

## SciGirls Longitudinal Executive Summary

Since 2006, 194 young women have participated in the SCIGIRLS program. Of those, 56 participated in the program for two summers (29%) – these students will be referred to as repeaters. In 2006, 16 girls participated. Since that year, 32-36 girls have participated each summer (in the summer of 2010 and 2012 there were 36 and 35 girls respectively in attendance).

Table: Demographics of All Campers

<b>Ethnicity</b>	<b>N</b>	<b>Percent of total</b>
Hispanic	13	7%
<b>Race</b>		
African American	36	19%
Asian American	24	12%
White	128	66%
No Race Listed <sup>1</sup>	4	2%

Table: Types of Schools Campers Attended at time of Camp

<b>School Type</b>	<b>N</b>	<b>Percent of total</b>
Public	137	71%
Public Charter	21	11%
Private	38	20%
Home-schooled/Other	5	3%

In terms of longitudinal follow up, we have followed up with 2006-2011 campers. Of the original 144 participants, 60 have responded (42%) to one or both of the following: 2009 survey and 2012 survey. Twenty one of these respondents were repeaters (35%). The demographics of these respondents can be found in the following tables.

Table: Racial Demographics of Longitudinal Cohort

	<b>N in cohort</b>	<b>Percent of Follow up cohort</b>	<b>Percent represented by camp overall</b>
African Americans	10	17%	18%
Asian Americans	3	5%	9%
Hispanic	1	2%	5%
White	46	77%	68%

<sup>1</sup> All identified as “Hispanic” and participated in SciGirls during a year when we did not separate ethnicity and race.

Table: Types of Schools Represented by Longitudinal Cohort

	N in cohort	Percent of Follow up cohort	Percent represented by camp overall
Public	36	60%	64%
Public Charter	10	17%	14%
Private	11	18%	18%
Home school	3	5%	4%

Table: Year of Camp Participation Represented by Longitudinal Cohort

	N in cohort	Actual number who participated that year	Response rate per year
2006	10	16	62.5%
2007	17	32	53%
2008	23	32	72%
2009	11	32	34%
2010	11	36	31%
2011	10	32	31%

Grade levels at time of contact

2009 Responses (29)

Grade Level	Number	Percent of total
6	3	10%
7	7	24%
8	4	14%
9	3	10%
10	4	14%
11	5	17%
12	3	10%

The 2012 cohort (n = 39) was composed if the following grade levels

Grade Level	Number	Percent of total
6	6	15%
7	7	17%
8	10	26%
9	3	23%
10	8	20%
11	3	7%

12	0	0%
College Freshmen	2	5%

### Higher Education Participation

In summer 2013 we followed up by email, social media, and phone with college-aged alumnae of the SciGirls camps. 50 alumnae were identified as old enough to have already entered college or would be entering college in fall 2013. We were able to determine the institutions attended by 37 of the 50 college-aged alumnae (74%). For 1 alumna, we could determine her major, but not her institution.

Table: College/university attendance of college-aged SciGirls alumnae

Institution	Number	Percent of total college-aged
Ave Maria University	2	4%
California Institute of Technology	1	2%
California Polytechnic State University	1	2%
Catholic University of America	1	2%
Cornell	1	2%
Florida A&M University	1	2%
Florida State University	12	24%
New College of Florida	1	2%
Palm Beach Atlantic University	1	2%
Pasco-Hernando Community College	1	2%
Queens University of Charlotte	1	2%
Sewanee-The University of the South	1	2%
Southeastern University	1	2%
Spring Hill College	1	2%
Tallahassee Community College	5	10%
University of Alabama	1	2%
University of Central Florida	1	2%
University of Florida	2	4%
Washington University in St. Louis	1	2%
Wellesley College	1	2%
Westpoint Military Academy	1	2%
Unknown	12	24%

Table: Detailed majors(s) of college-aged SciGirls alumnae

Major(s)	Number	Percent of total college-aged
Biochemistry	1	2%
Biology	3	6%
Biology & Chemistry	1	2%
Biology & Global Health and Environment	1	2%
Business	1	2%
Chemistry & Engineering, Mechanical	1	2%
Communication	1	2%

Creative Writing	1	2%
Early Childhood Development	1	2%
Education, Early Childhood	1	2%
Education, Elementary	1	2%
Engineering, Chemical	1	2%
Engineering, General, Sustainable Systems, and Computer Science	1	2%
Engineering, Industrial	1	2%
English & History	1	2%
Environmental Health	1	2%
Exercise Science	1	2%
Music Therapy	1	2%
Nursing	2	4%
Occupational Therapy	1	2%
Political Science & Pre-Law	1	2%
Psychology & Child Development	1	2%
Technical Communications	1	2%
Television Production	1	2%
Theology	1	2%
Undecided	5	10%
Unknown	17	34%

Table: Major categories for college-aged SciGirls alumnae

Category	Number	Percent of total college-aged
Business	1	2%
Communications	3	6%
Education	2	4%
Health Professions	4	8%
Humanities	4	8%
Social Sciences	3	6%
STEM	11	22%
Undecided	5	10%
Unknown	17	34%

Table: Major categories for college-aged SciGirls alumnae – Number of Repeaters

Category	Total Number	Number of Repeaters	Percent of repeaters overall
All	50	14	28%
Business	1	0	0%
Communications	3	1	7%
Education	2	2	14%
Health Professions	3	1	7%
Humanities	4	0	0%
Social Sciences	3	1	7%
STEM	11	5	36%
Undecided	5	1	7%
Unknown	17	3	21%

## Analysis of Results

All of the respondents (n=60 distinct respondents not double counting those who responded in 2009 and 2012) were interested in STEM before coming to the camp as evidenced by their applications. Forty nine of these participants (88%) still listed a science or math course as one of their favorite courses in 2009 and/or 2012. This is just one indication of the positive effect of the camp. There were other questions on the survey that specifically addressed how the camp affected these students over time. All of the respondents mentioned a positive effect of the camp on their interest, understanding or motivation in STEM, so this positive effect provides evidence of the long-term benefits of the camp programming – specifically having students interact with STEM professionals who can introduce them to a variety of STEM careers through hands on activities. The specific effects of the camp are listed in Table.

Table : Role that SCIGIRLS participation had on respondents

Effects of Camp	Tally	Percent of Total (n=60)
Increased interest in STEM	60	100%
Learned about real-world applications of STEM	26	43%
Learned about STEM careers	20	33%
Motivated to take more advanced STEM courses	9	15%
Motivated to pursue STEM careers	8	13%
Improved concept that women can be successful in STEM	7	12%
Increased confidence in STEM abilities	6	10%
Participated in and learned about collaboration as it relates to STEM	6	10%
Increased understanding of STEM	4	7%

These results demonstrate that participation in the camp had varying specific effects on students all leading to an increased interest in STEM. It is important to tease out this information through qualitative methods because many of the participants. Some of the participants increased their interest in STEM but may not be considering a STEM career in the future due to other interests. This result still meets the mission of the camp in that all participants whether they plan to work in a STEM field have an appreciation of STEM and can see its relevance to their lives. In terms of overall interest in STEM, respondents made statements such as: “Due to SCIGIRLS, I understand different sciences and how they interact with each other and society. I also have a broader perspective of how things work” (2012 survey response from 2010/11 camper.)

The reason for this increase in STEM could be seen in the next two categories: better understanding of STEM fields’ relevance to their lives and better understanding of STEM and STEM careers. Almost half of these respondents (43%) discussed a better understanding of STEM’s relevance to their lives after participating in SCIGIRLS. One camper explained that “SCIGIRLS allowed me to view different fields of science and more in depth to the complexity of science in everyday life” (2012 response from 2007/08 camper). Another camper explained that SciGirls made her “appreciate science and math more. I was able to see the real world application of these fields. This has made my classroom activities seem more relevant” (2012 response from 2010 camper). Two other campers helped them to see the relevance and interest of

STEM beyond their classrooms. For example, one explained that “SCIGIRLS reinforced my interest in Science and it also made me realize that there was more to science than just what was taught in the school room” (2009 response from 2007-/08 camper). And the other camper actually saw the relevance as proof that STEM was not “irrelevant, boring, or predictable” as she had thought it was based on her experience in STEM classes (2012 response from 2011 camper).

The second influence that the camp had on participants’ interest in STEM was teaching them a better understanding of STEM careers (33%) and fields (7%). A 2006/07 participant described this best in her 2009 survey response:

*I learned what types of sciences I really enjoyed, and what types I really didn't care for. Some areas surprised me: for example, I am totally into botany, of all things. We learned about the biology of the pine ecosystem, and I was fascinated! When we went to [a local water way] and took a nature hike, that solidified the deal: I ended up walking with one of the counselors who also loved botany, and she told me all about the different plants as we walked along. SCIGIRLS also opened me up to science jobs that I'd never thought about before -- like a forester, an Antarctic researcher... The list goes on and on.(2009 response from 2006/07 camper)*

Other respondents summarized this same sentiment. One camper explained that she had “never seriously considered a science career but after SCIGIRLS” she began to consider it (2012 response from a 2008 camper). Another respondent reflected back on her experience from four years prior and explained that SCIGIRLS was “a great way to become exposed to the types of careers offered. Before SCIGIRLS I didn't really know what a forensic scientist did or what a marine biologist did. But now that I have been exposed to those careers, I can make an educated decision about what I want to do ‘when I grow up’” (2012 response from a 2007/08 camper). Another camper expounded on this sentiment explaining that she “knew that there were many types of scientist but didn't realize how many different career paths you could take if you were a scientist” (2009 response from same 2007/08 camper).

Part of the increased interest in STEM came from students increased understanding STEM fields and the process of science. For example one respondent explained how her view increased:

*SCIGIRLS opened me more into the world of science. It taught me that science isn't just mixing chemicals together in a lab. You have to know what you're doing, be good at it, and always have the mindset that there might be an answer to your solution and that your solution could be different from someone else's. In other words, science isn't about finding the truth about something, it's about understanding why something happens (2012 response from a 2009/10 camper).*

Another camp expressed how the camp “really opened my eyes to different things girls can do with science. I really got to know that there are other things than just sitting in a lab and doing all kinds of tests” (2009 response from a 2006/07 camper).

This improved understanding of STEM and broadening of types of careers in STEM led many of the campers to become more interested (or at least persist in their current trajectory) in a

STEM career. Fifty seven percent of the participants (n=34) were interested in a STEM career, with an additional 14% (n=8) listing it as a possibility at least two or more years after participating in camp. According to the respondents the camp motivated participants to pursue STEM careers by motivating them to take advanced STEM courses (n=9) and/or persist in a STEM field. For example, the camper who spent most a hike talking to a counselor about botany, began to consider it as a career opportunity after that experience, “As I narrow down my college goals I am making sure that the college I choose has major science opportunities, even for those not majoring, or the option of a double-major with a music program” (2009 response from 2006/07 camper). Another camper reflected on her experience over five years before in SCIGIRLS and explained, “I have become more interested in math/science courses. Since I've attended the camp I have taken more, and more challenging, math and science courses” (2012 response from a 2007/10 camper). Another camp actually described a transition in motivation to take and an interest in advanced STEM classes because of SCIGIRLS:

*SCIGIRLS made me more interested in both science and math. Before SciGirls, science and math were just another subject that I liked but wasn't very good at. But when I went to the camp, it gave me a different perspective on how to view them. It made me start thinking about taking high school classes while I was still in seventh and eighth grade* (2012 response from a 2009 camper).

A similar number of young women expressed an interest in pursuing a career in STEM (n=8) after participating in the camp. One 2012 respondent credited her experience 4 years prior as changing her career trajectory: “I used to not wish to continue science courses past the minimum requirement, now I am choosing to go into a science career” (2012 response from a 2008 camper). Other campers discussed how they had always been interest in STEM but the camp experience “solidified that interest” (2012 response from a 2009 camper) and “opened my eyes to the kinds of careers I could have in science and confirmed my career goals” (2009 response to a 2008 camper).

The SCIGIRLS program is unique in that it is a single sex camp that exposes girls to female STEM professionals along with hands on activities that improve their understanding of STEM. This gendered exposure was mentioned by seven participants. One camper discussed how the camp “showed [her] that it was possible for women to be scientists” (2009 response from a 2007/08 camper). Another camper discussed how meeting female role models actually strengthened her career motivation:

*It just helped me know that this is what I want to do. Ever since I was 10 I wanted to be a chemist, but I didn't know any girl chemists. I met women in science thru Sci Girls and I can now see they aren't just geeky women in white coats* (2009 response from 2008 camper).

One camper who is now a college freshmen majoring in mechanical engineering reflected on her participation of SciGirls some five years prior:

*SCIGIRLS gave me a basis for my love of science. I had been to other science camps that also piqued my interest from a young age, but SCIGIRLS was the first to show how women could be involved in science. Going to a science-focused university with a 60/40 ratio of men to women, it's exciting to see that the percentage of women in the sciences is increasing* (2012 response from a 2007 camper).

The fact that this young woman still remembers her experience and can credit that experience as influencing her STEM career trajectory speaks to the effect of exposing young women to female role models in STEM. One respondent described this overall effect as “empowering”:

*SCIGIRLS did not really change my attitude toward science, but it definitely expanded what I knew and was exposed to. It was very interesting to be able to link fun to science and see all of the different fields that exist within the realm of science. It may have changed my attitude toward certain sciences that I had either never thought of doing, or had shut myself off to thinking that I couldn't do it. In a way, SCIGIRLS was empowering* (2009 response from a 2006 camper).

This camper describes a similar situation to the others in that she already liked science, but the camp was able to expand her ideas of what science was and what careers existed, providing her with the knowledge to make a more educated decision on a STME career.

There were also some unintended positive effects of the camp that were mentioned by participants within a year after their camp experience – increased confidence (n=6) and improved abilities to work as a team member (n=6). Neither of these aspects were part of the mission of SCIGIRLS but they are worth mentioning, especially since these qualitative results could indicate that these effects could be more immediate rather than longitudinal effects of the camp and its structure. One 2012 respondent explained that SCIGIRLS “increased my confidence - I feel a lot more outgoing and independent after SCIGIRLS. They let us develop on our own and work together and independently” (2012 response from a 2010/11 camper). Another camper described the camp’s impact on her confidence in succeeding in STEM, “SCIGIRLS has definitely given me more confidence that I want to get a job in science. It has also made me set higher goals for myself” (2009 response from a 2007/08 camper). Similarly other students expressed that they learned what it was like to “collaborate as a scientist” (2012 response from 2011 camper). And another explained that the camp, “helped me to become a team player, make some new friends, and learn new things” (2012 response from a 2011 camper).

Despite these positive longitudinal aspects of the camp, there were some respondents who described a decline in their desire to pursue a STEM career. This decline was based on experiences outside of the camp. For example, one participant explained, “I was really on fire for it after SCIGIRLS- but it started to decline once Physics came in” (2012 response from a 2006 camper). And another discussed how she felt like she was not “good at science and math in school” believing that “school was ruining [her] interest in STEM” (2009 response from a 2006/07 camper).