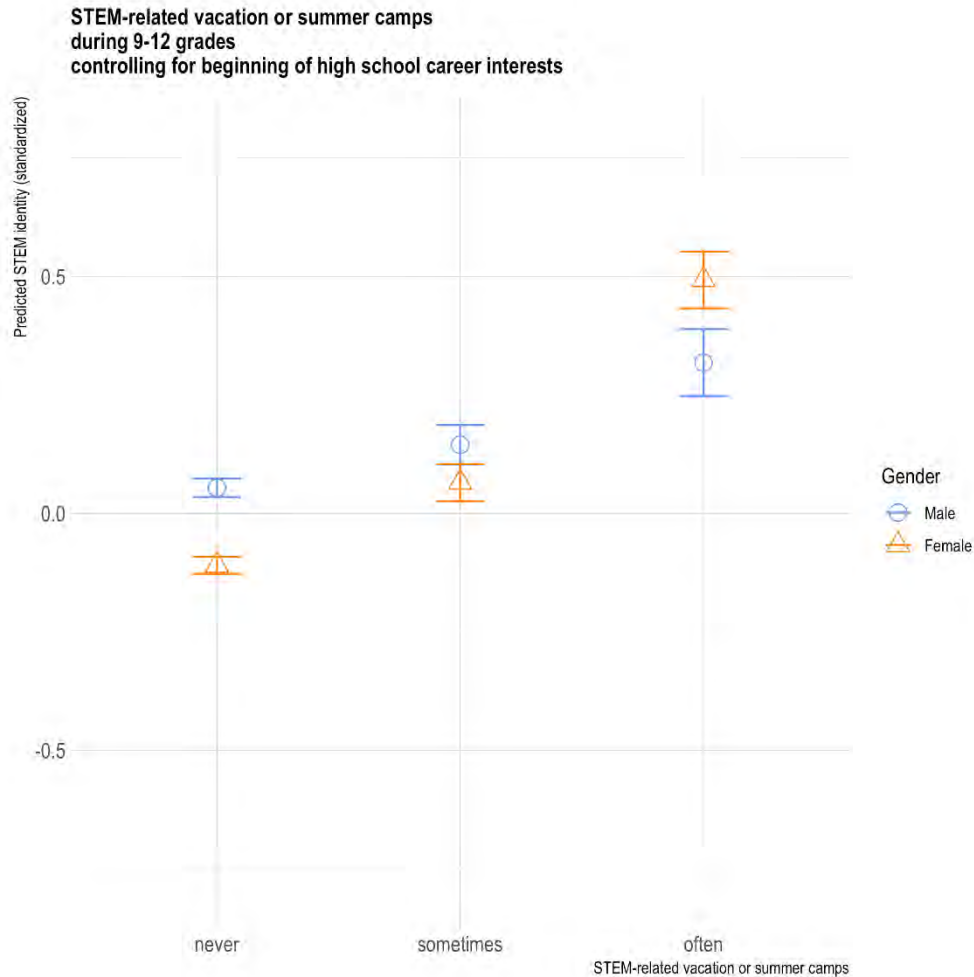
**STEM Cafes (eat, drink, chat about STEM with professionals)
during 9-12 grades
controlling for beginning of high school career interests**

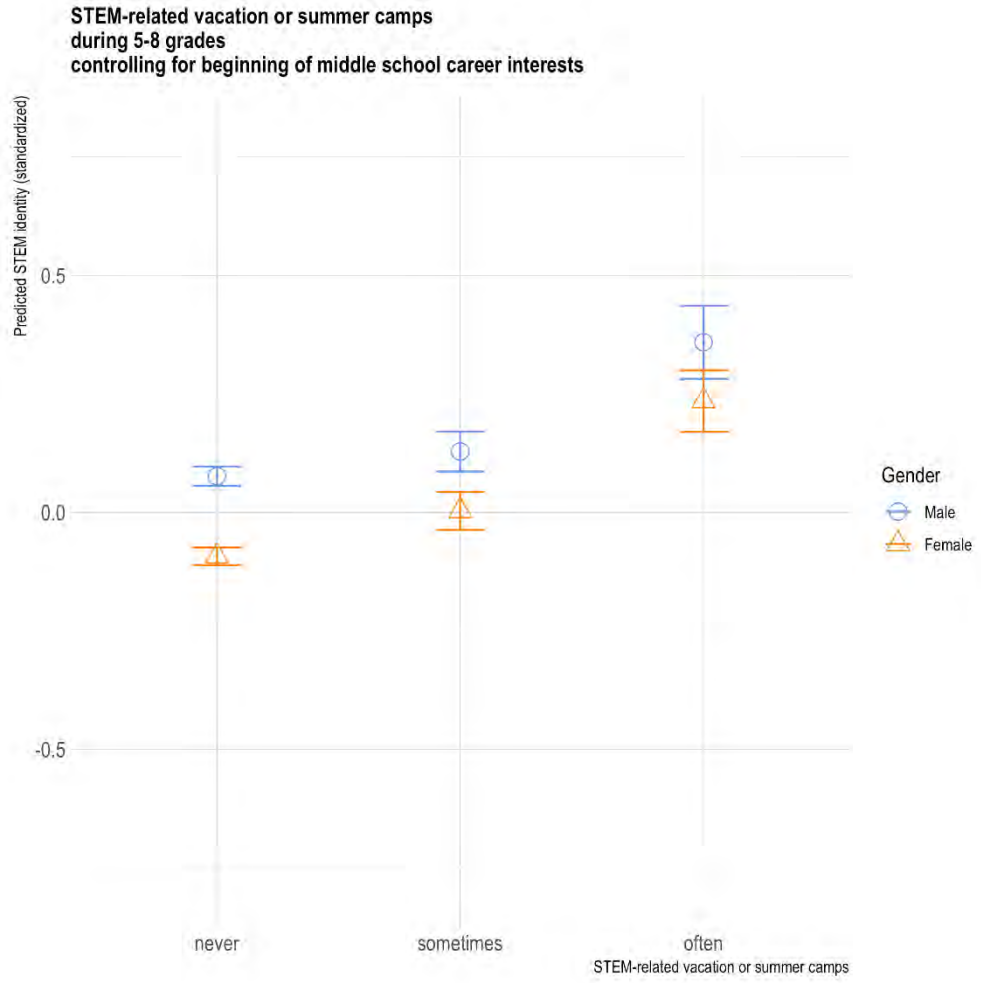
[to Index](#)



**STEM Cafes (eat, drink, chat about STEM with professionals)
during 5-8 grades
controlling for beginning of middle school career interests**

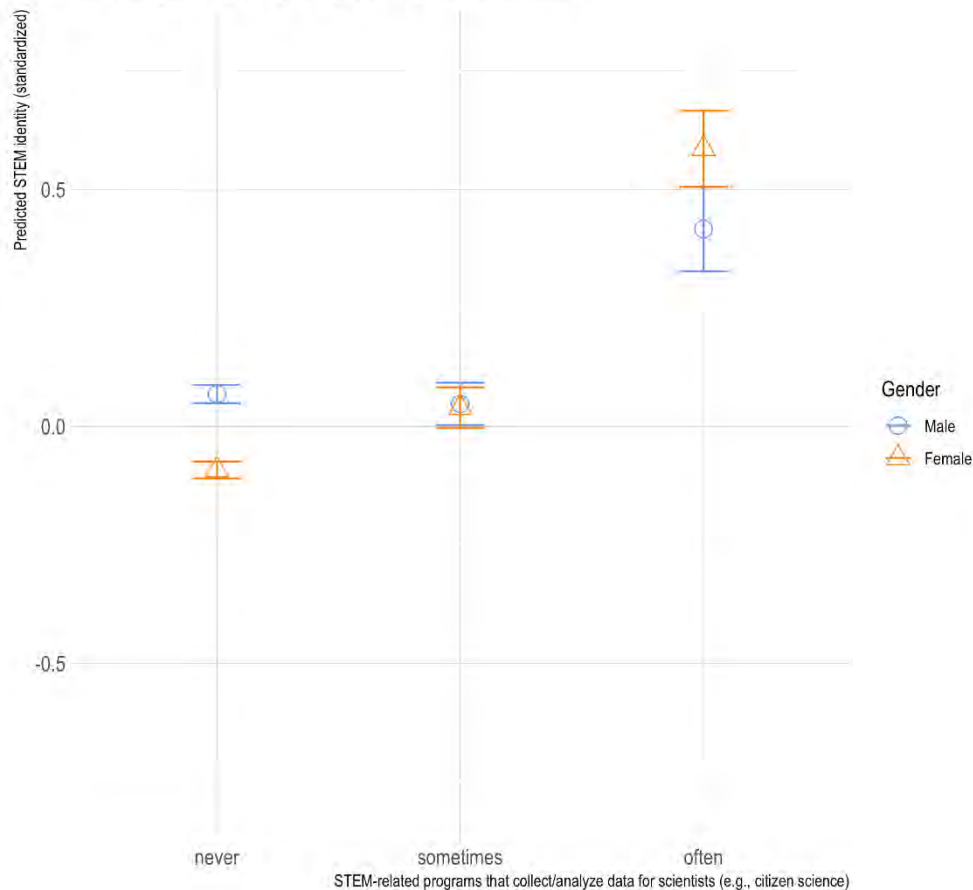






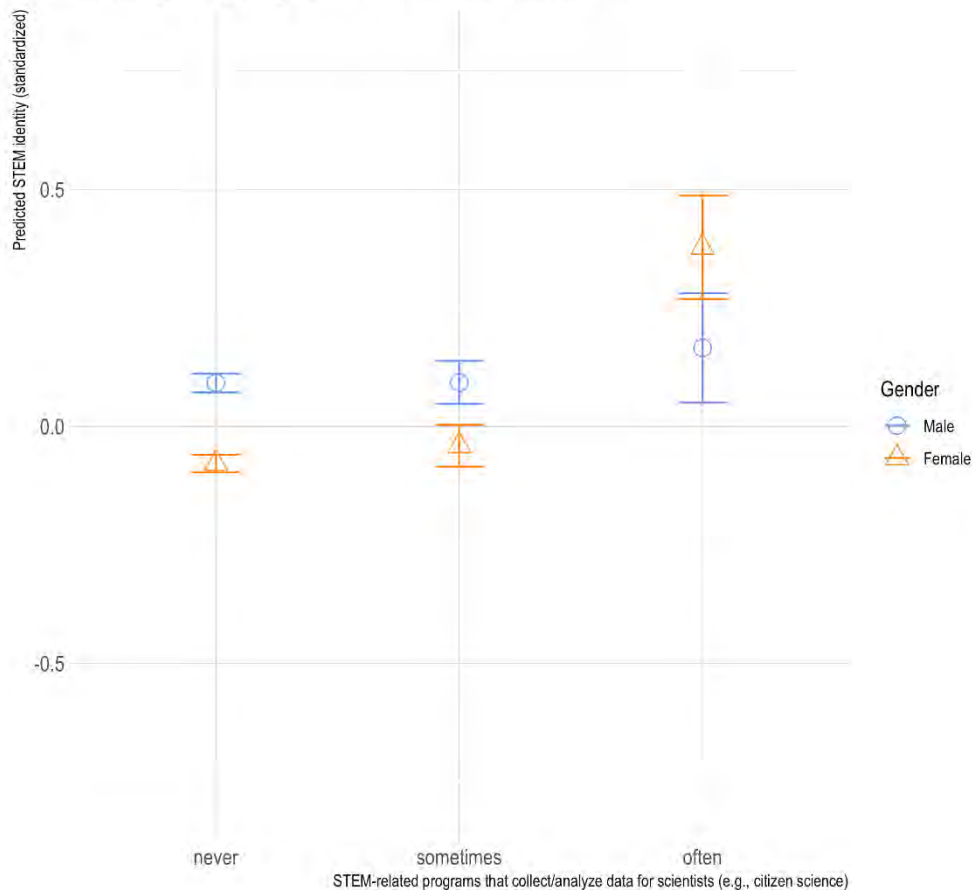
**STEM-related programs that collect/analyze data for scientists (e.g., citizen science)
during 9-12 grades
controlling for beginning of high school career interests**

[to Index](#)



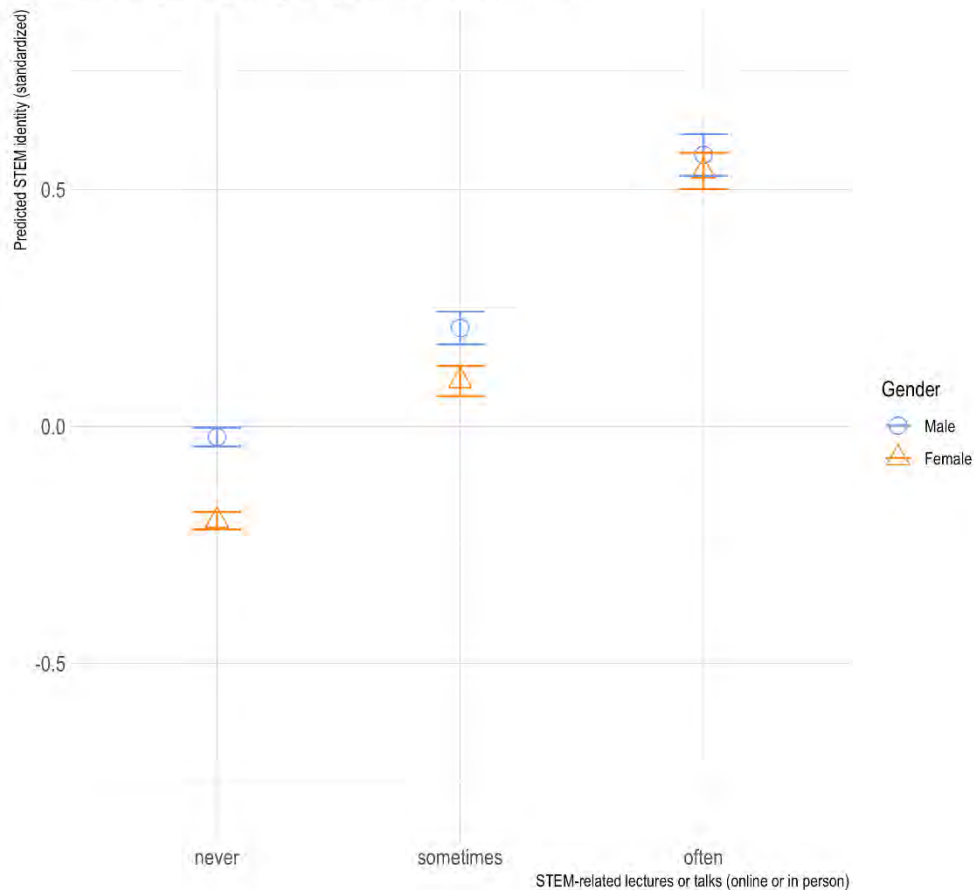
**STEM-related programs that collect/analyze data for scientists (e.g., citizen science)
during 5-8 grades
controlling for beginning of middle school career interests**

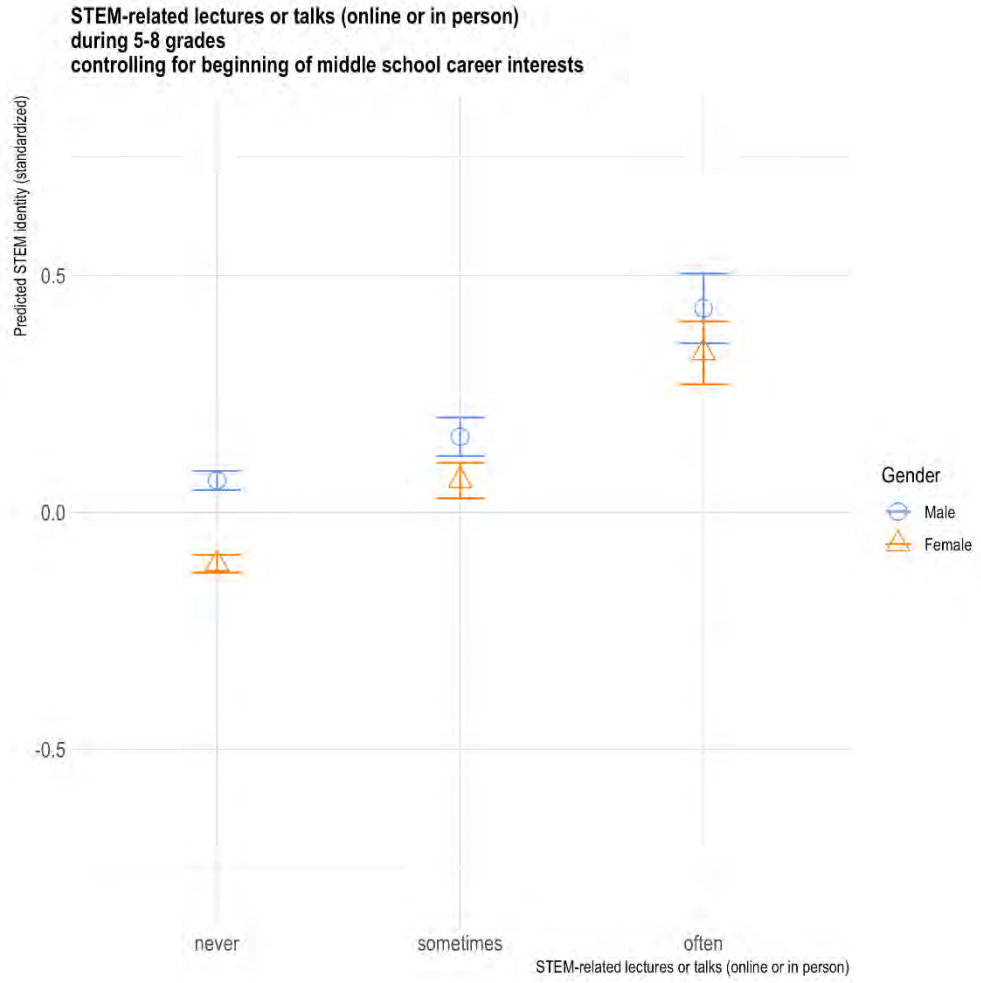
[to Index](#)

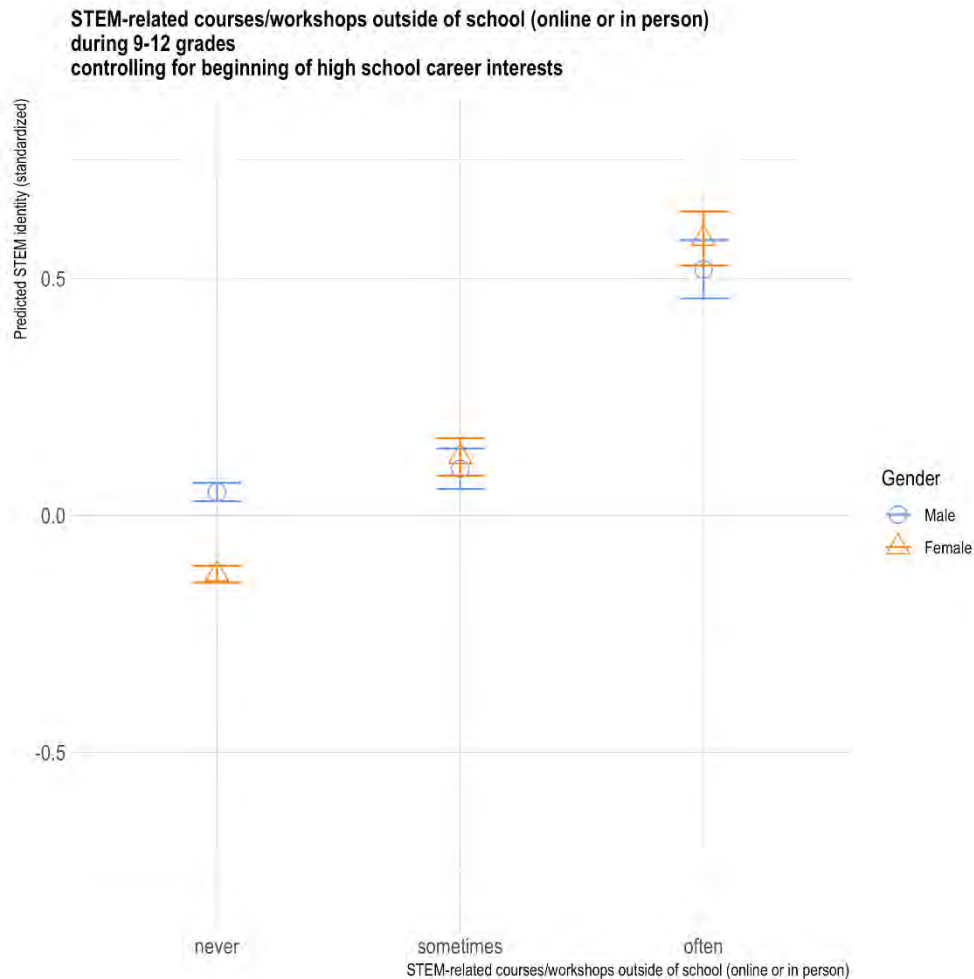


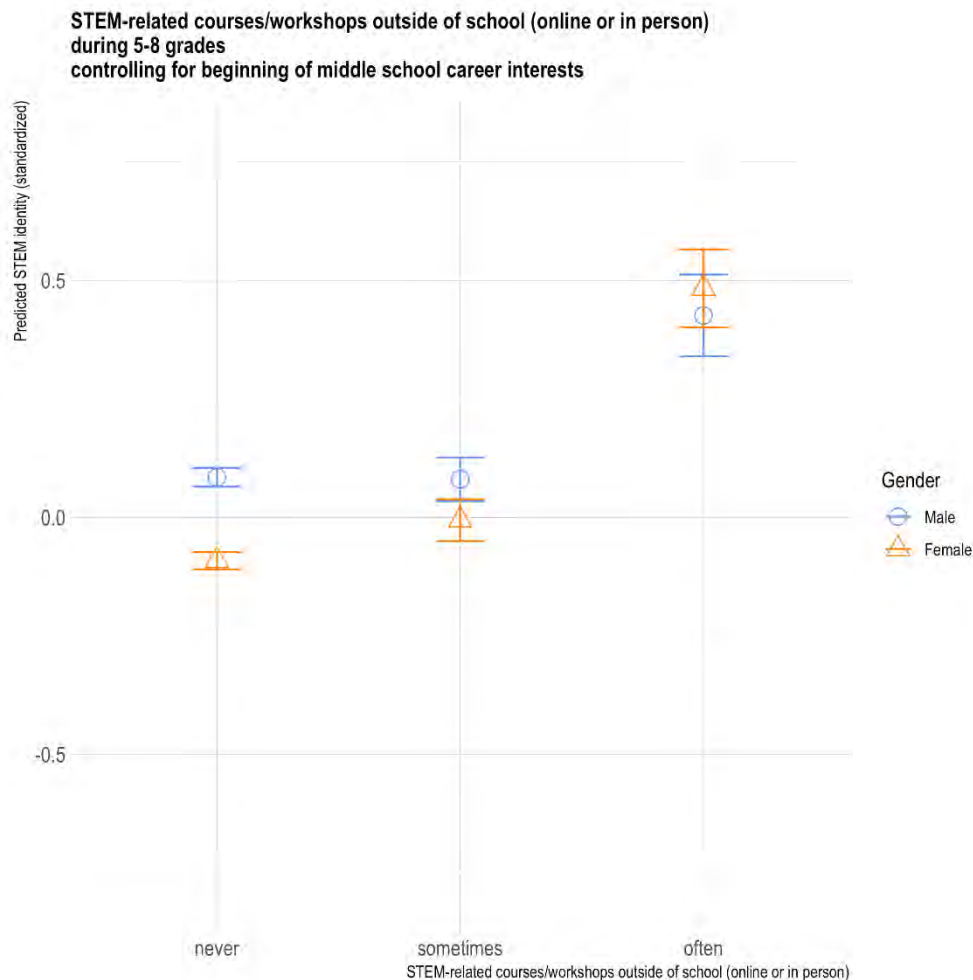
**STEM-related lectures or talks (online or in person)
during 9-12 grades
controlling for beginning of high school career interests**

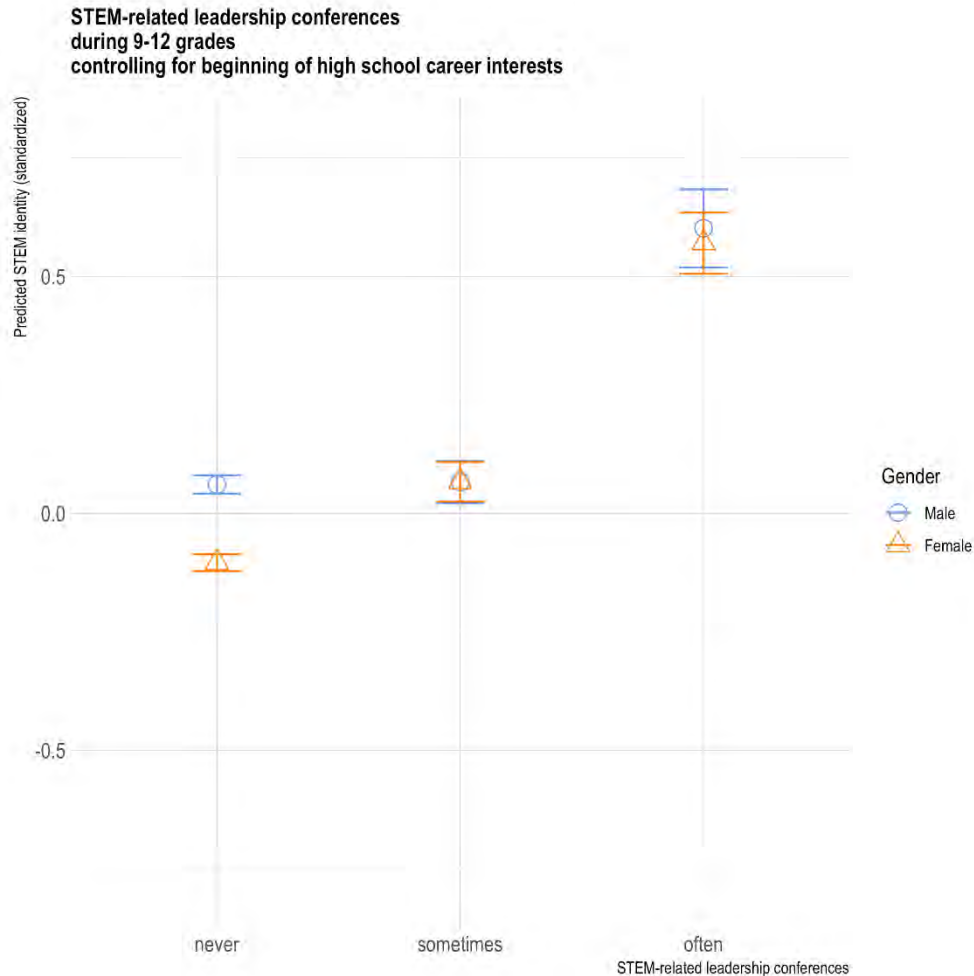
[to Index](#)

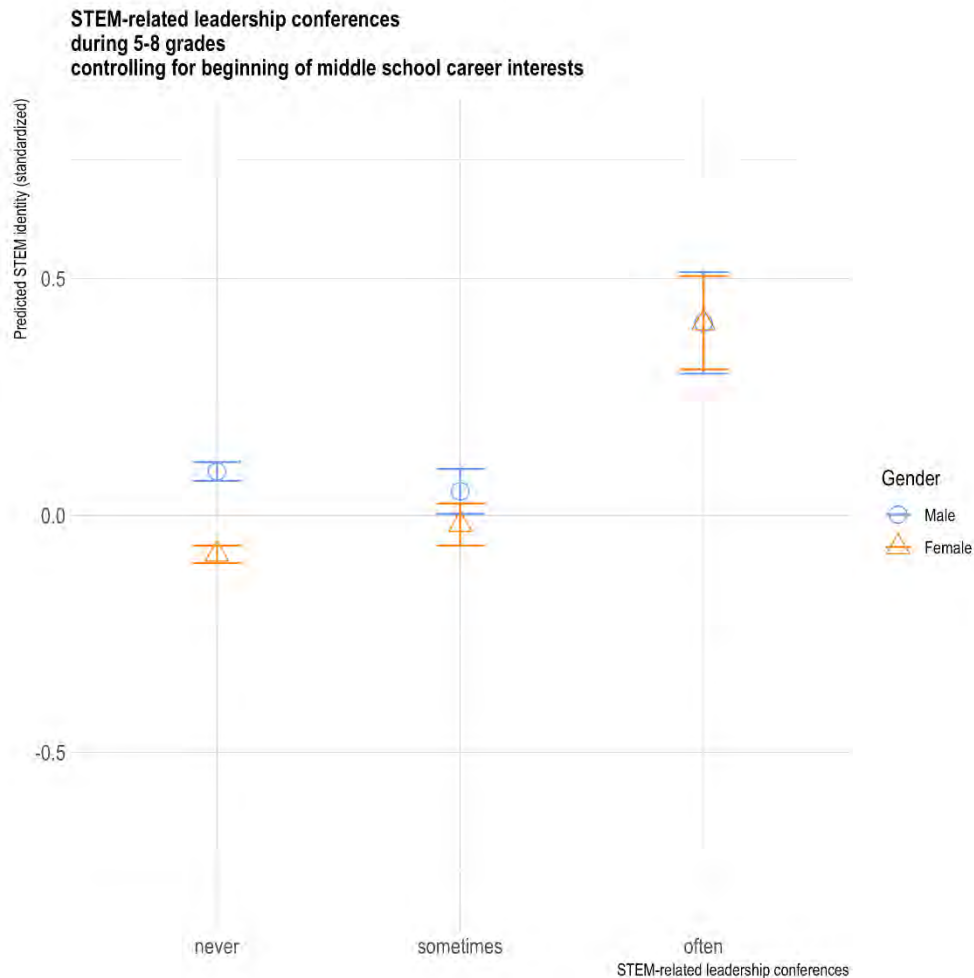


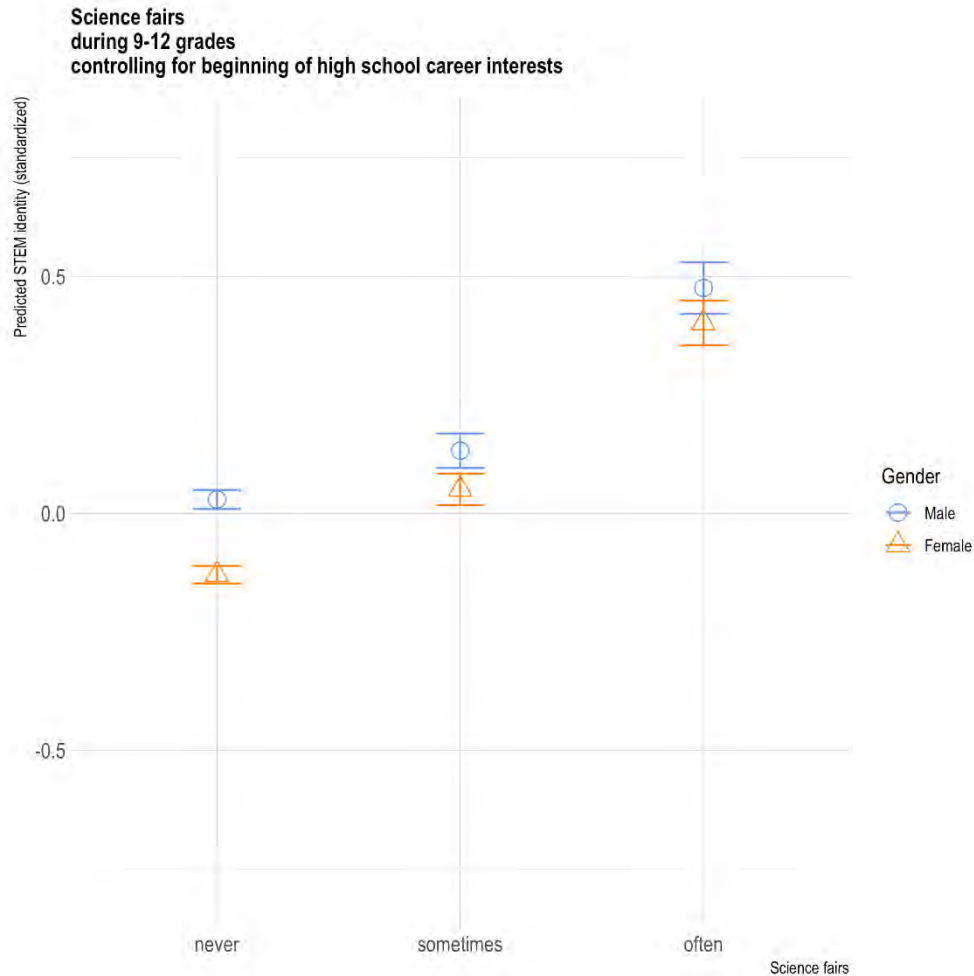


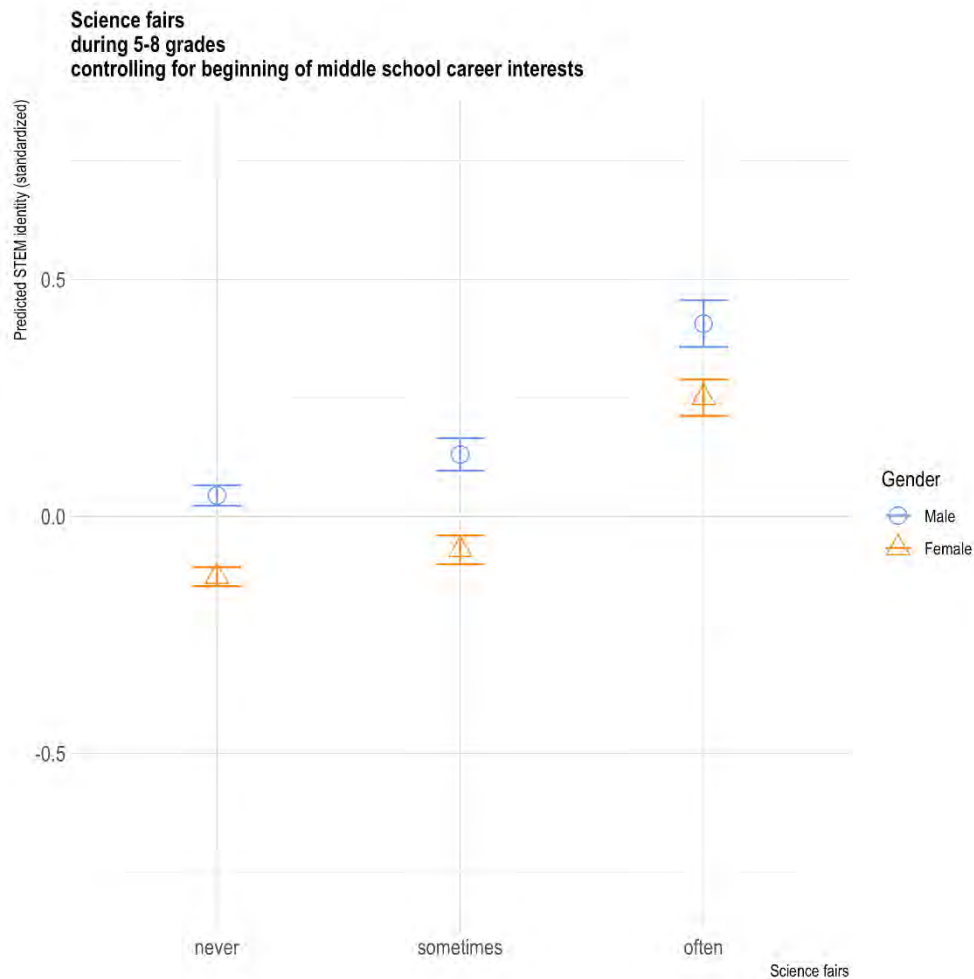


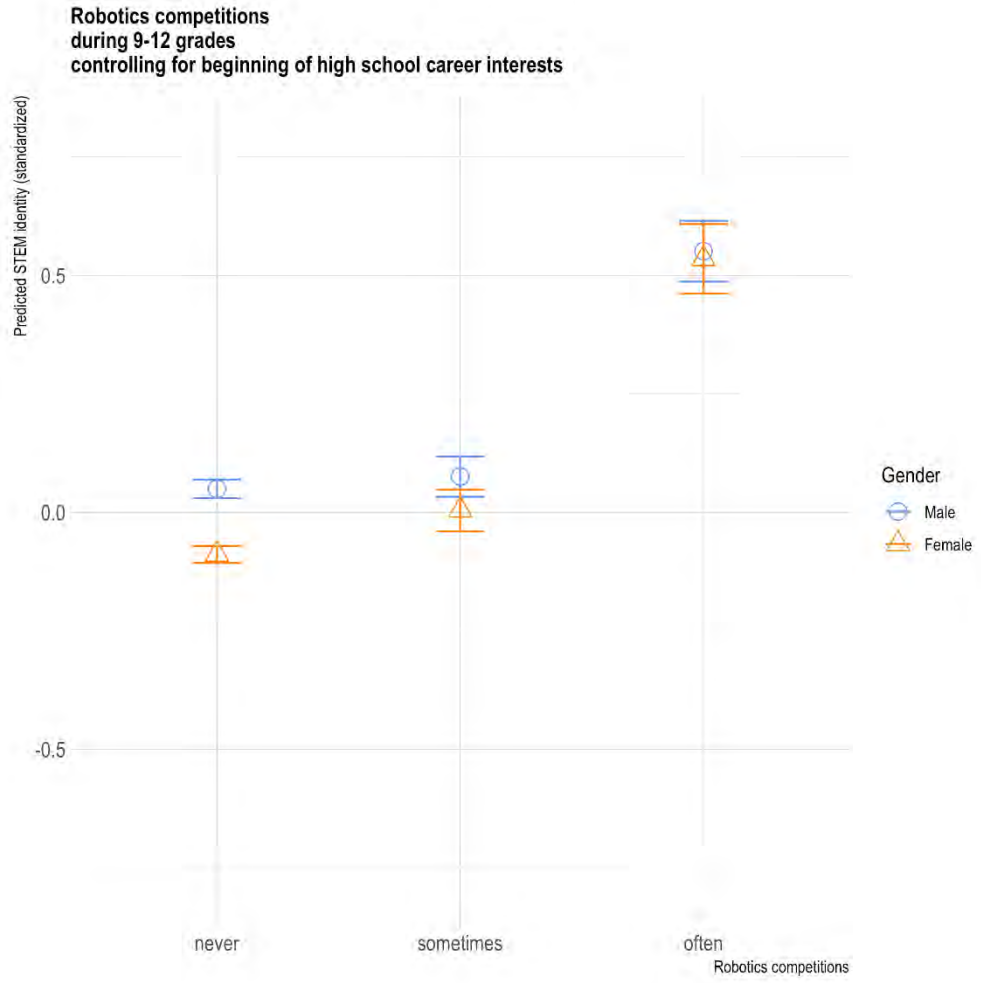


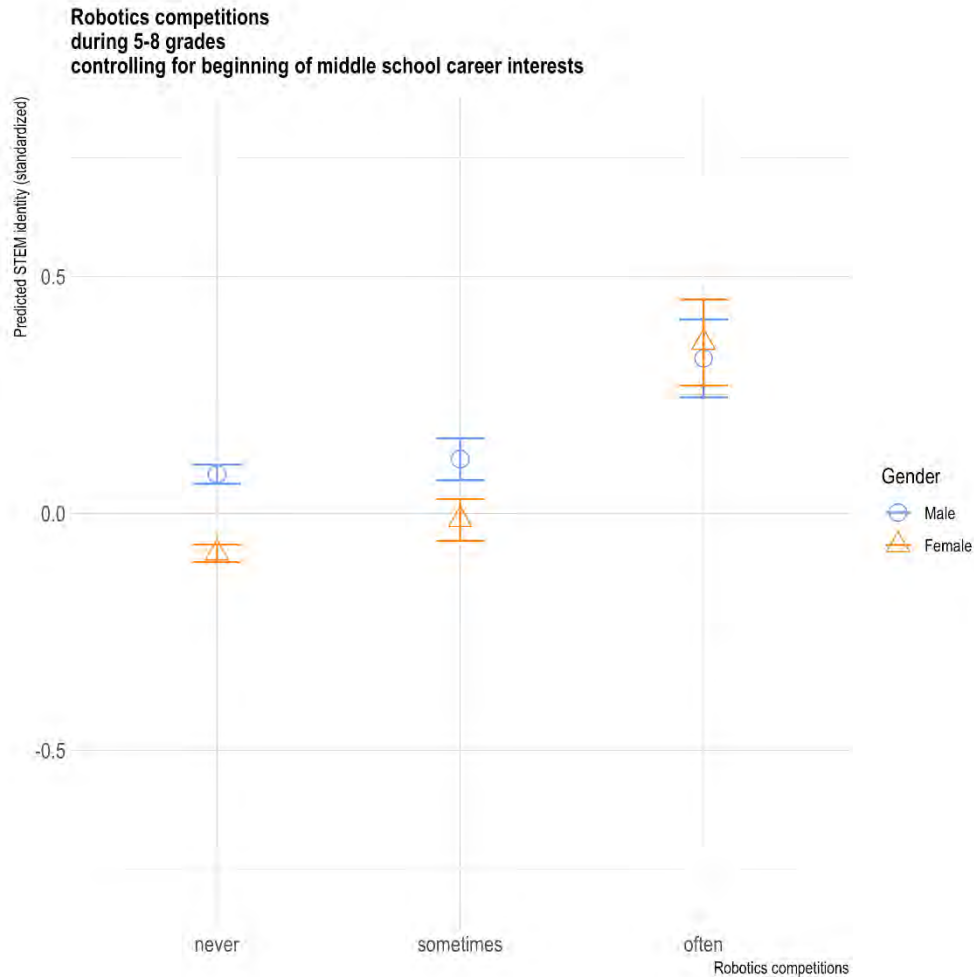


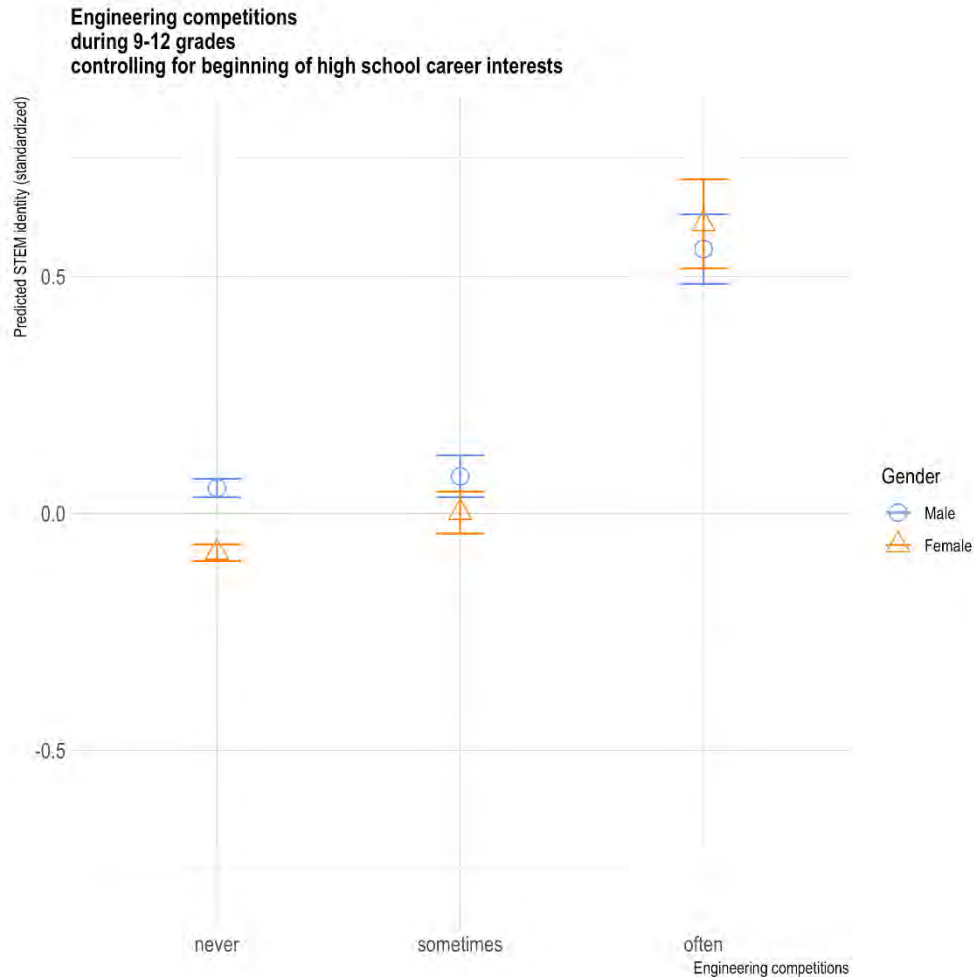


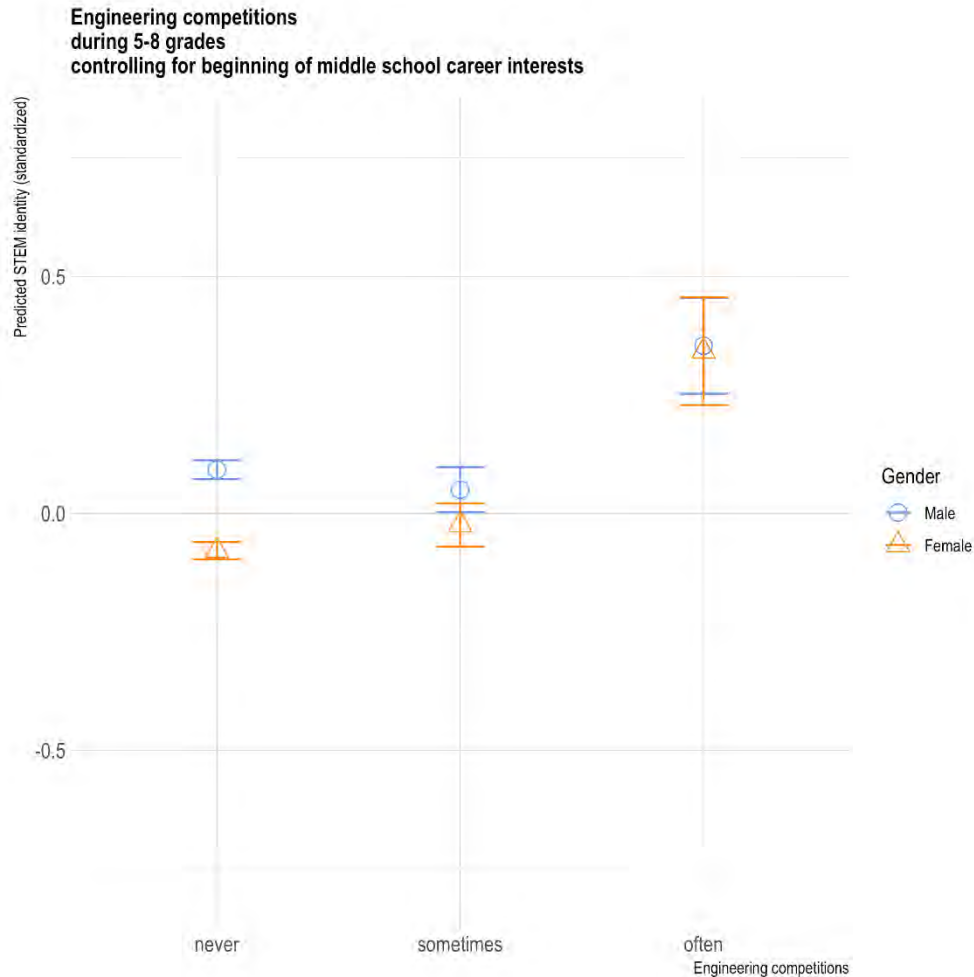






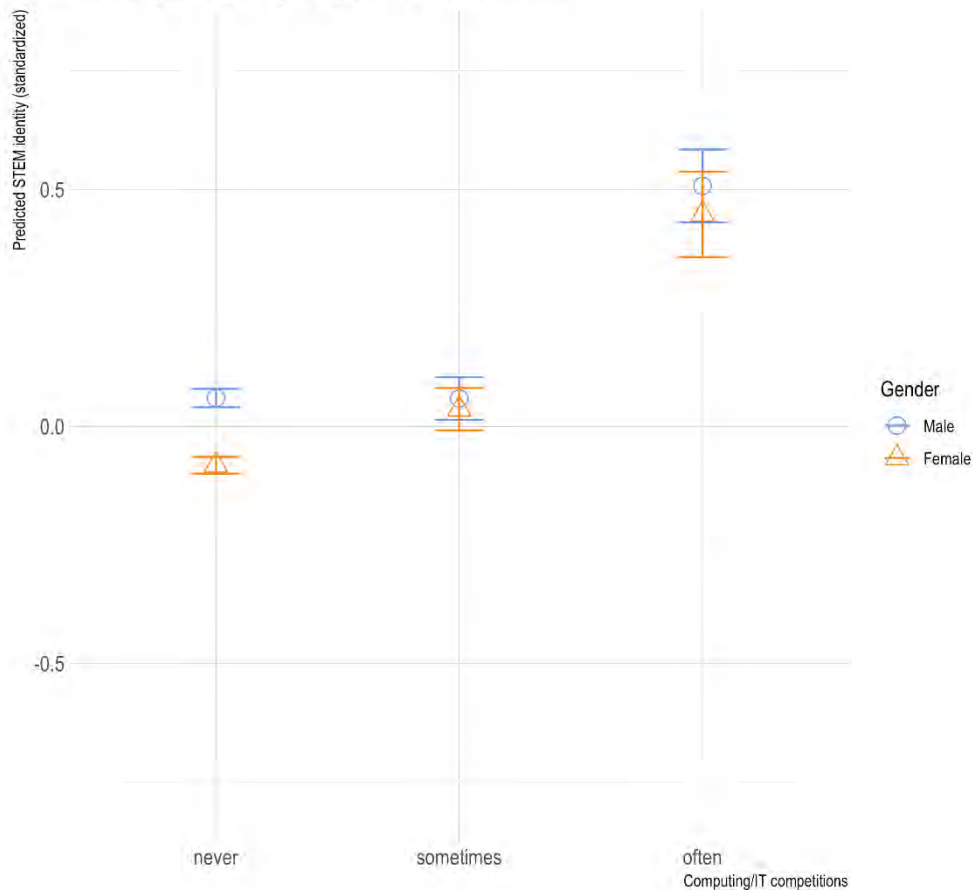






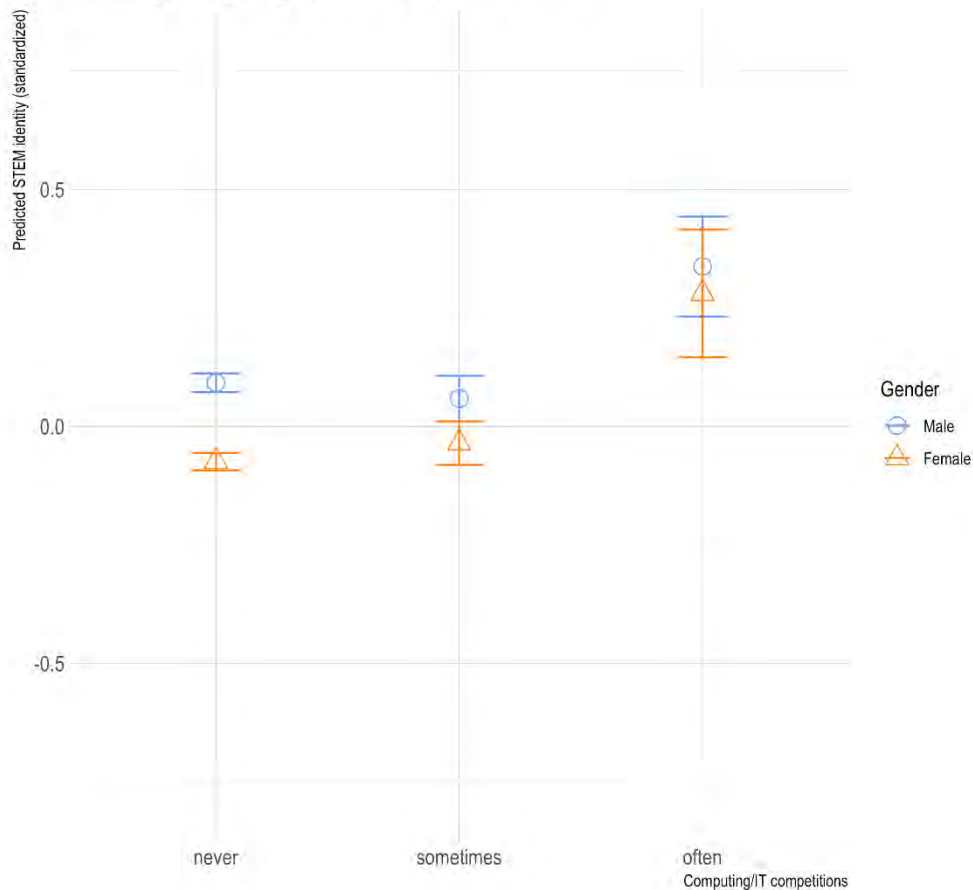
Computing/IT competitions
during 9-12 grades
controlling for beginning of high school career interests

[to Index](#)



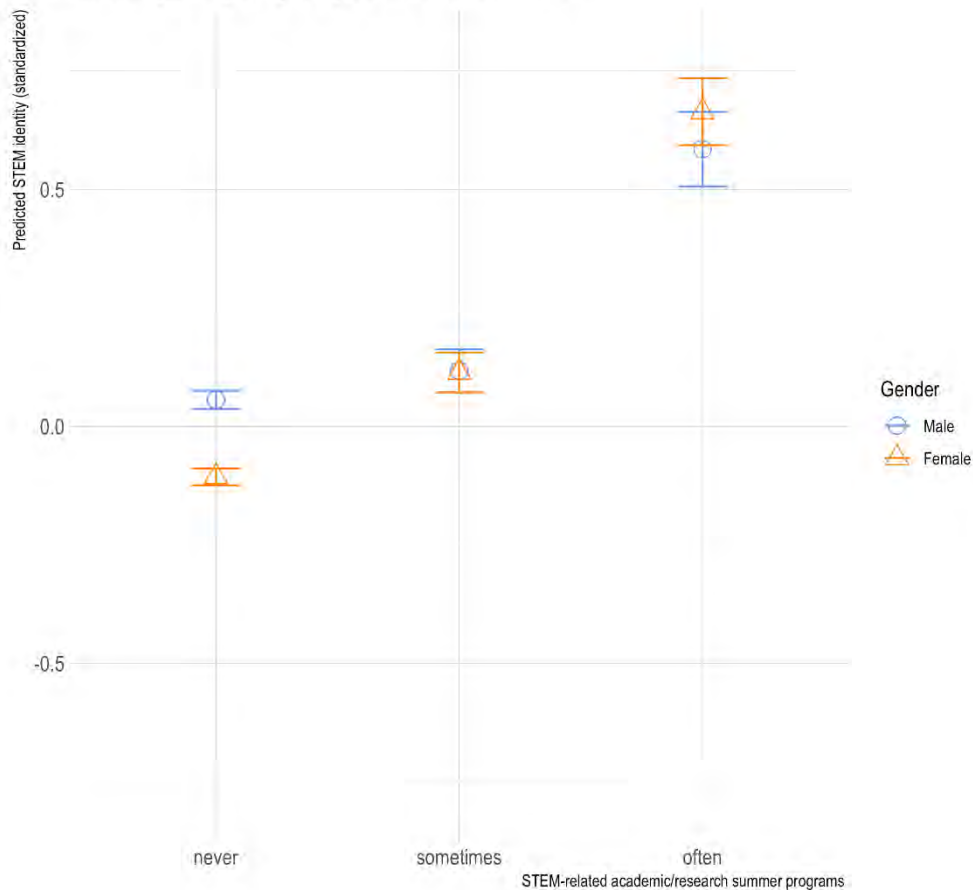
Computing/IT competitions
during 5-8 grades
controlling for beginning of middle school career interests

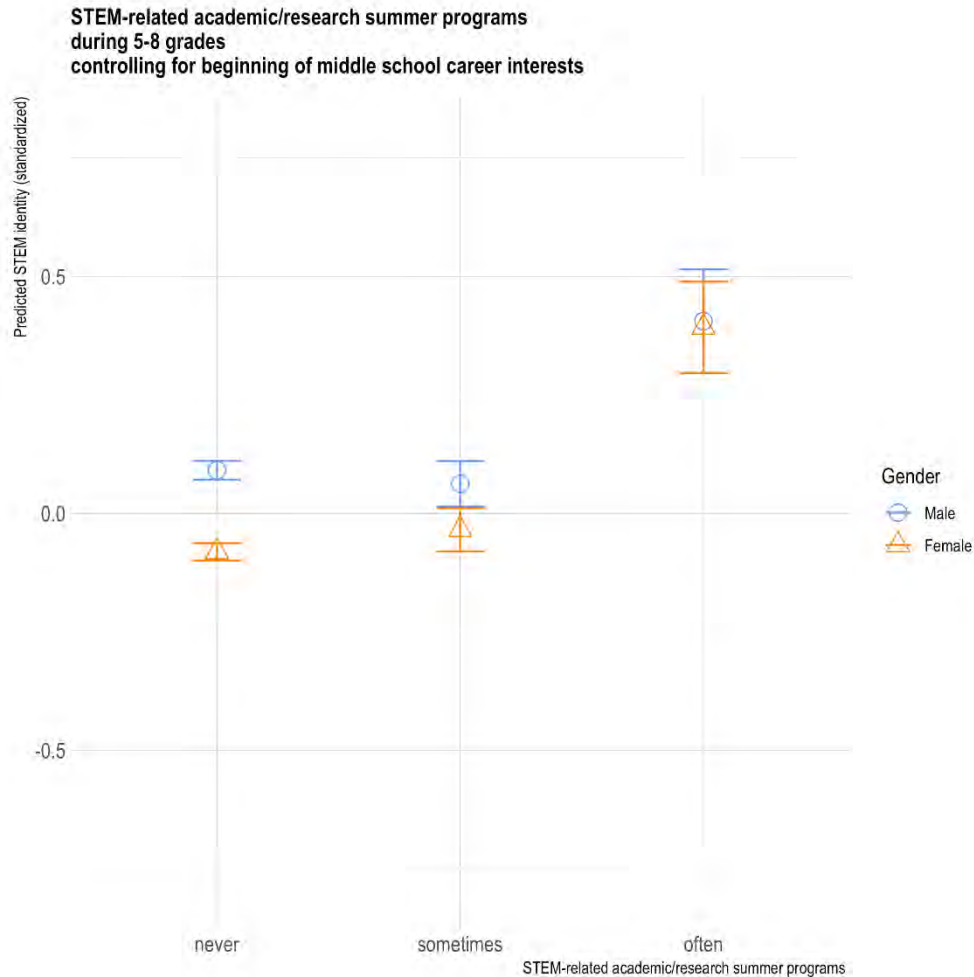
[to Index](#)

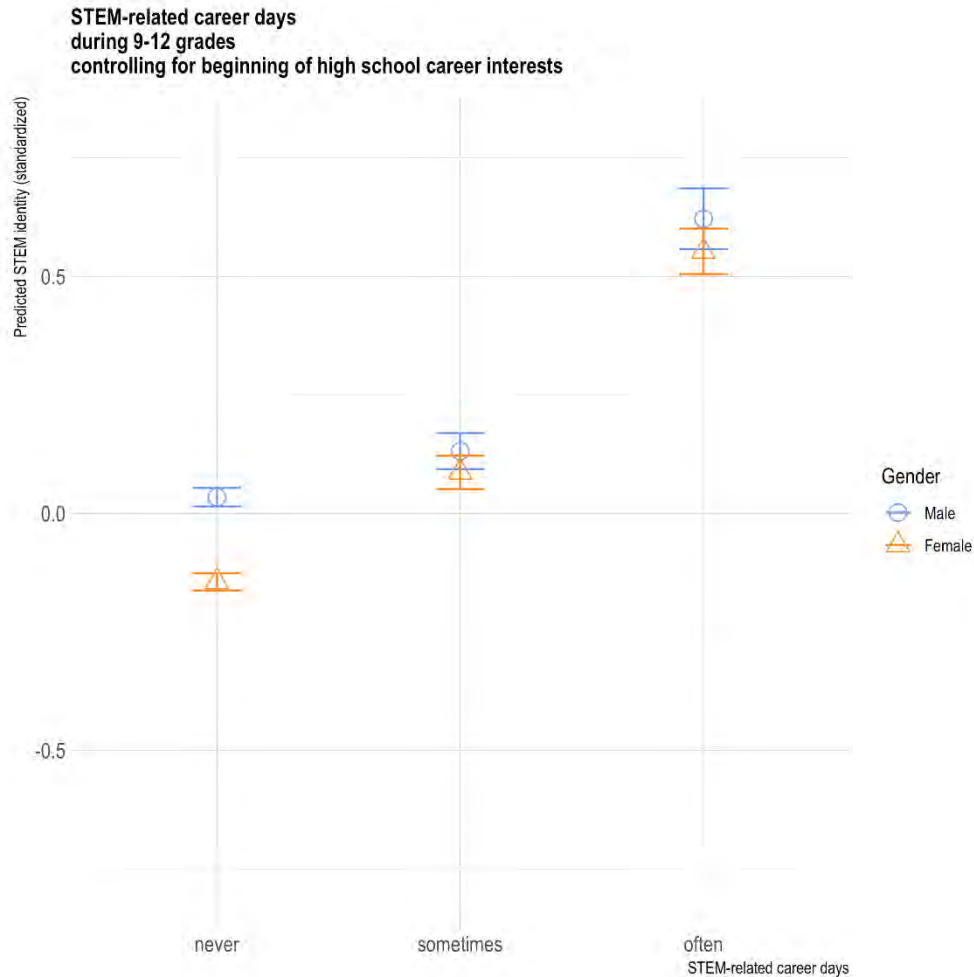


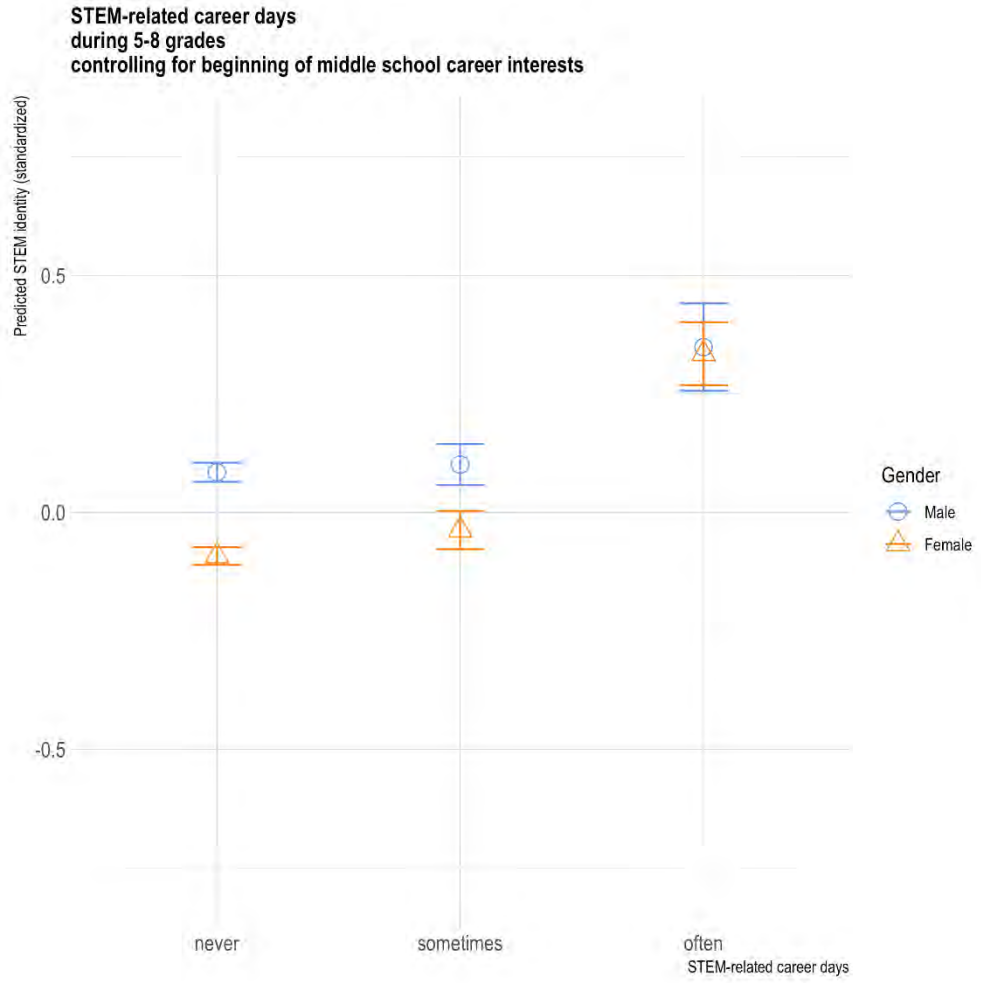
**STEM-related academic/research summer programs
during 9-12 grades
controlling for beginning of high school career interests**

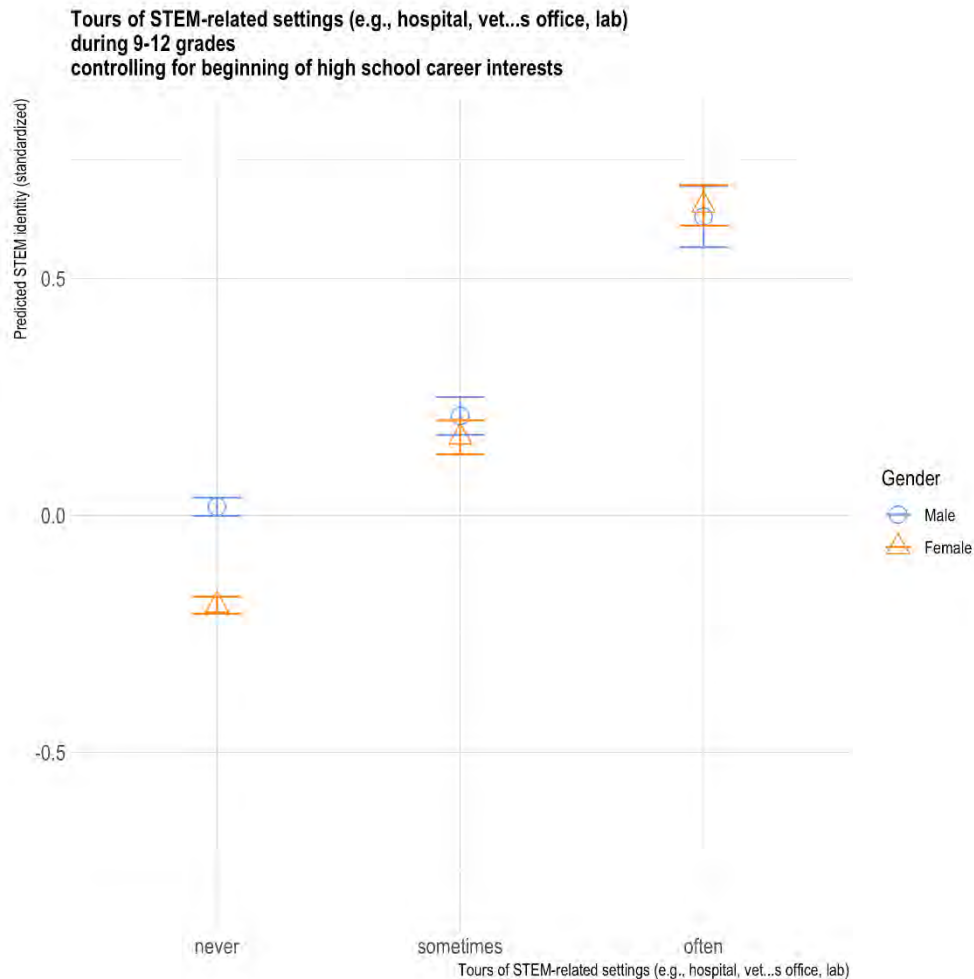
[to Index](#)

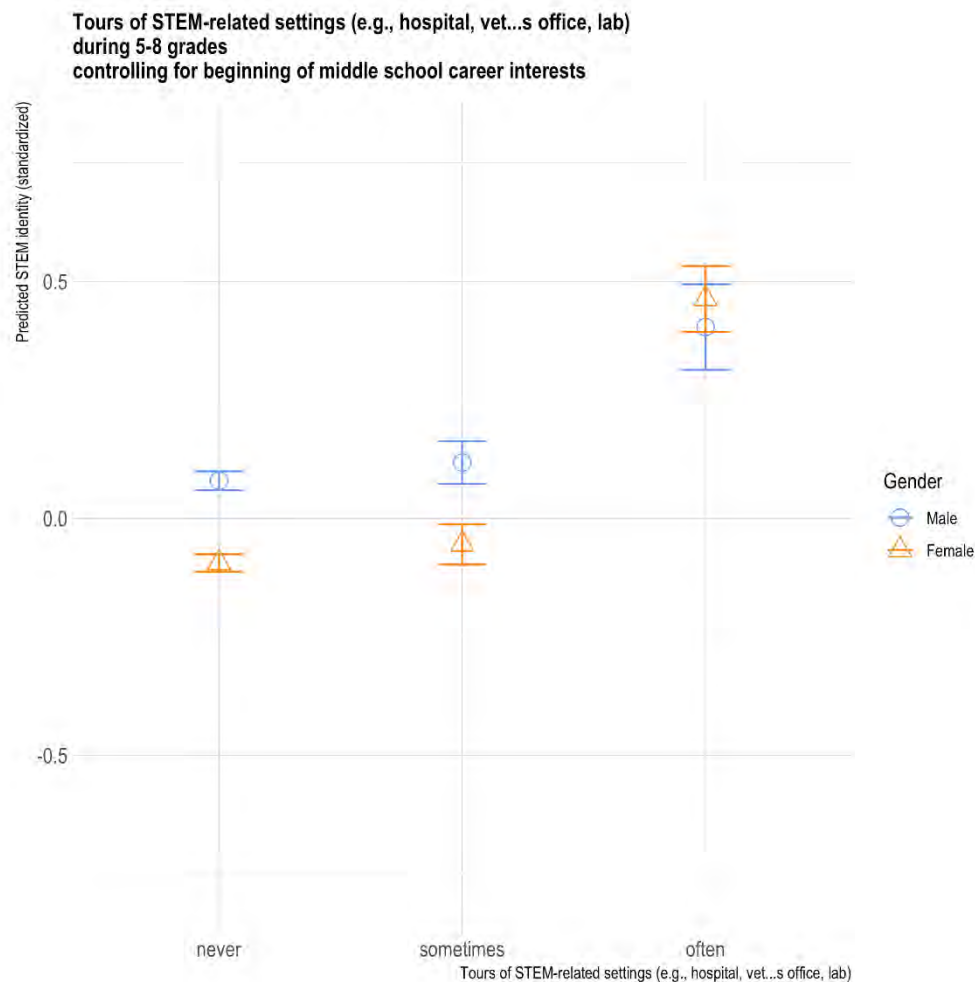






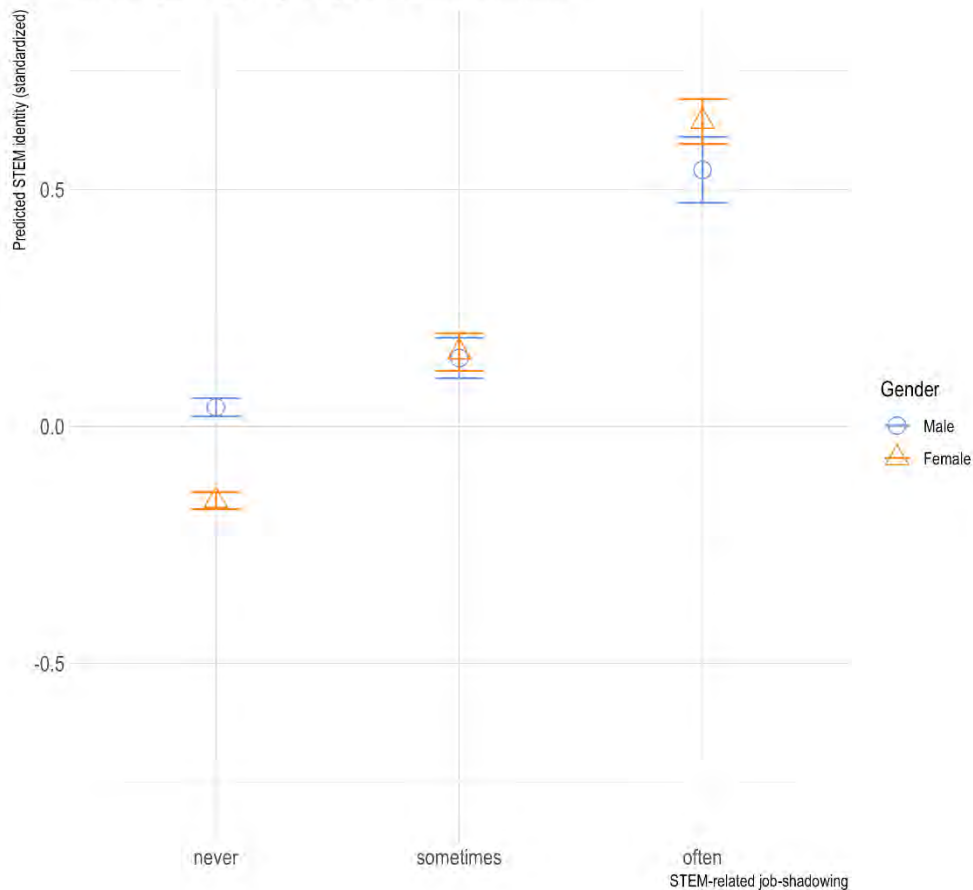


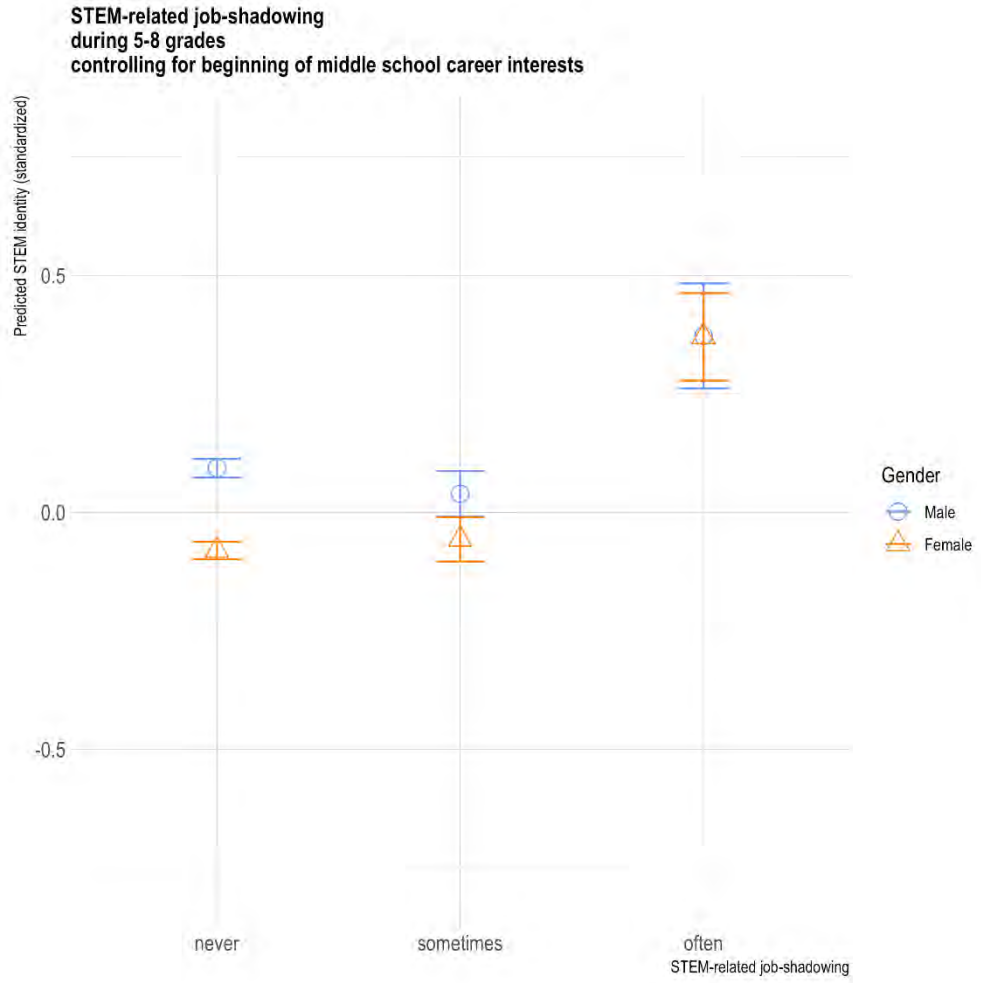


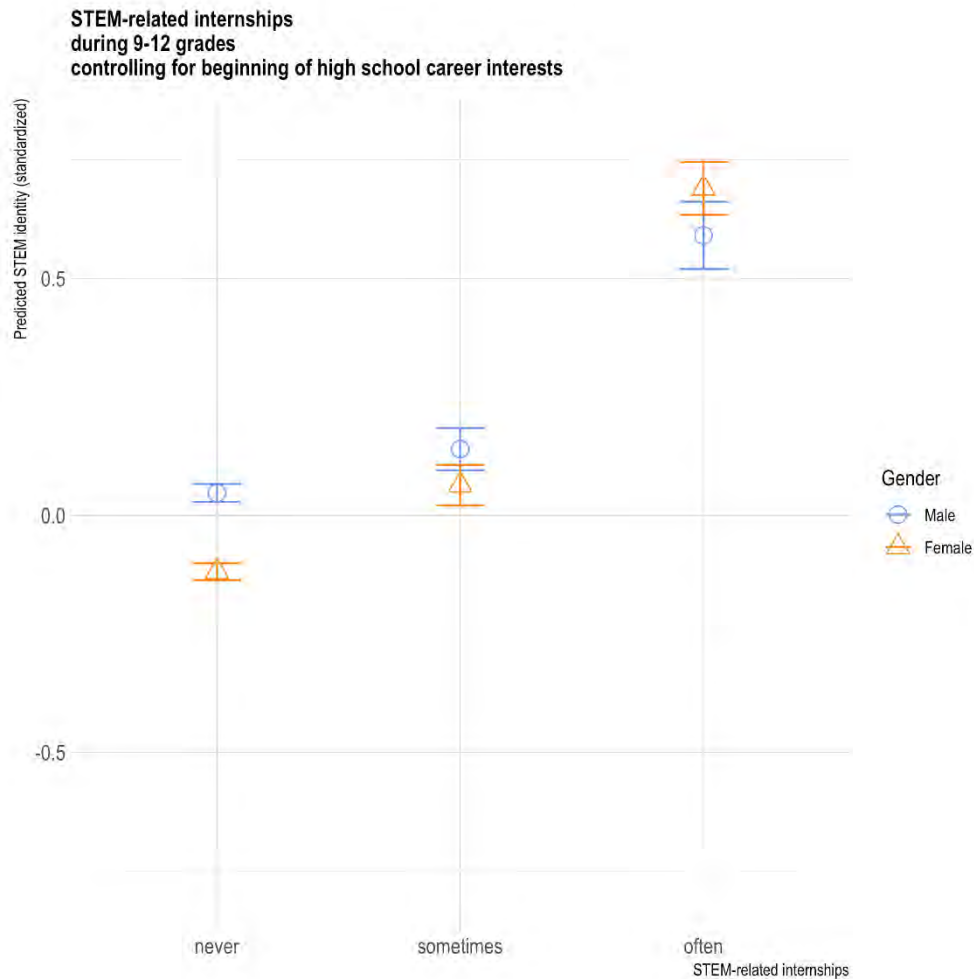


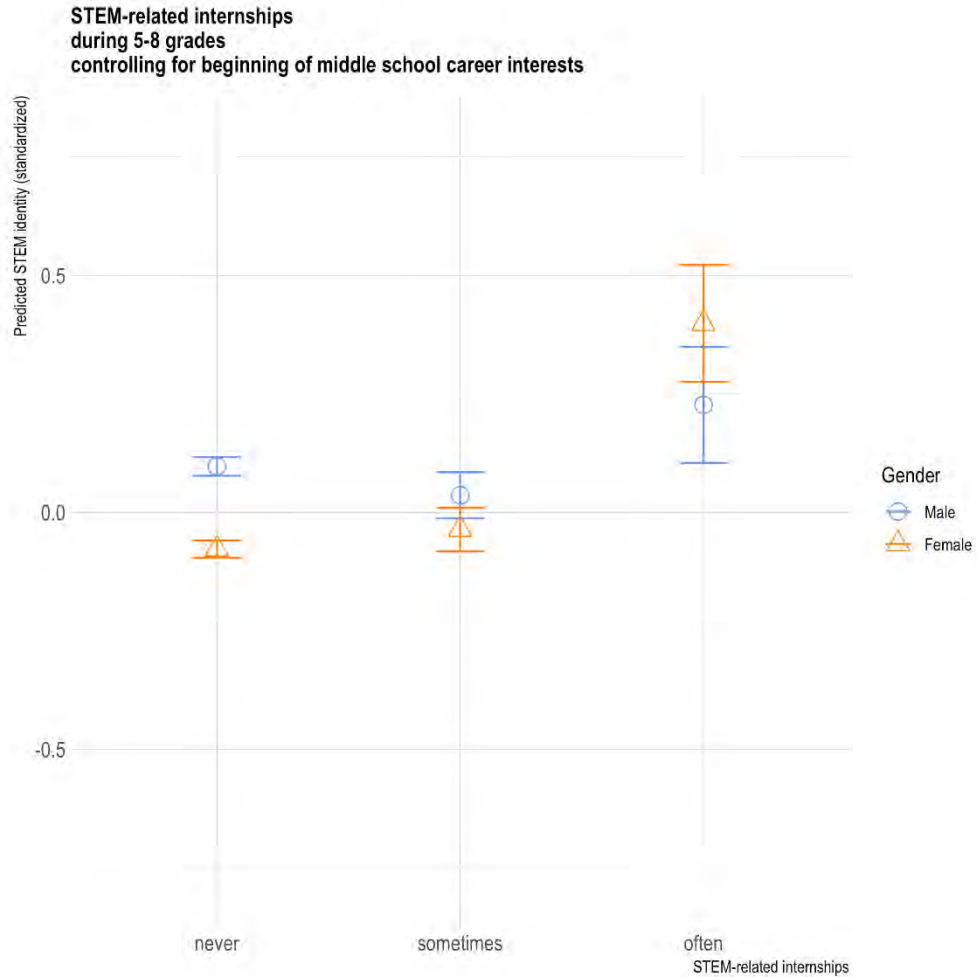
**STEM-related job-shadowing
during 9-12 grades
controlling for beginning of high school career interests**

[to Index](#)



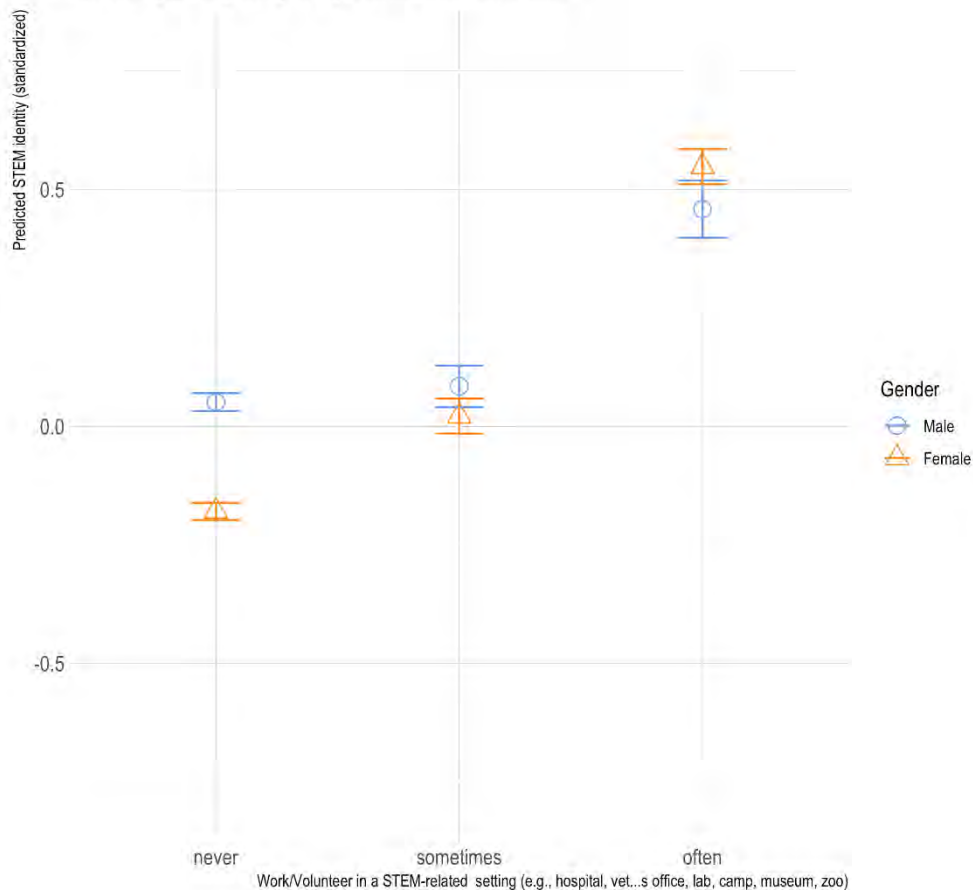






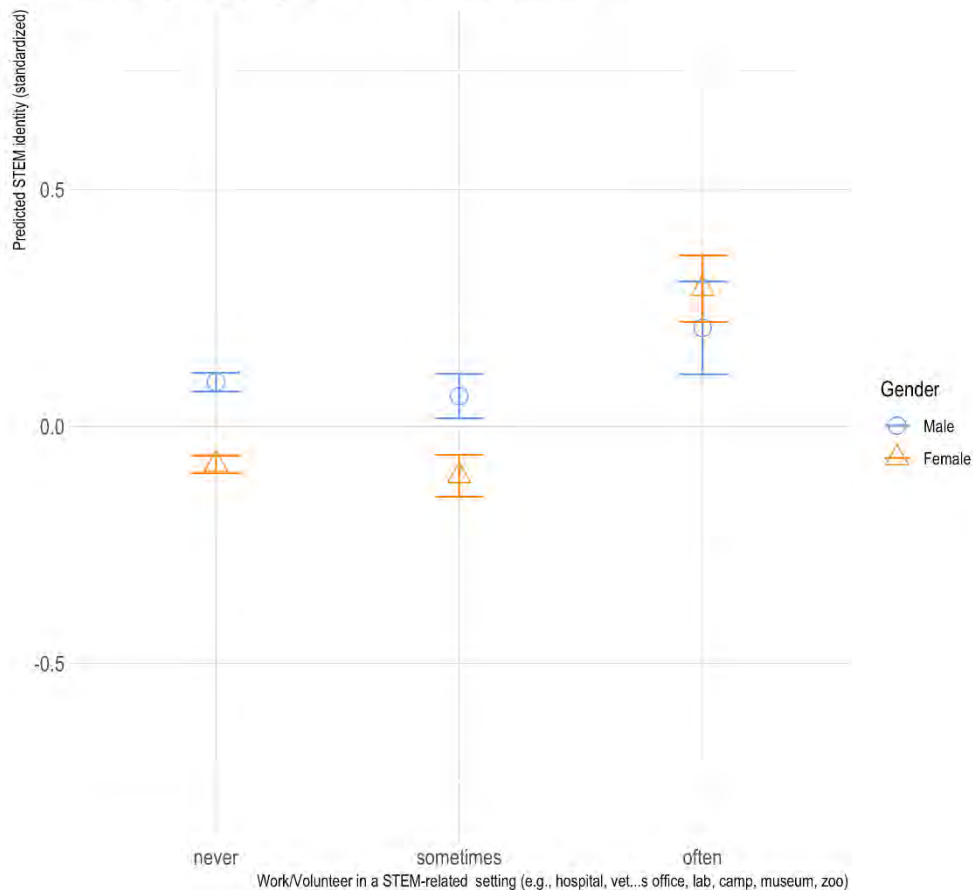
Work/Volunteer in a STEM-related setting (e.g., hospital, vet...s office, lab, camp, museum, zoo)
 during 9-12 grades
 controlling for beginning of high school career interests

[to Index](#)

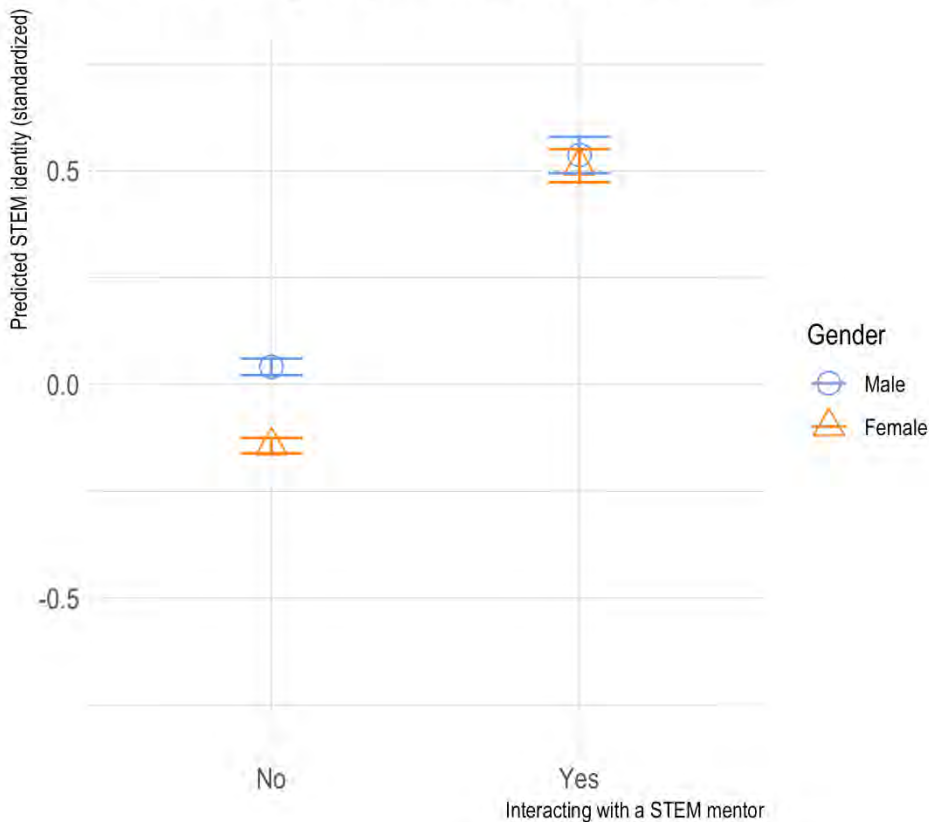


Work/Volunteer in a STEM-related setting (e.g., hospital, vet...s office, lab, camp, museum, zoo)
 during 5-8 grades
 controlling for beginning of middle school career interests

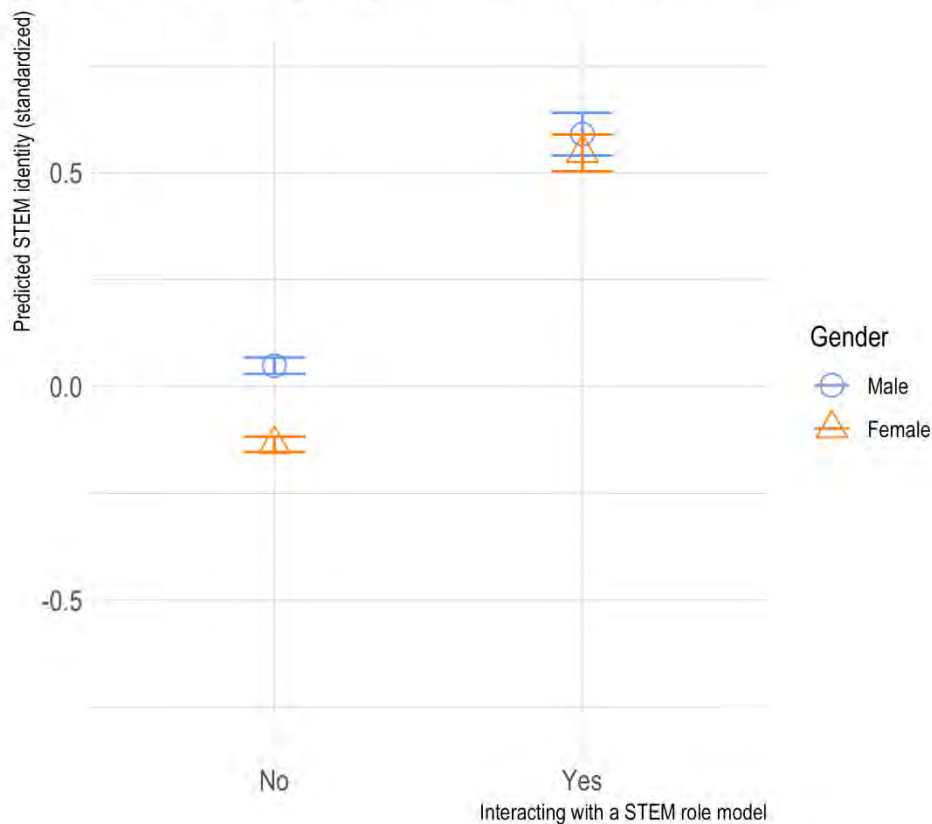
[to Index](#)



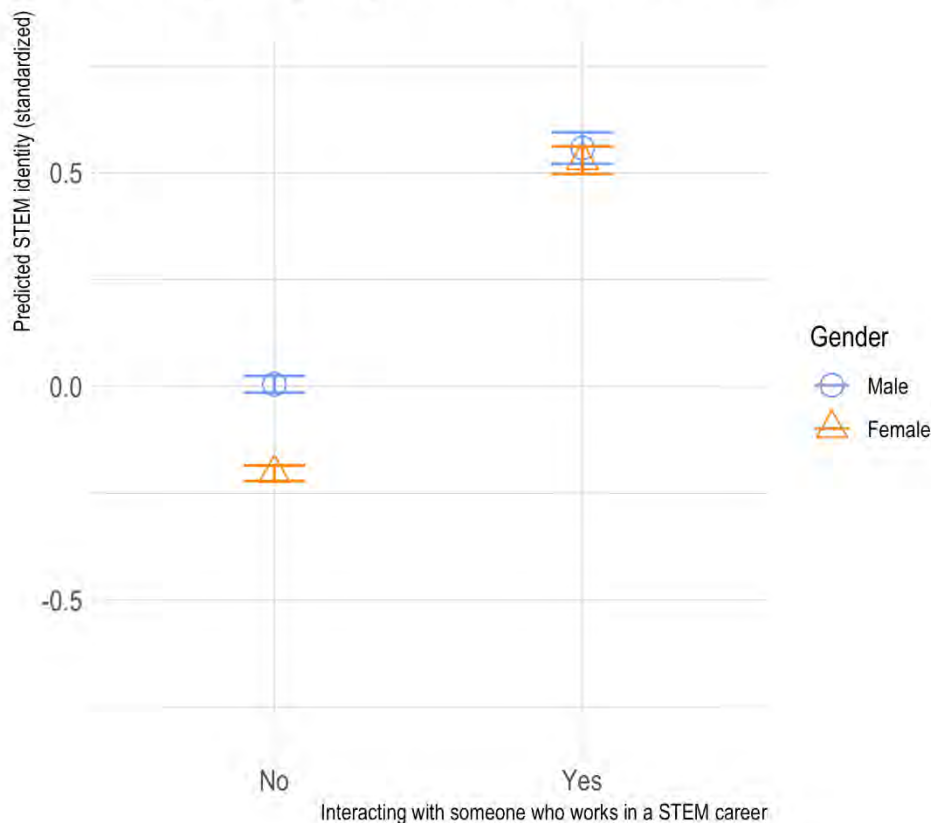
**Interacting with a STEM mentor
outside of school
controlling for beginning of middle school career interests**



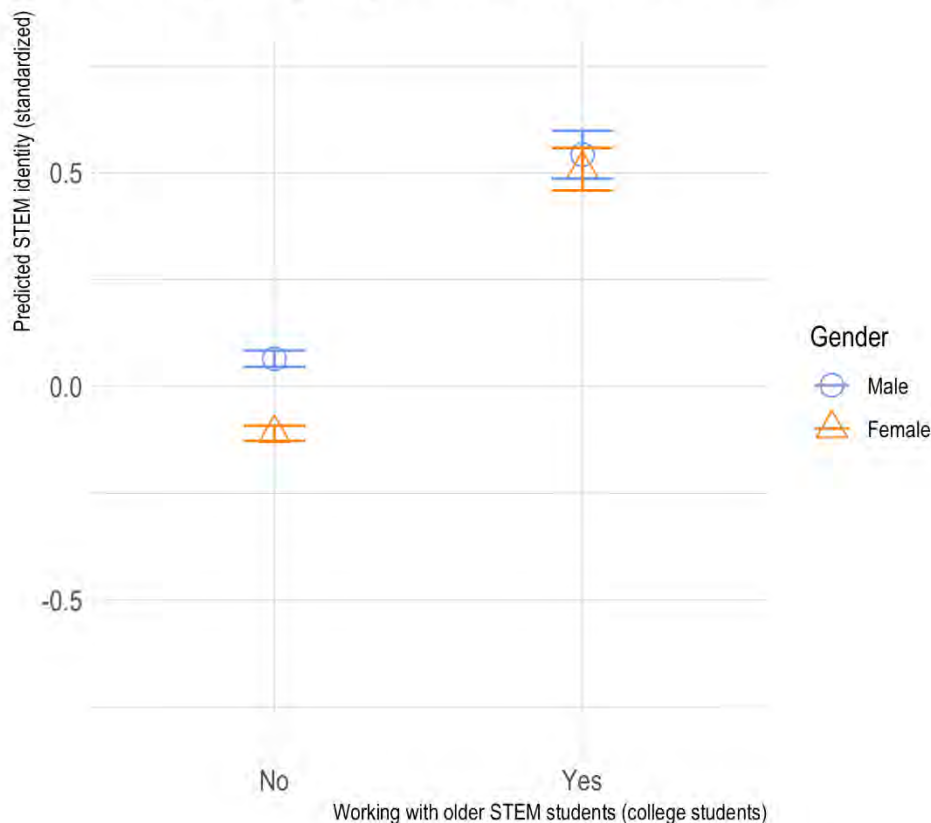
**Interacting with a STEM role model
outside of school
controlling for beginning of middle school career interests**



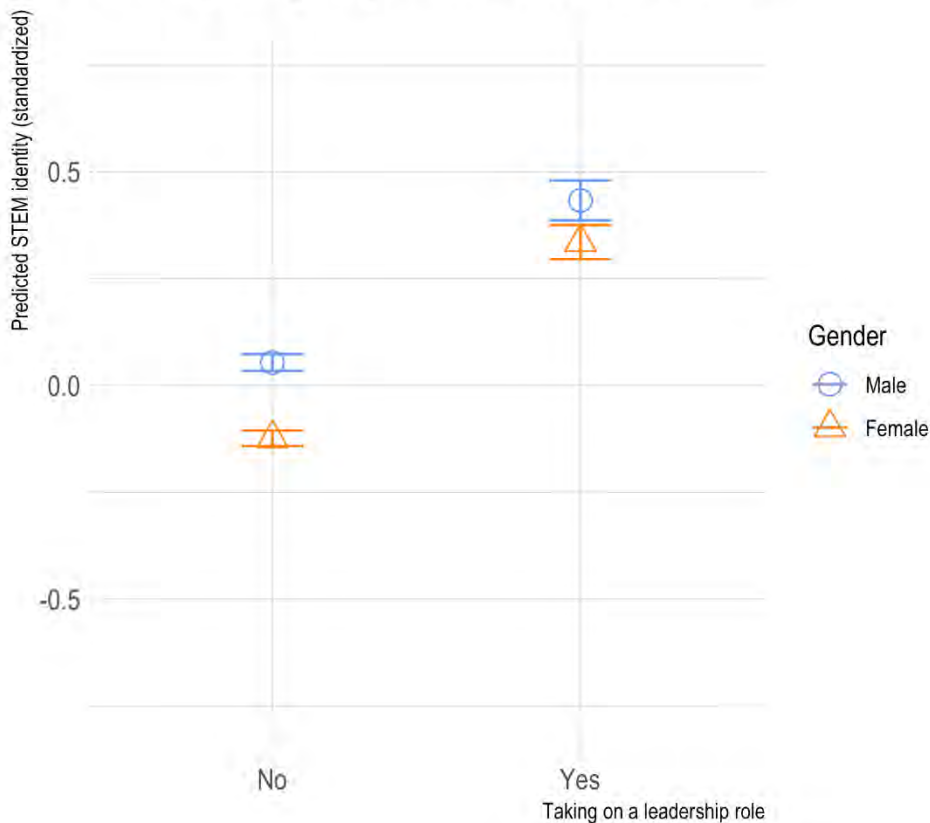
**Interacting with someone who works in a STEM career
outside of school
controlling for beginning of middle school career interests**



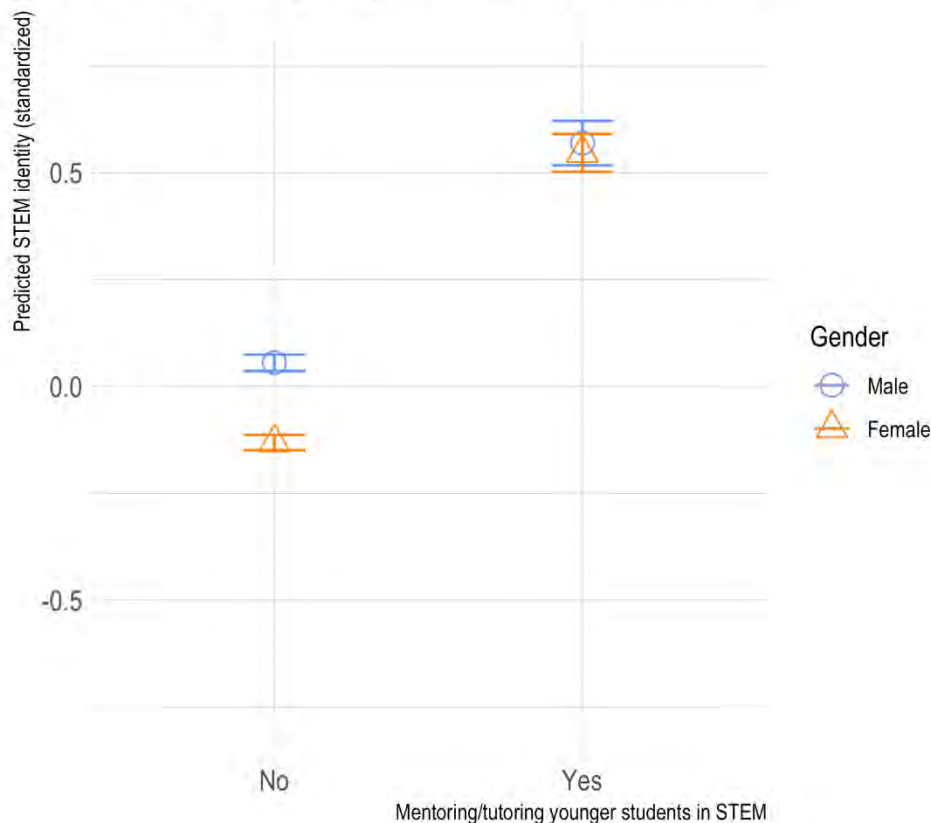
**Working with older STEM students (college students)
outside of school
controlling for beginning of middle school career interests**



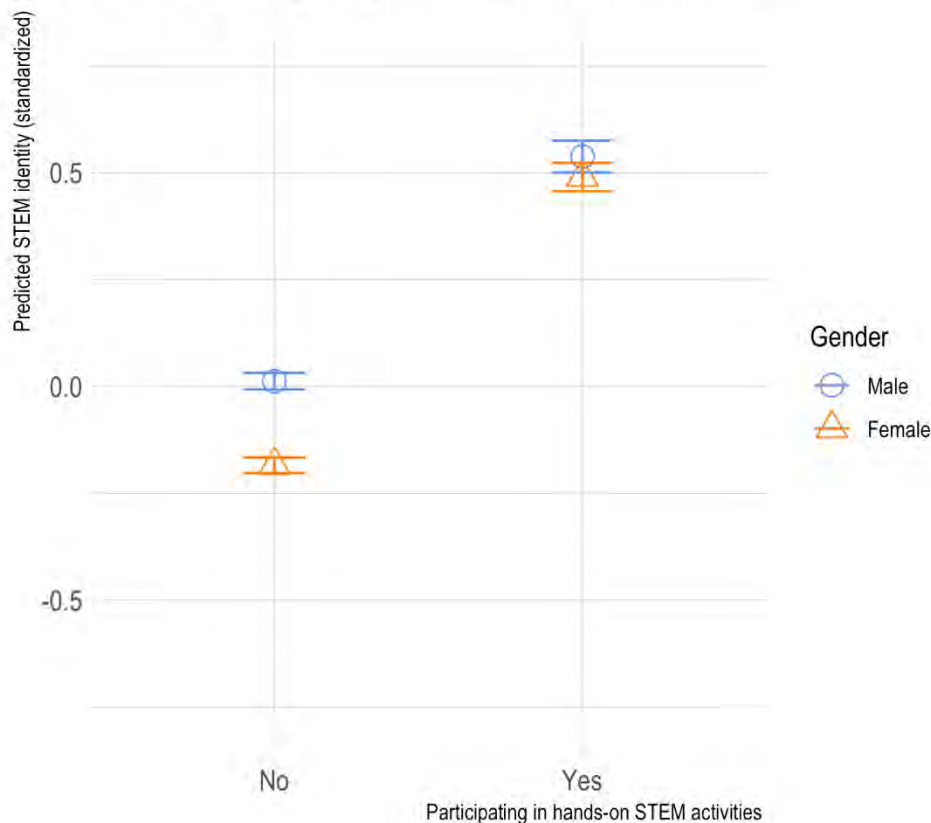
**Taking on a leadership role
outside of school
controlling for beginning of middle school career interests**



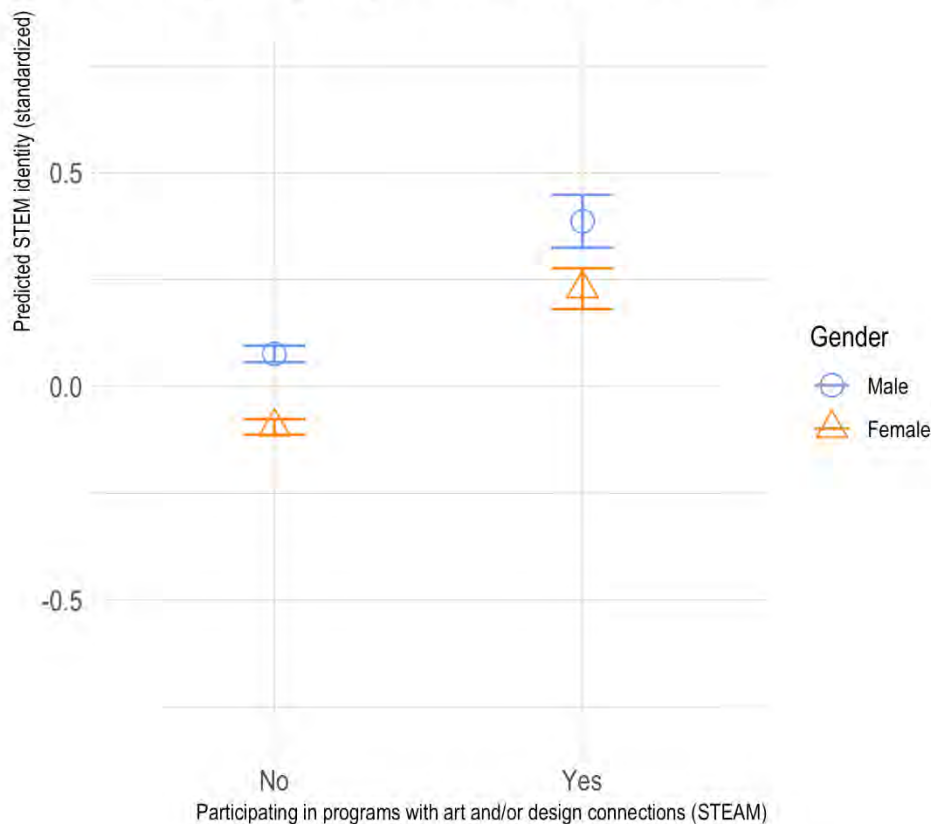
**Mentoring/tutoring younger students in STEM
outside of school
controlling for beginning of middle school career interests**



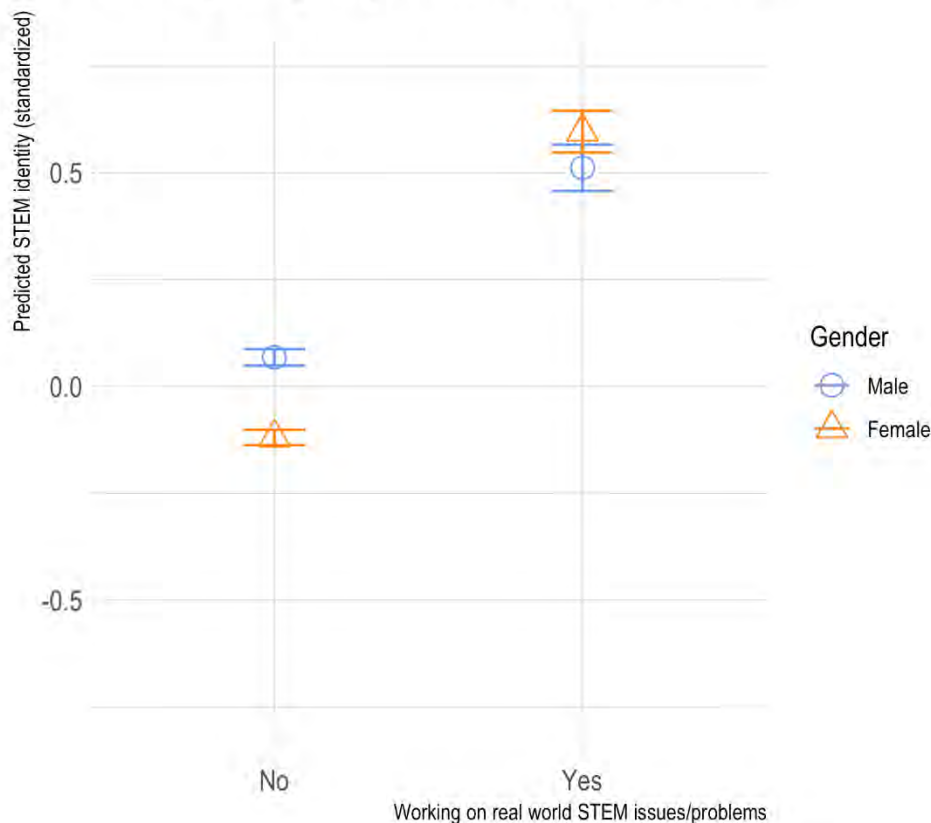
**Participating in hands-on STEM activities
outside of school
controlling for beginning of middle school career interests**



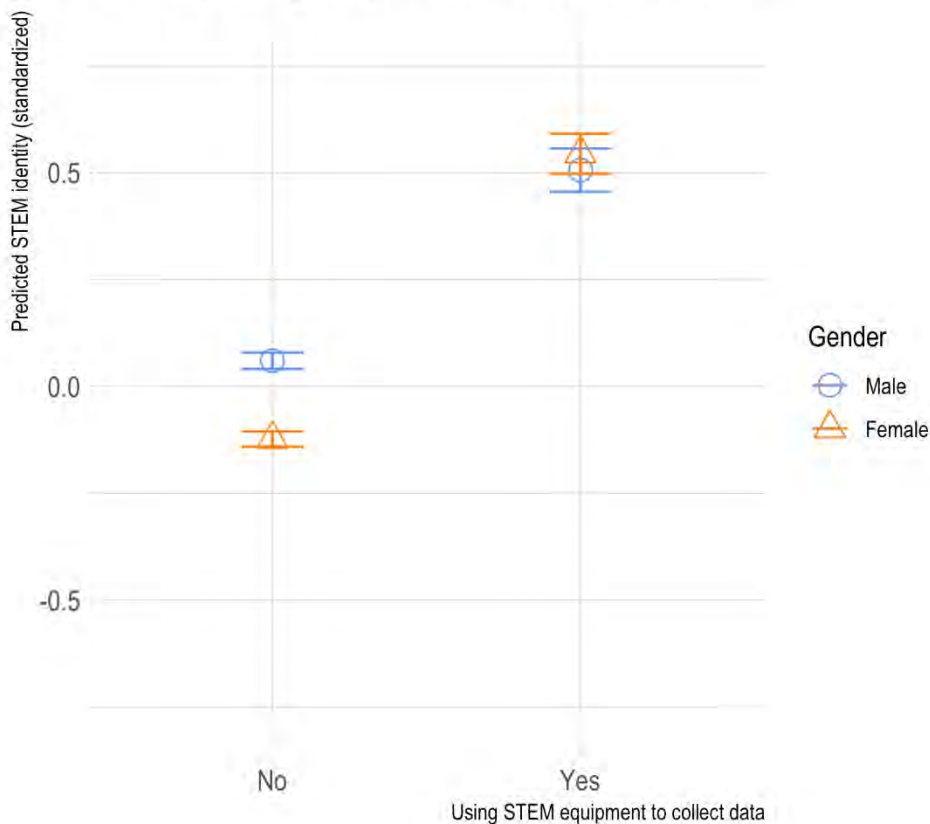
**Participating in programs with art and/or design connections (STEAM)
outside of school
controlling for beginning of middle school career interests**



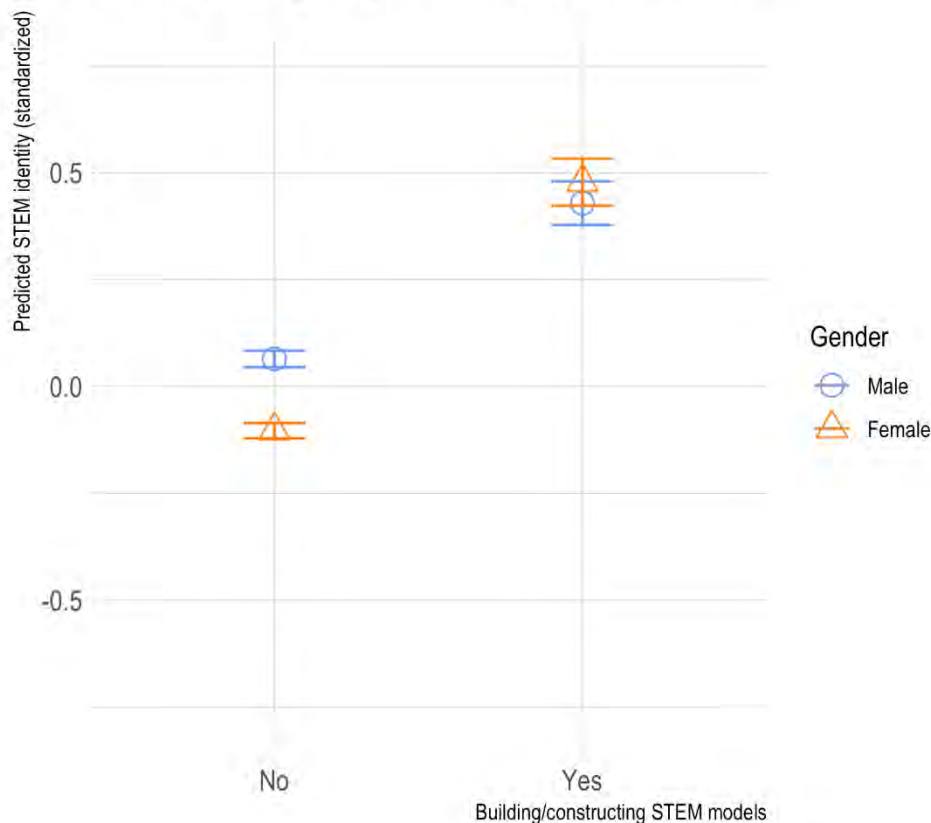
**Working on real world STEM issues/problems
outside of school
controlling for beginning of middle school career interests**



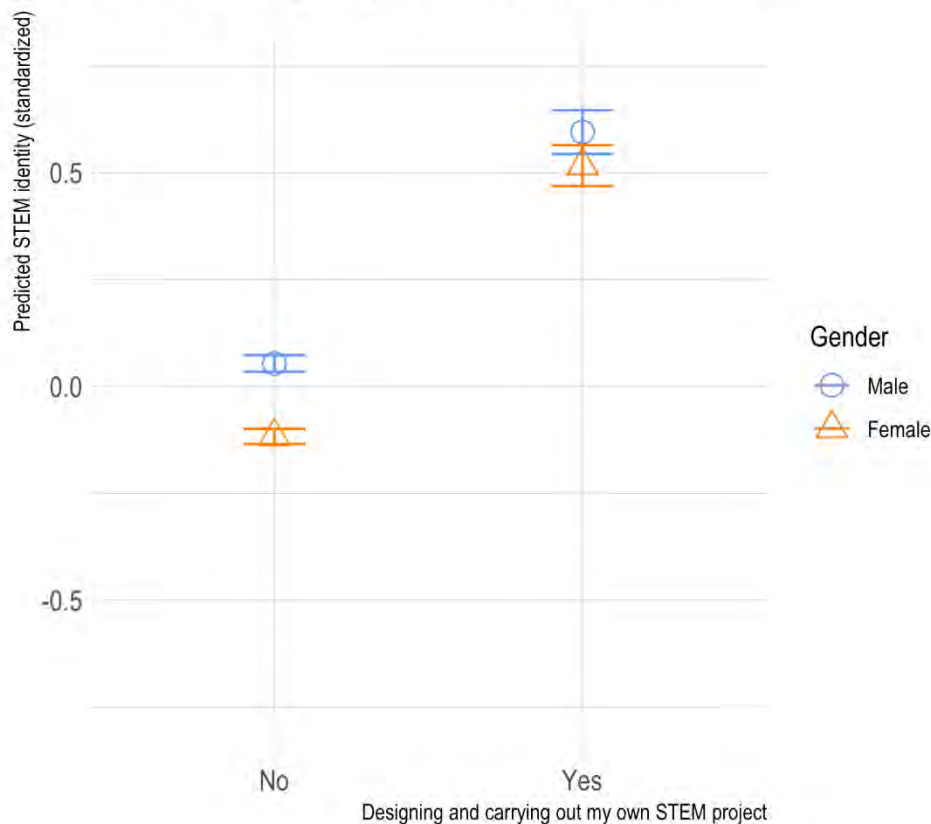
Using STEM equipment to collect data
outside of school
controlling for beginning of middle school career interests



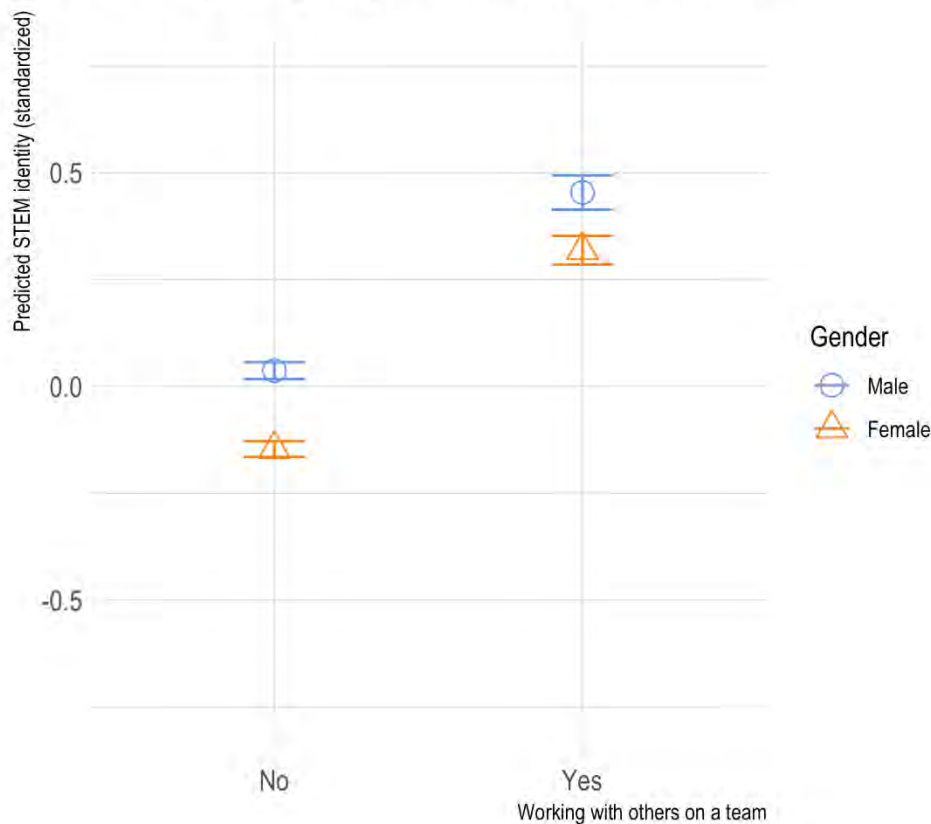
**Building/constructing STEM models
outside of school
controlling for beginning of middle school career interests**



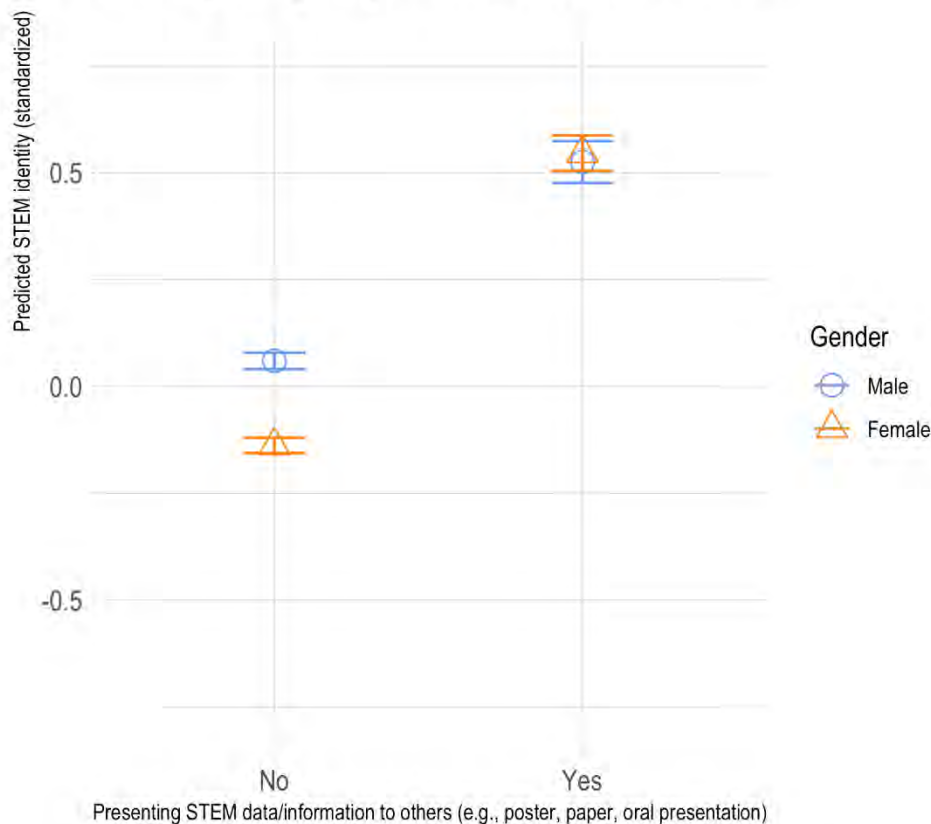
**Designing and carrying out my own STEM project
outside of school
controlling for beginning of middle school career interests**



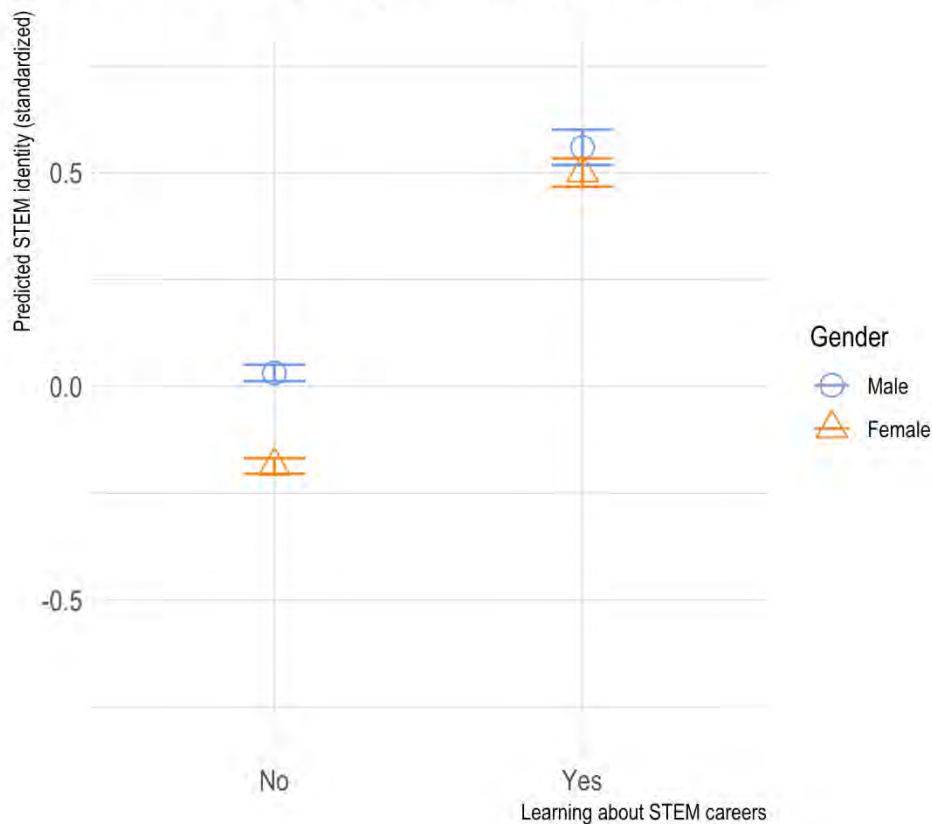
**Working with others on a team
outside of school
controlling for beginning of middle school career interests**



Presenting STEM data/information to others (e.g., poster, paper, oral presentation) outside of school
controlling for beginning of middle school career interests



**Learning about STEM careers
outside of school
controlling for beginning of middle school career interests**



Q & A

Discussion:

- How might you use this data in your own work?
- What else do you want to know about OST STEM experience and identity development?

Thank You!

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connecting museum professionals with employment opportunities

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Transferring Museum Skills to
Other Fields**
April 28, 2021



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Free Resources**
May 11, 2021

