Statement of

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Mr. Chairman, Ranking Member Ehlers, and members of the Committee, thank you for the opportunity to testify before you today. My name is Marcia Brumit Kropf, and I am the Chief Operating Officer of Girls Incorporated, the national non-profit youth organization that inspires all girls to be strong, smart, and bold®. On behalf of Girls Inc., our 96 local affiliates, and the girls that we serve, I am pleased to have the opportunity to present our approach to advancing girls' interest, confidence, and competence in STEM fields.

With local roots dating to 1864 and national status since 1945, Girls Inc., formerly Girls Clubs of America, has responded to the changing needs of girls and their communities through research-based programs and advocacy that empower girls to reach their full potential. We have a longstanding and deep commitment to preparing girls for careers they might otherwise never consider, including scientific and technical careers.

In 1985, with funding from the National Science Foundation, we launched Girls Inc. Operation SMART®, a structured approach to helping girls develop enthusiasm for and skills in science, technology, engineering, and mathematics. Since that time, more than 750,000 girls have participated in Operation SMART. Through hands-on activities, girls explore, ask questions, and solve problems, and they interact with women pursuing STEM careers. Girls Inc. Operation SMART was developed with the research-based premise that in order to increase STEM gender equity, girls need to be: 1) interested in science; 2) competent and confident in science; and 3) aware of future science careers. Our experience with Operation SMART and ongoing research and development leads us to three important messages for you today:

1. As a country, we still need to address the gender gap in STEM.
2. Informal science education is a critical strategy to address the gender gap.
3. The federal government must continue to play a role, alongside the private, nonprofit and educational sectors, in fostering girls' success in STEM fields.

To my first point, despite gains in the number and achievement of girls and women in STEM, substantial gaps remain.

Over the past 30 years, as the barriers of entry into many STEM fields have eased, women have vastly increased their proportion of bachelors, masters, and doctoral degrees earned in math and in the sciences. In 1970, women earned 0.8 percent of bachelors, 1.1 percent of masters, and 0.6 percent of the doctoral degrees in engineering. In 2006, the percentages were 19.5, 22.9, and 20.2, respectively.[i] The story is the same in physics, geology, and chemistry. In math, women are earning nearly half of the bachelors and masters degrees, and almost a third of the doctoral degrees.

Girls have now essentially closed the gender gap that has historically existed in math coursetaking, and in the grades boys and girls receive in those courses.[ii] Girls are also now narrowing that gap in the physical sciences.

Among SAT takers, a higher percentage of young women than young men are enrolled in honors math and science courses. In 2008, 53 percent of students who took the SAT and had taken at least 4 years of mathematics courses were young women; 53 percent of students who had taken at least 4 years of science courses were young women.[iii] And notably, half of the 40 finalists in the 2007 Intel Science Talent Search were girls.

At the same time, however, substantial gaps remain. Girls continue to lag behind boys in computer science, comprising just 17 percent of students taking the Computer Science A advanced placement exam in 2008, and just 12 percent of those taking the more rigorous AB exam, virtually the same proportions as in 1997.[iv] Likewise, just 35 percent of AP physics test takers were girls.

Of greater concern is the fact that gains in education have not translated into workplace parity as of yet. Women still represent fewer than one in five faculty members employed in computer science, mathematics, engineering, and the physical sciences collectively. In engineering in particular women account for just one in ten faculty members.[v] And, according to the Bureau of Labor Statistics, in 2008 women accounted for just 24.8 percent of all those employed in computer and mathematical occupations, just 6.7 percent of mechanical engineers, and just 6.3 percent of engineering managers.[vi]

Girls in the United States today grow up at a time when women have unprecedented opportunities. At the same time, they are aware that, in our society, women are often viewed as sexual objects and that their skills and abilities continue to be undervalued. In a 2006 Girls Inc. survey conducted by Harris Interactive, 55 percent of girls in grades 3 through 12 agreed with the statement, “In my school, boys think they have the right to talk about girls’ bodies in public.” At the same time, 44 percent of girls – almost half— agreed with the statement, “the smartest girls in my school are not popular” and 38 percent of boys agreed with the statement as well. This finding is virtually unchanged from an earlier study conducted in 2000. In addition, 36 percent of girls agreed that “people think girls are not

interested in computers and technology" and 17 percent of girls thought it was true that "teachers think it is not important for girls to be good at math."[vii]

This last finding is especially troubling and leads to my second point about the importance of informal STEM education—for girls, in particular, AND for the lessons it can bring into the regular school classroom.

As this Subcommittee is well aware, the National Academies recently published a report on learning science in informal settings, advising that schools should not be solely responsible for addressing the scientific knowledge needs of society. In fact, the Academic Competitiveness Council at the Department of Education recognized informal education as one of three integral pieces of the U.S. education system (the other two being K-12 and higher education) that are necessary to ensure U.S. economic competitiveness.[viii]

We at Girls Inc. agree.

First, informal science education offers a learning environment free of time limitations and test anxiety. As one participant of the Girls Inc. Eureka!® Program observed, "In Eureka science we get to do experiments every day and discuss and help our peers, but in school science you can't talk among your friends about the work or you will get in trouble."

Indeed, informal education allows students the ability to learn and discover through prolonged hands-on experiences. These experiences allow individuals to become comfortable making mistakes and using a trial-and-error method to solve complex problems. At Girls Inc. of the Greater Capital Region in New York, girls created working toy hovercrafts. They were so excited by their success that they decided to try to bring their experiment to scale. Using plywood and a leaf blower, the girls constructed a hovercraft that was strong enough to lift girls 4 inches off of the floor. Likewise, informal science education is more free to proceed at the pace of individuals' learning. One Girls Inc. scholarship recipient described doing the "Batteries and Bulbs" experiment. She said it took her group 3 afternoons to make the light bulb go on—but they did it. If the experiment had been conducted in a regular school classroom with the pressures of a tight schedule for covering specific curricula, at the end of class, the teacher would have most likely shared the solution. Her group would have learned that they couldn't make the light bulb go on themselves. At Girls Inc., they learned that they could.

Girls Inc. Eureka! is a four-week summer STEM and sports camp program for girls 12-15 held on a college campus. In Alameda County, CA, girls in Eureka!, who were predominantly urban, minority girls, increased their math course-taking plans, while control group girls' plans to take math decreased. Second-year Eureka! girls' math and science course-taking plans almost doubled. Their interest in science careers increased, and the percentage of girls whose wish for the following school year was "to do well/be on the honor roll," increased from 38 percent to 66 percent.[ix]

Alarmingly, however, this study also seemed to indicate that being away from school had a positive impact on girls—both Eureka! and control girls—in terms of wanting to do math and science. For most, being back in school tended to decrease that interest.[x]

For Girls Inc. and other providers of informal STEM education, this last finding points to what school systems may have something to learn from informal providers. Girls Inc. Operation SMART is a philosophy and approach to engaging girls in STEM subjects. It allows trained Girls Inc. affiliate staff to design their own programs, relevant to the interest and ages of the girls they serve. Girls Inc. of Carpentaria (CA), for example, has an Animal Care Club, where girls study animal habitats and are responsible for the care of the animals, including Rosie, their 12-year old tarantula. Girls Inc. of Omaha (NE) has a strong partnership with the College of St. Mary where female college students meet with girls in grades 1 to 6 twice a week for two months each semester in groups of 1 to 3 girls. A fifteen-year-old graduate of the program in Omaha explained that the projects were fun, hands-on, often outside, and, she said, "We didn't have to do worksheets."

Second, girls benefit from informal girl-focused programs because gender discrimination persists, usually subtle but at times blatant. Girls Inc. sponsors eight FIRST Robotics Lego League teams, with support from Motorola. The Girls Inc. teams often find themselves the only all-girl teams in the competitions (except of course when there are teams sponsored by the Girl Scouts). But on the co-ed teams, staff observed that it was always the boys who were operating the robots. In fact, on one occasion when I had the pleasure of speaking with some members of Robot Chicks Union, a group of female FIRST Robotics competitors, they complained that on co-ed teams they were actually assigned roles such as marketing and bringing the snacks for their team.

This phenomenon plays out in classrooms as well, where girls are too often relegated to supporting roles, such as recording notes, as they watch boys perform the experiments and work with equipment.

At Girls Inc., we pay explicit attention to equity and support girls as they develop the skills and self-confidence to navigate successfully through the challenges of adolescence. In Girls Inc. Operation SMART, we assume girls are interested in math, science, and technology. We let them make big, interesting mistakes. We encourage them to see themselves as scientists. Most importantly, we expect girls to succeed, and help them develop the same expectations of themselves.

According to the National Center for Women in IT, women are more likely than men to say they entered careers in STEM as a result of encouragement from a teacher, family member, or friend.[xi] While we may think of "encouragement" as "soft" or unnecessary, it is actually an important factor in women's decisions about careers. Parents are a critical part of the equation here and we help them seize opportunities to encourage their daughters in STEM. Our new Girls Inc. Thinking SMART Guide has a packet for parents, also available in Spanish, filled with resources and suggestions. For example, to determine if a home experiment is SMART, parents are asked to consider whether the activity allows girls to "use their hands, bodies, and senses for things other than writing." In contrast, an activity is probably not SMART if its primary goal is "to produce an ornament or decoration."

Encouragement increases self-efficacy, which in turn increases girls' participation in formal science classes and, later, in STEM-related careers.

Finally, women role models are essential for girls to be aware of career options and to envision themselves in those careers someday.

At an event at the White House last month, tennis great Billie Jean King spoke about the importance of female role models in sports. She said girls, "have to see it to be it." The same holds true for STEM. So, we incorporate a strong career component in our STEM programming. Girls Inc. has just completed a $2.3 million grant from the National Science Foundation for a program that connects girls with women in STEM career fields, including members of the Society for Women Engineers. And this is not just a 20 minute career day speech. This is working together over time on a substantive project, allowing for positive connections to be built.

Role models are particularly important for girls of color, but sadly minority women in science are scarce. African-American women make up just 1.5 percent of all those employed in science and engineering occupations, Hispanic women account for just 1.3 percent and American Indian and Alaska Native accounts for 0.1 percent.[xii] Ironically, African-American women have been shown to express higher levels of interest in science than white women.[xiii] Seventy percent of the girls served by Girls Inc. are girls of color. And 65 percent come from families with incomes under $25,000. It is essential that these girls receive high quality STEM programming that will open these fields up to them.

In 2004, we surveyed women who had previously received our Girls Inc. Lucile Miller Wright College Scholarships. Of the 85 respondents, 51 percent said that "My Girls Inc. experience influenced my college experience. It inspired me to pursue my interests in science, technology, engineering, and mathematics."[xiv]

My final point is that the federal government has a vital role to play in increasing girls' participation in STEM fields. We need the help of this committee to be recognized and tapped as equal players in STEM education.

- First, continue to support the National Science Foundation's Informal Science Education Program, and Research on Gender in Science and Engineering. Grants through the NSF are critical to the implementation of informal science education programs like ours as well as science museums, zoos, and environmental centers. Such grants provide research-based and innovative programs the ability to continue to increase national interest in STEM fields.

- Second, promote informal STEM education through federally funded afterschool programs. Proven, national programs like Girls Inc. Operation SMART incorporate the latest research on girls' engagement and persistence in STEM and can and should be targeted for funding to address the under representation of girls and minorities in STEM. Ninety percent of the sites funded by the 21st Century Community Learning Centers (federal afterschool program) are on school campuses.

- Third, support professional development for teachers and youth workers in informal STEM education and in gender-equitable teaching methods. Provide opportunities for these professionals to interact with each other and learn from each other.

- Finally, promote increased enforcement of Title IX. Public information campaigns are needed to raise awareness among students that Title IX covers discrimination broadly, not just sports. Title IX prohibits bias in counseling, sexual harassment in schools, and can be a tool for achieving classroom environments that are free of harassment.

In closing, according to a report of the Commission on the Advancement of Women and Minorities in Science, Engineering and Technology, there are four points at which the STEM career pipeline loses girls and women: as they enter middle school, late high school, college & graduate school, and finally in their professional life.[xv] We have to be attentive to all these stages and intentional about retaining girls and women at each. Thank you for doing your part through the important work of this committee. As we are fond of saying at Girls Inc., it doesn't matter where a girl is from, as long as she knows where she is going.

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[i] National Science Foundation, Division of Science Resources Statistics. (2008). *Science and engineering degrees: 1966–2006* (Detailed Statistical Tables NSF 08-321). Arlington, VA: Author. Retrieved July 13, 2009, from http://www.nsf.gov/statistics/nsf08321/.

[ii] Freeman, Catherine E. (2004). *Trends in educational equity of girls & women: 2004* (NCES 2005-016). Washington, DC: National Center for Education Statistics. Retrieved July 14, 2009, from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005016.

[iii] The College Board. (2008). *2008 college-bound seniors: Total group profile report.* New York: Author. Retrieved July 14, 2009, from http://professionals.collegeboard.com/profdownload/Total_Group_Report.pdf.

[iv] The College Board. (2009). *AP report to the nation.* New York: Author. Retrieved July 14, 2009, from http://www.collegeboard.com/html/aprtn/pdf/ap_report_to_the_nation.pdf.

[v] Commission on Professionals in Science and Technology (CPST). (2006). *Professional women and minorities: A total human resources data compendium* (16th Ed.). Washington, DC: Author.

[vi] Current Population Survey, Bureau of Labor Statistics. (2009). Employed *persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity, 2008.* Annual Averages 2008.

[vii] Girls Incorporated. (2006). *The supergirl dilemma: Girls grapple with the mounting pressure of expectations, summary findings.* New York: Author.

[viii] U.S. Department of Education. (2007). *Report of the Academic Competitiveness Council.* Washington, DC.

[ix] Campbell, Patricia B., Ph.D., Storo, Jennifer, Ed.M. and Acerbo, Kathryn, M.A. Math, Science, Sports and Empowerment: Girls Incorporated® Replication And Expansion Of The Eureka! Model. Executive Summary. Campbell-Kibler Associates, Groton, MA.

[x] Ibid.

[xi] Zarrett, N. & Malanchuk, O. (2006). Encouragement from parents or teachers plays a large role in students' choice of a Computer Science major. In Women and IT: Research on Underrepresentation. J.M. Cohoon & W. Aspray, eds., Cambridge: MIT Press.

[xii] National Science Foundation. (2007). *Employed scientists and engineers, by occupation, highest degree level, race-ethnicity, and sex: 2006.* Division of Science Resource Statistics, Arlington, VA.

[xiii] Hanson, S. (2004). African American women in science: Experiences from high school through the post-secondary years and beyond. *NWSA Journal 16*(1), 96-115.

[xiv] Girls Incorporated (2004). *Growing Up at Girls Incorporated: The GROW Study of Girls Inc. National Scholars.* New York: Author.

[xv] "Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering, and Technology." September 2000.