garibaygroup

Girls Energy Conservation Corps Girl Scout Program Summative Evaluation

TERC

Summer 2013

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Overview

Overview

TERC and the Girl Scouts of Eastern Massachusetts collaborated on the development of the Girls Energy Conservation Corps (GECCo) program. The program focuses on engaging Girl Scouts ages 9-13 in learning about climate change and technology through energy conservation activities. The program integrated evaluation throughout the process; TERC staff (in consultation with Garibay Group) conducted formative evaluation. Garibay Group led the summative evaluation of the program. This report focuses only on the summative phase.

The program involved a two-year development phase in which patches were piloted with a small group of troops. Years 3-4 of the project involved a "field test" in which Girl Scout troops were invited to participate in the program. Summative evaluation was conducted during this second phase of the project. (Full implementation to all Eastern Massachusetts Girl Scout troops will occur in years 4 and 5 of the program.)

Program Structure

GECCo was designed for Junior and Cadette Girl Scout troops. Using the patch structure used in Girl Scouts, the TERC team developed six patches focused on energy conservation topics. Troops were expected to complete three patch activities and an additional "Energy Challenge" activity in order to earn each patch. (The *Tell the World* patch is the exception.) For descriptions of the patch activities view Appendix A.

Initially, 65 troops were recruited for the Field Test. Of those, 44 troops (24 Juniors and 20 Cadettes) completed the patches. Most troops who dropped out did so due to competing activities rather than because of a lack of interest. (See Appendix B for details on retention rates.)

A total 483 girls (326 Juniors and 157 Cadettes) participated. While the total number of participating girls was below the goal of 570 for each Field Test year, it may reflect the reality of recruiting in an informal learning setting.

Troops were expected to complete at least one patch, but had the option to complete all three patches for their level. The majority (84%) completed one patch. (See Appendices C-E for rates of patch activity completion details.)

Program Goals

I. Increase their knowledge of the causes of climate change.

II. Increase their energy conserving behaviors.

III. Use technology to create and send energy conserving messages.

IV. Understand the power of working together to address an environmental problem.

Evaluation Design & Methods

Evaluation Design & Methods

This study used a mixed-method design (Greene & Caracelli, 2003), which combined quantitative and qualitative data collection.

Collecting key information about the same constructs in different ways allowed us to seek convergence or corroboration of the information to confirm and/or further explain the outcomes (Graham, 1989). When assessing changes in girls' energy saving behaviors, we collected data from girls, troop leaders, and parents. Results from these sources were compared to help better assess and explain outcomes.

Additionally, using a variety of quantitative and qualitative measurements allowed us to include both the rigor of statistical analysis and the depth and breadth of qualitative data.

Girl Scout Surveys

Using a pre/post design, surveys were administered in person to participating girls. The focus was to assess how the patch activities affected girls' knowledge, attitudes, motivation, behaviors, and confidence in saving energy and spreading the word about conserving energy. Both pre and post surveys were completed during troop time under the oversight of the troop leader. While the pre-patch survey was completed once at the start of a troop's involvement, post-patch surveys were administered after each patch. Once surveys were completed, they were mailed to the evaluators.

Survey completion rates for all girls combined were 78%. Evaluation staff encouraged completion and submission of surveys through email reminders and calls to troop leaders. Some surveys failed to make it back to us in the mail and others came without consent forms so could not be used in the final data set. In addition, some girls did not complete either the pre- or post-patch survey for the patch. Overall, the completion rate is about the expected rate for this data collection method.

Troop Leader Surveys

Retrospective troop leader surveys provided a deeper understanding of: 1) the patch experience; 2) patch effects on troop leaders' knowledge, attitudes and behaviors; and 3) perceptions of impacts on the girl scouts.

Troop leader surveys were administered online after Garibay Group received a troop's completed post-patch surveys. 63 troop leaders completed the survey for a response rate of 90%.

Parent Surveys

We used parent surveys to better assess how the patch activities influenced participating girls' energy conservation behaviors at home. Parent surveys were administered online after we received the girls post-patch surveys. A total of 243 parents completed surveys for a 69% response rate. Most parents were mothers (95% for Juniors and 88% for Cadettes). A portion of parents were also troop leaders (16% for Juniors and 25% for Cadettes).

While response rates were higher for parents from Cadette troops than were those from Junior troops, a review of the data did not disclose any noticeable biases for the Junior data; these seem representative. (See Appendix F for all survey completion rates by type.)

Evaluation Design & Methods, cont'd.

Observations

We observed girls during GECCo patch activities to obtain a general understanding of the girls' experiences and interactions. We were especially focused on girls' engagement as well as evidence of a deepening awareness of energy conservation and climate change topics. We observed a total of 12 meetings to allow us to collect observations from all 6 patches.

In selecting troops, we focused on medium sized ones (8 to 16 girls), which allowed us to systematically observe group dynamics and interactions. Observations were scheduled based on when troops were meeting and which activity/patch was scheduled for that session. (This information was provided by troop leaders so that we could determine the final observation schedule.)

While schedule shifts, winter storms and delayed troop leader communications about patch selection challenged observation scheduling and optimum troop selection, we were able to find representative troops to meet our stratification needs.

Energy Challenge Logs

All patches except for the *Tell the World* patch required the girls to complete the "Energy Challenge" activity. This activity asked girls to enter their energy saving actions on the GECCo website. We reviewed these data as evidence of their energy saving behaviors. Data were downloaded from the website, results analyzed, and final points based on energy saving action indicated were summed.

Girls' Media Products

Girls completing the *Tell the World* patch created a media message. These messages provided additional data to examine the extent to which girls developed conservation messages.

Data Analysis

Quantitative data were analyzed using basic descriptive statistics which were then summarized in tables or charts. We examined frequency and percentage distributions, using statistical analysis tests to assess whether differences were statistically significant.

The main statistical tests used included:

- Pearson Chi Square tests for differences in pre/post-patch nominal variables and Exact tests for small samples.
- Related or paired sample Wilcoxson signed-rank tests for ordinal variables assessing differences with pre/post-patch answers.
- Independent sample Mann-Whitney U tests for determining differences between Junior and Cadette distributions.

We analyzed open-ended survey questions using content analysis to develop response categories and descriptions.

Observation data consisted of written field notes, photo documentation, and debrief summaries. Team debriefs involved review of documentation to discuss evidence of engagement, awareness/knowledge-building, and motivation and to identify contextual issues of importance. Data were coded using thematic analysis.

Evaluation Design & Methods, cont'd.

For media message analysis each of the products were reviewed to look for the presence (or absence) of four criteria:

1. Used some form of technology to create their message.
2. An energy conservation message was clearly conveyed.
3. The message made a connection between energy use and climate change.
4. The message clearly conveyed to the viewer why he/she should follow the prescribed action.

The results were compiled and summarized with examples from the girls' media.

Limitations

As with any study, this evaluation had limitations. Due to the informal and variable nature of the Girl Scout troops, there were several factors that played a role in the our ability to assess the effects of the patch activities.

We had no control over which patches, how many patches, or which patch activities the girls completed. Given that troops controlled these factors, it limited our ability to effectively assess the effects of multiple patches. The self-selection bias of those troops choosing to complete more than one patch is a potentially strong confounder of patch effects. For instance, the girls motivated enough to complete multiple patches might already have higher ratings on many of the survey questions compared to those who only completed one patch. In addition, sample sizes for those completing multiple patches were very small, which affected our ability to assess differences in outcomes.

Observations revealed varying troop leader facilitation styles/skill levels, which likely affected the ways girls experienced activities.

Constantly shifting meeting dates, accompanied by a relatively small sample size of troops, also compromised our ability to observe troops with common criteria to better control for variations in troop size or troop leader facilitation experience/ styles.

Some of the output data were affected by limited online data management capabilities. For instance, in the original design, 360Kid was to track which troops played the online game and how many times they played it. Once the online tracking responsibilities were transferred to the Girl Scouts, however, these data became impossible to track. After the transfer of data management responsibilities, we were only able to track the website page views of the online GECCo game.

Lastly, Year 3 Juniors' more limited Internet access compromised the ability to more fully assess the "Energy Challenge" output numbers.

Participant Demographics

Respondent Demographics: Girl Scouts

The majority of participating girls from Junior troops were between the ages of 9-11. For Cadette troops, the majority of participating girls were between 12-14. The majority of girls who participated in GECCo (60% of Juniors and 76% of Cadettes) self-identified as Caucasian. A fair number of girls (26% of Juniors and 14% of Cadettes), however, chose not to share their ethnic background. (See Appendix G for more detailed race/ethnicity data.)

Figure 1. Junior Girl Scout Age Distribution

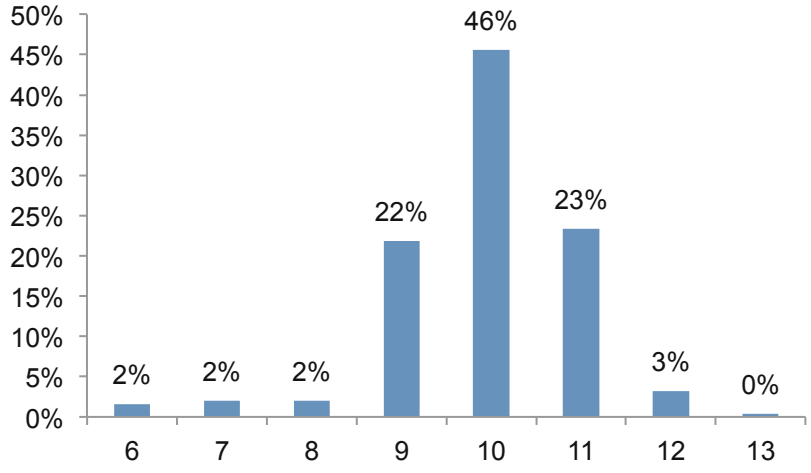
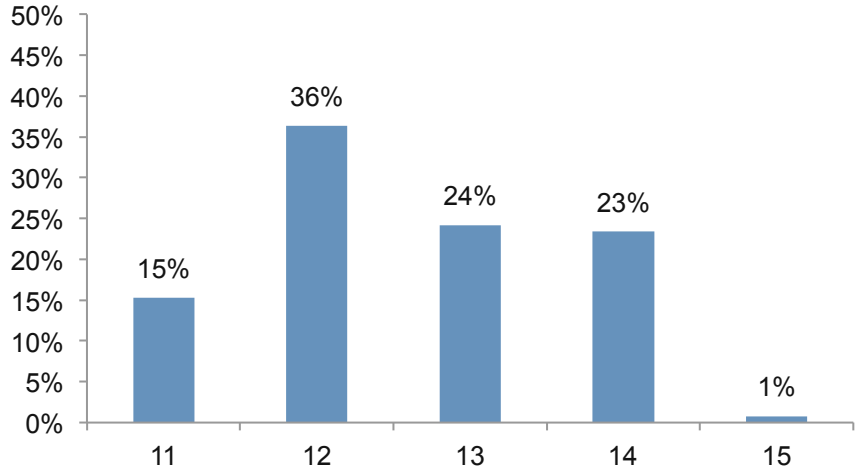


Figure 2. Cadette Girl Scout Age Distribution



Respondent Demographics: Troop Leaders

Troop leaders had a range of experience facilitating troops; the median number of years was six. A significant portion (78%) of troop leaders responding to the survey were also parents of girl scouts (49 of the 63 troop leaders had daughters in the troop completing the patch). The majority (73%) of these troop leaders had at least a bachelor's degree or higher. (See Appendix H for more information on Troop Leader demographics.)

Table 1. Troop Leaders by Years of Experience

Years of Experience	N (63 total)	Percent
1	3	5%
2	3	5%
3	4	6%
4	13	21%
5	8	13%
6	10	16%
7	4	6%
8	5	8%
9	3	5%
10	3	5%
11	1	2%
15	1	2%
17	1	2%
18	2	3%
32	2	3%

Table 2. Troop Leaders by Education Level

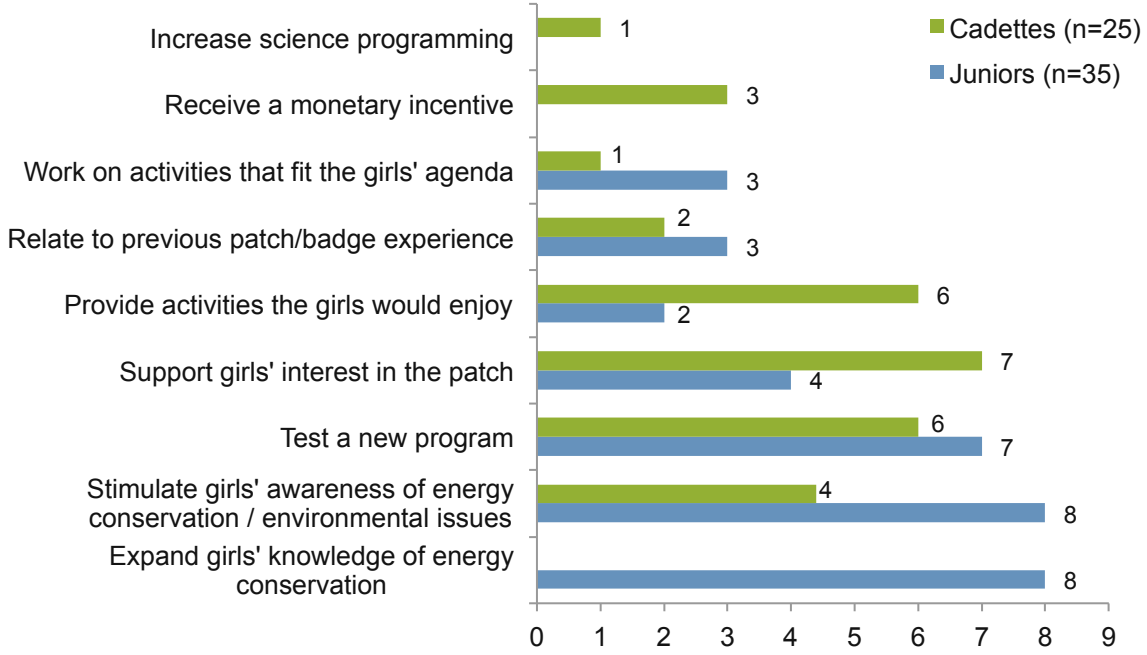
Education	N (63 total)	Percent
High School or GED	6	10%
Vocational school or associate degree	9	14%
Bachelors degree	22	35%
Master's degree	20	32%
Ph.D. or other professional degree	4	6%
Other	2	3%

Overall Experience

Troop Leader Motivations for Participating in GECCo

Troop leaders offered a wide variety of reasons for participating in GECCo. Junior troop leaders saw the patch primarily as an opportunity to expand the Girl Scouts' knowledge of energy conservation and stimulate their awareness of the issue. Cadette leaders were more often motivated to support the girls' interests and provide activities the girls' would enjoy.

Figure 3. Troop Leaders' Motivations for Participating in GECCo by Girl Scout Level



Note: Respondents could provide multiple reason for participation.

Junior Troop Leaders

It was a great opportunity to allow the girls to learn ways they can save energy and help the environment.

Trying something new to raise awareness on conserving energy. The package seem cool and easy to use

[My motivation was] to help become more aware of things around them and how everything is affected by one thing.

We are focusing on energy conservation this year, building toward conducting an energy audit of the school's elementary building and a related service project.

Cadette Troop Leaders

The program was presented to and reviewed with the troop at one of our first meetings, and the girls elected to participate in the program.

The girls were very excited about the idea of trying out new badges and that they were about conservation.

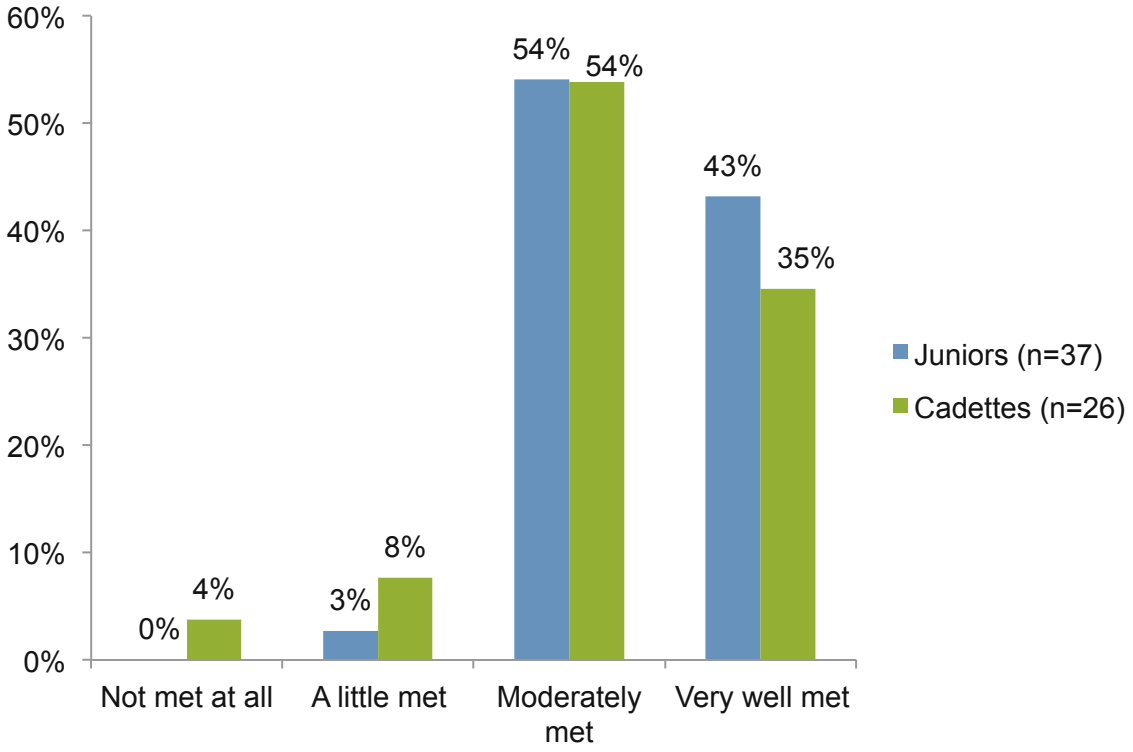
I wanted the girls to become more aware of the impact their actions can have on the environment.

I thought…that this might be a good thing to connect it to.

Troop Leader Expectations

Overall, expectations for the majority of Junior (97%) and Cadette (88%) adult leaders were either “moderately” or “very well” met. When comparing open-ended responses related to expectations, Junior troop leaders tended to report fewer issues with activities. Nonetheless, there were no statistically significant differences in ratings between Junior and Cadette troop leaders.

Figure 4. Troop Leader Patch Expectation Ratings by Girl Scout Level



Independent Mann-Whitney U Test significance = .304, showing no statistically significant differences between Junior and Cadette Troop leaders.

Troop Leader Expectations, cont'd.

For Junior troop leaders, two aspects were mentioned as contributing to positive ratings:

- Scouts enjoyed the activities (n=15)
- Activities raised scouts' awareness of their impact on their environment (n=6)

Other factors mentioned by some troop leaders included, that activities were interactive (n=2), relevant and age appropriate (n=2), and provided meaningful engagement (n=1).

Those providing lower expectation ratings found that the activities were either too complex or not stimulating enough (n=8). Leaders noted that some activities often included too much detail, intense requirements, and felt like school work to the scouts.

Cadette troop leaders noted two aspects of the program that contributed to their positive ratings:

- Scouts gained an understanding of how their actions impacted their environment (n=6)
- Scouts enjoyed the activities (n=6)

A couple troop leaders also noted that the activities were easy to execute and the website information was helpful. Some troop leaders who provided lower ratings indicated that activities weren't stimulating enough (n=5) and that, therefore, participating Girl Scouts lost interest rather quickly. There are two possible explanations for this experience: a) troops could not make the connection between the science and the activities; or b) having previous experience with similar content meant the girls were already familiar with the subject.

While overall expectation ratings were positive, there were differences when data were disaggregated by patch. Although open-ended comments on reasons for ratings were limited, there were some insights:

- *Be Cool* went over the girls' heads, possibly due to too much detail. They felt the patch material might be more appropriate for 6th graders rather than 4th graders (Junior troop leaders).
- *Tell the World* took longer than expected to complete (Cadette troop leaders).

(See Appendix I for complete troop leader expectation ratings by patch.)

Junior *Troop Leaders*

The program is VERY WELL documented and helpful.

The activities kept their interests, got them to think about conservation outside of the meeting time, and the activities were varied (games, written activities, crafts), which kept them interested.

I enjoyed the program very much. It is well organized and the materials are good.

Most of the activities were engaging to the girls and they appeared to actually learn something.

The activities were age appropriate and the girls enjoyed doing them.

Cadette *Troop Leaders*

The girls had a fun time doing the activities and actually got me to conserve.

Some of the activities were fun and girls really enjoyed them. These include the chalk a walk and the silly stories.

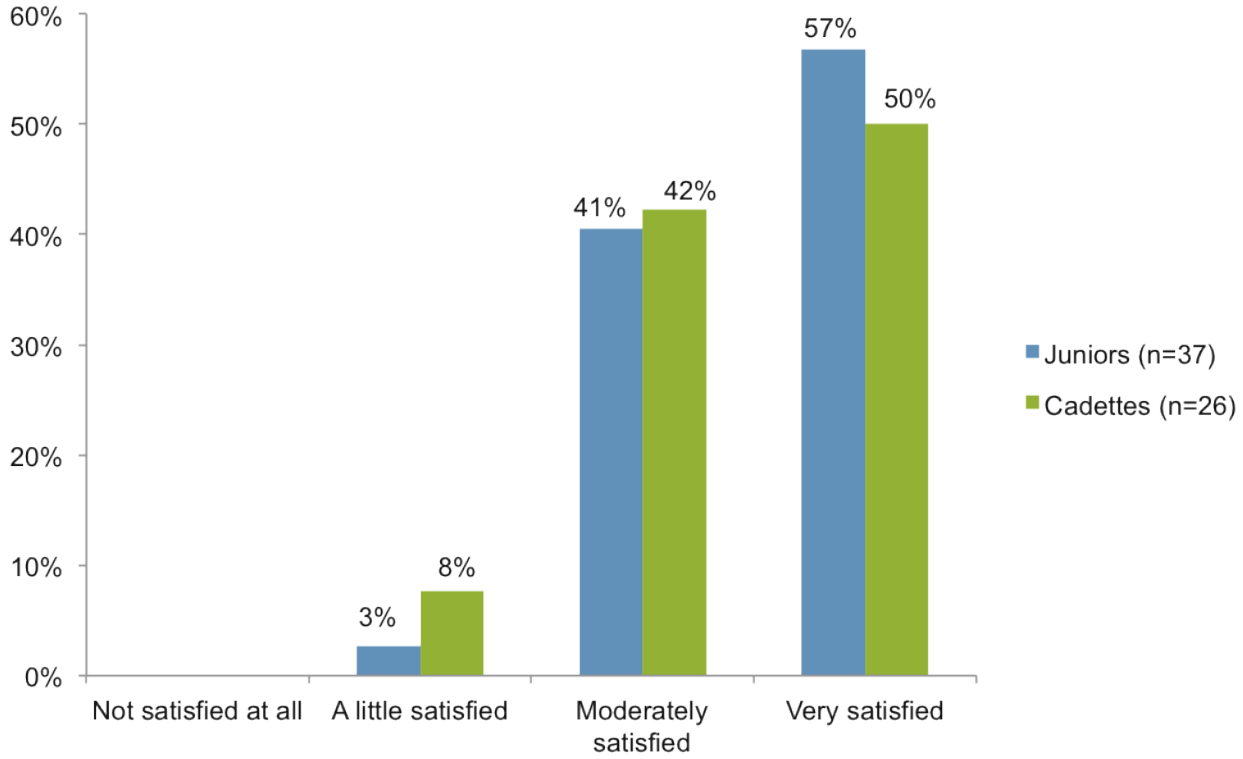
The girls had a ball doing all the activities!! The whole thing was great.

The girls were very enthusiastic about the patch activities and enjoyed them thoroughly. They were motivated to do more than the minimum, which is always a good sign.

Troop Leader Satisfaction

More than 90% of both Junior and Cadette troop leaders were either “moderately” or “very” satisfied with the patch they completed. There were no statistically significant differences between Junior and Cadette troop leader satisfaction ratings.

Figure 5. Troop Leader Satisfaction Ratings by Girl Scout Level



Independent Mann-Whitney U Test significance = .505; No statistically significant differences between Junior and Cadette Troop leaders.

Troop Leader Satisfaction, cont'd.

Troop leaders were asked to rate their level of agreement with several statements about the activities. The majority of troop leaders "agreed" or "strongly agreed" that the patch activities were age appropriate, fun and well timed. While ratings were somewhat higher, for the "Activities were fun" statement, differences were not statistically significant.

Table 3. Junior Troop Leader Activity Ratings (n=37)

	Agree Strongly	Agree	Disagree	Disagree Strongly
The activities were age appropriate. The girls could understand what they were to do themselves and carry out the work without much help from the troop.	15	16	5	1
The activities were fun for the girls.	20	17	0	0
The activities were well-timed. We were able to finish the activities for each patch within 2 troop meeting sessions.	10	20	0	7

Table 4. Cadette Troop Leader Activity Ratings (n=26)

	Agree Strongly	Agree	Disagree	Disagree Strongly
The activities were age appropriate. The girls could understand what they were to do themselves and carry out the work without much help from the troop.	9	10	3	4
The activities were fun for the girls.	10	12	0	4
The activities were well-timed. We were able to finish the activities for each patch within 2 troop meeting sessions.	10	9	3	4

Independent Mann-Whitney U Test significance was used to test for significance between Junior and Cadette troop leader responses. We failed to find a difference. a) The activities were age appropriate. (significance=.346); b) The activities were fun for the girls. (significance=.106); c) The activities were well-timed. (significance=.988)

Troop Leader Satisfaction, cont'd.

Juniors
Junior troop leaders were very satisfied with the GECCo patches with 97% reporting they were "moderately satisfied " to "very satisfied." Leaders commented that the activities were engaging, age appropriate (n=5), diversified (n=2), and stimulated awareness of environmental issues (n=3). However, a number of respondents also saw challenges with some activities.

Motivation and comprehension of activities were the most challenging aspects identified. While Troop Leaders did not elaborate on specific reasons for their challenges, a number of respondents (n=6) shared that they experienced difficulties keeping the Scouts focused and motivated to complete the activities. They reported that sometimes the girls became bored and lost interest in doing a particular activity.

Other respondents thought completing the pre and post surveys brought unnecessary complexity to doing the patch. In addition, Scouts were sometimes unable to comprehend the science aspect of the activities and, more specifically, the idea of climate change. On the other hand, five troop leaders provided feedback that the patch was not challenging enough.

Cadettes
Although ratings were slightly lower compared to Juniors, Cadette troop leaders were also satisfied with the GECCo patches (92% providing "moderately satisfied to "very satisfied"). The level of satisfaction for Cadettes, however, very much depended on the particular troops' reaction to specific activities completed as part of that patch.

Troop leaders voiced their satisfaction, noting girls' enjoyment and engagement during the activities (n=8). Among the positive aspects some Cadette troop leaders mentioned were the diversity of activities (n=2), that they were generally age-appropriate (n=2), and the well-written instructions (n=2). A couple troop leaders praised the personal impact the activities had on the girls' energy saving habits as well as the teamwork the activities fostered (n=2).

Juniors
The girls enjoyed the hot chocolate activity and recording how long their showers were.

They were excited and enjoyed the exercises.

The girls really got into the whole project, which totally amazed me. The girls really learned more then I thought they would.

They enjoyed learning the pathways for electricity a lot and seemed to connect to this activity. They enjoyed the game and I thought the examples were very real for the girls.

I feel that the activities were very well explained and were very enjoyable for most. I feel that the information was user friendly.

Girls enjoyed the activities but I had been hoping to see a bit more sustained interest.

Troop Leader Satisfaction, cont'd.

Some troop leaders, however, indicated some activities were not as stimulating as they would have liked (n=4), noting that it was difficult for the girls to relate to the content or the science aspects of the patch.

A few leaders noted that they thought the activities were too focused on having fun (n=3) rather than on learning science concepts. Other troop leaders found the instructions were difficult to follow (n=3), or that the patch was redundant with other experiences the girls had had previously (n=2).

Understanding instructions for some activities was also challenging for some the girls. Some activities such as *Fuel Stomp Theater* were difficult to comprehend and others just didn't provide clear guidelines on exactly how to carry these out (e.g., where to draw for *Chalk a Walk*).

Cadettes

There was a nice diversity of activities, which appealed to both the girls and leaders.

I did feel that the activities were very well designed from a enjoyment perspective. The girls all seemed to be engaged the whole time they were doing them.

[The activities left] the girls with ideas that they can remember and carry with them into personal and also community learning.

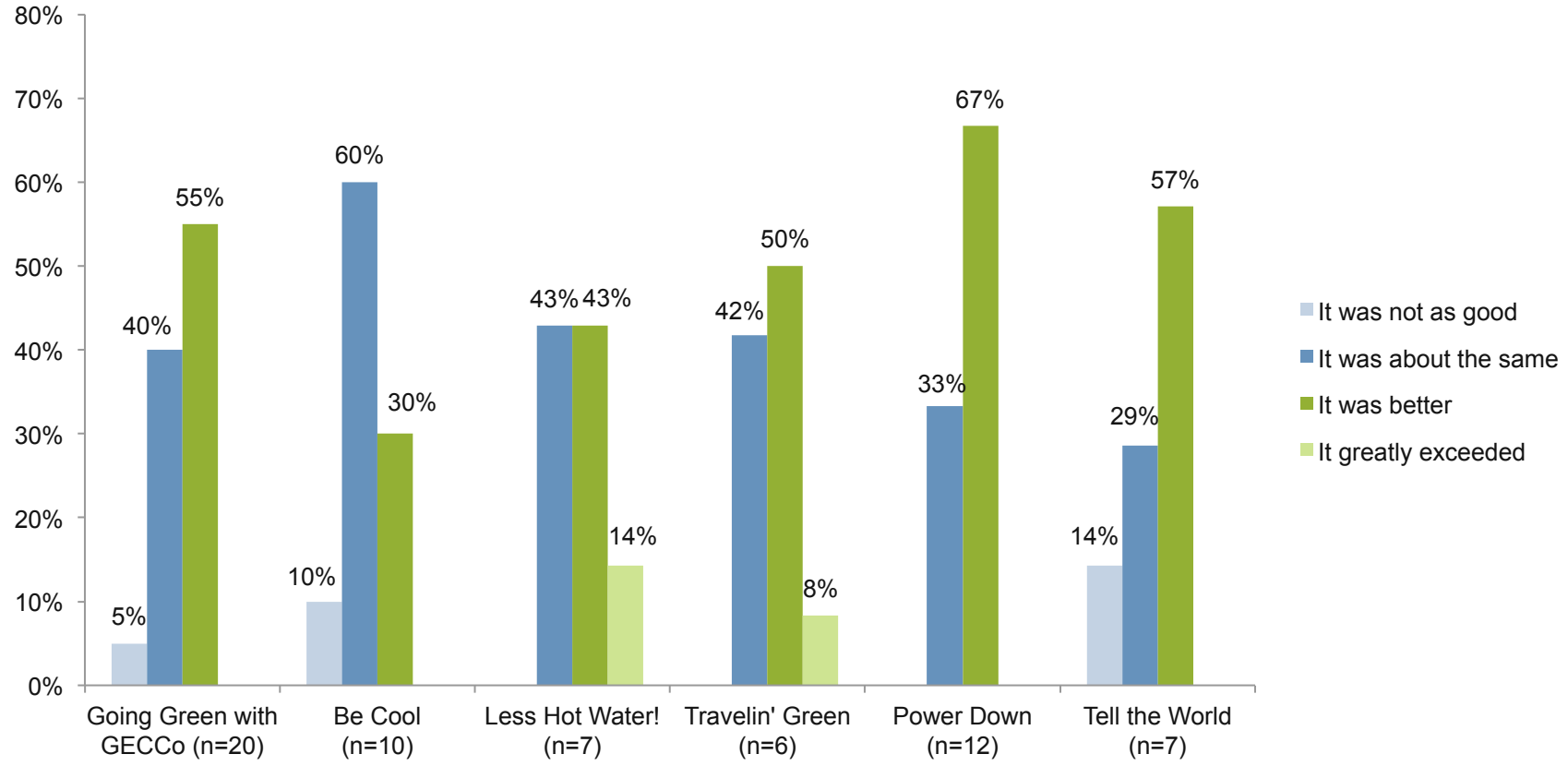
The girls really took this patch and ran with it. They even made a table at our towns Thinking Day event to spread the word about conserving energy with other Girl Scout Troops..

I feel these girls weren't challenged that much, since some of this has already been addressed in their schools.

Comparison to Other Girl Scout Patches

Troop leaders were also asked how well the GECCo patches met their expectations compared to other Girl Scout patches. The large majority indicated that compared to other patches, their troops' experiences with GECCo was better. The patches with the highest ratings were *Going Green with GECCo*, *Travelin' Green*; *Power Down*; and *Tell the World.*

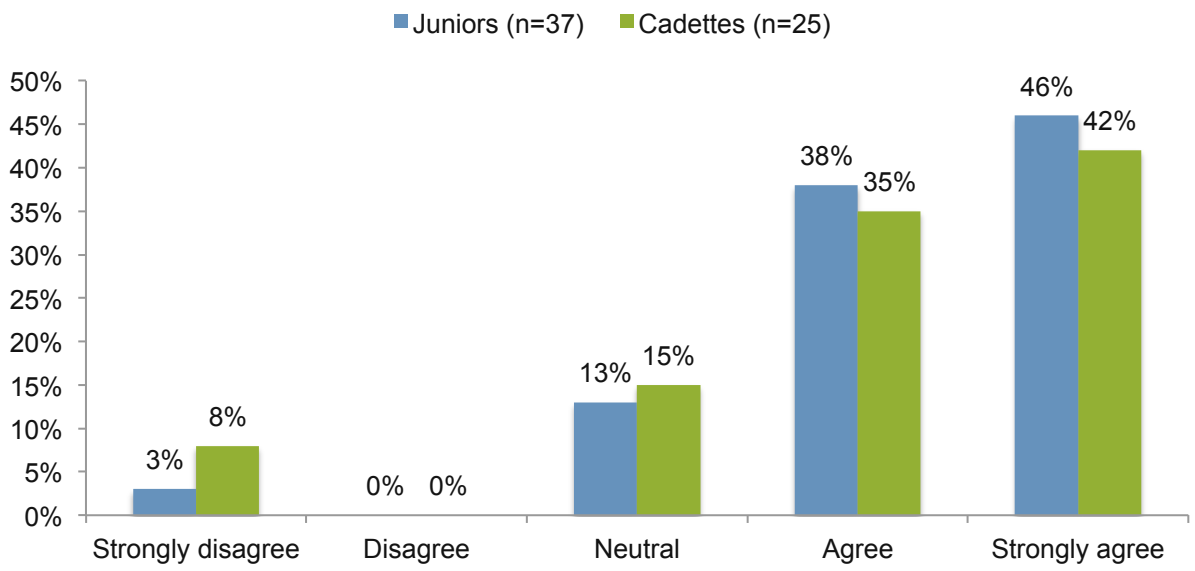
Figure 6. Troop Leader Ratings Comparing GECCo Patch to Other Girl Scout Patches



Troop Leader Satisfaction, cont'd.

To obtain another measure of troop leaders' satisfaction and perception of quality of the patches, we also asked troop leaders their level of agreement with a statement about whether they would recommend the GECCo patch to another troop. While troop leader recommendation ratings were slightly lower than general satisfaction ratings, they were still moderately high overall, with 84% of Junior troop leaders and 80% of Cadette troop leaders agreeing or strongly agreeing that they would recommend the patch.

Figure 7. Troop Leader Agreement Rating for "I would recommend this GECCo patch to another troop" by Troop Level



When we disaggregated the data by patch, we found that *Power Down*, *Going Green with GECCo*; *Less Hot Water*; and *Tell the World* patches received no negative ratings. Two troop leaders, one completing the *Be Cool* patch and the other the *Travelin' Green* patch would not recommend the patch to another troop.

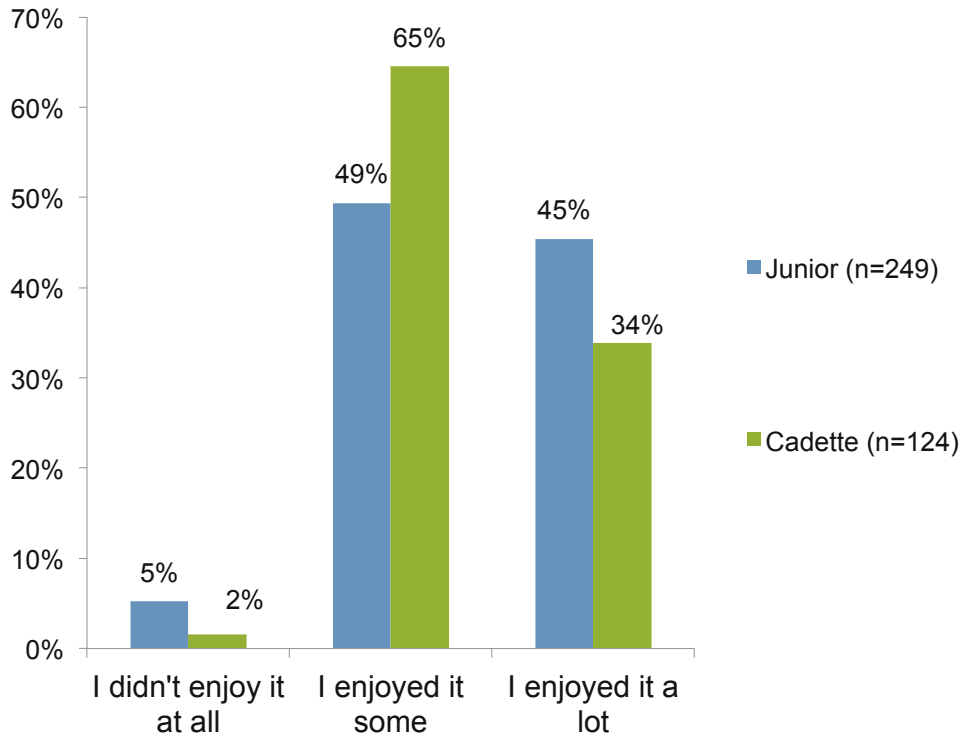
(See Appendix J for detailed breakout of recommendation ratings by patch.)

Independent Mann-Whitney U Test significance = .593; We fail to find statistically significant differences between Junior and Cadette troop leader responses for recommending GECCo patch to other Girl Scout troops.

Participating Girls' Enjoyment Ratings

Girls participating in GECCo moderately enjoyed the patch experience. Close to half (49%) of the Junior Girl Scouts "enjoyed it some" while 45% "enjoyed it a lot." Over half (64%) of the Cadette girls "enjoyed it some" while 34% "enjoyed it a lot. While Junior and Cadette results appear slightly different, the differences are not statistically significant.

Figure 8. Girl Scout Enjoyment Ratings



As might be expected, the more patches a girl scout completed, the higher her enjoyment ratings. One interpretation is that the girls who enjoyed the patches most were more likely to complete multiple patches. Since the majority of girls only completed one patch, however, the most accurate enjoyment rating is the one provided after a scout's first patch completion. (See Appendix K for detailed breakout of enjoyment ratings by patch.)

Independent Mann-Whitney U Test for significant differences between Junior and Cadette enjoyment ratings show no statistically significant differences for any number of patches completed. Patch 1 significance = .102.

Participating Girls' Engagement

Observation data illuminated girls' experiences with GECCo activities and ways they engaged.

We found that differences in leader roles played a factor in girls' engagement. In general, Junior troop leaders prepared the activities and facilitated them so that the girls only had to follow and participate in activities. This strategy helped keep the girls organized and moving through the activities regardless of the girls' personalities and leadership skills since there was always an adult leading the girls through activities.

On the other hand, Cadette troop leaders encouraged the girls to do the patch activities on their own. Depending on the troop, girls' roles might have included choosing the activities, downloading the activity directions, and figuring out how to complete the activity. Cadettes sometimes found following directions or even sometimes organizing themselves challenging and this seemed to impact their overall experience.

The effects of girl-led activities played out in various ways sometimes leading to different levels of engagement for Cadettes.

One Cadette troop, for example, involved a group of home-schooled girls who were very focused on the activities and quite well-versed in organizing themselves and staying on task. On the other hand, another Cadette troop was very casual at their meetings and allowed doing homework or fingernail painting during the time that other girls were attempting to organize the activity, which ultimately negatively affected overall general engagement.

The quality of engagement also varied from activity to activity. Junior activities such as reminder bracelets and carbon ballet were well-suited to the age of the girls and their interests; this was reflected in their positive demeanors for the duration of the activities.

On the other hand, activities such as the paperclip shower were not interesting to the girls. They did not see the point of

Girl Scouts enjoy watching fellow scouts perform their version of *Carbon Ballet*.

Girl scout troop enjoys the *Fuel Stomp Theater* Activity.

Participating Girls' Engagement, cont'd.

using paper clips, commenting that they could have just simply done the math and moved on to other GECCo components.

Cadette activities were similar in nature. Participating girls clearly enjoyed the *Power Down, Watts-it-Take* and *Fuel Stomp Theater* activities and we observed girls smiling and genuinely interested. On the other hand, they called the *Jumping Jack Fuel and Travelin' Green* activity "Cheesy."

It's important to note, however, that the quality of engagement could easily differ from troop-to-troop for the same activity. For example, we observed one troop who seemed to have a great time doing the *Fuel Stomp Theater* activity and yet, received negative feedback from another troop who struggled with the same activity and did not enjoy it.

Overall, there were enough "positive" activities for most troops to balance out the negative effects of the activities that were less engaging for the girls.

Social Interaction

GECCo patch activities also promoted positive social interaction. Evidence of collaboration and other positive interactions included: working together toward meeting a common goal (e.g., completing an activity), group discussions of ideas presented, and sharing ideas for energy saving actions.

Some activities encouraged more social interaction than others. Generally, activities that required planning, coordination, and cooperation of all the girls promoted high levels of social interaction. For example, we observed a high degree of collaboration during the *Carbon Ballet* activity, *Tell the World* action videos, and the *In the Dark* skits since the required that girls work together

Girls work together to plan and create a movement narrative about the carbon cycle.

Girl scouts counting paperclips, which girls found tedious and did not elicit much social interaction.

Participating Girls Engagement, cont'd.

as they planned and implemented their ideas. In these cases, the social aspect was well-integrated into the activity design itself.

Girls were clearly more energized by activities that had social interaction, such as collaboration, built into the activity. Activities that allowed girls to create something meaningful that could be implemented at the end of the activity (social action) also contributed to overall engagement and enjoyment.

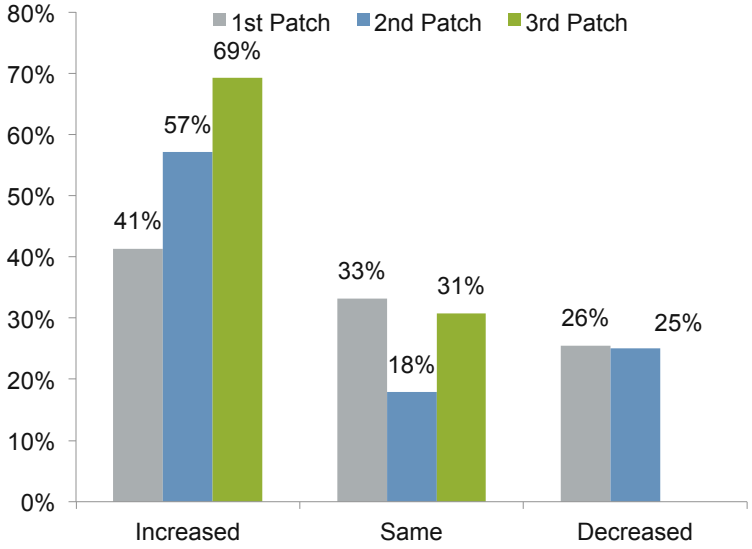
Girl Scouts hold up their *Wind Words* sign, "Power Down"—a term that took on meaning for the girls when they operationalized it to mean "turn electronics off." They collaboratively worked together to create the sign and encourage "social action."

Outcomes by Goal and Indicator

Outcomes: Goal I Increase Knowledge About Climate Change

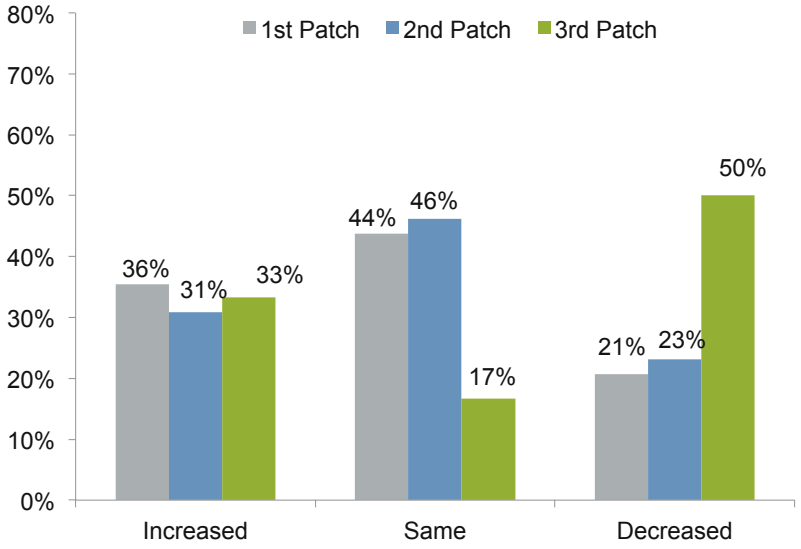
Participating Junior and Cadette Girl Scouts increased their overall correct answers for climate change questions on the pre- post questionnaire. Typically, the more GECCo patches a Girl Scout completed, the more they correctly answered climate change questions. 39% of the Girl Scouts increased their pre-patch scores after the first patch; 49% after the second patch; and 58% after the third patch. When data were disaggregated, however, there were only statistically significant shifts for Juniors after patches one and two (but not the third). Overall, while scores indicated increased knowledge gain, the goal of 75% of the Girl Scouts increasing correct questionnaire scores was not met.

Figure 9. Junior Accumulative Pre-Post Climate Change Question Score Differences Exact Significance Tests



Patch 1 vs. 2: n=235 Exact test (2 sided) sig = .003)
Patch 1 vs. 3: n=28 Exact test (2 sided) sig = .021)
Patch 2 vs. 3: n=13 Exact test (2 sided) sig = .077)
**statistically significant difference when < .05*

Figure 10. Cadette Accumulative Pre-Post Climate Change Question Score Differences Exact Significance Test



Patch 1 vs. 2: n=121 Exact test (2 sided) sig = .302)
Patch 1 vs. 3: n=13 Exact test (2 sided) sig = .100)
Patch 2 vs. 3: n=6 Exact test (2 sided) sig = .200)
**statistically significant difference when < .05*

Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

Analysis of the correct scores by question illuminated important differences between Cadettes and Juniors. Pre-patch scores showed that Cadettes started the program with more knowledge than Juniors. After completing two patches, however, Junior and Cadette scores were more comparable. Cadette gains, overall, were modest and not statistically significant. On the other hand, Junior gains after the first two patches were statistically significant. (See Table 5 for exact percentages of correct answers, by patch.)

Girls were asked "How do your energy saving actions help reduce greenhouse gases?" in both the pre- and post-patch surveys in order to further measure their understanding of the link between energy conservation and climate change. While the goal was to have 75% of girls provide more correct answers and detailed examples after completing patches, less than 10% of girls provided more correct answers for how their own energy use contributes to climate change. (See Appendix L for a description of how open ended answers were scored.) Juniors appeared to have a stronger trend for increasing their understanding about how conserving energy reduces green house gases while Cadettes appeared to have no trend for change. (See Table 6 for percent of correct answers by question.)

Calculated percentages of girls who changed their answers to correct answers from the previous survey about their understanding of how their energy saving actions impacts climate change revealed that:

- After patches 1, 2, and 3, Juniors were able to provide 7%, 8%, and 9% more correct answers, respectively.
- Cadettes were able to provide 4% more correct answers after the first patch, but decreased their correct answers 7%, and 15% after patches 2 and 3, respectively.
- While small samples sizes likely contributed to the third post-patch Cadette results, it appears there was a stronger trend for Juniors to increase their understanding of how saving energy reduces green house gases compared to Cadettes who did not show increases in their understanding.

Table 5. Junior and Cadette Comparison of Percent of Correct* Explanations by Patch Numbers Completed.

	Pre-Patch	Post-Patch 1	Post-Patch 2	Post-Patch 3
Junior % Correct	5%	12%	21%	29%
Cadette % Correct	19%	23%	15%	-

*See Appendix M for complete responses scored for correctness.

Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

Table 6. Climate Change Questions by Percentage Correct Answers for Pre- and Post-surveys by Girl Scout Level

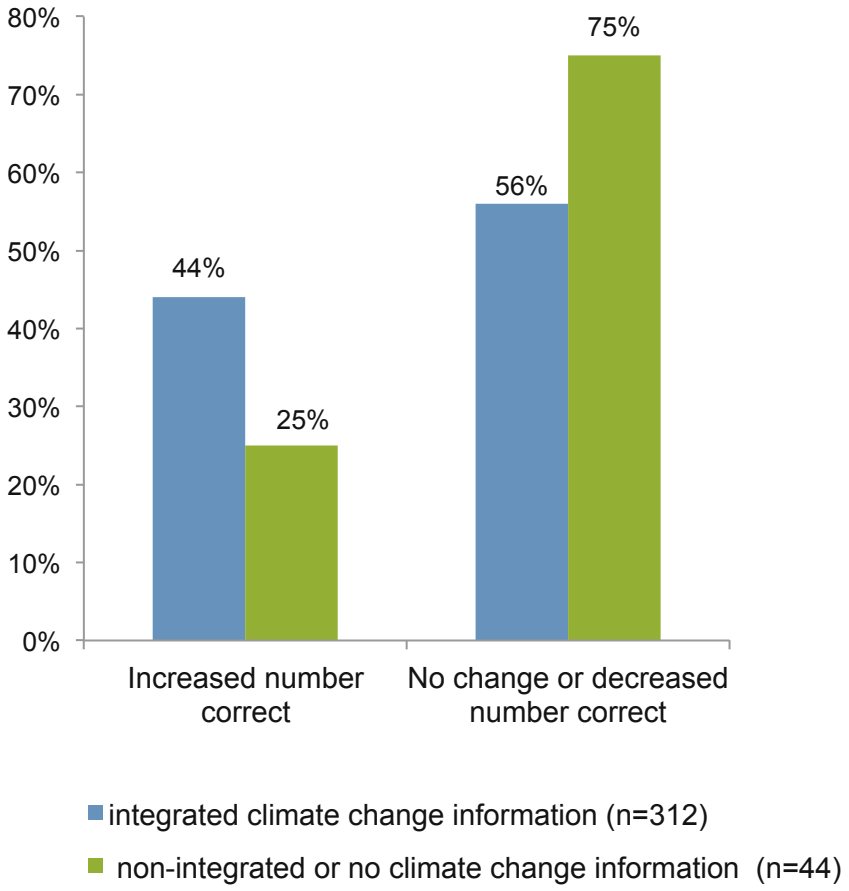
Question	Girl Scout Level	Pre Patch	Post Patch 1	Post Patch 2	Post-Patch 3
Why is the climate changing?	**Junior %**	40%	59%	68%	77%
	Cadette %	67%	73%	69%	83%
	Total %	49%	64%	68%	79%
Green house gases keep the planet warm enough to live on. If we add more green house gases, more plants and animals will grow.	**Junior %**	42%	41%	61%	85%
	Cadette %	64.5%	68%	69%	17%
	Total %	49%	50%	63%	63%
When people use energy made from burning natural gas and other fuels they add green house gases to the air.	**Junior %**	35%	42%	54%	77%
	Cadette %	54%	61%	69%	50%
	Total %	41%	49%	58.5%	68%
Which of the following actions help to reduce climate change?	**Junior %**	67%	82%	73%	85%
	Cadette %	89.5%	94%	100%	100%
	Total %	75%	86%	82%	89.5%

Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

The extent to which activities integrated climate change information seemed to influence knowledge change scores. Six Junior activities and three Cadette activities integrated strong climate change information directly into the activity. Other activities (7 for Juniors and 5 for Cadettes) did not integrate climate change information directly; they typically provided a sentence or two about climate change in the introductory paragraph of the activity guide (e.g., saving electricity reduces climate change by reducing the use of fossil fuels).The rest of the activities focused on conserving energy and did not mention climate change (13 for Juniors and 10 for Cadettes).

89% of Juniors (n=135) and 79% of Cadettes (n=112) participated in at least one activity that integrated climate change information directly. The difference in proportions were statistically significant (Pearson Chi Square =.027). We also found that girls who engaged in activities that integrated climate change information showed more increases in correct answers post-activity than did girls who did not participate in activities with integrated climate change information. The differences are moderate and are statistically significant (Pearson Chi Square =.019).

Figure 11. Increased Number of Correct Climate Change Answers by Integration of Climate Change Information in Activity



Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

Although knowledge gains as measured by pre/post-patch questionnaires did not meet the set indicator of 75%, it is important to note that this does *not* mean participating girls did not learn and deepen their understanding of both climate change and energy conservation. Beyond the positive change scores in pre/post tests (albeit at a lower percent than the set indicator), the nature of their learning was broad and varied and depended, in part, on the specific girls' and troops experiences, prior knowledge, and context. Observation data provided insights into the nature of girls' learning.

There was strong qualitative evidence that engaging in GECCo activities deepened girls' understandings of how to save energy. For example Junior troop girls participating in *Going Green with GECCO* discussed the importance of unplugging electrical things not being used because they still draw energy and how such things as hot water, fireplaces, and transportation all use energy. During the *Power Down and Watts it Take* patch activities, Cadette Girl Scouts were surprised by how much energy some appliances use (such as the hair dryer or a computer that's not turned on). Girls completing the *Less Hot Water* activities also learned some practical concepts such as how much water they could save by shutting off the faucet when they washed their hands and how taking even a minute off one's shower time can make a big difference in conserving water.

Troop leaders helped expand the girls' knowledge about saving energy as well. Examples included filling a dishwasher to full capacity to avoid wasting energy or learning about how a partially filled freezer uses more electricity than a full one.

Activities also provided opportunities for experiential learning. Girls observed working on the *Be Cool* patch, for example, were pretty impressed that they could find the drafts in the classroom with the draft finders they had made. They tried them by windows, doors, and even electrical sockets. Their comments, such as, "Oh yeah!" "You can see it!" "And you can even feel it!" showed the importance of hands-on learning for them.

Climate Change Learning Examples from Observations

- Learning was evident as the girls asked several questions to help clarify their understanding of the issues such as:
  - *Should they unplug "the computer" when not using it?*
  - *Does using the fireplace use energy?*
  - *Would filling the bath tub only half way save energy?*

- One girl suggested using a flashlight to save on electricity, but learned that the batteries still had to have the energy put into them by a source of electricity that most often originates from a fossil fuel.

- One group of Cadettes discussed the more energy-efficient options for transporting people and goods. They compared the energy needed to email a letter versus using the postal service. They initially thought using paper would use less energy, but after their discussion, they questioned whether postal mail was the most energy efficient method to get a message to someone else due to the need for mail trucks to transport the letters.

Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

With input from adult leaders, Girl Scouts also engaged in conversation about what they were doing, which was often an important aspect of their learning. Overall, we saw increased potential for learning when the troop leader allowed time for reflection (either during or after the activity) because it allowed the girls to explore the ideas at hand together and better process the information.

Data also suggested that some activities were more effective at helping girls understand the link between energy conservation and climate change. Two activities where observations revealed significant learning about climate change included the *CO_2 Race* and *Carbon Ballet*.

"CO_2 Race"

This activity was especially successful at helping girls learn the connection between energy use and climate change and effectively illustrated how difficult it is for trees to balance the increased CO_2 production from human activities. One girl we observed, for example, noticed that there weren't many lentils in the tree cup. She commented about what she observed and then the troop leader reiterated that while CO_2 is put into the atmosphere quickly, trees can only absorb it slowly. The troop leader encouraged further discussion by posing the question: "How do trees take CO_2 back out?" Since the girls in the troop were not sure, the troop leader took the opportunity help them understand that trees absorb CO_2 through their leaves. At the end of the meeting the troop leader asked the purpose of the activity and the same girl responded, "*To know how fast fossil gases get into the air and how slow trees absorb it.*"

"Carbon Ballet"

In this activity the girls acted out a narrated story about how putting too much carbon in the air affects climate change. Acting out the narrative several times and watching others perform helped the girls review the ideas several times over. Some troop leaders also reviewed the ideas covered. For example, one troop leader quizzed her group; girls generally understood that carbon comes from the gasoline and it goes up into the atmosphere when it is burned.

The *Carbon Ballet* activity not only provided opportunities for experiential learning (in this case kinesthetic learning), but the repetitive aspect in which girls watched other troop members perform their version of the ballet also allowed girls to reflect on these ideas throughout the process.

Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

Troop leader data provided additional perspectives on Girl Scouts' learning. Junior troop leaders saw the program as primarily affecting Scouts' awareness of how to increase energy conservation. Leaders thought, however, that the program had only moderate success in helping the girls comprehend the causes of climate change and how their energy conservation behavior affects climate change.

Cadette troop leaders saw the program as primarily affecting Scouts' awareness of how to increase energy conservation and how to help others conserve energy. Leaders, however, thought the program only had moderate to little success in helping girls comprehend the causes of climate change and how their energy conservation behavior affects climate change. Some troop leaders, however, noted that addressing energy conservation in itself was important enough goal.

Although ratings between Juniors and Cadettes varied, there were no statistically significant differences between troop leader perceptions of the patches' impacts on Girl Scouts' knowledge related to energy use and climate change.

Table 7. Junior Troop Leader's Perceptions of the Patches' Impact on Scouts' Knowledge of Energy Use and Climate Change (n=37)

	A great deal	A moderate amount	A little	Not at all
The causes of climate change	24%	46%	19%	11%
How their energy use behaviors are related to climate change	35%	47%	18%	0%
How they can increase their energy conservation	58%	36%	6%	0%
How they can help others increase their energy conservation	47%	36%	17%	0%

Table 8. Cadette Troop Leader's Perceptions of the Patches' Impact on Scouts' Knowledge of Energy Use and Climate Change (n=26)

	A great deal	A moderate amount	A little	Not at all
The causes of climate change	15%	42%	27%	15%
How their energy use behaviors are related to climate change	23%	42%	19%	15%
How they can increase their energy conservation	48%	20%	32%	0%
How they can help others increase their energy conservation	38%	27%	31%	4%

Independent sample Mann-Whitney U tests show there are no statistically significant differences between Junior and Cadette leaders perceptions. Significance scores were: a) The causes of climate change significance =.261; b) How their energy use behaviors are related to climate change significance =.094; c) How they can increase their energy conservation significance =.128; d) How they can help others increase their energy conservation significance =.213.

Outcomes: Goal I Increase Knowledge About Climate Change, cont'd.

Junior Troop Leader Perceptions
According to participating troop leaders, the three most significant patch take-aways for the Junior Girl Scouts were:

- awareness of their personal role in energy conservation (n=13);
- an understanding of the concept that small changes can have a big impact (n=11);
- increased knowledge of energy conservation and concrete ways to practice this (n=11).

Only one troop leader mentioned that the girls increased their awareness about how to impact others' energy conservation actions.

Cadette Troop Leader Perceptions
According to participating troop leaders, the two most significant patch take-aways for the Cadette Girl Scouts were:

- Awareness of their own energy conservation habits and the personal impact that they have on the environment (n=10);
- Understanding that small changes on a personal level can have a big impact on the planet (n=7).

A few of the adult leaders also felt their girls increased their skills in impacting other people's energy saving actions (n=4) and increased their experiences on how to work as a team (n=3).

Troop Leader Comments

More awareness of how their actions affect the environment.

How they were using hot water without evening thinking about how much they were using needlessly.

What impact they currently have with their own experience.

The girls learn ways they can make a difference toward climate change by doing simple things such as unplugging electronics and turning off the lights.

That small changes in behaviors can ultimately lead to a great level of change.

Learning what energy is exactly and where is comes from and how it is wasted or not wasted for them at home.

Outcomes: Situating Goal II in a Theoretical Framework

The second GECCo program goal focuses on having participating Junior and Cadette Girl Scouts (ages 9-13) and their troop leaders increase their energy conserving behaviors. Behavior change is a complex and multidimensional construct that requires examining several factors to more fully understand how participating Girl Scouts' energy saving behaviors were affected. The trans-theoretical model of behavior change (Prochaska, et al.,1997) is useful in understanding the stages of behavior change in assessing GECCo's second goal.

Table 9. Stages in the Trans-theoretical Model of Behavior Change

Pre-contemplation	No intention to change
Contemplation	Thinking about changing
Preparation	Taking behavioral steps toward change that will presumably occur in the next 30 days
Action	Consciously taking action around the planned change
Maintenance	Adhering to the action steps for more than six months

The trans-theoretical model of change posits that behavior change is a process that occurs over time through a sequence of stages that help determine the readiness for change.

Outcomes: Situating Goal II in a Theoretical Framework, cont'd.

The processes of change include both covert and overt activities that people use to progress through the stages. While the GECCo program does not aim to impact the ten or more processes that have been defined in behavior change models, we outline the five processes in the behavior change literature which the project had the most potential to impact:

1. Raising consciousness about energy conservation and climate change including alternative actions to take (increased knowledge or understanding measured for Goal I);
2. Motivation to change (a process that involves a weighing of the pros and cons of energy saving behaviors);
3. Identifying as someone who can and wants to save energy;
4. Behavior management techniques such as creating and placing reminder signs, bracelets, etc.
5. Making a firm commitment: showing the intention to engage in the behavior such as writing a pledge and logging their energy saving actions online.

To assess behavior impacts, we measured the pre/post stages of change via survey questions. These questions examined participants' readiness for saving energy with progressively broader circles of influence: themselves; their families; other troops; and their towns.

We also asked the girls to identify how often they were either willing to or currently saving energy across several common energy use areas.

The following section presents findings from these sets of questions.

The program defined three indicators that would demonstrate increased energy conservation, including:

1. 75% of Junior and Cadette Girl Scouts will log energy conserving behaviors online.
2. 75% of family members will observe more instances of energy conserving behaviors during Scouts' home time.
3. 75% of Troop leaders will report engaging in more energy conserving behaviors post program than pre program.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Motivation

Juniors exhibited higher levels of motivation to make a difference in pre-patch surveys compared to their post-patch. Those completing only one patch were also less motivated to make a difference than those who completed two or more patches. Cadettes showed no significant differences in pre- and post-patch ratings.

Junior and Cadette Girl Scouts showed statistically significant differences in motivation to help make a difference in climate change. Juniors showed significantly more desire to help reduce climate change before starting their patch activities, with 47% of Juniors "really, really" wanting to make a difference compared to 22.4% of Cadettes. (Juniors and Cadettes who completed more than one patch failed to statistically differ.)

Juniors who only completed one patch were less motivated to make a difference in climate change compared with those completing two or more patches, which may be evidence that only more motivated girls continued to complete multiple GECCo patches.

Cadettes showed no significant changes in their ratings to make a difference in climate change after any of the patches. They held a moderate level motivation throughout the patches with 50% to 67% "wanting to make a difference."

Table 10. Junior Percentages of Ratings of How Much the Girls Want to Make a Difference in Climate Change after One Patch

	I really, really want	I want	I sort of want	I'm not sure if I want
Pre-Patch n=270	47%	38%	9%	6%
Post-Patch 1 n=248	31%	44%	9%	6%

Junior Wilcoxon related sample signed-rank significant tests for differences in motivation to make a difference in climate change: Pre-patch to post-patch 1 = .009

Table 11. Cadette Percentages of Ratings: How Much the Girls Want to Make a Difference in Climate Change after One Patch

	I really, really want	I want	I sort of want	I'm not sure if I want
Pre-Patch n=152	22%	57%	16%	5%
Post-Patch 1 n=122	25%	53%	16%	6%

Cadette Wilcoxon related sample signed-rank significant tests for differences in motivation to make a difference in climate change: Pre-patch to post-patch 1 = .821

Goal II: Increase In Energy Conserving Behaviors – Girl Scouts' Motivation, cont'd.

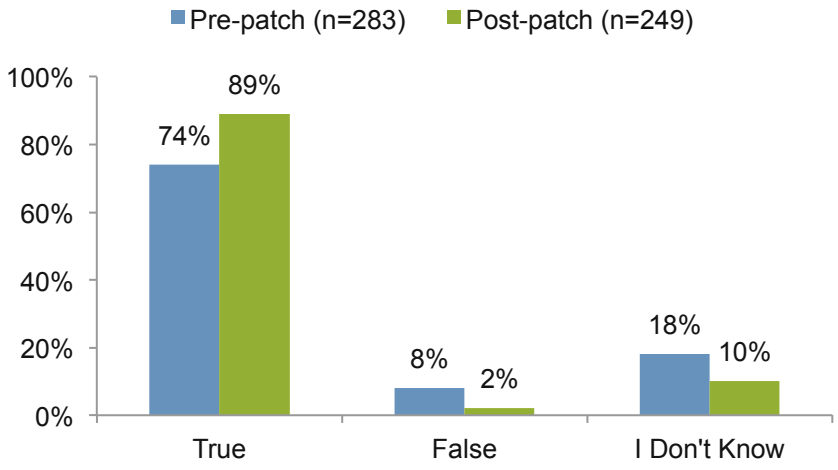
Overall, we noticed evidence of moderate motivation levels during observations. While we were unable to see the girls directly saving energy, there were several types of indirect evidence about their motivation, including:

- Almost all girls contributed genuine ideas of how they could conserve energy themselves.
- When asked what they were going to do with the crafts that they made, the girls had specific plans about where they would hang signs; place draft blockers; or gift reminder bracelets.
- Girls were highly energized when talking about how they could remind siblings and adults to conserve energy, such as turning off lights, water, or idling cars.
- Data indicated girls showed parents their pledges for completing energy saving activities at home.
- Girl Scouts showed interest in getting enough points for the "Energy Challenge" to contribute to tree planting, but the "Energy Challenge" motivation was only about half successful in pushing them above their normal energy saving actions during the rest of the week.
- We also noted a mix of reactions to what participating girls were willing to do to save energy. Girls definitely had moments of clarity! While one girl, for example, decided she liked her shower time too much to change it, another was impressed by how much water could be saved by taking just a minute off her shower time and decided she would do so.
- Overall, the girls were energized by ideas through which they could make a bigger impact by saving energy; whether by taking action to write side-walk messages; raise money to build more sidewalks; or apply for a grant to help other troops learn how to conserve energy. The girls may not have been able to follow through on all their ideas, but were motivated by thinking about the possibilities.

Goal II: Increase In Energy Conserving Behaviors – Girl Scouts' Identity / Beliefs

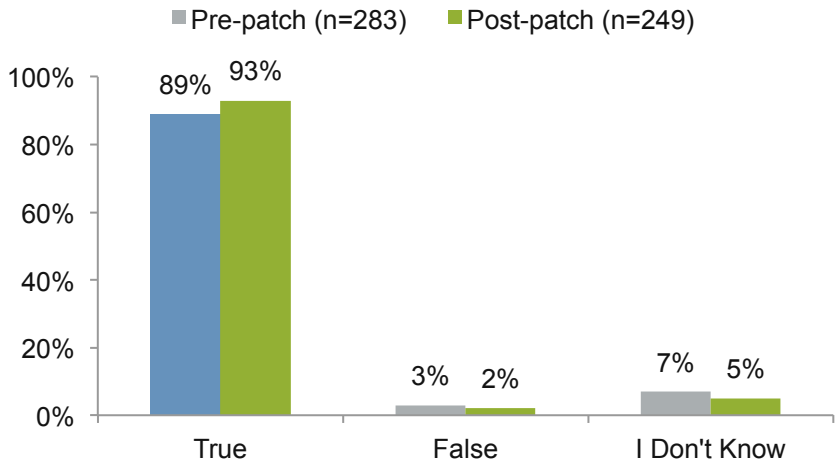
High proportions of both Juniors (74%) and Cadettes (90%) began their patch activities with a belief that they can make a difference in reducing climate change. While higher percentages of girls agreed that they could make a difference after completing the patch activities, the gains were not statistically significant for either Juniors or Cadettes troops. Comparison of the two indicated that Cadettes did maintain higher statistically significant ratings that they can make a difference in climate change compared with Juniors. (Pearson Chi Square significance = .001)

Figure 12. Junior Girl Scouts' Agreement Ratings to the Statement "I Can Make a Difference in Reducing Climate Change" Patch 1



Junior Exact Test significant tests for differences pre-patch to post-patch 1 = .748

Figure 13. Cadette Girl Scouts' Agreement Ratings to the Statement "I Can Make a Difference in Reducing Climate Change" Patch 1



Cadette Exact Test significant tests for differences pre-patch to post-patch 1 = 1.0

Goal II: Increase In Energy Conserving Behaviors – Girl Scouts' Identity / Beliefs

To further measure shifts in participating girls' beliefs in identifying as someone who can and wants to save energy, surveys included four identity statements. Pre- and post-patch results showed mixed outcomes. Generally, a high proportion of girls already began the program envisioning themselves as being able to save energy and help others do so as well (though ratings were lower for helping troops). After completing one patch, the proportions of both Juniors and Cadettes who thought of themselves as someone who could save energy showed a statistically significantly increase. For all other statements, Juniors showed statistically significant decreases post-patch. Cadettes showed statistically significant increases post-patch on statements related to helping their troops and town save energy, but no differences to helping their family save energy.

Table 12. Junior Percentages of Positive Agreement ("Yes") with Identity/Belief statements

	Pre-Patch "Yes" n=283	Post-Patch 1 "Yes" n=249
I think of myself as someone who can save energy myself.[1]	79%	83%
I think of myself as someone who can help my family save energy.[2]	87%	79%
I think of myself as someone who can help another troop save energy.[3]	50%	43%
I think of myself as someone who can help my town save energy.[4]	48%*	34%

Junior Exact Test significant tests for differences pre-patch to post-patch 1
[1] Myself: Pre-patch to post-patch 1 =.028
[2] Family: Pre-patch to post-patch 1 =.006
[3] Troop: Pre-patch to post-patch 1 =.000
[4] Town: Pre-patch to post-patch 1 =.000

Table 13. Cadette Percentages of Positive Agreement ("Yes") with Identity/Belief statements

	Pre-Patch "Yes" n=151	Post-Patch 1 "Yes" n=124
I think of myself as someone who can save energy myself.[5]	78%	89%
I think of myself as someone who can help my family save energy.[6]	75%	75%
I think of myself as someone who can help another troop save energy.[7]	42%	54%
I think of myself as someone who can help my town save energy.[8]	36%	40%

Cadette Exact Test significant tests for differences pre-patch to post-patch 1
[5] Myself Pre-patch to post-patch 1=.025
[6] Family: Pre-patch to post-patch 1=.762
[7] Troop: Pre-patch to post-patch 1=.000
[8] Town: Pre-patch to post-patch 1=.600

Goal II: Increase In Energy Conserving Behaviors – Girl Scouts' Identity / Beliefs, cont'd.

I think of myself as someone who can save energy
Both Juniors and Cadettes started the program with high proportions of girls who envisioned themselves as someone who can conserve energy (79% and 78% respectively). Nonetheless, after completing one patch, the proportions of the girls who thought of themselves as someone who could save energy significantly increased. Juniors increased by 3% and Cadettes by 11%.

There were no statistically significant differences between Cadettes and Juniors in their distributions of whether they thought of themselves as someone who can save energy prior to completing the patches (Pearson Chi Square significance = .978).

I think of myself as someone who can help my family save energy
Prior to starting patch one, Juniors showed a much higher percentage of girls affirming that they saw themselves as helping their family conserve energy (87%) compared to Cadettes (75%). These differences were statistically significant (Pearson Chi Square significance = .006).

These differences, however, disappeared after the girls completed their first patch. Post-patch results showed a significant decrease in the proportions of Junior girls who saw themselves as someone who can help their family save energy. Cadettes did not show any statistically significant shifts from baseline.

I think of myself as someone who can help another troop save energy
At baseline, 42% of Cadettes and 50% of Juniors could envision themselves helping another troop. After completion of a patch, however, scores between the two, differed. Junior Exact Test significant tests showed statistically significant decreases in identifying with the ability to help another troop save energy while Cadettes saw statistically significant increases.

There were no statistically significant differences between Cadettes and Juniors (Pearson Chi Square significance = .131).

I think of myself as someone who can help my town save energy
Between 36% (Cadettes) and 48% (Juniors) of the girls could envision themselves helping the town at baseline. There were no statistically significant differences between Junior and Cadette percentages at baseline (Pearson Chi Square significance = .053).

After patch completion,
Junior Exact Test significant tests showed statistically significant decreases in girls identifying with the ability to help their town save energy while Cadettes saw statistically significant increases.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Behavioral Change Stages

Several statements measured how ready participating girls were to save energy themselves. Both Juniors and Cadettes showed statistically significant increases in their readiness to save energy themselves between baseline and after completing the first patch. Juniors did not show any statistically significant on all other statements.

Table 14. Junior Behavioral Change Pre and Post Patch 1 Ratings (pre, n=280, post, n=245, unless noted)

		I'm already doing it	I'm ready to start	I'm thinking about it, but not ready yet	I'm not ready yet
How ready the Girls are to Save Energy Themselves[1]	Pre n=249	33%	40%	19%	8%
	Post	54%	22%	16%	7%
How Ready the Girls are to Help their Family Save Energy[2]	Pre	26%	50%	15%	9%
	Post	37%	35%	18%	9%
How ready the Girls are to Help another Troop Save Energy[3]	Pre n=279	4%	37%	32%	27%
	Post	4%	32%	34%	30%
How Ready Girls are to Help their Town Save Energy[4]	Pre	5%	32%	31%	31%
	Post	6%	24%	30%	40%

Junior Wilcoxon related sample signed-rank significant tests for differences

1. Pre-patch to post-patch 1 = .001
2. Pre-patch to post-patch 1 = .335
3. Pre-patch to post-patch 1 = .574
4. Pre-patch to post-patch 1 = .136

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Behavioral Change Stages, cont'd.

In addition to showing increased readiness to save energy themselves, Cadettes, showed statistically significant increases for statements related to helping their family and another troop save energy. They showed no increase, however, for the statement about readiness to help their town save energy.

Table 15. Cadette Behavioral Change Pre and Post Patch 1 Ratings (pre, n=152, post, n=124)

		I'm already doing it	I'm ready to start	I'm thinking about it, but not ready yet	I'm not ready yet
How ready the Girls are to Save Energy Themselves[1]	Pre	36%	39%	20%	5%
	Post	60%	25%	10%	4%
How Ready the Girls are to Help their Family Save Energy[2]	Pre	28%	42%	22%	9%
	Post	42%	37%	14.5%	6.5%
How ready the Girls are to Help another Troop Save Energy[3]	Pre	3%	33%	37%	28%
	Post	18%	32%	35%	14%
How Ready Girls are to Help their Town Save Energy[4]	Pre	6%	29%	26%	39%
	Post	18%	23%	27%	32%

Cadette Wilcoxon related sample signed-rank significant tests for differences =

1. Pre-patch to post-patch 1 = .003
2. Pre-patch to post-patch 1 = .013
3. Pre-patch to post-patch 1 = .000
4. Pre-patch to post-patch 1 = .090

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Behavioral Change Stages, cont'd.

How Ready the Girls are to Save Energy Themselves

While independent sample Mann Whitney U significance tests all failed to show statistically significant differences between Juniors and Cadettes (all resulted in >. 05 scores) for any of the behavioral changes stage questions prior to the patch, we still disaggregated them in case the patch activities had different outcomes for the two groups of girls.

Both Juniors and Cadettes showed statistically significant increases in their readiness to save energy themselves after completing the first patch. Both groups shifted to higher percentages of girls saying they were already saving energy themselves after completing the first patch, presumably shifting up from "I'm ready to start" prior to the patch activities. Proportions of Juniors who said they were already saving energy increased 21% and 24% for Cadettes.

How Ready the Girls are to Help Their Family Save Energy

Only Cadettes showed a statistically significant increase in proportions of girls who were more ready or already helping their families save energy after completing the first patch. Juniors showed no statistically significant changes. After the first patch 37% of the Juniors and 42% of the Cadettes checked that they were already helping their families conserve energy. A fair proportion of the remaining girls (36% of the Juniors and 37% of the Cadettes) said they were "ready to start" after the first patch.

How Ready the Girls are to Help Another Troop Save Energy

Only Cadettes showed statistically significant increases post-patch in proportions of girls who were more ready or already helping another troop save energy. Juniors showed no statistically significant changes. After the first patch, 4% of the Juniors And 18% of the Cadettes checked that they were already helping another troop conserve energy. A fair proportion of the remaining girls (32% of the Juniors and Cadettes) said they were "ready to start" helping another troop save energy after the first patch.

How Ready the Girls are to Help their Town Save Energy

Neither Juniors or Cadettes showed any statistically significant changes in their readiness to help their town conserve energy after completing a patch. After one patch, 6% of Juniors and 18% of Cadettes said they were already helping their town conserve energy. The majority of the girls were either not ready yet (40% Juniors and 32% Cadettes) or just thinking about it, but not ready to help their town yet (30% Juniors and 27% Cadettes) after completing a GECCo patch.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Intentions for Taking Action to Conserve Energy

We included four statements to further assess what girls were willing to do to conserve energy both pre- and post-patch. These questions provide another measure to intended energy saving actions, a pre-cursor to action. Baseline results showed a moderate level of "readiness to engage in energy conservation actions" prior to the patch activities. Post-patch ratings indicated mixed results. Juniors showed statistically significant increases in their willingness to use less hot water while bathing, but showed a decrease in willingness to pass out information, and no differences for all other statements.

Table 16. Junior Intentions for Taking Action to Conserve Energy (pre, n=283, post, n=248 unless noted)

		Very True	Mostly True	Not sure	Mostly False	Very False
To conserve water, I would be willing to use less water when I bathe.[1]	Pre	40%	28%	20.5%	6%	6%
	Post	45%	30%	15%	5%	5%
I would be willing to ride the bus to more places in order to reduce air pollution.[2]	Pre	23%	19%	28%	12%	18%
	Post n=248	25%	18%	29%	11%	17%
I would be willing to conserve energy by using less air conditioning.[3]	Pre n=284	38%	28%	24%	5%	5%
	Post	35%	28%	24%	6%	8%
I would go house to house to pass out information about conserving energy.[4]	Pre n=284	26%	16%	34%	8%	16%
	Post	16.5%	14%	29%	12.5%	28%

The related sample Wilcoxson Signed-Rank test for significance for:

1. Pre-patch vs. post-patch 1 = .042
2. Pre-patch vs. post-patch 1 = .132
3. Pre-patch vs. post-patch 1 = .299
4. Pre-patch vs. post-patch 1 = .000

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Intentions for Taking Action to Conserve Energy, cont'd.

Cadettes showed statistically significant increases in willingness to use less water while bathing. They also showed significant increases in their willingness to ride the bus to reduce air pollution, but showed no significant differences in their willingness to use less air conditioning or to pass out information about energy conservation from house to house.

Table 17. Cadette Intentions for Taking Action to Conserve Energy (pre, n=151, post, n=123 unless noted)

		Very True	Mostly True	Not sure	Mostly False	Very False
To conserve water, I would be willing to use less water when I bathe.[1]	Pre	28%	38%	15%	11%	9%
	Post	42%	38%	11%	5%	3%
I would be willing to ride the bus to more places in order to reduce air pollution.[2]	Pre	35%	24%	24%	5%	11%
	Post	46%	24%	22%	6%	2%
I would be willing to conserve energy by using less air conditioning.[3]	Pre	30%	30%	28%	9%	3%
	Post	32%	34%	20%	7%	6%
I would go house to house to pass out information about conserving energy.[4]	Pre	17%	14%	30%	15%	24%
	Post n=122	11%	17%	36%	16%	19%

The related sample Wilcoxson Signed-Rank test for significance for:

1. Pre-patch vs. post-patch 1 = .000
2. Pre-patch vs. post-patch 1 = .018
3. Pre-patch vs. post-patch 1 = .593
4. Pre-patch vs. post-patch 1 = .920

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Intentions for Taking Action to Conserve Energy, cont'd.

To conserve water, I would be willing to use less water when I bathe

Both Juniors and Cadettes showed statistically significant increases in their willingness to use less water when bathing after the first patch. Proportions of Juniors and Cadettes saying it was "very true" that they would be willing to use less water while bathing increased by 5% and 14% respectively.

Girls completing a second and third patch showed higher willingness to use less water. However, these girls self-selected for completing more than one patch, which introduces a bias that confounds results. Most girls completing more than one patch were already more enthusiastic about energy conservation and may be more likely to complete multiple patches. Hence, we can't say whether their higher level of willingness was due to completing the patch or because their was a self-selection bias.

I would be willing to ride the bus to more places in order to reduce air pollution

Increases in percentages of girls who were willing to ride the bus to reduce air pollution from baseline to post-patch were significant for Cadettes, but not Juniors. Note, however, that only Cadettes had a patch that focused specifically on transportation topics.

After the first patch, 46% of Cadettes checked that it was "very true" that they would be willing to ride the bus compared to 35% prior to the patch activities. Only 25% of Juniors checked "very true" for their willingness to ride the bus after the first patch.

I would be willing to conserve energy by using less air conditioning.

Statistical tests did not show significant differences between baseline and post-patch for either Juniors or Cadettes. Around one-third of both Juniors and Cadettes checked that it was "very true" and another third "mostly true" that they would be willing to conserve energy by using less air conditioning after completing one patch. Note that only Juniors had a patch that focused specifically on heating and cooling topics.

I would go house to house to pass out information about conserving energy.

Statistical test results showed that percentages of Junior girls who were willing to go from house to house to pass out energy conservation information significantly decreased after completing a GECCo patch. Cadette percentages failed to statistically differ between pre- and post-patch measures.

After the first patch, Juniors who said it was "very true" prior to the patch fell 10 percentage points, from 26% to 16%. Cadettes also declined 6 percentage points, but the decline could be due to chance and failed to statistically differ.

Note that only the Cadette girls had the *Tell the World* patch that focused specifically on how to share information about energy conservation with others. Some Junior troops, however, worked with variations of sharing information such as posting reminders or making reminder bracelets.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Intentions for Taking Action to Conserve Energy, cont'd.

Patch Activity Observations
Observation data further indicated moderate levels of evidence that participants intended to take action on their own to save energy. Girl Scout scores provided the most evidence. "Energy Challenge" goals provided the most direct evidence.

The "Energy Challenge" activity instructs the girls to set a goal of raising money for a cause (such as planting trees; saving gecko habitats; or helping climate change education). In order to accomplish this, they had to take action to save energy themselves during the week to earn the points. The goal oriented activity helped inspire the girls to take action.

- Most girls were enthusiastic about contributing to the "Energy Challenge" and they got ideas from one another as they discussed the challenge.

- In some troops the girls decided on independent actions they would take and others came to consensus about a group action. For instance, one group decided they would all save energy by turning off lights when watching TV.

- Some intentions were future-based, such as planting trees in the spring or making more draft blockers to conserve energy in the house and others were more quickly implemented, such as asking a parent to unplug the computer when work was done.

We also observed ways experiential learning at the troop meetings transferred into implementation at home. For instance, the direct experience of finding and feeling the drafts in the room combined with a craft project that empowered the girls to stop the drafts was effective in helping the girls take action at home. Girls liked the gecko draft blockers and they wanted to use them at home because they were useful. When following up with the girls at the next meeting, all the girls found drafts at home and put their draft blockers to use.

Other activities resulted in learning information that moved girls to make some changes in their energy use at home. The "Down the Drain" activity, for example, encouraged one troop to talk about ways they could conserve water at home. After learning about how much water comes out of a sink faucet in just one minute, they were inspired to make some changes. They made reminders for themselves and their families to shut faucets so they could remember "in the moment" when they were using water and made plans for where they were going to hang the reminders (e.g., bathroom door).

Some activities also helped girls reflect on what they personally were willing to do. The "Down the Drain" activity, for example, resulted in girls examining their shower time and thinking about how much time they were willing to give up in the shower. Additionally, the "Reminder Bracelet" activity resulted in many girls saying they would use their bracelets to help start a conversation with others about conserving energy. Talking with others did not resonate with all troop members, however. One girl, for example, created a bracelet, but wasn't sure whether she would follow through.

Overall, the high energy from the activities and social interaction helped increase the intention, will, and confidence in taking action in the majority of troop members. However, we are unable to say how long the heightened energy will have an effect.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors

We asked girls three questions about their actual energy saving actions both prior to and after each patch. Both Juniors and Cadettes showed statistically significant increases in turning off lights and talking with parents about saving energy at home. There were no significant shifts in responses to turning off water when brushing their teeth after competing one or more patches. However, both Juniors and Cadettes reported high proportions of girls who were already engaging in this behavior prior to doing any GECCo patches.

- 78% of Juniors indicated they already turned off water in the sink while brushing their teeth to conserve water at baseline, suggesting a high percentage of girls already engaged in this behavior.
- Juniors showed statistically significant increases in turning off lights at home when they were not in use after doing one GECCo patch. Juniors who said it was "very true" that they turn off lights when not using them increased from 51% to 63%
- Juniors displayed statistically significant increases in talking with parents about how to help with saving energy at home after doing one GECCo patch. The proportion of Juniors who said it was "very true" that they have talked with their parents about how to save energy increased 7 percentage points from 19% to 26%.

Table 18. Junior Increase in Energy Conserving Behaviors
(Pre: n=284, Post: n=246, except when noted)

		Very True	Mostly True	Not sure	Mostly False	Very False
I turn off the water in the sink while I brush my teeth to conserve water.[1]	Pre n=285	78%	14%	4%	1%	2%
	Post	81%	10%	4%	2%	2%
To conserve energy, I turn off lights at home when they are not in use.[2]	Pre	51%	33.5%	10%	4%	2%
	Post	63%	28.5%	5%	2%	1%
I have talked with my parents about how to help with saving energy.[3]	Pre	19%	18%	26%	13%	24%
	Post	26%	21%	21%	11%	20%

The related sample Wilcoxson Signed-Rank test for significance for:
1. Pre-patch vs. post-patch 1 = .317.
2. Pre-patch vs. post-patch 1 = .004
3. Pre-patch 1 vs. post-patch 1 = .001

Goal II: Increase In Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

- At baseline, 74% of Cadettes said it was "very true" that they already turned off water in the sink while brushing their teeth to conserve water, indicating a high percentage of girls already engaged in this behavior.
- Cadettes displayed statistically significant increases in turning off lights at home when they were not in use after doing one GECCo patch. Cadettes increased 11 percentage points to 66% after completing one patch.
- Cadettes showed statistically significant increases in talking with parents about how to help with saving energy at home after doing one GECCo patch. The proportion of Cadettes who said it was "very true" that they have talked with their parents about how to save energy increased 12 percentage points from 13% to 25%.

Table 19. Cadette Increase in Energy Conserving Behaviors
(Pre: n=152, Post: n=122, except when noted)

		Very True	Mostly True	Not sure	Mostly False	Very False
I turn off the water in the sink while I brush my teeth to conserve water.[1]	Pre	74%	16%	5%	3%	2%
	Post n=121	84%	9%	4%	1%	2%
To conserve energy, I turn off lights at home when they are not in use.[2]	Pre	55%	34%	6%	4%	1%
	Post	66%	29.5%	0%	3%	1%
I have talked with my parents about how to help with saving energy. [3]	Pre	13%	14%	24%	24%	25%
	Post	25%	25%	25%	12%	13%

The related sample Wilcoxson Signed-Rank test for significance for:
1. Pre-patch vs. post-patch 1 = .173
2. Pre-patch vs. post-patch 1 = .018
3. Pre-patch vs. post-patch 1 = .173.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

While the goal of 75% of Junior and Cadette Girl Scouts logging their energy conserving behaviors online was not attained, a fair amount of girls accomplished this challenge. Eleven Cadette troops (55%) and 15 Junior troops (63%) logged onto the "Energy Challenge" and signed up for the challenge.

Nineteen of these troops (43%) completed the "Energy Challenge." However, If we take into consideration that nine Cadette troops were not required to complete the "Energy Challenge" for the *Tell the World* patch, we find that 82% of the required Cadette troops entered their energy saving actions online and 54% of all the troops required to enter their actions online did so.

An additional issue in measuring this indicator is that Juniors who participated in GECCO during the Year 3 field test were not required to enter their energy saving actions online due to the lack of access to the Internet during troop time and could elect to enter them on paper instead.

The girls who participated in the Field Test earned thousands of points towards their causes by turning off electronics; conserving hot water; conserving heating or cooling energy; getting around using less energy; or sharing information with other people about how to conserve energy. The most points were earned by spreading the word about energy conservation (14,439 points) with turning off electronics (14,057 points) a close second.

The most popular activities for saving energy were:

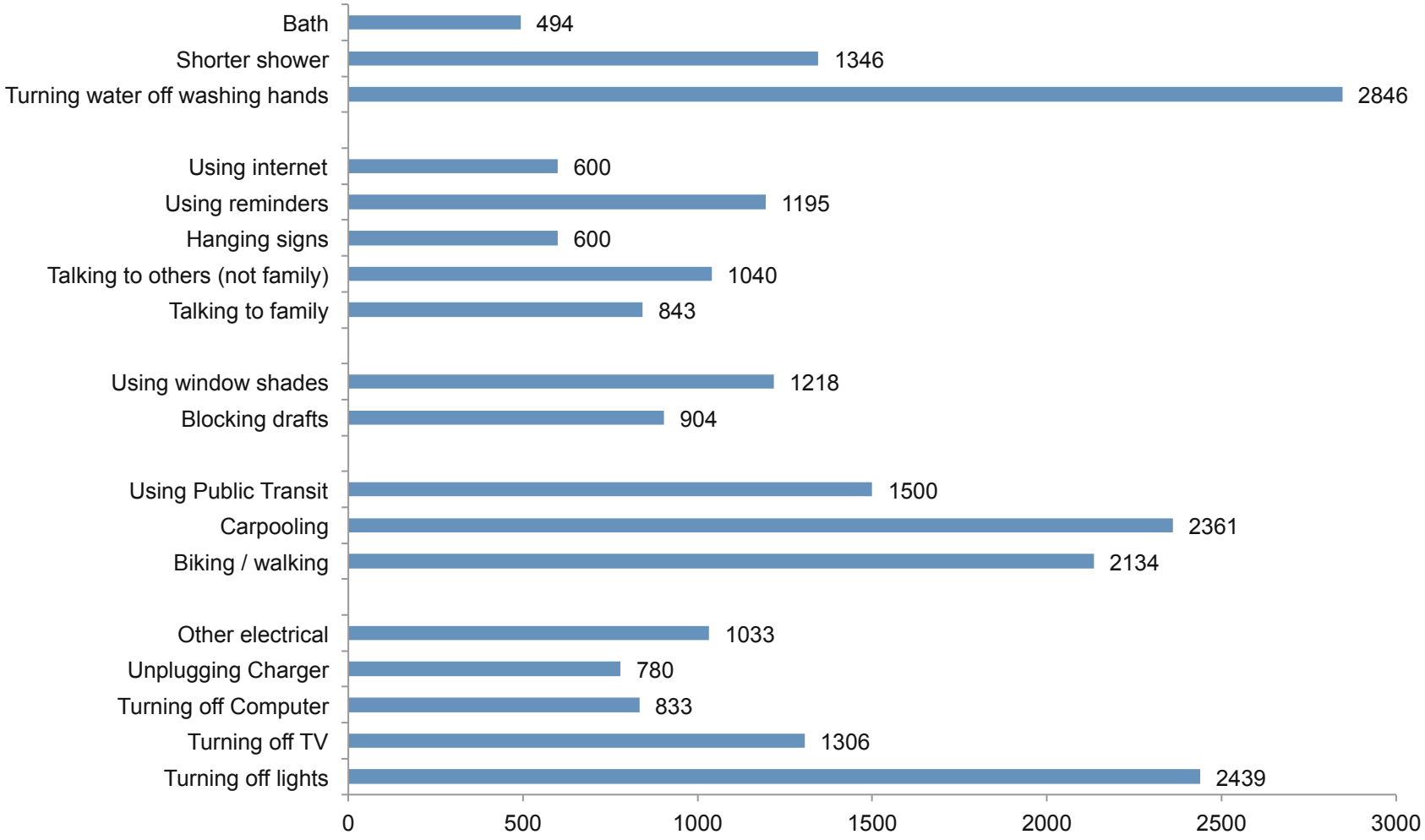
- Turning off water when washing hands;
- Turning off lights;
- Carpooling;
- Walking or riding bike.

Table 20. Energy Challenge: Energy Saving Behavior Points Earned by All Participating Girl Scouts by Year

	Yr. 3 Points	Yr. 4 Points	Total Points
Electronics	10,774	3,283	14,057
Getting Around	8,124	2,943	11,067
Spreading the Word	7,839	6,600	14,439
Hot Water	6,854	2,176	9,030
Heating and cooling	2,694	1,074	3,768

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

Figure 14. Points Earned by Participating Girl Scouts through Energy Saving Actions



Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

In order to better understand behaviors at home, we asked parents whether they observed increases in energy saving behaviors at home. The program goal indicator aimed for 75% of family members observing more instances of energy saving behaviors. The goal was exceeded: 86% of Juniors and 85% of Cadettes increased their interest; 89% of Juniors and 86% of Cadettes increased their energy saving actions; 81% of Juniors and 72% of Cadettes increased sharing information.

Table 21. Junior Parent Ratings for Increase In Energy Conserving Behaviors (n=158)

	No more than usual	A little more	A fair amount more	A great deal more	Not sure
To what extent has your child expressed more interest in finding ways to conserve energy since working on this GECCo patch?	13%	38%	35%	14%	1%
To what extent has your child taken specific action to conserve energy since working on this GECCo patch?	10%	51%	28%	10%	1%
To what extent has your child shared information with either you or someone in your household about conserving energy since working on this GECCo Patch?	15%	43%	25%	13%	4%

Table 22. Cadette Parent Ratings for Increase In Energy Conserving Behaviors (n=124)

	No more than usual	A little more	A fair amount more	A great deal more	Not sure
To what extent has your child expressed more interest in finding ways to conserve energy since working on this GECCo patch?	14%	42%	36%	6.5%	2%
To what extent has your child taken specific action to conserve energy since working on this GECCo patch?	11%	47%	33%	6.5%	2%
To what extent has your child shared information with either you or someone in your household about conserving energy since working on this GECCo Patch?	26%	35%	31%	6.5%	2%

Juniors and Cadette parents fail to significantly differ in responses for post-patches 1, 2, and 3. (Pearson Chi Square Exact Test significance = .588; .738, and 1.0 respectively.)

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

To what extent has your child <u>expressed more interest</u> in finding ways to conserve energy since working on this GECCo patch?

Most parents said their girls increased their interest in energy conservation either a little or a fair amount. We saw no statistically significant differences between the Junior and Cadette parent ratings after the first patch. Ratings distributions were similar for households with girls who completed multiple GECCo patches.

Parents provided ample evidence that girls were increasing their interest in conserving energy. They reported that girls asked questions about energy conservation such as asking about:

- The energy bill;
- Ways they could conserve energy at home;
- How much energy appliances used;
- Using a smaller car;
- Or how to winterize the home.

Parents also noticed the girls' increasing awareness in different areas such as:

- How much energy the girls were using themselves;
- How much energy others in the household were using;
- More awareness around water running; unused electrical appliances or lights that were on; or gas emissions occurring when the car was idling.

Along with increased awareness, some parents cited that their girls were increasing their understanding of how energy use is linked to climate change and increasing their interest in environmental stewardship overall. They provided examples like their girls:

- Becoming interested in alternative energy sources like wind power;
- Talking about ways to conserve energy more at home;
- Thinking about how transportation can occur without using gas;
- Talking about recycling and reducing product packaging.

My child was learning about conserving energy in Science class at the same time our troop was working on this patch. My child shared the info from school with our troop. She has gone on-line to several sites looking for more info on the subject.

[She] has discussed some interest in how wind and solar energy sources work. She also discussed with me and her father the extent to which we as a family waste energy.

My boyfriend bought her an energy creator kit she really enjoyed using. She was all excited when she made a light bulb glow and a fan start working, a device that plays music. She is amazed by the wind towers for electricity in Kingston.

[We've had] more conversations about use of energy and its effects on community and world. Integrated knowledge from school learning with knowledge from GECCO program to increase overall understanding. Talked to others in household about efforts.

[She showed] excitement when school had a fundraiser selling energy efficient power strips and light bulbs.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

To what extent has your child taken specific action to conserve energy since working on this GECCo patch?

Most parents said their girls increased their actions in energy conservation either a little or a fair amount. We saw no statistically significant differences between the Junior and Cadette parent ratings after the first patch. Rating distributions were similar for girls completing multiple patches. Parents provided overwhelming evidence that girls were taking action themselves to conserve energy at home while doing their patches.

The most popular ways that girls took action themselves were by:

- Turning off lights;
- Turning off water when brushing teeth;
- Taking shorter showers;
- Turning off and/or unplugging electrical appliances when not in use.

Less popular, but still mentioned energy saving activities included:

- Using the shades to regulate heat or light;
- Recycling;
- Changing to energy efficient light bulbs;
- Conserving paper by using both sides;
- Blocking drafts;
- Putting on more clothes to stay warm rather than asking to turn the heat up;
- Helping to plan trips to use less gas (combining errands or car pooling);
- Walking to school or walking the dog within the neighborhood to reduce gas usage.

To what extent has your child shared information with either you or someone in your household about conserving energy since working on this GECCo Patch?

Most parents said their girls had shared energy conservation information with someone in the household either a little or a fair amount. We saw no statistically significant differences between the Junior and Cadette parent ratings after the first patch. Rating distributions were similar for girls completing multiple patches.

Parents provided ample evidence that girls were talking with others in the household about energy conservation.

Turning off the lights seems to happen more often. They are more aware that they are doing the environment good if they carpool, which is something they normally do. But now there is an awareness about it.

She is very vigilant about turning off the water while brushing teeth and setting certain times for me to run the dishwasher. We are taking more walks around the house with our dog rather than driving down to the beach to walk her on the boardwalk. Saving energy by not using gasoline. She is also using the computer less and playing board games or outdoor activities more.

She has been very careful about water conservation, turning off the water during brushing teeth, shortening showers, etc. She has made sure to unplug phone, game and laptop chargers that are not being used. She no longer leaves the television on to go to sleep.

Making full loads of laundry instead of just several small loads. Telling her sister to stop wasting water. Shorter showers. I'm sure there is more.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

Parents reported that girls were:

- Sharing what they learned during their patch activities;
- Asking to see and talk about the energy bill;
- Discussing more ways they could conserve energy at home;
- Discussing energy conservation in general;
- Discussing how to winterize the home;
- Helping to plan trips and carpool to use less gas.

Parents also noticed the girls were sharing information with their family members including parents, siblings, and grandparents. The girls were sharing what they learned through various mechanisms such as:

- Sharing energy conservation information;
- Sharing how energy use is linked to climate change;
- Talking about the importance of energy conservation;
- Talking about ways to conserve energy;
- Sharing the energy conservation behavior tracking chart (i.e. to track how many times lights and TV's were turned off or unplugged when not in use);
- Giving reminder bracelets to family members or posting energy saving reminders around the house.

The most popular way girls communicated their increased desire to conserve energy was to remind others in the family to conserve more when their actions were not aligned with what they had learned. (See Appendix N for a distribution of how Girl Scouts shared energy conservation information.)

Some girls also shared information outside their homes. Some troops decided to share their messages in school by putting information into the school newsletter, putting up energy conservation posters at school; passing out energy saving brochures to neighbors; or presenting energy conservation information in front of their classmates.

She was already quite involved. She now tries to walk instead of having us drive if it is practical. And she has renewed vigilance about turning out lights.

She has shown concern about the number of times we run our dishwasher and has suggested ways to fit more dishes into every load to reduce the number of times we run the dishwasher. She is also concerned about parents taking long showers, leaving the lights on in the bathroom and even her sister's night light. [She] has mapped our route coming home from school so we can drive as few miles as possible, she has pointed out grocery stores that are on our way when we need to stop for milk so to avoid driving extra miles to our usual grocery store. She would like for her parents to drive smaller cars.

She repeatedly reminds her siblings to be more aware of electronics being left on when not in use and asks them to turn them off.

She is noticing when people leave water running or a door open and asks that they shut it off or close the door.

Goal II: Increase in Energy Conserving Behaviors – Girl Scouts' Actual Energy Conserving Behaviors, cont'd.

She discussed the topics that were covered at the meeting. She talked to us on how to conserve the energy and what activities she had done. She found it very interesting and learned a lot.

[She] has discussed some interest in how wind and solar energy sources work. She has also discussed with me and her father the extent to which we as a family waste energy.

She talked about ways in which we as a family wasted energy, she told our neighbors how they will save money if they leave only one light on at night outside instead of leaving 3 or more as our neighbors usually do.

We discussed the different cycles on appliances, like the dishwasher, washing machine and clothes dryer - how they all can be used more efficiently.

The troop also made a presentation during their all-school meeting, each girl having something to say, about conserving energy and recycling. They made posters for which they received permission to hang around the school building, and as a troop contributed conservation tips to the school newsletter.

She has asked her brothers to shut off air conditioners when they leave their rooms. She also asked them not to open the refrigerator and leave it open while they pour a drink.

She tells me about how even small changes in conserving energy by one person can really impact our environment. She talks about using less oil and how far that resource has to travel to get to our home.

She has shared her research and when her grandmother was over with some other extended family members, she did a mini presentation of energy conservation before dinner.

We now have conversations at dinner regarding ways people can conserve energy. We also discuss possible future energy needs and alternatives.

She wrote a letter and mailed it to her (younger) nephew to tell him about how much electricity is used when you plug in the toaster or hair dryer. She'll bug her (younger) brother to take quicker showers.

She discusses the activities during dinner time and explained the value of conserving energy and her specific plans to contribute to the efficiencies.

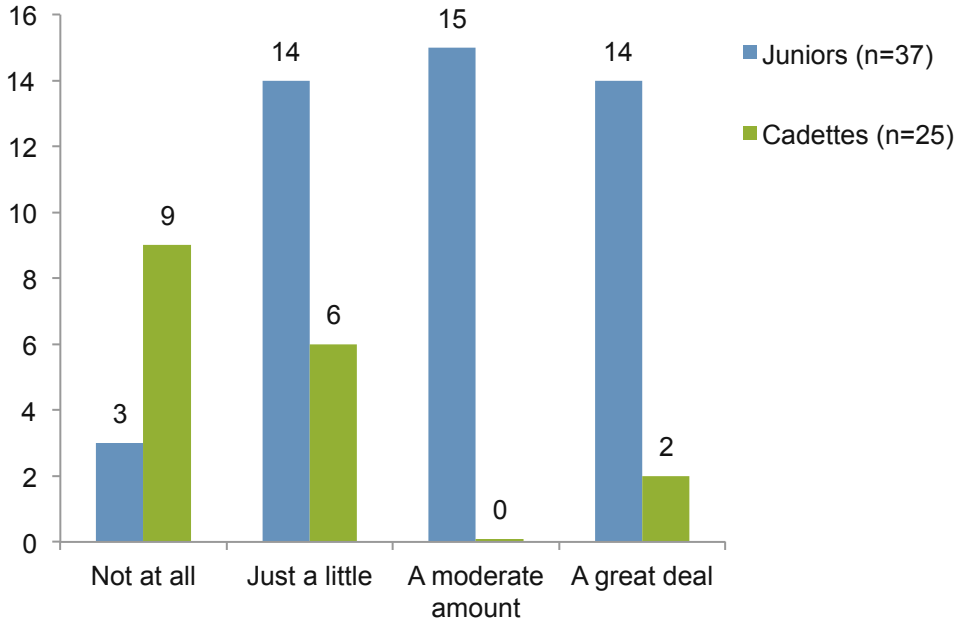
They were relaying the information to a younger cousin. She is also going to work with a Daisy Troop to pass on age appropriate information for that troop. They are going to help with making light plates for reminding the younger girls to turn off their lights.

Outcomes: Goal II Increase in Energy Conserving Behaviors –Troop Leaders' Knowledge

Behavior is heavily influenced by the social environment of the family, peers, and adult role models. Thus, the second program goal also called for troop leaders to increase their energy conservation behaviors. The majority of troop leaders responding thought the patch had a little to moderate impact on their understanding of climate change. While 78% of Junior compared to 54% of Cadette troop leaders provided "just a little" or "moderate" ratings, the differences between the two groups were not statistically significant.

While Junior and Cadette troop leaders failed to statistically differ in their responses, we still isolated their comments to look for any qualitative differences. We found that both groups had numerous troop leaders who already knew a fair amount about climate change. Overall, most felt they were more impacted by increased awareness of conserving energy in daily life. There seemed to be less impact for Cadette leaders around the connection between energy conservation and climate change.

Figure 15. Troop Leader Ratings on the Extent their Understanding of How Climate Change Occurs Increased



The independent sample Mann-Whitney U test fails to show statistical significance for any differences in Junior and Cadette leader distributions with a significance of .062.

Outcomes: Goal II Increase in Energy Conserving Behaviors –Troop Leaders' Knowledge, cont'd.

Junior and Cadette troop leader data revealed that a number of respondents were already very familiar with the topic of climate change. Therefore, the patch had little effect on improving their understanding.

Others agreed that the patch affected their understanding of climate change in two major ways: 1) it helped them better understand the concept of climate change and 2) it allowed them to become more aware of their personal conservation habits.

Some leaders (n=4) also thought the activities were more focused on energy conservation and didn't discuss its relationship to climate change. As noted before, leaders and troops, in general, found this connection confusing.

Junior Troop Leaders

This has affected my understanding of how things work together. It is not just about recycling but everything around you.

Honestly, I never really understood how fossil fuel is collected and distributed...and why CO_2 gets trapped.....also I never appreciated the resource drain that plugged in electrical devices caused.

It showed me lots of examples of where I could conserve energy and help others conserve energy.

It was a helpful reinforcement and the various energy saving tips were good reminders.

I didn't really feel I got anymore knowledge than I had before this patch.

Cadette Troop Leaders

After doing the patch I feel I conserve more energy in my daily life and encourage my family to also.

I know that every little thing I do can effect climate change.

We didn't really talk about climate change. We talked a lot about saving energy but not WHY we were saving it.

As a science teacher, I consider myself fairly well-versed in climate change. I don't feel the patch added to my prior knowledge.

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders' Energy Conservation Motivation

Junior troop leaders agreed that the patch had a positive impact on their motivations to help reduce climate change. According to Junior troop leaders, the patch increased their awareness of personal conservation habits and it encouraged them to make conscious efforts to actively conserve energy.

While Cadette troop leaders in general felt that the patch had positively affected their understanding of climate change and inspired a determination to take actions to reduce climate change, a third of them (9) saw no effect on their beliefs or motivations related to climate change. These troop leaders either admitted that they were already motivated enough or didn't perceive the idea of climate change as central in the activities. Cadette troop leaders weren't as convinced as Junior leaders that the patch impacted their motivations to reduce climate change.

Junior Troop Leader Comments

I am now even more aware of the things I do that could be adjusted to make a difference.

I always thought of myself as a person who was always reducing climate change but now I see more of the things I can change.

I am recycling more, taking shorter showers, turning off lights, talking to people about it. I am even turning off lights at work when the conference rooms are empty.

By working on the patch, it has helped me become more conscious about pulling the shades down to cool the house.

It reminds me that small changes can make a difference.

Cadette Troop Leader Comments

I am being more conscience about turning off lights at home and unplugging unused appliances. I also try to drive less.

I take shorter showers. Conserve on gas consumption by planning my route and carpooling. Recycle all plastics and refill bottles instead of just trashing them.

The GECCo challenge made it clear that there are little things that everyone can do.

If anything, it has increased my desire to reduce climate change.

The patch has heightened my awareness and my passion for sharing what I have learned.

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders' Energy Conservation Motivation, cont'd.

Troop Leaders' Desire to Help Others Understand how Conserving Energy Impacts Climate Change

Doing the patch strengthened troop leaders' desire to help others understand how conserving energy can impact climate change. Overall, troop leaders shifted their ratings from low or no desire to moderate desire to help others understand. Shifts were statistically significant. (Related samples Wilcoxon signed-rank significance test = .000.)

Troop Leaders' Desire to Organize Community Efforts to Conserve Energy

Participating in the patch also increased troop leaders' desire to organize community-level activities to save energy in their community. Overall, troop leaders shifted their ratings from "no interest" at all and "moderately low" to moderate levels of interest. These shifts are statistically significant. (Related samples Wilcoxon signed-rank significance test = .000)

[Junior and Cadette troop leader distributions failed to show statistically significant differences with independent sample Mann-Whitney U test significance values of .590 and .466 for pre and post results respectively.]

Table 23. Junior Troop Leaders' Energy Conservation Motivation Ratings (n=37)

		Not at all	Just a small amount	A moderate amount	A high amount
Junior Troop Leaders' Desire to Help Other Understand how Conserving Energy Impacts Climate Change	Pre	11	17	6	3
	Post	2	10	16	9
Junior Troop Leaders' Desire to Organize Community Efforts to Conserve Energy	Pre	20	9	6	1
	Post	6	15	11	5
Junior Troop Leaders' Thinking about Ways to Conserve Energy (n=36)	Pre	13	14	6	3
	Post	2	9	15	10

Table 24. Cadette Troop Leaders' Energy Conservation Motivation Ratings (n=26)

		Not at all	Just a small amount	A moderate amount	A high amount
Cadette Troop Leaders' Desire to Help Other Understand how Conserving Energy Impacts Climate Change	Pre	6	13	4	3
	Post	2	4	12	8
Cadette Troop Leaders' Desire to Organize Community Efforts to Conserve Energy	Pre	14	10	1	1
	Post	4	8	12	2
Cadette Troop Leaders' Thinking about Ways to Conserve Energy	Pre	6	9	9	2
	Post	0	6	14	6

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders' Energy Conservation Motivation, cont'd.

Troop Leaders' Thinking about Ways to Conserve Energy

As a result of performing the patch activities, troop leaders started thinking about new ways to conserve energy more often. Overall, troop leaders shifted from very low to moderately high amounts of thinking about conserving energy. These shifts are statistically significant. (Related samples Wilcoxon signed-rank significance test = .000.)

Both Junior and Cadette troop leaders provided similar responses to their perception on the impact of the patch in motivating them to help others reduce climate change. They primarily saw themselves communicating about the issue with family and close friends as well as educating troops. The patch also gave leaders insight into: 1) creative ways to promote energy conservation, 2) better understanding of personal ability and power to impact others, and 3) the importance of group effort in motivating people to conserve energy.

Junior Troop Leader Comments

It has motivated me to take a stand and make sure that my friends and family start thinking about recycling and other ways to save.

Doing the patch has made me encourage other around me to switch off when not in use and look for alternative ways of doing stuff.

Conserving energy is something I've always thought was important and that's why I wanted to do these patches with my troop, which is how I feel like I'm helping others.

I am more inclined to participate in community wide activities that can help reduce climate change.

Cadette Troop Leader Comments

I will continue with renewed spirit to educate and utilize energy saving techniques in my home with my family, so that they may (as I) spread their efforts and knowledge in this area in schools, work places, community organizations and with others.

Education of our girls (and then their families) is a great way to make this impact!

It has made me more aware of my ability to impact other people's choices about energy use.

The patch has helped me to think about fun ways to share the message.

People like to feel they are not trying to save energy alone, they like to be part of a group effort.

Outcomes: Goal II Increase in Energy Conserving Behaviors –Troop Leaders' Identity / Beliefs

Importance of Reducing Climate Change: Troop leaders significantly increased the importance they placed on the need to help reduce climate change after participating in the patch activities with the girls. The shift in ratings ranged from largely moderate to moderately high ratings. (Related samples Wilcoxon signed-rank significance test = .000.) Junior and Cadette troop leader distributions failed to show statistically significant differences with independent sample Mann-Whitney U test significance values of .651 and .372 for pre and post patch results respectively.

How Much their own Energy Conservation Efforts Can Impact Climate Change: Troop leaders significantly increased how much they felt their own energy saving actions can impact climate change after participating in the patch activities with the girls. The shift in ratings go from moderately low to moderately high ratings. (Related samples Wilcoxon signed-rank significance test = .000) Junior and Cadette troop leader distributions failed to show statistically significant differences with independent sample Mann-Whitney U test significance values of .593 and .485 for pre and post results respectively.

Table 25. Junior Leaders' Belief Ratings about Energy Conserving Behaviors (n=37)

		Not at all	Just a small amount	A moderate amount	A high amount
Importance of Reducing Climate Change	Pre	5	9	17	6
	Post	0	2	19	16
How Much their own Energy Conservation Efforts Can Impact Climate Change	Pre	3	16	14	4
	Post	0	5	17	15
How Much they Felt Many People Taking Small Energy Savings Can Impact Climate Change	Pre	3	13	12	9
	Post	0	2	16	19

Table 26. Cadette Leaders' Belief Ratings about Energy Conserving Behaviors (n=26)

		Not at all	Just a small amount	A moderate amount	A high amount
Importance of Reducing Climate Change Ratings	Pre	5	8	7	6
	Post	1	2	14	9
How Much their own Energy Conservation Efforts Can Impact Climate Change	Pre	7	7	7	5
	Post	2	3	12	9
How Much they Felt Many People Taking Small Energy Savings Can Impact Climate Change	Pre	6	9	4	7
	Post	2	2	6	16

Outcomes: Goal II Increase In Energy Conserving Behaviors –Troop Leaders' Identity / Beliefs, cont'd.

How Much Troop Leaders Felt Many People Taking Small Energy Savings Can Impact Climate Change

Troop leaders significantly increased how much they felt many people taking small energy saving actions can impact climate change after participating in the patch activities with the girls. The shift in ratings go from moderately low to moderately high ratings. (Related samples Wilcoxon signed-rank significance test = .000) Junior and Cadette troop leader distributions failed to show statistically significant differences with independent sample Mann-Whitney U test significance values of .302 and .741 for pre and post results respectively.

Troop leaders significantly increased both their vision of themselves as someone who can conserve energy themselves and help their family save energy. The shift in ratings ranged from "mostly true" to "very true" ratings for both measurements for Juniors and Cadettes. (Related samples Wilcoxon signed-rank significance test = .000 for both variables.)

Troop leaders significantly increased both their vision of themselves as someone who can help another troop and help their town save energy. The shift in ratings go from either "not" or "a little true" to either "a little" or "more true" for both measurements of Junior and Cadette leaders. (Related samples Wilcoxon signed-rank significance test = .000 for both variables.)

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders' Identity / Beliefs, cont'd.

Table 27. Junior Troop Leader's Energy Conservation Identity/Beliefs (n=37 unless otherwise noted)

		Not at all true	A little true	Mostly true	Very true
Junior Troop Leaders See Themselves as Someone who can Save Energy	Pre	0	6	19	12
	Post	0	1	16	20
Junior Troop Leaders See Themselves as Someone who Can Help their Family Save Energy	Pre	0	7	21	9
	Post	0	1	15	21
Junior Troop Leaders See Themselves as Someone who Can Help Another Troop Save Energy	Pre (n=36)	10	17	4	5
	Post	3	15	7	12
Junior Troop Leaders See Themselves as Someone who Can Help their Town Save Energy	Pre (n=36)	16	13	3	4
	Post	6	19	3	7

[Junior and Cadette troop leader distributions failed to show statistically significant differences with independent sample Mann-Whitney U test significance values of .563 and .955 for pre and post results respectively for conserving energy themselves and .938 and .974 for pre and post results respectively for helping the family conserver energy.]

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders' Identity / Beliefs, cont'd.

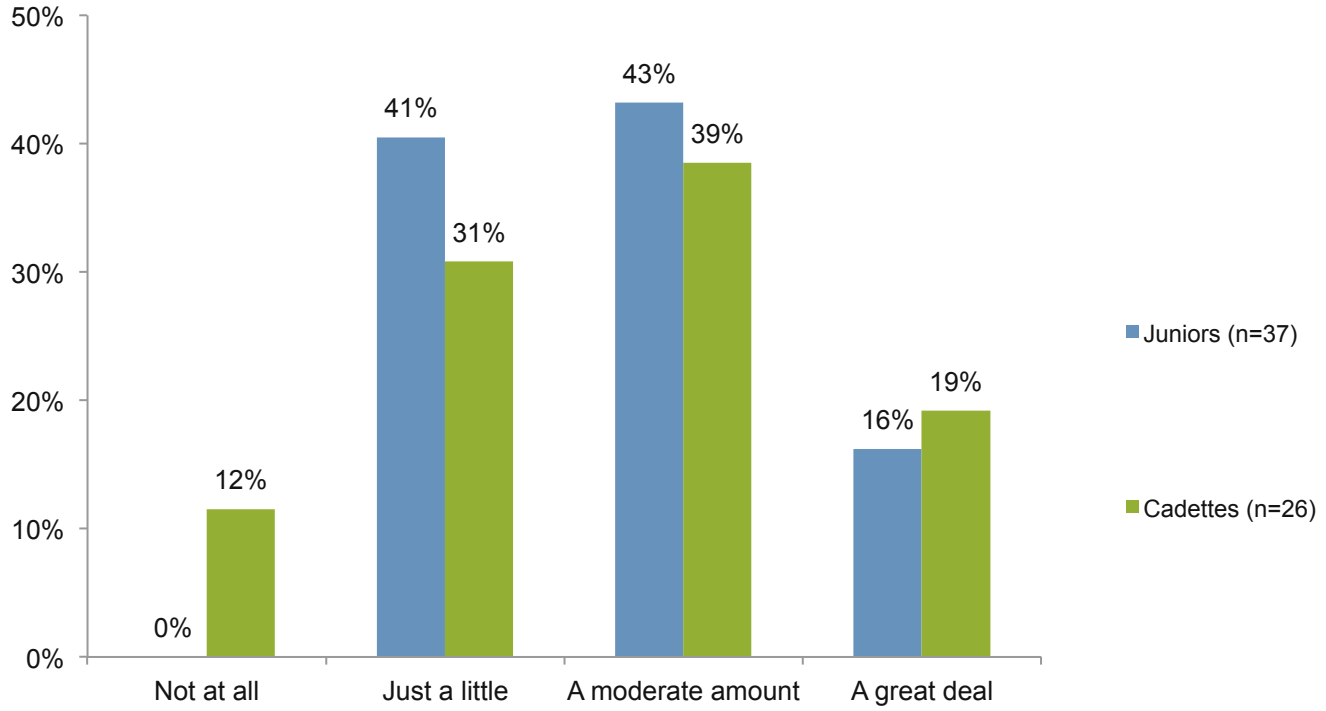
Table 28. Cadette Troop Leader's Energy Conservation Identity/Beliefs (n=26)

		Not at all true	A little true	Mostly true	Very true
Cadette Troop Leaders See Themselves as Someone who can Save Energy	Pre	0	8	9	9
	Post	0	1	11	14
Cadette Troop Leaders See Themselves as Someone who Can Help their Family Save Energy	Pre	0	6	13	7
	Post	0	1	10	15
Cadette Troop Leaders See Themselves as Someone who Can Help Another Troop Save Energy	Pre	6	16	2	2
	Post	2	4	14	6
Cadette Troop Leaders See Themselves as Someone who Can Help their Town Save Energy	Pre	17	5	3	1
	Post	4	11	8	3

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders Taking Action to Conserve Energy

Most Junior (84%) and Cadette (69%) troop leaders felt the patch had either “a little” to “moderate” impact on their energy conservation behaviors. Junior and Cadette troop leader ratings distributions failed to show statistically significant differences.

Figure 16. Troop Leader Ratings on the Extent their Energy Conservation Behaviors Were Influenced by Completing the Patch



The independent sample Mann-Whitney U test fails to show statistical significance for any differences in Junior and Cadette leader distributions with a significance of .754.

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders Taking Action to Conserve Energy

Junior troop leaders found the patch positively affected their energy conservation behavior. Leaders reported that they became more conscious about their daily habits and the ways they could change them in order to conserve energy. A large number of troop leaders were more determined to conserve water (i.e. taking shorter showers) as well as limit their car use by combining errands in one trip, carpooling, or using public transportation.

Cadette troop leaders, while cumulatively listing a wide range of actions, primarily mentioned turning off lights and unplugging electronics when not in use as two daily habits that most often did.

We also asked troop leaders six retrospective pre/post questions about how often they engaged in energy conservation behaviors to quantitatively assess changes.

The program indicator goal of having 75% of Troop leaders reporting engaging in more energy conserving behaviors post program than prior to the program was met. We found that 83% of troop leaders increased at least one energy saving behavior. All Increases were statistically significant. (Wilcoxson signed-ranked paired sample tests showed significance tests at .000 for all questions.)

Table 29. Energy Saving Behaviors Reported by Troop Leaders as a Result of Participating in GECCo

Behavior	%
Combining errands	34%
Walking or using public transit	29%
Purchasing energy efficient light bulbs	46%
Unplugging electrical appliances	63%
Taking shorter showers	51%
Putting on warmer clothes instead of turning up heat	40%

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders Taking Action to Conserve Energy, cont'd.

Both Junior and Cadette troop leaders reported combining their errands to save gas and using public transportation slightly more often after the patch. These shifts are statistically significant. (Related samples Wilcoxon signed-rank significance test = .000.)

After completing a patch, both Junior and Cadette troop leaders reported buying energy efficient bulbs and unplugging electronics when not in use more often. These shifts are statistically significant. (Related samples Wilcoxon signed-rank significance test = .000)

Both Junior and Cadette troop leaders reported consciously taking shortened showers and putting on warmer clothes rather than turning the heat up in post-patch responses. These shifts are statistically significant. (Related samples Wilcoxon signed-rank significance test = .000)

Table 30. Junior Troop Leaders Taking Action to Conserve Energy (n=37, unless noted)

		Not at all	Just a small amount	A moderate amount	A high amount
The Amount of Time that Junior Troop Leaders Combine Errands (n=36)	Pre	1	7	18	10
	Post	0	2	16	18
The Amount of Time that Junior Troop Leaders Walk or Use Public Transportation	Pre	11	17	7	2
	Post	8	11	13	5
The Amount of Time that Junior Troop Leaders Purchase Energy Efficient Light Bulbs	Pre	5	12	9	11
	Post	1	2	16	18
The Amount of Time that Junior Troop Leaders Unplug Electronics When not Using Them	Pre	15	16	5	1
	Post	6	5	18	8
The Amount of Time that Junior Troop Leaders Consciously Shorten Showers	Pre	9	16	7	5
	Post	1	10	16	10
The Amount of Time that Junior Troop Leaders Put on Warmer Clothes Rather than Turning the Heat Up	Pre (n=36)	1	9	10	16
	Post	0	1	11	25

Junior and Cadette troop leader distributions failed to show statistically significant differences with independent sample Mann-Whitney U test significance values of .579 and .183 for the combined errands and .396 and .865 for the public transportation pre and post results respectively.

Goal II: Increasing Energy Conserving Behaviors –Troop Leaders Taking Action to Conserve Energy, cont'd.

Table 31. Cadette Troop Leaders Taking Action to Conserve Energy (n=26, unless noted)

		Not at all	Just a small amount	A moderate amount	A high amount
The Amount of Time that Cadette Troop Leaders Combine Errands	Pre	1	6	8	11
	Post	0	0	9	17
The Amount of Time that Cadette Troop Leaders Walk or Use Public Transportation	Pre	5	13	7	1
	Post	5	6	14	1
The Amount of Time that Cadette Troop Leaders Purchase Energy Efficient Light Bulbs	Pre	8	4	5	9
	Post	3	2	6	15
The Amount of Time that Cadette Troop Leaders Unplug Electronics When not Using Them	Pre	11	12	3	0
	Post	3	7	14	2
The Amount of Time that Cadette Troop Leaders Consciously Shorten Showers	Pre	8	6	4	8
	Post	2	4	7	13
The Amount of Time that Cadette Troop Leaders Put on Warmer Clothes Rather than Turning the Heat Up	Pre	4	5	7	10
	Post	0	1	11	14

Goal III: Using Technology to Create and Send Conservation Messages

The third goal of the project was to increase girls' exposure to and use of technology. In addition to a range of online games and resources through the GECCo website, participating troops could log their energy saving conservation actions online. The program also included a component in which girls developed conservation messages and sent them to others.

Meeting this goal was somewhat challenging for two reasons. First, troops did not always have access to computers and the Internet during troop meetings. Second, Girl Scout meetings are generally more oriented toward including hands-on activities and those that include a fair amount of social engagement such as playing games or making crafts together.

Access to computers and the Internet were generally higher for Cadettes compared with Juniors. Slightly less than one-half of the Junior troop leaders reported having online access during meeting time, compared to 90% of participating Cadette troops.

Access to computers and the Internet were generally higher for Cadettes compared with Juniors. Slightly less than one-half of the Junior troop leaders reported having online access during meeting time, compared to 90% of participating Cadette troops.

To accommodate limited computer/ online access for Juniors troops, participating troops had the option of creating conservation messages either digitally or via more traditional paper formats.

On the other hand, the availability of hard-copy patch materials very likely decreased the amount to which participating troops accessed online resources, such as games.

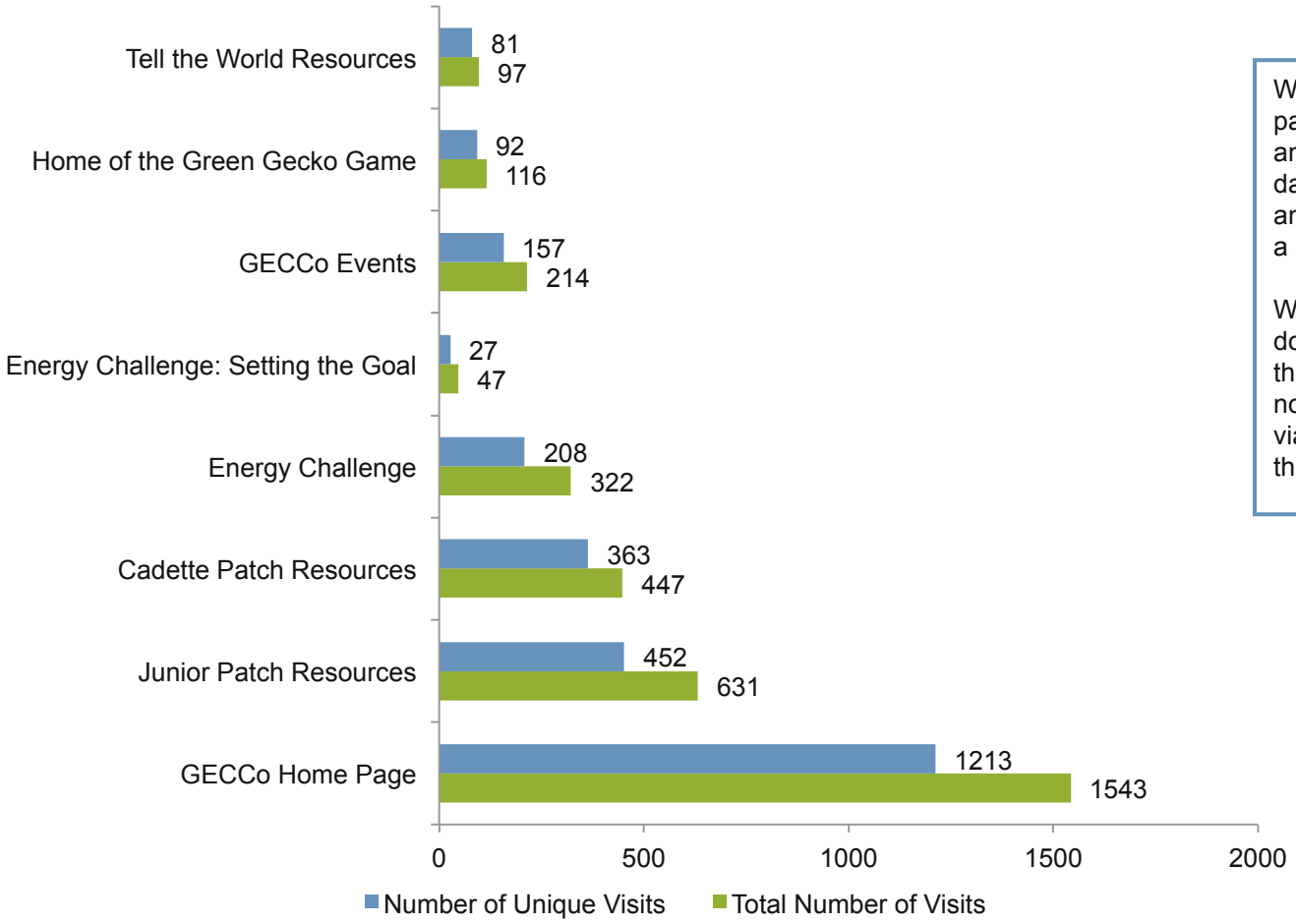
Table 32. Percentages of Troops with Computer Access During Troop Time by Girl Scout Level

Access During Meeting Time	Juniors % Yes n=24	Cadettes % Yes n=19
General computer	54%	68%
DVD	71%	58%
Computer with Internet	46%	90%
Computer for Girl Scout use	42%	90%
Computer for Demonstration	54%	47%
Multiple computers with Internet	0 = 46% 1 = 29% 2+ = 25%	0 = 5% 1 = 10% 2+ = 84%

Goal III: Using Technology to Create and Send Conservation Messages, cont'd.

The program included a number online resources intended to be used by participating troops. Those used most frequently included the GECCo home page and the patch resources. The least frequented were the *Tell the World* resources and the *Home of the Green Gecko* game.

Figure 17. Girls' Use of Online GECCo Resources



Website tracking methods shifted part way through the program and we were not able to obtain data that tracked individual troops and number of games played by a specific troop.

While troop leader surveys documented the use of "Home of the Green Gecko" game, they did not delineate whether use was via the online or board version of the game.

Goal III: Using Technology to Create and Send Conservation Messages, cont'd.

The most common way participating girls reported sharing their energy conservation messages was by talking with others (63% of Juniors 52% of Cadettes). Other popular ways of sharing energy conservation information varied slightly due to differences in patch activities.

Table 33. Most Common Ways of Sharing Energy Conservation Messages

	Juniors	Cadettes
Speaking to others	63%	52%
Using reminders such as bracelets or bumper stickers	39%	0%
Making videos	0%	26%
Hanging posters	27%	26%

Table 34. How Girls Communicated their Energy Conservation Messages

	Juniors	Cadettes
Emails	19%	22%
Texts	14%	23%
Ecards	6%	3%
Creating videos	5%	26%
Creating animations	5%	10%
Creating video games	4%	3%

Table 35. Modes of Sharing for Cadette *Tell the World* Patch

Mode	Percent
Emails	30%
ECards	4%
Videos	70%
Animations	11%
Text messages	26%
Power Point slides	4%

Table 36. Number of Products Sent Cadette *Tell the World* Patch

Number Sent	Percent
Sent one product	47%
Sent two products	25%
Sent three products	20%

Goal III: Using Technology to Create and Send Conservation Messages, cont'd.

While high percentages of girls completing the *Tell the World* patch reported using technology to create and share energy conservation, messages, parents were not the most likely target receiving those messages. Only 6 out of 47 (13%) parents of girls who completed *Tell the World* patches documented seeing the girls' energy conservation videos.

Just over one third of these parents also indicated other ways the girls were sharing energy saving messages at home. Thus, the parent goal indicator of "75% of parents of girls completing the *Tell the World* patch will report receiving a girl-created message using technology about energy conservation" was not met and is likely not the best indicator for this goal. Cadette girls talked to their parents about energy use, but not necessarily sharing their technology messages with them.

During the Field Test, eight of nine troops (89%) sent documentation of their media project for their *Tell the World* patch.

- 7 troops completed action videos
- 1 troop completed a still video
- 1 troop created individual animations using SCRATCH

The outcome surpassed the goal indicator to receive 75% of the technology-based creations from the troops doing the *Tell the World* patch.

All presentations contained unique ideas of how to communicate energy-saving messages to others. Some girls took on an extra challenge by learning new technology skills, such as animation programming with SCRATCH software to create their messages.

We reviewed the *Tell the World* messages for four criteria:

1. The girls used some form of technology to create their energy saving message.
2. An energy conservation message was clearly conveyed.
3. The message made a connection between energy use and climate change.
4. The message clearly conveys to the viewer why he/she should follow the prescribed energy saving action.

All troops delivered an energy conservation message to the audience. Some girls focused on one action, such as turning off the computer when not using it while others listed several actions that one could take to reduce energy consumption. The girls were creative about how they delivered their message and often used themes as part of the messaging.

- One troop used a bunny costume, revising the already well-known Energizer bunny to an energy conservation bunny. This bunny enforced turning off electronics that were wasting energy.

- A couple troops used "mother nature" or "daughter nature" roles to voice the environmental impact of energy use.

- Some troops exaggerated wasteful energy habits to make a point about how one can easily conserve energy by simply being more mindful in everyday actions.

Making the connection of energy use to climate change in girls' messaging, however, was rare. Only a couple of troops made a clear connection to climate change—these were fairly weak connections (e.g., stating that wasting energy would negatively impact gecko habitats or that driving

Goal III: Using Technology to Create and Send Conservation Messages, cont'd.

cars pollutes the air, which can affect the survival of humans and animals.)

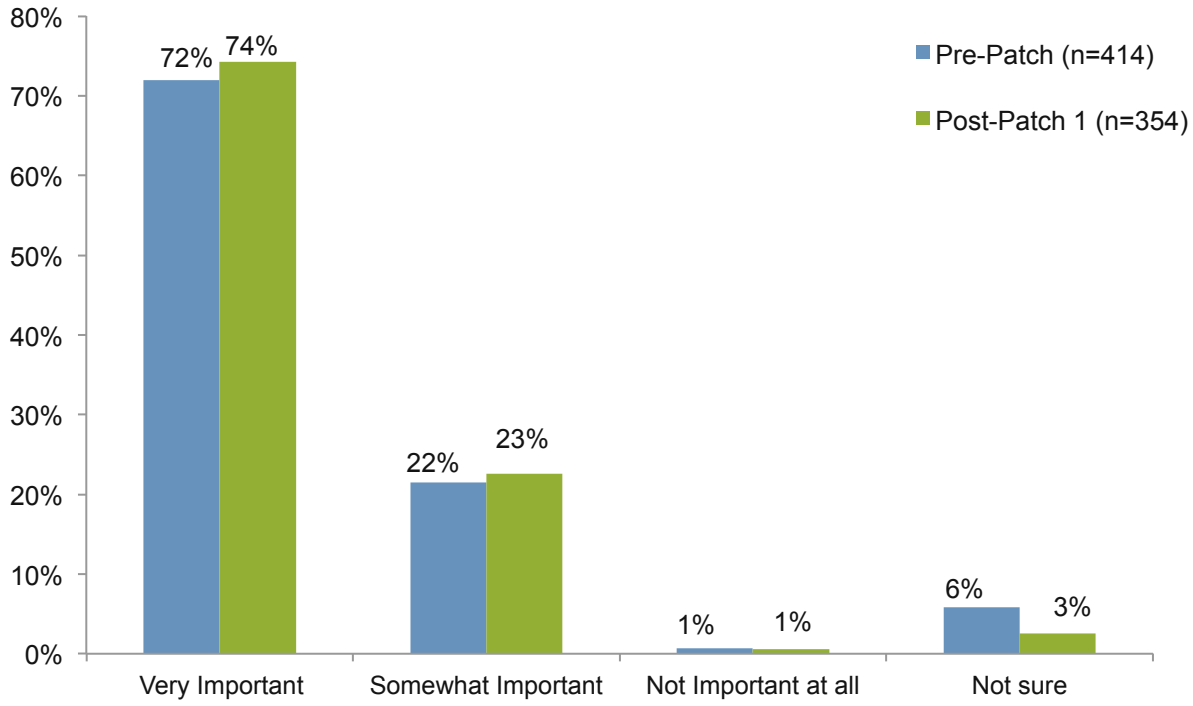
All but a few of the messages effectively communicated why he/she should take the prescribed energy conservation action. For instance, the weakest messages contained slight references to a high energy bill, but failed to explain why the viewer should conserve energy beyond it being wasteful. Most actually failed to mention any reason to conserve energy at all.

While some girls created very simple, but very effective messages, others wrote and acted out elaborate skits and even wrote and sang their own songs about conserving energy.

Goal IV: Understanding the Power of Working Together to Reduce Climate Change

This goal focused on the understanding that the power of "collective action" can help address an environmental problem. As part of measuring girls' understanding, surveys included the question: "How important is it for everyone to save energy in small ways to reduce climate change?" We found relatively high proportions of importance ratings both prior to and after the patch activities.

Figure 18. Ratings to Question: "How Important Do You Feel It Is for Everyone to Save Energy in Small Ways to Reduce Climate Change?"



Goal IV: Understanding the Power of Working Together to Reduce Climate Change, cont'd.

One indicator for this goal was that girls who engaged in at least one collective action activity would rate the importance of collective action higher at the end of the program than at the start. We analyzed results for girls who only completed patch activities that focused on collective action. We did find slight, but significantly higher ratings from baseline to post-survey after the first patch (Wilcoxon related sample signed-rank significant tests, p=.012) and third patch (Wilcoxon related sample signed-rank significant tests, p=.023) but not for the second patch. (There were no significant differences between Juniors and Cadettes.)

While increases were statistically significant, they were very small. At baseline, 72% of the girls rated collective action for energy conservation as "very important" and ratings steadily increased by about 2% after each patch (76% at patch two and 78% after the third patch). There was likely a selection bias for the girls who completed multiple patches, however. Thus, the increase after the first patch is the most valid measure.

The majority of girls took part in either one (41%) or two (47%) collective action activities (see Table 37).

The program aimed for girls who engaged in more than one collective action activity to rate the importance of collective action higher than those who undertook one or no collective action activities. Girls who engaged in more than one collective activity failed to statistically significantly differ in ratings of the importance of collective action than those who completed one activity or less (Pearson Chi Square Exact test sig=.872).

During troop observations, we saw low to moderate amounts of evidence that participating girls were deepening their understanding of ways small energy conservation actions can add up to help reduce climate change.

Although girls were already coming into the GECCo program with high levels of understanding the importance of joining together to make a larger environmental impact, we did observe

Table 37. Percentage of Girls Participating in Collective Action Activities by Number of Activities

# of Activities	% Participation
1 Activity	41%
2 Activities	47%
3 Activities	6%
4 Activities	4%
5 Activities	0%
6 Activities	1%

Goal IV: Understanding the Power of Working Together to Reduce Climate Change, cont'd.

Increased awareness of "how" they could work together to make a bigger environmental impact.

- Although the "What Color GECCo are You?" activity is not explicitly focused on how little actions can add up, activity the questions generated conversations based on girls' personal experiences. One girl, for example, shared that her family turned off the lights only when watching TV and shared that they saved a lot of money on their energy bill. The troop later discussed the possibility of using this action as a way the whole troop could save energy as part of a collective effort.

- The "CO_2 Race" activity helped the girls understand that people's actions can create an unbalanced ecosystem if they produce carbon dioxide at faster rates than trees can convert back to oxygen. It was clear that some girls did not know that humans contributed to climate change and learned that they did through the activity.

- During the discussion that followed the "Down the Drain" activity, the troop leader asked about the purpose of the activity. The girls responded with comments showing their growing understanding of how much water can be conserved during common activities:

  - *To show how much water you can save by shutting off the faucet when you wash your hands."*
  - *"A little water goes a long way."*
  - *"One girl was surprised by how much water was used in 20 seconds."*

- After engaging in the "Paper Clip Shower" activity, the girls were asked what they learned from it. One girl said, "Taking a minute off can make a big difference," indicating that she understood how doing something small can add up to have a big impact.

- During the "Watts-it-Take" activity, the girls showed surprise at how much energy some appliances, such as laptops and hairdryers used. One girl, after seeing the laptop taking three watts of electricity before it was even turned on said she would tell her mom to turn her computer off given that even using three watts of electricity can add up over time.

- The girls chose the slogan "Power Down" to help spread the word to more people about the importance of turning off lights and "powering down" all electronics in order to collectively conserve energy.

- During discussions about sharing conservation messages with younger troops, girls discussed the importance of taking shorter showers as one possible focus. They called the project "The Power of the Five Minute Shower."

Conclusions

Conclusions: Overview

Overall, we found moderate levels of increased knowledge about climate change for Juniors and low or undetectable levels for Cadettes. On the other hand, troop leader feedback and observations show that learning about "how" to conserve energy was a core asset of the GECCo program.

Differences in learning about climate change are associated with a stronger focus around climate change learning in Junior patch activities compared with Cadette activities as well as troop leader expectations of the patch activities and girls.

The level at which climate change messages were integrated into activities affected climate change knowledge scores. Analysis confirmed that girls who engaged in patch activities that integrated climate change information into the activity increased the number of questions they answered correctly more than those girls who engaged only in activities that provided non-integrated climate change information in the patch activity guide or had no inclusion of climate change information. The effects were moderate and statistically significant (n=356, Pearson Chi Square, p=.019).confirming that level of exposure to climate change information was a contributing factor that was related to knowledge gain.

Having strong rationale for one's actions is a core element of sustained behavioral shifts. Strengthening this component of the program will not only raise their girls' intellectual knowledge, but it will also help them justify their actions and communicate more effectively why others should join them in conserving energy.

Our observations and review of the program structure suggest small revisions of the patch requirements and program materials to increase the learning around climate change across the patches and Girl Scout levels.

Most information exchanges around climate change were observed during the "Energy Challenge" discussions. The "Energy Challenge" could be revised to incorporate key climate change learning points and the "Energy Challenge" could be required for all patches to maintain consistent access of the information across all patches.

At least some of the program's efficacy in learning new knowledge can be attributed to the troop leader's facilitation skills and perceptions. Events with trained facilitators mentoring the girls through activities is one way to overcome troop leader differences and some form of troop leader training would be another.

The GECCo program was moderately effective on increasing both Girl Scout and troop leader energy conservation behaviors. Most constructs show adequate strength to support sustained behavior change. The weakest link, as mentioned above, is knowledge acquisition around climate change for the girls.

Our results also illuminate age differences around the identified behavioral change constructs. We attribute some variation in outcomes to be associated with developmental differences of the participants rather than the patch curriculum. Our findings suggest that the constructs developed for adult behavioral change models may need to be adapted for pre-adolescent youth.

Conclusions: Overview, cont'd.

While we are unable to fully explain the effects of age, it is worthy to mention to guide future behavioral research studies for youth.

We also found the different behavioral construct outcome measurements support the program's decision to move three patches that expand the focus from individual energy saving behaviors to helping others conserve energy to the older girls at the Cadette level. The Cadette girls were developmentally more ready than the Juniors to help others shift their behaviors.

We found some limitations for GECCo Junior girls to access technology and use it to send energy conservation messages.

Less than one-half of Junior troops had access to computers and the Internet during their meeting time. The development team responded appropriately by 1) moving many of the technology-dependent activities to the Cadette level where about 90% of the troops had access to computers and Internet during troop time and 2) hosting regional events where the Girl Scouts could access both technology and facilitators who were experienced in using the technology. These shifts were effective in providing technological access to the girls.

We found that the majority of Cadette girls working on the *Tell the World* patch that emphasized the use of technology, were successful in creating and sending media-based messages. A smaller proportion of girls completing other patches also used commonly accessible technology to send messages.

We found evidence that 1) some troops struggled with new technology and could use technical assistance and 2) weakness in understanding the connection between energy use and climate change affected the girls' ability to deliver more efficacious energy conservation messages.

Girl Scouts came into the GECCo patches with very high ratings around the importance of collective action to help reduce climate change making it more challenging to detect the effects of the patch. We did find slight statistically significant increases that were supported with both troop leader feedback and observations that provided evidence of growth for the girls in increasing their awareness and learning in this area. The combined evidence shows the GECCo patch activities were effective in helping increase the girls experience of and awareness around the impacts that collective energy conservation efforts can have on reducing global warming.

Conclusions by Goal: Goal I – Increase Knowledge about Climate Change

On the whole, girl scouts deepened their understanding of climate change. Increasing knowledge is an important component of sustainable behavior change. Humans need strong rationale to persist in behaviors that require effort or the behavior will cease to persist as soon as environmental supports are removed. Most girls in this program had already been exposed to two rationales for conserving energy: 1) it is good to conserve energy, recycle, and "be green," and 2) it saves money for the family.

Many girls, however, did not fully comprehend how conserving energy helps maintain a healthy, balanced environment, or that their small actions can even have an impact on climate change. Helping participating girls understand how energy use relates to climate change will add a third rationale to the girls' repertoire, expanding on the possible explanations to draw from to motivate their energy-saving actions.

A high proportion of girls came into the GECCo program saying it is very important for everyone to save energy in small ways to reduce climate change.

Participating Girl Scouts also came into the program with limited understanding of how energy use links to climate change. Increasing participants' understanding of the topic, which also provided the girls with greater ability to articulate and communicate the reasons for their actions (as well as to help convince others of the importance of conserving energy).

As expected, younger-aged Juniors came into the patch activities knowing less about climate change than did Cadettes. Statistical tests showed significant increases in Juniors' composite scores after completing one patch. While Cadettes appear to have increased their composite scores after one patch, statistical tests failed to show significant increases.

We disaggregated the climate change questions to help illuminate the depth of participating girls' understanding of climate change. A higher proportion of girls answered questions that only required a superficial understanding of climate change and how it links to energy conservation, while questions that required more in-depth understanding were answered correctly less often.

Girls most readily understood that conserving energy through everyday actions can reduce climate change. Many girls had already been exposed to the concept of energy conservation and being "green," which accounted for 67% of the Juniors and 90% of the Cadettes correctly answering this question prior to the program. In post measures, 82% of Juniors and 94% of Cadettes correctly identified which energy-saving actions help reduce climate change.

The next level of knowledge about climate change was measured with a question that aimed to see if the girls understood how carbon dioxide traps the sun's energy, leading to global warming. Only 40% of Juniors and 67% of Cadettes answered correctly prior to beginning the patch. In post-patch assessments 59% of Juniors and 73% of Cadettes answered questions correctly.

Conclusions by Goal: Goal I – Increase Knowledge about Climate Change, cont'd.

Even fewer girls understood how energy use impacts climate change. In pre-patch assessments, only 35% of Juniors and 54% of Cadettes understood that burning fossil fuels for energy adds greenhouse gases to the air. Post-patch scores increased only slightly (only 7% increase in correct answers by Juniors and an 8% increase by Cadettes).

Since understanding the link between energy use and climate change is critical, we also asked the girls for an explanation in their own words of how energy-saving actions help reduce greenhouse gases. Prior to the program, only 5% of Juniors and 19% of Cadettes could articulate a complete explanation of how saving energy reduces greenhouse gases. We saw only a 7% increase for Juniors and a 4% increase for Cadettes in post-patch assessments. Hence, while the girls learned about conserving energy and climate change, few increased their understanding of the link between saving energy and reducing greenhouse gases and even fewer could articulate it.

We also found that the girls did not increase their understanding of the need to keep greenhouse gases in balance and how they function in the environment. We asked a true/false question: "Greenhouse gases keep the planet warm enough to live on. If we add more greenhouse gases, more plants and animals will grow." Prior to the program, 42% of Juniors and 64% of Cadettes correctly answered this question. After completing the patch, 41% of Juniors and 68% of Cadettes answered correctly. Essentially, there was little or no increase in understanding of how greenhouse gases function in the environment.

Troop leaders' perceptions of what the girls learned about climate change from the patches echo the girls' survey results. Junior leaders felt the program was moderately successful in helping girls comprehend the causes of climate change and how energy-use behavior relates to climate change; Cadette leaders rated their troops with little to moderate success in understanding the same concepts.

Furthermore, some Cadette troop leaders conveyed that they felt focusing on the message to conserve energy was enough and that it wasn't necessary to bring in the science of climate change (which at time proved to be difficult). Other Cadette troop leaders thought their girls had already learned about climate change and greenhouse gases through school activities. Roughly a third of the Cadettes failed to correctly answer the three multiple-choice climate change questions both prior to and after completing one of the GECCo patches, however; a fair proportion of the girls could have deepened their understanding with a little attention to the information. It is highly possible that Cadette troop leaders' preconceptions of what the girls should get out of the activities negatively affected some of the Cadettes' learning about climate change.

In addition, both Junior and Cadette troop leader comments about the girls' most significant takeaways failed to mention increased understanding about

Conclusions by Goal: Goal I – Increase Knowledge about Climate Change, cont'd.

climate change. In this case, what is "not" said may tell us that understanding climate change was not a focal point. Instead, troop leaders defined the most significant learning areas as follows:

Juniors
- Awareness of their personal role in energy conservation;
- Increased understanding of the concept that small changes can have a big impact;
- Increased understanding of energy conservation and concrete ways to do it.

Cadettes
- Increased awareness of their own energy conservation habits;
- Increased awareness of their own impact on the environment;
- Increased understanding that small changes can have a big impact.

Troop leader survey questions provided further evidence that these were the key learning areas from the patch activities. The greatest learning among both Juniors and Cadettes related to a deepening awareness of how to increase their energy conservation behaviors in everyday activities. The majority of troop leaders reported moderate-to-high increases (36% to 58% for Juniors) in learning about how girls can increase their own energy conservation behaviors and moderate-to-high (20% to 48%) for Cadettes.

The second highest ratings were about how the girls could help others increase their energy conservation behaviors, which links to the concept of how small actions can add up to larger impacts. The majority of troop leaders reported moderate-to-high increases for Juniors (36% to 47%) in learning about how girls can help others increase energy conservation behaviors and moderate to high increases (27% to 38%) for Cadettes.

Troop leaders perceived that girls had learned less about the causes of climate change and how energy use relates to climate change. In survey responses for how much the troop leaders felt girls increased their knowledge about the causes of climate change, 46% of Junior troop leaders reported moderate increases and 24% high increases. For Cadettes, 42% troop leaders reported moderate increases and 15% high increases.

In survey responses for how much troop leaders felt participating girls increased their knowledge about how their energy use relates to climate change, 47% of Junior troop leaders reported moderate increases and 35% high increases while 42% of Cadette troop leaders reported moderate increases and 23% high increases.

Observation data revealed how easily troop leader planning and facilitation impacted the girls' learning about climate change information. When troop leaders provided opportunities for girls' to reflect on the ideas presented in activities, girls more readily deepened their learning. For example, we saw this facilitation skill work well during "Carbon Ballet" and "CO2 Race," when troop leaders helped girls reflect about what they were learning and checked that girls' understood the ideas. Not all troop leaders did this, resulting in missed opportunities for learning.

We also observed that the majority of discussions about climate change information occurred during the "Energy Challenge" activity. Thus, the requirement that all patches include

Conclusions by Goal: Goal I – Increase Knowledge about Climate Change, cont'd.

the "Energy Challenge" component will be useful to keep. Currently, the *Tell the World* patch does not require this activity; we strongly suggest it be added as a requirement.

While few girls doing the *Tell the World* patch incorporated climate change information in their videos, those who attempted to showed little understanding of the material. In addition, if "Energy Challenge" is required for all patches, this provides an opportunity to strengthen core climate change content in this particular activity, providing all girls the chance to deepen their understanding and convey this important content in the future.

As discussed earlier, the extent to which an activity integrated climate change messages influenced knowledge gain. Thus, level of exposure was an important factor.

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors

The largest impact of the GECCo patch activities appears to be an increase in energy conservation behaviors for both the girls and the troop leaders. While this particular evaluation cannot determine how long energy conservation behaviors will last, we do have clear evidence that both the girls and troop leaders increased their behaviors while completing the patch materials.

Girl Scout Behavioral Change

We examined the processes involved in change along with the stages of change the girl scouts exhibited around specific energy conservation action measures. By examining the multi-dimensional nature of behavior change, we can identify the strengths and weaknesses that may impact long-term behavior modification.

Energy Conservation and Climate Change Knowledge

We observed slight increases in energy conservation knowledge during patch activities; troop leaders reported moderate increases. It is notable that among the significant learning points the troop leaders described is that girls increased their awareness of their own energy conservation habits as well as how they can increase their energy conservation. We observed similar learning points at both Junior and Cadette troop meetings.

We saw moderate increases in Juniors' rudimentary understanding of climate change, and few girls could articulate how energy use is associated with climate change. Junior Troop leader comments were consistent with our findings.

Any increase in understanding of climate change measured by multiple-choice survey questions was not statistically significant for Cadettes. Their lack of increase in ability to articulate how energy use links to climate change on open-ended questions, and Cadette troop leader comments, were consistent with the multiple-choice question findings.

Furthermore, some Cadette troop leaders conveyed that they felt that focusing on energy conservation was enough, cuing us that Cadettes may have limited opportunities to expand their knowledge in this area.

Motivation to Help Reduce Climate Change

Going into the program, Juniors had statistically significant higher ratings than Cadettes regarding how much they wanted to make a difference in climate change; 47% of Juniors and 22% of Cadettes "really, really wanted to make a difference." Differences were no longer significant after completing one patch, and Juniors felt less motivation to "make a difference" at levels comparable to Cadettes. After one patch, the highest proportions of girls (44% Juniors and 53% Cadettes) just said that they "want" to make a difference, rather than "really, really want" to make a difference. While Juniors decreased their motivation after the initial patch, both Juniors and Cadettes demonstrated moderate levels of motivation in their ratings.

Parental feedback confirmed the Scouts' motivation, with 86% of Junior parents and 85% of Cadette parents reporting that their girls increased their interest in conserving energy at home. Likewise, we observed moderate levels of motivation during patch activities. The girls were motivated to use the crafts they made to save energy or to remind others to save energy. Almost all girls were also

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors, cont'd.

highly energized when they talked about how they could remind siblings and adults in their family to conserve energy.

In the troops we observed, the higher levels of motivation only helped about half of the girls remember to complete their "Energy Challenge" pledges, however. Hence, discussing ideas to conserve energy was highly motivating, but not always enough to carry them into action.

Juniors evidently became more aware of what they were ready to do after putting their thoughts into action, while Cadettes were probably more clear about what they were willing to do from the start. Because we saw moderate motivation during the patch activities, we do not think the drop in Juniors' motivation levels is due to the activities. Differences between Cadette and Junior responses are more likely due to maturational development.

Identity around sphere of influence

We asked the girls several questions to learn how they thought about how much impact they could make in climate change. These questions helped us understand the girls' identity around energy conservation and self-efficacy, both of which are related to behavior change. We found that high percentages of both Juniors (74%) and Cadettes (90%) came into the program thinking they could make a difference with climate change. This sense of self-efficacy failed, however, to make any statistically significant changes for either Juniors or Cadettes after completing patches. Cadettes retained statistically significant higher proportions of girls who felt they could make a difference with climate change.

We also asked the girls several questions about how much influence they felt they had in energy conservation and in helping themselves, their family, other troops, and their town save energy. Most Juniors and Cadettes thought of themselves as someone who could save energy themselves and the numbers of girls affirming this vision increased after completing a patch. We saw, however, a downward trend; significantly fewer Juniors thought that they could help their families, other troops, or their towns save energy after completing one patch. This downward trend was not seen for Cadettes, whose proportions of girls seeing themselves as able to help other troops (and even their town) save energy increased after completing one patch.

The Juniors' downward trend could be due either a stronger focus on personal or family energy conservation in the patch activities, or to maturational development. We believe the latter had a strong influence here.

The Cadette patch activities exhibited a stronger orientation towards helping other troops (or community members) conserve more energy, which is consistent with the increased motivation and self-efficacy evident in the Cadette outcomes. Cadettes, however, may just be more ready to help others with energy conservation behaviors than their younger counterparts. These results may serve as evidence that the Junior and Cadette patch activities are age-appropriate.

Increased Skills in How to Support Energy Conservation

Troop leader observations indicated that girls are learning how to increase their energy-conservation behaviors. Participating girls increased their energy-saving in two ways:

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors, cont'd.

1) learning how much water can be saved when taking shorter showers or mindfully turning off water when brushing teeth and washing hands; and 2) learning to remember (or help others remember) to conserve energy through supports such as reminder bracelets, posters, or energy-conservation messages. Using creative ways to keep energy conservation in mind was one strong component of the patch activities' focus on supporting girls' increased energy-conservation behavior. Each patches had at least one activity in which girls created reminders for themselves or others to conserve energy. Junior activities focused on reminding the girls and their families, while Cadette messages included spreading the word to other troops and the greater public.

Making a commitment

Making commitments is also a component of embracing behavior change. The "Energy Challenge," which requires girls to commit (or "pledge") to do weekly energy-saving activities, is currently required for all patches except *Tell the World*.

One of the Goal II indicators for behavior change was for 75% of the girls to electronically log their "Energy Challenge" actions. Cadettes met this goal, with 82% of the troops completing either the *Travelin' Green* or *Power Down* patches entering their "Energy Challenge" actions online.

Only 42% of Junior troops entered their energy savings online, but they were allowed to track their actions on paper due to the lack of Internet access during troop time.

73% of troop leaders reported completing the "Energy Challenge," including those earning the *Tell the World* patch. (Omitting the *Tell the World* patch troops not required to do the activity, 87% of the troops completed the "Energy Challenge," exceeding the online behavior logging goal.) This percentage is similar to that of parents who said their girls increased their energy-saving activities at home while doing the GECCo patch. Parent feedback and patch activity completion logs provide evidence that most girls at least attempted to follow through on their commitments.

Our observations illuminated that only half of the girls we observed followed through with their pledges, however. We expect that the actual proportion of girls following through to be somewhere above the 43% of logged energy savings and the 87% of troops who completed the "Energy Challenge."

Another measure of commitment to change is evidence of intention to take action. We observed girls' intentions to save energy at home in their discussions of how they would put their energy-saving craft projects to use (e.g., where to hang reminder posters or place draft blockers or who they would give reminder bracelets.)

We also used survey questions to assess girls' willingness to take specific actions to conserve energy, including using less water when bathing, riding the bus, using less air conditioning, and passing out energy-conservation information in their neighborhood. Going into the program, Juniors were more willing to use less water when they bathed or pass out information about energy conservation, while

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors, cont'd.

Cadettes were more willing to ride the bus. The only behaviors showing statistically significant increases were in willingness to use less water for bathing (Juniors and Cadettes) and riding the bus more often (Cadettes). Juniors actually showed less willingness after the program to pass out energy conservation information at houses. (Juniors' willingness to increase their own energy-saving behaviors stays in their personal spheres of action rather than extending to the community.)

Girl Scout Energy Conservation Behaviors

When designing behavior change programs, it is important to know how ready the participants are to engage in the desired activity to gauge what they need to move to the next step. We found, as expected, that more girls were ready to conserve energy in ways closer to their personal spheres. Higher percentages were ready to save energy themselves, slightly less would help their families save energy, even fewer would help another troop save energy, and very few would help their town save energy.

Approximately one-third of the girls began the program saying they were already saving energy. We found that the program activities helped girls move from readiness to save energy into the action stage; after completing the patch, slightly more than half of the girls said they were already saving energy. The shifts were statistically significant for Juniors and Cadettes.

Shifts, however, for moving to the action stage of helping their families or other troops save energy were only statistically significant for Cadettes. Shifts beyond the personal sphere of influence occurred in smaller proportions of Girl Scouts than did shifts for personal action.

These results are consistent with Juniors' motivation and self-efficacy beliefs, while Cadettes see themselves as agents of change for a sphere beyond themselves. It is interesting to note that Cadettes provided higher identity ratings than readiness for action ratings, however.

Finally, we asked the girls directly if they engaged in three energy-saving actions: turning the water off while brushing their teeth; turning off unused lights at home; and talking with parents about how to help save energy.

Prior to the program, high percentages of both Juniors and Cadettes responded that they either turned off water when brushing their teeth or turned off lights when not using them. Fewer girls said it was true that they talked to their parents about how to help conserve energy, however, with Cadettes showing statistically significant lower ratings than Juniors.

Statistical significance tests also showed that both Juniors and Cadettes significantly increased turning off lights when not in use and talked to their parents about how to help save energy after completing one patch. After the one patch, approximately two-thirds of girls said it was "very true" that they turned off lights when not in use up, from around one-half prior to completing the patch. About 19% of Juniors said that they talked to their parents about

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors, cont'd.

how to save energy prior to the patch, 26% said they did so after completing the patch. About 13% of Cadettes said it was "very true" that they talked with their parents about saving energy prior to completing the patch, while 25% did after.

Overall, evidence shows that participating girls increased their energy-saving activities after engaging in the GECCo program. Several components help us interpret the effects of the program. For instance, while Juniors increased their knowledge, they decreased their ratings of how much influence they felt they had in energy conservation. Their ultimate outcome was increased energy conservation in select areas.

The array of behavioral change constructs suggest that Juniors have the knowledge, identity/self-efficacy, and motivation to maintain their own energy-saving actions, but not to help others save energy. Their limited understanding of how energy use links to climate change may weaken the sustainability of their actions over time, though we believe the outcomes are realistic for girls of this age to accomplish over two girl scout meetings.

While Cadettes failed to gain statistically significant knowledge in climate change, their identity/self efficacy ratings remained strong after the program, and their readiness to change behaviors increased over three spheres of influence (self, family, and other troops). Cadettes also increased their energy-saving behaviors for specific actions. Despite not gaining more knowledge about climate change, the Cadettes still accomplished realistic behavior change outcomes for the duration of the program.

Cadettes are at a prime age to understand the deeper aspects of climate change and to articulate it to others. Some girls struggled with articulating climate change information in their *Tell the World* videos, however, which reduced the efficacy of the messages.

Assessing multiple components of behavior change, indicated differences between Juniors and Cadettes that are likely to result as much from their maturity level as the program material. Younger Scouts may not respond the same way to behavior-change interventions as the older ones. For example, Juniors were not ready to help others change their energy-saving behaviors, but were ready to make changes to their *own* behavior. Cadettes, though only a couple of years older, were ready to help others change their energy-conservation behaviors.

The program activities expanded the Cadettes' perceived sphere of influence, but the Juniors' sphere contracted. We suspect that Junior girls may still be forming their identities, causing them to misjudge ratings until they have enough experience to answer in a way that aligns with their realities.

We also found that developmental differences occur when using adult-tested behavior change models and constructs with youth. It is important to deconstruct these differences in future studies to apply them to youth behavioral change models and theories.

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors, cont'd.

Troop Leader Behavioral Change
We also examined troop leaders' similar processes and stages involved in behavioral change. Examining the multi-dimensional nature of behavior change allows us to identify how troop leaders engaged in behavior modification.

Knowledge
Most troop leaders felt that they gained either a little bit or a moderate amount of knowledge concerning climate change. Variations in knowledge were apparent, as some leaders had extensive knowledge due to being teachers, while others exclaimed that they didn't really know the details around climate change prior to working with the program.

Troop leader comments also reflected similar patterns of exposure to climate change information as Junior and Cadette Girl Scouts had. Junior troop leaders were exposed to more details about climate change, since the Junior patch activities had a stronger focus on the information. Both Junior and Cadette troop leaders felt they increased their awareness and understanding of their personal conservation habits and how they could reduce their impact on the climate.

Attitudes / Beliefs
Both Junior and Cadette troop leaders increased their ratings of the importance of reducing climate change, how much their own energy conservation efforts could impact climate change, and how they felt people making small energy savings could impact climate change after participating in GECCo. Increases in attitudes and beliefs in these areas show that what troop leaders learned impacted their perceptions of humans' potential role in reducing climate change. Within the GECCo environment, troop leader attitudes and beliefs are important components of the efficacy of the activities, since their attitudes and actions impact how they facilitate the activities and how the girls learn.

Motivation
Junior and Cadette troop leaders agreed that the program raised their motivation to reduce climate change. (Cadette leaders were less convinced than Junior leaders that the program positively impacted their motivation to reduce climate change.) The leaders who said their motivation failed to increase noted either that they were already motivated or that reducing climate change was not central to the program material. Ratings for leaders' desire to help others understand how conserving energy impacts climate change rose in statistically significant ways despite some troop leaders' more neutral comments.

Leaders identified four areas that helped motivate them to conserve energy: 1) increased awareness of personal conservation habits; 2) creative ways to promote energy conservation; 3) better understanding of personal ability and power to impact others; and 4) the importance of group effort in motivating people to conserve energy. As a result of working with the program, troop leaders also increased their desire to organize community efforts to conserve energy from "no desire at all" or "a little desire" to "moderately low" to "moderate" levels of desire.

Conclusions by Goal: Goal II – Increase in Energy Conservation Behaviors, cont'd.

Identity
Troop leaders also increased their sense of identity as people who could save energy themselves, help their families save energy, help other troops save energy, and help their towns save energy. Their ratings increased in a pattern consistent with the Cadette girls (higher increases of influence on their own or their family's actions, lower ratings in seeing themselves helping another troop or town.)

Increasing Conservation Behaviors
Troop leaders felt the program had "a little" to "a moderate" impact on their energy conservation. They also increased the amount they thought about ways to conserve energy from "very low" or "moderately low" to "moderately high." Finally, troop leaders also increased energy-saving behaviors across all measures.

We found significant impact across the board on all the constructs identified as important components of energy-conservation behavioral change. As role models for the girls, troop leaders must show the attributes they want the Girl Scouts to achieve. The GECCo program activities helped raise the troop leaders' consciousness about climate change and energy conservation, which created a strong, supportive environment for the girls to experience similar growth.

The construct showing the weakest increase was Cadette leaders' knowledge of climate change. This weakness is consistent with the Cadette Girl Scouts' lack of statistically significant gains in climate change knowledge.

Conclusions by Goal: Goal III – Using Technology to Create and Send Messages

GECCo aimed to increase technology and new media in Girl Scout programming. Bringing tech into the program activities proved to be challenging, since fewer than half of Junior troops had access to computers or the Internet. We also found that GECCo that Girl Scout culture is heavily oriented toward social interaction and crafts rather than technology-based activities.

The program worked around these access issues in two ways: 1) The more heavily technology-oriented activities were moved to Cadette level patches, where 90% of the troops had access to computers and the Internet for troop use, (rather than under 50% for Junior troops, and); and 2) GECCo patch events were designed to bring girls to places with access to high technology and facilitators versed in how to use it, giving girls an optimal learning environment. Because the events were added after the evaluation design was set, we lack details of the events other than descriptions of the content and attendance.

As expected, Juniors relied more heavily on word of mouth and non-technology messages—such as reminder bracelets or posters—to spread the word about conserving energy. Even so, some Juniors reported using forms of technology to spread the word, such as emails or texts.

Despite many Junior troops' limited access to the Internet, GECCo Internet resources *are* being used, with most activity centered around viewing program resources and logging into the "Energy Challenge" to pledge (and enter) energy-saving activities. The "Home of the Green Gecko" game is also being viewed, but we have no way to directly measure whether girls play the game or which troops play the game.

We focused more on Cadettes, who had better access to the Internet, to better understand how patch activities helped the girls increase their exposure to technology and how they could impact energy conservation. Cadettes showed slightly more use of technology than Juniors, as expected. They also had the option of completing the *Tell the World* patch, which was oriented toward spreading energy conservation messages using technology.

About 85% of the Cadettes doing the *Tell the World* patch said that they created a technology-based product to share an energy conservation message. While slightly fewer than half of them sent one product, a fourth sent two products and one-fifth sent three products.

The most popular product was an action video (70%). While one indicator fell short (only 36% of the parents, rather than 75% of the parents of the girls completing the *Tell the World* patch, reported receiving a girl-created message using technology about energy conservation), the girls doing the patch created products that they sent to us and/or posted on Internet sites such as YouTube. We received tech-based products from all but one troop (89%), surpassing the goal indicator of 75%.

These products reflected the learning trends mentioned in the first two goals. The girls did a good job in incorporating energy-saving messages that helped viewers understand *how* they could conserve energy as well as *why* the viewer should do so. Mirroring Goal I learning outcomes, however, the girls

Conclusions by Goal: Goal III – Using Technology to Create and Send Messages, cont'd.

did not incorporate clear messages about the connection between energy use and climate change. Also, some of the troop leaders' comments noted that it was challenging for the girls to develop a video without the necessary knowledge base.

Overall, *Tell the World* gave the girls an opportunity to be creative while working together to help others understand how and why to conserve energy. Some troops struggled with the new technology, however. The troop that created animations using SCRATCH had trouble completing their messages and posting them without help. This indicates that without guidance, some troops may not complete the activity. Technical assistance to help the girls create media-based products may be necessary.

Clearly, creating products and messages using technology was fun and challenging for the girls, but technical assistance mentors and technology events may be necessary to help the troops incorporate some new media activity into their agendas.

Conclusions by Goal: Goal IV – Understanding the Power of Working Together to Reduce Climate Change

As part of the effort to inspire girls to spread the word about the importance of energy conservation, GECCo aimed to help them understand how big an impact collective action can have. In other words, making small energy-saving changes on a personal level can add up over time and many people taking energy-saving steps can lead to an even larger impact.

We found that 72% of the girls came into the program highly rating the importance of the need to save energy in small ways to reduce climate change. In this regard, the majority of the girls did not need to be convinced of the importance of energy conservation, even in small ways. Some 28% of the girls, however, did not offer the highest ratings of importance, leaving room for persuasion. The program effectively raised the importance level by a couple of percentage points after the first patch, a statistically significant shift. Completing more than one collective action activity failed to show statistically significant larger effects in the girls' ratings, however.

Collective action importance ratings do not describe the whole picture of the patch effects on the girls' learning about collective action, though. As we noticed in Goal I reports on increasing understanding, troop leaders independently identified learning about collective action to be among the most significant takeaways for girls completing GECCo patches. They found that the girls deepened their understanding of how small changes can impact the planet.

Furthermore, we observed multiple instances during patch activities where the girls were learning:

- That human energy use contributes to climate change
- How small shifts in personal and collective energy use can add up over time
- How to decrease energy use in everyday actions

As a whole, we think the GECCo program effectively met its goals for increasing girls' awareness and understanding of how working together in making small energy savings can have a large impact on climate change.

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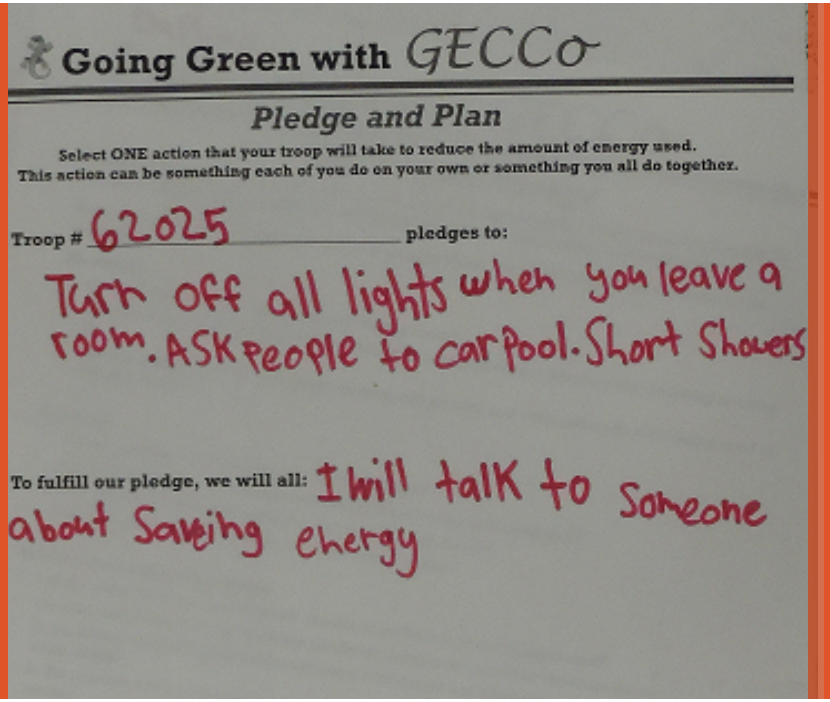

Going Green with GECCo

Pledge and Plan

Select ONE action that your troop will take to reduce the amount of energy used. This action can be something each of you do on your own or something you all do together.

Troop # 62025 pledges to:

Turn off all lights when you leave a room. ASK people to carpool. Short Showers

To fulfill our pledge, we will all: I will talk to someone about Saveing energy

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Appendices

Appendix A: Observed Patch Activity Summaries

Going Green with GECCo

GECCo Challenge provides the structure for the girls to help reduce climate change through their own actions. The troop sets an energy-saving goal and reports their actions to earn money for environmental conservation projects.

Going Green with GECCo provides a way for the girls to see how they currently use energy and identify things they can do to save more energy. The girls answer questions about how they use energy and color their gecko according to their answers. After coloring their gecko, they learn the meaning of the colors, helping them identify ways they are wasting energy. The information and discussion help them find ways to use less energy and help fight climate change.

Carbon Ballet explores the human-caused movement of carbon from a fossil fuel to carbon dioxide in the atmosphere. While a narrator reads the narrated ballet of carbon, the girls act out the cycle of the carbon, resulting in a "dance" that represents the movement of carbon—from deep in the ground to burning in a car to floating in the atmosphere. They learn how the extra carbon dioxide that humans put into the atmosphere by burning fossil fuels traps extra heat from the sun and causes climate change through their actions.

Remind-Me Bracelets allow girls to create something they can wear to remind themselves and others to conserve energy. The girls make bracelets with energy conservation messages and symbols. They can then wear them as conversation pieces or give them to others to spread the word about the importance of energy conservation and the reduction of climate change.

Be Cool

GECCo Challenge provides the structure for the girls to help reduce climate change through their own actions. The troop sets an energy-saving goal and reports its actions, which earn money for environmental conservation projects.

The CO2 Race models how humans are putting carbon dioxide into the atmosphere faster than trees and other plants can get it back out. In this activity, the girls race; one girl spoons rice onto a table, representing putting carbon dioxide into the atmosphere, while another girl (with taped fingers to limit her ability to grasp) takes the rice off the table and puts it in a container, representing trees that remove carbon dioxide from the atmosphere. The girls experience how difficult it is for trees to keep up with humans putting CO2 into the atmosphere, which results in increased greenhouse gases, global warming, and climate change.

The Draft Finder activity helps the girls learn to find drafts and how to block them. The girls use sticks and streamers or tissue paper to actively identify drafts in their room. In addition, the girls learn more about how energy is wasted when heat escapes through drafty areas.

The GECCo Draft Blockers empower the girls to stop drafts by creating crafty gecko "draft blockers" to use at home. This activity enforces the concept of taking action to save energy by fixing drafts they find.

Less Hot Water!

GECCo Challenge provides the structure for the girls to help reduce climate change through their own actions. The troop sets an energy-saving goal and reports its actions, which earn money for environmental conservation projects.

The Down the Drain activity has the girls measure the amount of water wasted during the 20 seconds you soap your hands (the recommended time). Girls conduct an experiment, measuring how much water is collected in a gallon jug over a 20-second period. This exercise aims to help girls understand how much water and energy can be saved if they turn off the tap while soaping

Appendix A: Observed Patch Activity Summaries, cont'd.

their hands. The girls gain an understanding of the energy it takes to transport, purify, and heat water as well as the impact that conserving water can have on climate change.

The Paperclip Shower activity aims to help the girls understand how the little decisions we make every day, like how long we decide to stay in the shower, can impact—good or bad—the environment. The girls use paperclips to represent the number of gallons of water used in showers in the scenarios of three girls. After seeing the baseline gallons of water used with the paperclips they see how much water is saved when the girls change their shower habits. The activity aims to help the girls understand that by just changing their shower or bath routine a little, they can save a lot of water and energy.

Power Down

Energy Challenge provides the structure for the girls to help reduce climate change through their own actions. The troop sets an energy-saving goal and reports its actions, which earn money for environmental conservation projects.

In the Dark uses the scenario of suddenly being in "in the dark" without electricity to generate discussion about how we use electricity and how we can use less of it.

Watts-it-Take? uses a kilo-o-watt meter to see how much electricity certain appliances use. Once the amount is known, girls discuss how long the appliance is used in order to better understand the how much energy it takes up in the house.

Fuel Stomp Theater challenges the girls to use a wide array of communication skills while identifying renewable energy from which to generate electricity.

Wind Words calls the girls to use their creativity in creating an energy-saving banner to hang with a message to remind community members to conserve energy.

Travelin' Green

Energy Challenge provides structure for the girls to help reduce climate change through their own actions. The troop sets an energy-saving goal and reports its actions, which earn money for environmental conservation projects.

Jumping Jack Fuel uses jumping jacks to fuel selected vehicles. The goal is to get from place to place and experience how different vehicles move different distances on the same amount of fuel. How far you move depends on what type of "vehicle" you drive. The purpose is to explore the concept of miles per gallon and the fact that different vehicles use different amounts of fuel.

Silly Travel Tales is an entertaining way to create silly mini-travel stories and then consider the amount of transportation energy used in each.

Chalk-a-Walk uses the fun activity of drawing with chalk on the sidewalk to spread the word about GECCo and saving energy. The purpose is to draw sidewalk-art messages to let people know about the importance of travelin' green. The more people who save energy, the better it is for the environment and to help fight climate change.

Tell the World

The **Live action video** development engages the girls to develop their own scenarios around saving energy that they then act out and videotape. The video is then posted online to share the energy saving message with others across the web.

Appendix B: Participating Troop Retention Rates

Table 37. Participating Troop Retention Rates by Troop Level

Recruitment	# of Troops	Completed	Retention Rate
Juniors	38	24	63%
Cadette *(Year 3)*	18	14	78%
Cadette *(Year 4)*	9	6	67%

Appendix C: Number of Troops Completing Junior Patch Activities

Figure 19. Be Cool

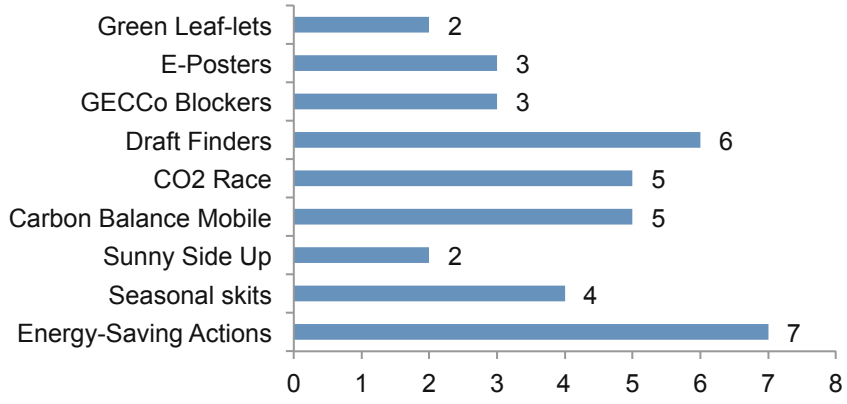


Figure 20. Less Hot Water!

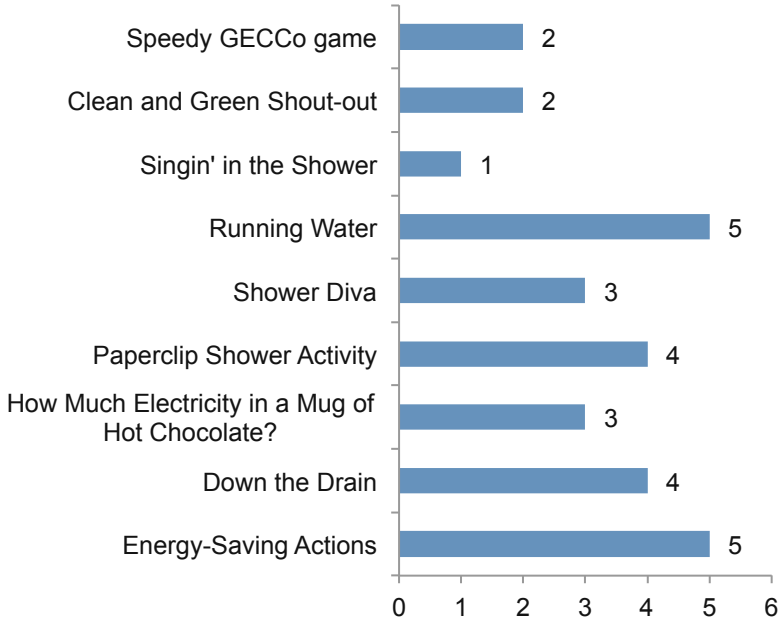
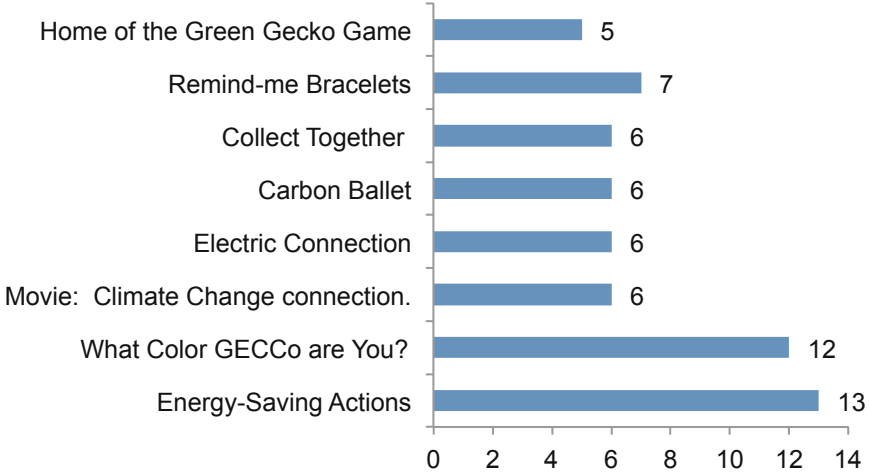


Figure 21. Going Green with GECCo



Appendix D: Number of Troops Completing Cadette Patch Activities

Figure 22. Power Down

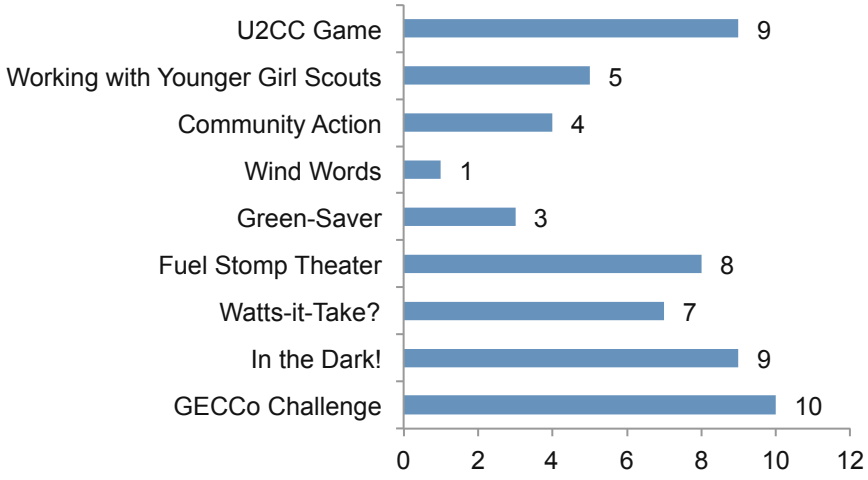


Figure 23. Tell the World

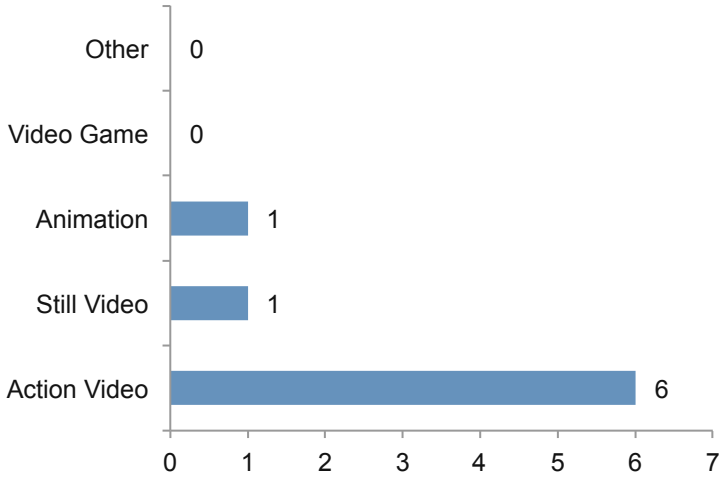
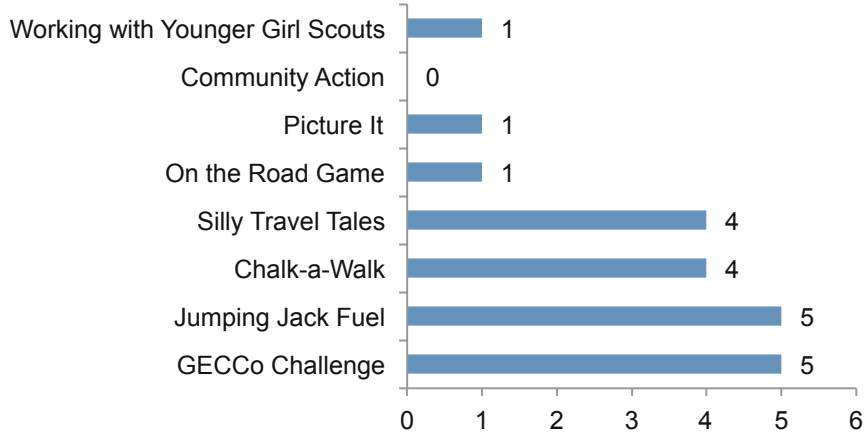


Figure 24. Travelin' Green



Appendix E: Patch Completion

Table 38. Junior Troop Patch Completion Numbers

	Going Green with GECCo		Be Cool		Less Hot Water		Total Count	
Patch Sequence	**# Patches**	**# Girls**	**# Patches**	**# Girls**	**# Patches**	**# Girls**	**# Patches**	**# Girls**
First Patch	15	180	5	53	4	32	24	265
Second Patch	0	0	2	23	2	15	4	38
Third Patch	1	15	0	0	1	8	2	23

Table 39. Cadette Troop Patch Completion Numbers

	Tell the World		Power Down		Travelin' Green		Total Count	
Patch Sequence	**# Patches**	**# Girls**	**# Patches**	**# Girls**	**# Patches**	**# Girls**	**# Patches**	**# Girls**
First Patch	7	70	10	81	3	32	20	183
Second Patch	0	0	1	8	2	16	3	24
Third Patch	2	16	0	0	0	0	2	16

Appendix F: Survey Completion Rates by Survey Type and Girl Scout Level

Table 40. Survey Completion Rates by Survey Type and Girl Scout Level

Survey Type	Number Completed*	Completion Rates
Junior Girl Surveys (Pre- and Post-Patch)	235	79%
Junior Troop Leader Surveys	37	90%
Junior Parent Surveys	134	44%
Cadette Girl Surveys (Pre- and Post-Patch)	121	78%
Cadette Troop Leader Surveys	26	90%
Cadette Parent Surveys	109	69%

**Girls with surveys but without parental consent were omitted from the calculations.*

Appendix G: Girl Scout Demographics

Table 41. Girl Scout Ethnicity by Girl Scout Level

Race/ Ethnicity	Junior n = 267	Junior Percent	Cadette n = 136	Cadette Percent
African American	3	4%	1	<1%
Asian	4	1%	5	4%
Caucasian	159	60%	104	76%
Hawaiian / Pacific Islander	1	<1%	1	<1%
Hispanic / Latino	66	25%	4	3%
Native American	2	<1%	1	<1%
Multiple Ethnicities	5	2%	4	3%
Other	17	6%	1	<1%
I choose not to share	70	26%	19	14%

Appendix H: Troop Leader Demographics

Table 42. Troop Leaders by Race/Ethnicity

Race/ Ethnicity	N	Percent
African American	3	5%
Asian	3	5%
Caucasian	54	86%
Hispanic / Latino	2	3%
Pacific Islander	1	2%

n=63

Table 43. Troop Leaders by Age

Age	N	Percent
18-25	3	5%
26-35	9	14%
36-45	19	30%
46-55	32	51%
55+	0	0%

n=63

Appendix I: Troop Leader Expectations

Table 44. Troop Leader Expectation Ratings by Patch

Patch	Not at all met	A little met	Moderately met	Very well met
Going Green with GECCo (n=20)	-	-	50%	50%
Be Cool (n=10)	-	10%	60%	30%
Less Hot Water! (n=7)	-	-	57%	43%
Travelin' Green (n=6)	-	8%	54%	39%
Power Down (n=13)	17%	-	50%	33%
Tell the World (n=7)	-	14%	57%	29%

Appendix J: Troop Leader Recommendations

Table 45. Troop Leader Agreement Rating for "I would recommend this GECCo patch to another troop" by Patch

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Going Green with GECCo	0%	0%	15%	45%	40%
Be Cool	10%	0%	10%	30%	50%
Less Hot Water!	0%	0%	14%	29%	57%
Travelin' Green	15%	0%	8%	39%	39%
Power Down	0%	0%	0%	50%	50%
Tell the World	0%	0%	43%	14%	43%

Appendix K: Girl Scout Enjoyment

The majority of girls completed only one patch. When data were disaggregated by number of patches completed, we found that the more patches the girls completed, the higher their enjoyment ratings. One interpretation is that the girls who enjoyed the patches were more likely to complete multiple patches.

Figure 24. Junior Girl Scout Enjoyment Ratings by Patch

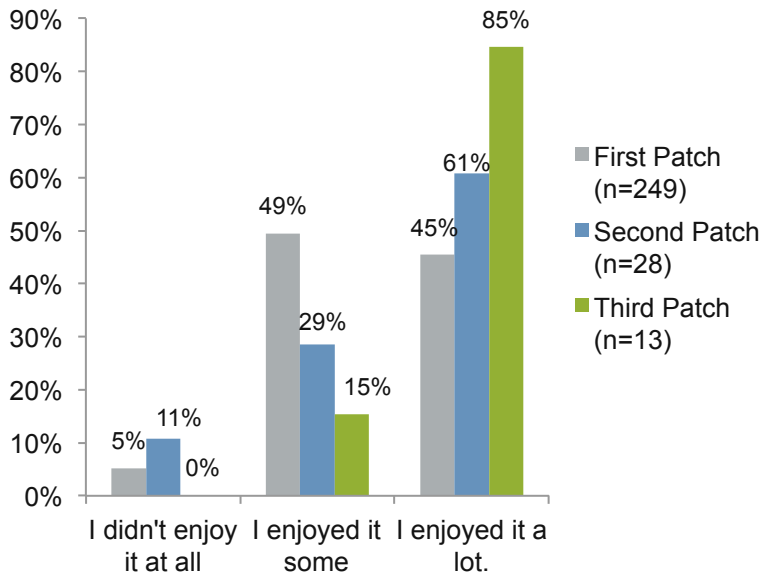
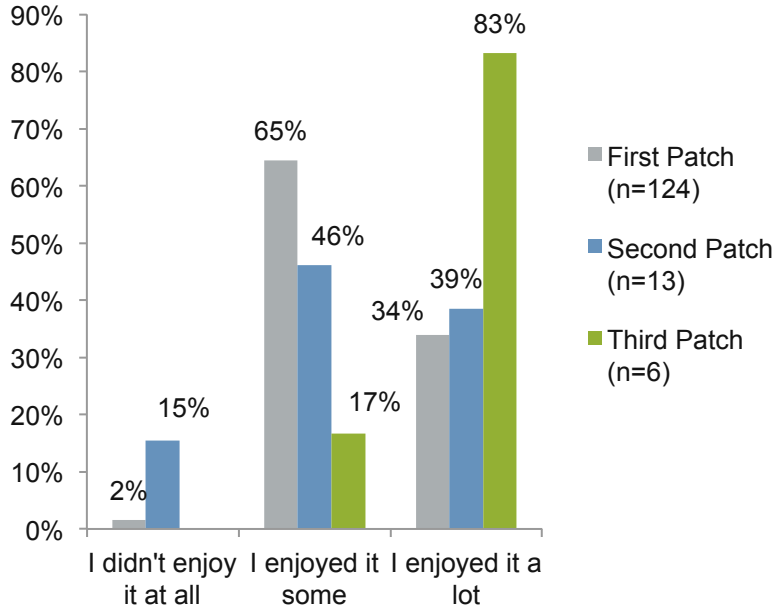


Figure 25. Cadette Girl Scout Enjoyment Ratings by Patch



Independent Mann-Whitney U Test for significant differences between Junior and Cadette enjoyment ratings show no statistically significant differences for any number of patches completed. Patch 1 significance = .102; Patch 2 significance = .272; Patch 3 significance = .966.

Appendix L: Girl Scout Scored Answers for How Energy-Saving Actions Are Related to the Reduction of Greenhouse Gases

Scoring Description

Girls were asked "How do your energy-saving actions help reduce greenhouse gases?" in both the pre- and post-patch surveys directly after documenting their energy-saving actions. Answers were scored according to how correct and completely each girl linked their energy-saving actions to the creation of less carbon dioxide/greenhouse gas via burning less fossil fuels to create energy.

Scoring was completed in the following manner:

1 = Complete explanation: The explanation includes details about how less energy use leads to less carbon dioxide creation and, thus, less greenhouse gas formation.

2 = Partial explanation: The explanation includes talking about using less energy, but without mentioning anything about less carbon dioxide that leads to less greenhouse gases. (Or the answer does not convey any coherent understanding of the link between using less energy and producing fewer CO2/greenhouse gases.)

3 = Don't know, completely wrong, or incoherent answers.

4 = Missing explanations.

Pearson Chi Square and Exact tests show that Junior and Cadette distributions significantly differ for pre-patch (.000) and the first post-patch answers (.002), but not the second (sign=.072) or third post-patch (sign=.102) answers. The results for the significance tests are likely influenced by the small sample sizes and selection biases for the second and third patches.

Appendix M: Girl Scout Scored Answers for How Energy-Saving Actions are Related to the Reduction of Greenhouse Gases, cont'd.

Figure 26. Junior Girl Scouts Percentage of Girls with Correct Answers to "How do your energy- saving actions help reduce greenhouse gases?" by Number of Patches Completed

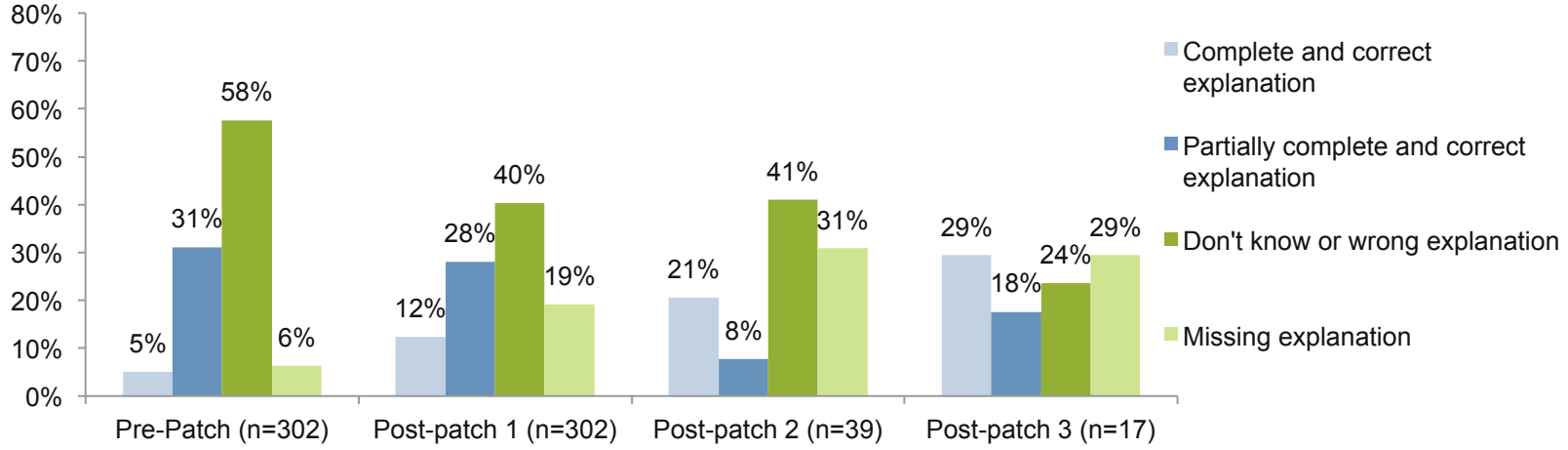
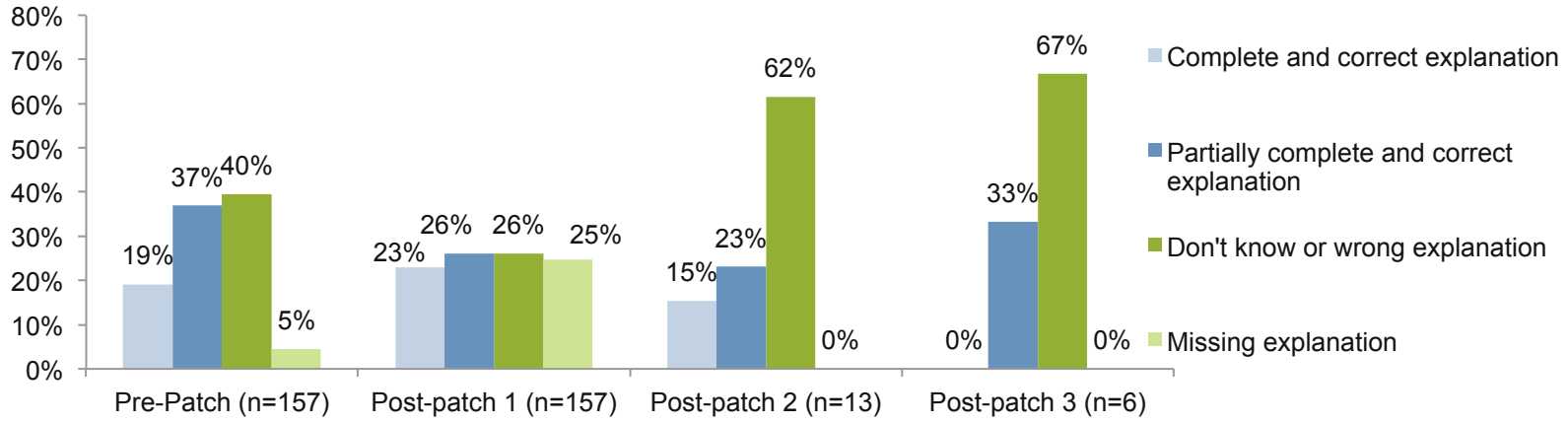
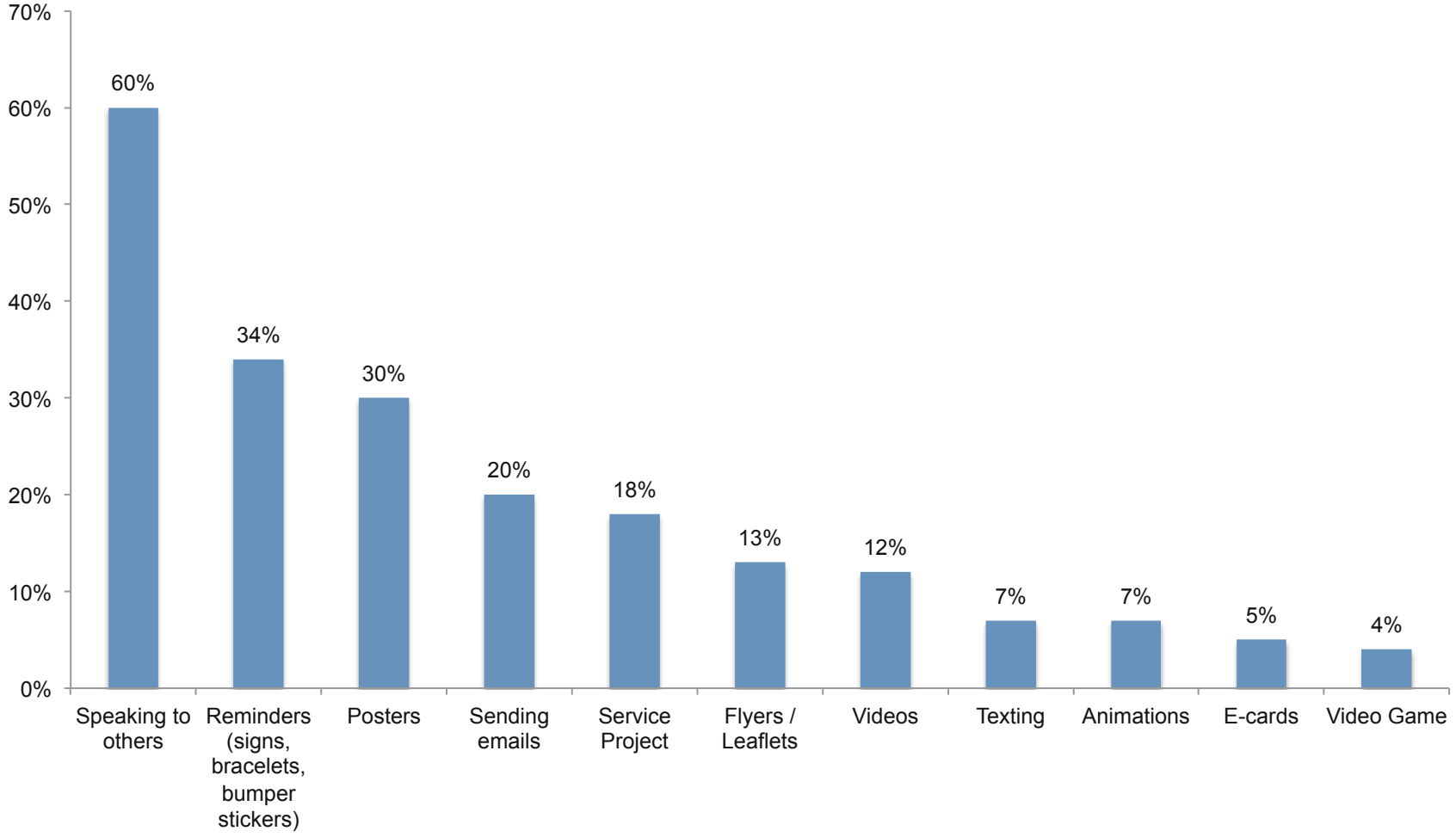


Figure 27. Cadette Girl Scouts Percentage of Girls with Correct Answers to "How do your energy-saving actions help reduce greenhouse gases?" by Number of Patches Completed



Appendix N: Distribution of How Girl Scouts Shared Energy Conservation Information

Figure 28. Ways GECCo Girl Scouts Shared Energy Conservation Information (% of total responses for Cadettes and Juniors combined)



Appendix N: Distribution of How Girl Scouts Shared Energy Conservation Information, cont'd.

Table 46. Ways GECCo Girl Scouts Shared Energy Conservation Information by Level (% of total respondents)

	Juniors	Cadettes	Tell The World
Speaking to Others	63%	52%	51%
Reminders (signs, bracelets, bumper stickers)	39%	22%	9%
Posters	31%	27%	26%
Sending Emails	19%	22%	30%
Service Project	17%	20%	11%
Flyers/Leaflets	16%	23%	6%
Videos	5%	26%	70%
Texting	14%	23%	26%
Animations	5%	10%	11%
E-cards	6%	3%	4%
Video Game	4%	3%	0%

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culturally responsive / contextually relevant /

research + evaluation /