Denver Museum of Nature & Science's *Expedition Health*: Final Research Report

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Prepared for:

Denver Museum of Nature & Science

Prepared by:
Steve Yalowitz, Ph.D.
Cláudia Figueiredo, Ph.D.

About the Institute for Learning Innovation:

Established in 1986 as an independent non-governmental not-for-profit learning research and development organization, the Institute for Learning Innovation is dedicated to changing the world of education and learning by understanding, facilitating, advocating and communicating about free-choice learning across the life span. The Institute provides leadership in this area by collaborating with a variety of free-choice learning institutions such as museums, other cultural institutions, public television stations, libraries, community-based organizations such as scouts and the YWCA, scientific societies and humanities councils, as well as schools and universities. These collaborations strive to advance understanding, facilitate and improve the learning potential of these organizations by incorporating free-choice learning principles in their work.

Table of Contents, Main Report

List of Tables, Main Report

List of Figures, Main Report

List of Appendices

Executive Summary

Denver Museum of Nature and Science's *Expedition Health* Research Study

Supported by funding from the Colorado Health Foundation

Research study conducted by the Institute for Learning Innovation

In April 2009, the Denver Museum of Nature & Science (DMNS) opened an innovative human biology exhibition with a focus on health: *Expedition Health*. The visitor experience is themed around a climb up Mount Evans—one of Colorado's well-known "fourteeners" (14,258 feet in elevation). The exhibition utilizes nine real-life Coloradans as "expedition buddies"—virtual learning companions who accompany visitors throughout the exhibition. The exhibition combines hands-on, full-body activities and real anatomical specimens throughout five different specialized learning environments. These environments include an area for early learners (age five and under) to explore using their minds and bodies, a stage for live performances and demonstrations (including dissections), and a working lab where visitors become active participants in health science research. Peak Pass cards customize and record each visitor's experience, contributing to a personal profile visitors can print and keep at the end of their visit. Following their visit, visitors have access to an extended-experience website where they can view and manipulate their own *Expedition Health* data, play videos they made, and much more as they relive their visits and embark on a lifelong health expedition.

Through generous support and funding from the Colorado Health Foundation, DMNS contracted with the Institute of Learning Innovation (ILI) to conduct a research study aimed at understanding the impact and outcomes of *Expedition Health* on its target audience: youth eight to fourteen year old and their families.

Expedition Health set out with the following four objectives:

- Visitors will have an increased understanding that their health is a combination of their genetics, their choices, and their environment.

- Visitors will have a deeper appreciation that their bodies change in ways they can see and measure.
- Visitors will have an increased understanding that they can positively influence their biology and optimize their health.
- Visitors will actively participate in scientific inquiry to increase their knowledge of human biology and their understanding of the scientific process.

With these objectives guiding the study, the ILI research team—in collaboration with the DMNS Director of Visitor Research and Program Evaluation and members of the Museum's *Expedition Health* core team (including a project manager, exhibit developer, educator, and health science curator)—focused on ***four group outcomes*** to observe and assess during and after *Expedition Health* visits for family and school groups: ***1) personal connections 2) understanding/ knowledge gain, 3) changes in thinking, and 4) changes in behavior.***

Over eight months (July 2009- Feb 2010), multi-method longitudinal research was conducted using both quantitative and qualitative methods. The study included 658 individuals (over half of whom were children). Methods included focus groups with families, school group (student) questionnaires, interviews with families in the exhibition, observation of families in the exhibition, and online surveys (three to four months post-visit).

Specifically, research questions focused on how ***group composition, groups' past experiences, group choices made within the exhibition,*** and ***group interactions within the exhibition*** related to the four outcomes listed above. The study also examined whether or not the four outcomes persisted over time.

Additionally, two dimensions of the *Expedition Health* experience provided a framework by which to examine group outcomes: ***content focus*** and ***interaction level***. The exhibition presents science/biology content as well as health/wellness content. These two content focus areas are not separated within the exhibition. For the purposes of this study, the Museum team identified two components/activities within *Expedition Health* strongly related to science/biology and two strongly related to health/wellness to facilitate assessment of potential differences in group outcomes (referred to as "content focus"). Similarly, the exhibition has components about the human body in general and others very specific to the visitors' *own* bodies. Again, the Museum team identified two exhibition components/activities strongly reflective of each category so that differences in group outcomes could be assessed

(referred to as "interaction level"). Two additional exhibition components which fall in the middle were also included in the analyses, used as controls.

KEY FINDINGS

Both science/biology content focus and health/wellness content focus were part of family groups' experiences. The content focus dimension *did not* appear to significantly affect groups' personal connections, understanding/knowledge gain, changes in thinking, or changes in behavior (the 4 key outcomes).

- Most groups appeared to engage in both the science/biology and the health/wellness components of the exhibition, rather than focusing on one or the other.
- When groups *did* choose components that focused more on their *own* bodies, rather than the body in general (or vice verse), it did not appear to significantly impact group outcomes.
- When groups chose exhibition components that focused more on science/biology than health/wellness (or vice verse), it did not appear to significantly impact group outcomes.

The exhibition component interaction level (general body versus visitors' *own* bodies) *did* appear to impact outcomes.

- Exhibition components focused on the visitors' *own* bodies elicited more group interaction (i.e. conversations) than those related to the human body in general.
- Exhibition components focused on health/wellness elicited more group interaction (i.e. conversations) when related to visitors' *own* bodies (rather than the body in general).

Adults and children initiated family group interaction (i.e. conversations) in different ways.

- Adults initiated most of the interactions within the exhibition, regardless of content focus (science/biology versus health/wellness) or interaction level (general body versus visitors' *own* bodies).
- Adults initiated more facilitation and instruction-based interactions, whereas children initiated more general and specific comments about exhibition components.
- Both youth and adults initiated interactions related to trouble-shooting (e.g. trying to resolve mechanical/computer issues).

Overall, groups' personal connections, understanding/knowledge gain, changes in thinking, or changes in behavior (the four key outcomes) were prevalent throughout the study.

- Personal connections (e.g. staying active, exercising, health issues, etc.) were referenced by 85-93% (depending on study method used) of family groups and almost three-fourths of family groups connected something they saw in *Expedition Health* with how they stay healthy or exercise.
- All interviewed family groups indicated gaining knowledge or understanding from the exhibition.
- Intended/future behavior changes were mentioned by 72-88% (depending on study method used) of family groups. The top three behaviors mentioned were staying active/exercise, healthy eating /nutrition, and 'other' healthy behaviors (e.g. using sunscreen).

Group dynamics had varying effects on groups' personal connections, understanding/knowledge gain, changes in thinking, or changes in behavior (the four key outcomes). Gender and age presented interesting results.

- Groups including youth of both genders—boys and girls—made significantly more personal connections.
- Groups with only girls (female children) cited more changes in behavior.
- Groups with both adult males and adult females reported more knowledge gain than groups with adults of only one gender.
- Groups with more than one youth in the target age range (age 8-14) had more personal connections, knowledge gain, and changes in behavior than groups with just one youth in that age range.
- The number of exhibition components family groups engaged with and the total amount of time they spent in *Expedition Health* did not impact group outcomes.
- Museum membership status did not affect group outcomes.

***Expedition Health* appealed to groups with vocational or educational connections to science/biology and health/wellness. However, these connections did not influence groups' personal connections, understanding/knowledge gain, changes in thinking, or changes in behavior (the four key outcomes).**

- About one-third of family groups interviewed included someone who worked or studied in a health-related field.
- Nearly one-third of the family groups interviewed included someone who worked or studied in a field related to science or biology.
- Neither professional/academic ties nor past activities linked to science/biology or health/wellness impacted group outcomes.

The four key outcomes (personal connections, understanding/knowledge gain, changes in thinking, and changes in behavior) persisted over time, as evidenced by online follow-up surveys three to four months after visiting.

- Regardless of visitors' age, "See Yourself Age," "Front Range Bio Ride," "Body Trek Theater," "Lung Dissection," and "Biology Base Camp"[1] were exhibition components most frequently remembered.
- Almost two-thirds (65%) of adult visitors had been reminded of something in *Expedition Health* since their visit; most mentioned the exhibition in general, exercising/being active, and eating healthier.
- 70% of adults said they learned "quite a bit" or "very much." When asked about their health specifically, 62% said they learned "quite a bit" or "very much."
- Youth reported learning science facts about the human body and how to take care of their bodies.
- Whereas 24% of adults said their visit changed their thinking about health "quite a bit," most (88%) said it changed their thinking about science at least a little. In terms of science, 16% of adults said their visit changed their thinking about health "quite a bit," with 70% indicating it changed their thinking about science at least a little.
- 93% of adults said there was something they were doing differently as a result of visiting. Most responses related to staying active/exercising and healthy eating/nutrition.

[1] For information about specific exhibition components, please refer to the appendices of the full report.

- 42% of adults reported an increase in discussing things they could do as a group to be healthier after visiting *Expedition Health.* Almost a third (30%) reported going to places as a group where they could be active more often than before their visits.

The four key outcomes were also demonstrated in the school group/student component of the study.

108 students completed questionnaires following a school trip to *Expedition Health*. Seventy-four percent of these were 3rd graders and 26% were 5th graders. Almost two-thirds (62%) of these students spoke a language other than English at home at least some of the time. (For 94% of these youth, the other language was Spanish). More than three-quarters (76%) of these students had been to the Museum before and about half (48%) had been to *Expedition Health* before.

- 66% of students indicated that something in *Expedition Health* reminded them of their own life. The most-cited example was bicycle riding.
- Learning new facts about the human body (24%), specific facts (24%), and behavior changes (24%) were cited by students when asked to name one thing they learned as a result of visiting the exhibition.
- 82% of students claimed *Expedition Health* made them care more about their own body and/or health.
- 89% of students said they would tell others their own age to visit *Expedition Health* and 98% indicated they would like to come back and visit with their families.

Introduction

In April 2009, the Denver Museum of Nature & Science (DMNS) opened a new permanent exhibition focused on health science: *Expedition Health*. Funded through a grant from the Colorado Health Foundation, DMNS contracted with the Institute for Learning Innovation (ILI) to conduct a research study **to understand family outcomes (at the group level) related to *Expedition Health*, both during and after a visit to the exhibition.** This research is a part of a broader effort by DMNS's Health Science Initiative.

Expedition Health has the following objectives:

- Visitors will have an increased understanding that their health is a combination of their genetics, their choices, and their environment;
- Visitors will have a deeper appreciation that their bodies change in ways they can see and measure;
- Visitors will have an increased understanding that they can positively influence their biology and optimize their health;
- Visitors will actively participate in scientific inquiry to increase their knowledge of human biology and their understanding of the scientific process.

The exhibition focuses not only on the human body in general, but also each visitor's *own* body. One mechanism to provide this personalized experience is the incorporation of the "Peak Pass," an electronic card which can be used at many interactive components throughout the exhibition to record information about individual biometrics. Each visitor can pick up a Peak Pass and check in at sign-in stations at the entrance to the exhibition. At sign-in they are prompted to enter their first name, birth month, and day and choose a "virtual learning companion" from among the "expedition buddies[2]." The visitors' information is entered into a database that records their data at Peak Pass–activated exhibits and contributes to a personal profile for visitors to print and keep at the end of their visit. Another key element of *Expedition Health* is a connection with the regional landscape. Visitors learn throughout the exhibition that their "expedition buddies" are real-life Coloradans who trained for and experienced a hiking expedition up Mount Evans, one of the region's well-known peaks. This enables visitors to explore the science and biology of the human body (and in particular their *own* bodies), as well as health, through a regional lens.

[2] Photos identify buddy by name, hometown, and hobbies or interests. For more information about the Peak Pass and the Buddies, see Appendix 1.

Specifically, six research questions, developed collaboratively by ILI and DMNS, guided the research efforts:

1. Which of the following group outcomes related to science/biology and health/wellness occur as part of the *Expedition Health* experience:

    - Personal connections;
    - Understanding/knowledge gain;
    - Changes in thinking;
    - Changes in behavior.

2. How do group outcomes persist and change over time?

3. How do group composition and prior experiences relate to the outcomes?

4. How do group choices in the exhibition relate to the outcomes?

5. What kinds of group interactions occur, and how do they relate to the outcomes?

6. How do student groups react to the exhibition?

Within the study, "family" was defined as a group visiting on their own (i.e., not part of a larger organized group) with at least one adult and with one child between the ages of 8 and 14 years. The age range of 8-14 years was selected because it matched the target audience of the *Expedition Health* exhibition.

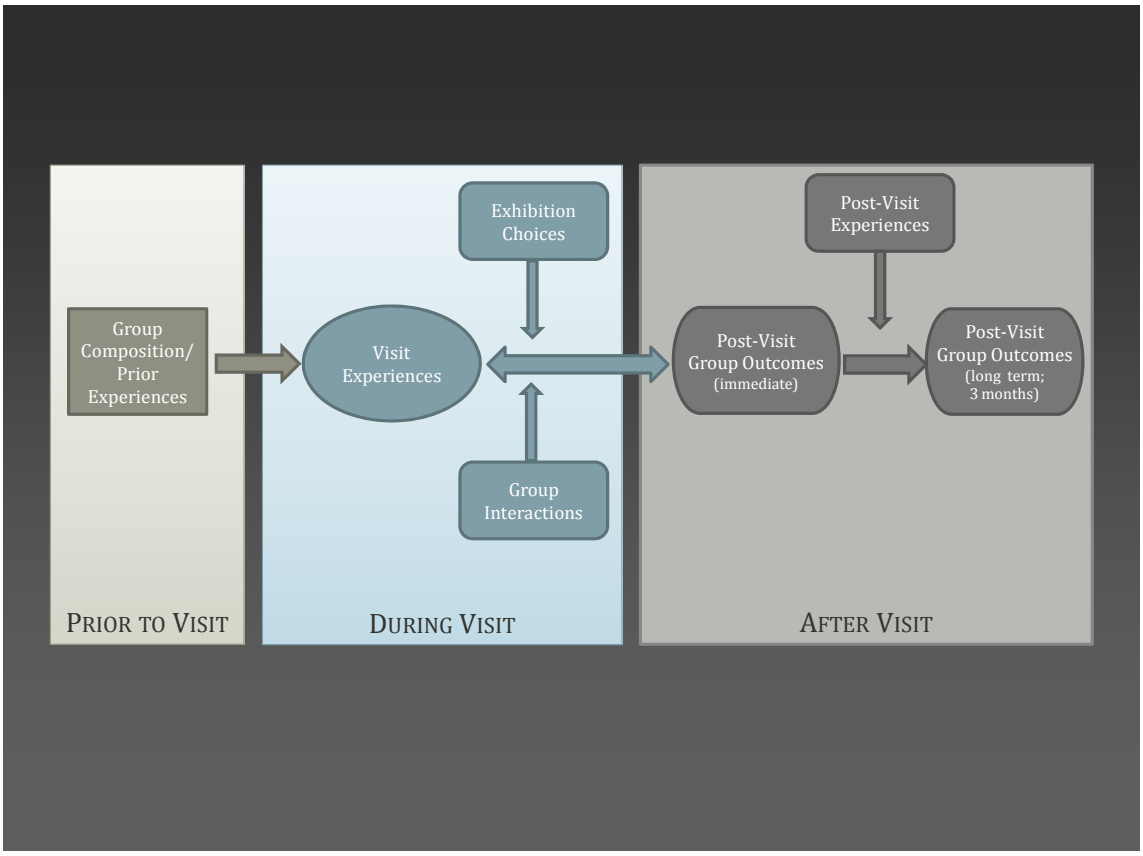
This report fully describes the study of *Expedition Health* conducted by ILI, including methods, findings, and conclusions and recommendations. While figures and tables are included in the main report, an even more detailed compilation of the data produced by this research is presented in the Appendices, at the end of the report.[3]

Research Design

A multi-method, longitudinal approach, with both qualitative and quantitative methods, was used to study family outcomes related to *Expedition Health*. The research followed a model developed for this study which attempted to assess how families' experiences prior to the visit related to their experiences during the visit, and how families' visit experiences related to their outcomes immediately after and a few months after the visit (see Figure 1).

[3] See the Table of Contents for the complete list of tables.

Figure 1: Conceptual Model Used to Guide the Research



In studying families' experiences and outcomes, **measurement was done not at the level of individuals within a family but rather at the level of the group itself**. Therefore, if any one individual within a group demonstrated an outcome, it was considered evidence that the group had achieved that outcome. This allowed for studying the behaviors and social interactions within each group as a whole, rather than breaking them down into individual pieces related to only one individual.

Methods

Data were collected over 8 months, from July 2009 through February 2010, using five complementary methods:

1. Focus groups with families;
2. Onsite interviews with families;
3. Follow-up online questionnaires administered to families;
4. Focused observations/interviews with families at specific exhibition components;
5. Student questionnaires.

Focus groups were conducted to test and refine the conceptual model developed by researchers, and to uncover emergent factors and variables related to the research questions. Once the model was finalized, onsite interviews were conducted with families about their visit to the *Expedition Health* exhibition. To complement this macro view of the family experience, focused observations were conducted of families at specific exhibition components to understand how they were interacting and reacting to specific types of exhibition components. Three to four months following their visit, families received a follow-up online questionnaire, administered to both adults and children, designed to address how the various outcomes from *Expedition Health* persist and change over time. This amount of time was chosen so that enough time had elapsed to allow for change to occur, but not so much time to allow for decay. Finally, student questionnaires were included to collect information from children attending to *Expedition Health* as part of a formal school visit.

Table 1: Data Collection Procedures

Method	**Sample Size**[4]
Part 1: Refining the Conceptual Model	
1. Focus groups with families Members and non-members	n = 27 individuals (12 adults, 15 children)
Part 2: Testing the Conceptual Model	
2. Onsite interviews with families	n = 118 groups (198 adults, 220 children)
3. Follow-up online questionnaires with families	n = 61 individuals (43 adults, 18 children)
4. Focused observations/interviews of families at specific exhibition components	n = 36 groups (49 adults, 56 children)
5. Student questionnaires	n = 108 children
TOTAL	658 individuals

Across all five data collection methods, a total of 658 individuals were included in the study. The onsite interviews with families (n=418) and the focused observations/interviews of families

[4] While the group was the unit of analysis for most of the methods, two methods (follow-up online questionnaires and student questionnaires) were conducted with individuals. Therefore, both the number of groups, where applicable, and the individuals are reported in this table.

at specific exhibition components (n=105) comprised the majority of individuals (n=523, or 80% of the sample). These two methods were the primary mechanisms through which the research questions were answered. As such, most of the findings presented in this report are derived from these two samples.

Families in each of these two main samples – onsite interviews and focused observations/interviews – were compared to see to what extent their demographics were similar. More families in the onsite interview sample were members of DMNS. Specifically, 44% of families in this sample were members as compared to only 28% in the focused observation/interview sample. Additionally, seasonal variations existed between the two samples. Specifically, the onsite interview sample visited the museum in August/September, while the focused observation/interview sample visited the museum in December. Aside from these two differences, the samples were similar to each other.

See the Appendices for the full analyses, above and beyond the analyses included in the main report.

Detailed Description of Methods

Focus groups with families *(DMNS members and general visitors)*: Twenty-seven individuals participated in focus groups at the beginning of the study, with the purpose of testing the general model (see Figure 1). One of the focus groups included DMNS members (17 individuals; 5 adults, 12 kids) and the other included general visitors (10 individuals; 7 adults, 3 kids).

DMNS staff recruited participants for the two focus groups. In the case of museum members, participants were recruited from the museum membership database. For the session with general visitors, walk-in visitors present on the day of the focus group were recruited. Participants were given tickets to *Expedition Health* and asked to visit the exhibition before the focus group. Written consent was given by the adult for their child(ren)'s participation, and written assent was obtained from participating children under 18 years of age.

Both focus groups occurred on July 30, 2009 at the Museum and were facilitated by an ILI researcher; the focus group with general visitors included a group that was more comfortable with Spanish so it was conducted bilingually in English and Spanish. The sessions lasted roughly two hours; refreshments were served and IMAX and museum vouchers were provided to participants as a thank you for participating. As the focus groups were used to test and further refine the research model and research questions, findings were presented to DMNS staff orally at the outset of the study and are not presented in this report.

Onsite interviews with families: Interviews were conducted with 198 adults and 220 children in 118 different family groups. Interviews were conducted in August and September 2009, and gathered information about families' experience in *Expedition Health,* as well as family outcomes immediately after the visit. Data collectors were recruited by DMNS staff and trained by an ILI researcher.

Adults and children in family groups were approached by a data collector as they exited *Expedition Health*. If they matched the criteria for participation in the study and agreed to participate, they were guided to an available empty classroom for the interview. The criteria for inclusion in the study were as follows:

1. The presence of a child in the group between 8 – 14 years in age;
2. Parental permission for the group, including children, to participate;
3. Evidence of having made a "natural" visit to *Expedition Health*; in other words, they were not prompted by the researchers to visit the exhibition.

In the classroom, parents signed consent and assent forms and individuals from the group participated in an audio-recorded interview that followed a semi-structured interview guide containing both open-ended and closed-ended questions The interview guide was developed by researchers at ILI and revised in consultation with Kathleen Tinworth, DMNS Director of Visitor Research and Program Evaluation, and the *Expedition Health* core team (see Appendix 2 for instruments). This process was used to develop the instruments employed in this study.

During the interview, adults and children were asked to provide information about their group composition and about their prior experiences related to science/biology and health/wellness. **For the purposes of this study, exhibition components were grouped into one of two main categories: science/biology and health/wellness.** The degree to which a component focuses on science/biology versus on health/wellness was determined by the Museum's *Expedition Health* core team (including exhibits staff, a Museum educator, and a health science curator). This classification system is used throughout the report as exhibition components are compared to one another. It is important to realize that these categories are not mutually exclusive. In other words, a component can be rated high in terms of its focus on science/biology but low on its focus on health/wellness.

In addition, families were asked to provide contact information so that they could participate in a follow-up online questionnaire (see below). Upon completion of the interview, families were given IMAX and museum vouchers as a thank you for their participation.

Follow-up online questionnaires with families: A total of 61 individuals from the onsite interviews (43 adults and 16 children, representing 35 different groups) participated in online questionnaires administered three to four months after their visit. The purpose of the questionnaire was to assess longer-term outcomes and post-visit experiences of the group, to see what impact a visit to the *Expedition Health* exhibition was having after people returned home.

Two different questionnaires were used: one for adults and another for children. As was the case with the family interviews, the questionnaires were designed by ILI researchers in collaboration with Kathleen Tinworth, DMNS Director of Visitor Research & Program Evaluation, and the *Expedition Health* core team (see Appendix 2).

An email was sent to the contact person from the onsite interview who was asked to answer the online questionnaire and to invite other adults and children who were visiting with them at the time of the onsite interview to also complete a questionnaire. Visitors were offered the opportunity to enter a drawing for an Amazon.com gift certificate valued at $100 as a thank you for their participation. Thirty-six percent of onsite interviews were matched by online questionnaires; therefore, more than one-third of the original onsite family interview sample participated in the follow-up questionnaire.

Focused observations/interviews with families at specific exhibition components: A total of 101 visitors (49 adults and 56 kids) participated in this portion of the study. ILI researchers conducted focused observations and interviews in December 2009, focusing specifically on ten pre-selected exhibition components[5]. These exhibition components were selected according to two dimensions: 1) content area (focus on science/biology or health/wellness); and, 2) interaction level (focus on human body generally or the visitor's body specifically).[6] The *Expedition Health* core team, with instructions from ILI, rated each exhibition component along these two dimensions to select 10 exhibition components. See Appendix 1 for descriptions of the ten specific exhibition components, and see Figure 10 for a visualization of how these ten

[5] Exhibition components included were: Size up Your Stride, Bioride, Hydrate, Superfood Heroes (program), Explore RX (cart), Food Is Fuel, Measure Up, Your Heart's Electricity, Tope Ten Traumas on the Trail, and Fate of a Granola Bar. See Figure 10 for how they were included on the two dimensions mentioned above (Science/Biology + Health/wellness and Generic Body /One's Own Body dimensions).

[6] The main distinction here included a Peak Pass card. The Peak Pass allowed visitors to collect and record information about their own body at an exhibition component. For example, a component that measured blood pressure would record it on the card and they could access this information after their visit.

components were split along the two dimensions mentioned above: a) science/biology and health/wellness and b) generic body or own body).

Researchers only observed those families who met the study inclusion criteria (see section on "Onsite interviews with families"). Families were invited to participate and upon acceptance, asked to provide permission for the conversation to be recorded.[7] After being connected to the microphones, individuals within the family group were asked to engage in one or two of the pre-selected exhibition components as they normally would. Their behaviors were observed and recorded by researchers, and their conversations were recorded digitally. When they were done interacting with the components, they were interviewed about each component in the order in which they engaged with each. As with the onsite family interviews, visitors were offered IMAX and museum vouchers as a thank you for their participation.

Student questionnaires: A total of 108 students in one 3rd and one 5th grade classes from two local schools completed questionnaires on October 15 and 22, 2009. Self-administered questionnaires were designed to assess the nature of children's experiences with *Expedition Health*, as well as the nature of the outcomes resulting from their experience (see Appendix 2 for the student questionnaire). Participating classrooms were recruited by Museum staff and questionnaires were completed during a school trip to *Expedition Health*.

LIMITATIONS OF THE STUDY: Decisions made during any research study about the sample, methods, and analysis impact the study and its ability to answer the research questions. As such, every study has limitations that are important to mention so that the results can be interpreted in the proper context. The following are some limitations that should be kept in mind while reading the research report:

- Focus on families: While the purpose of the study was to examine families, it should be cautioned not to assume these findings apply to other types of visitor groups. While many of the same patterns would be expected (e.g., the importance of personal connections) the family group dynamic is expected to be a major influence on the visitor experience.
- Timing of data collection: The onsite family interviews were collected during different time periods: the onsite interviews were in August/September and the focused observations/interviews were in December

[7] In this phase of the research, groups were limited to four individuals; each individual wore a wireless digital microphone and the system supported a maximum of four microphones at one time.

- Restricted group size for focused observations/interviews with families at specific exhibition components: This method was limited to four individuals so that the groups' conversations could be recorded; the audio equipment limited the number of channels that could be recorded. As such, this portion of the study only involves groups of four or fewer; it is possible that larger groups have different kinds of experiences and outcomes in *Expedition Health*.
- Sample sizes in follow-up online questionnaire: The sample sizes for the follow-up studies were not as large as anticipated (n=43 adults, 18 kids). Therefore, while the results are robust enough to show trends, they need to be investigated further or replicated with larger sample sizes to confirm them.

Description of the Sample: Group Composition and Prior Experiences

As described in the conceptual model that guided this study (see Figure 1), group composition and past experiences of families were assessed in order to link background variables with exhibition outcomes. Group composition and past experiences are described below for those families who participated in the onsite interviews and focused observations. Later in the report, these variables will be used to help explain patterns in group outcomes.

Group Composition

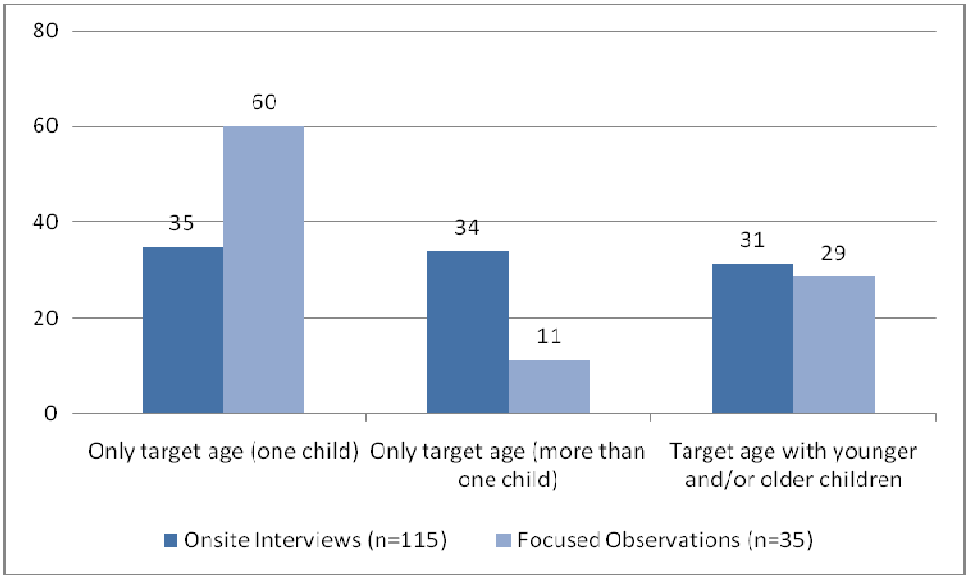
Group composition was determined by collecting demographic information at the group level, rather than at the individual level. This information included museum membership, group size, ethnicity, age of the children, and gender of both adults and children. As articulated earlier in the methods section, family groups needed to include at least one child between the ages of 8 and 14 years of age in order to be included in the study. However, families were not excluded if there were additional children in their group above or below the target age range. As such, groups with children outside of the target age range were recorded and included in the analyses.

Group size varied between the two samples. Specifically, the size of family groups participating in the onsite interviews ranged from 2 to 9 individuals, with about one third of the groups made up of 3 to 4 individuals. Groups participating in focused observations were restricted to a maximum of 4 individuals, as mentioned earlier, due to limitations of the recording equipment. Consequently, groups in this sample were made up of 2 to 4 individuals.

Families in both study samples were comparable in terms of ethnicity. Most families were white (89% in both onsite interviews and focused observations/interviews). The second largest ethnic group, by far, was Hispanic/Latino; this was 14% of the onsite interviews and 17% of the focused observations/interviews.[8] The Museum confirmed that these demographics reflect the Museum's general visitor demographics.

More of the families in the onsite interview sample had multiple children in their groups than did those in the focused observation sample. For example, families participating in onsite interviews were evenly distributed across three categories: 1) groups with one child, who was in the target age range; 2) groups with multiple children, all of whom fell in the target age range; and 3) groups with multiple children in and outside the target age range. On the other hand, the majority of families in the focused observation sample (60%) had only one child, who was in the target age range (see Figure 4). This may have been impacted, in part, by the amount of time required to participate in the focused observations.

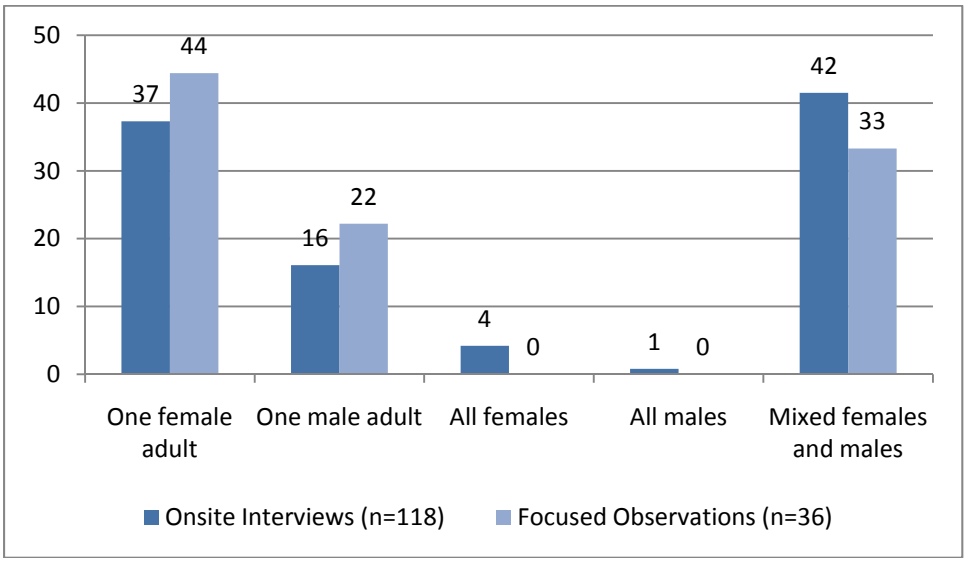
Figure 2: Group Composition Based on Children's Age (percent)



The gender of the adults in family groups also differed between the samples. Figure 3 below shows that while the majority of families in the focused observation sample were composed of individual females (44%), the majority of families in the onsite interview sample were mixed male and female groups (42%).

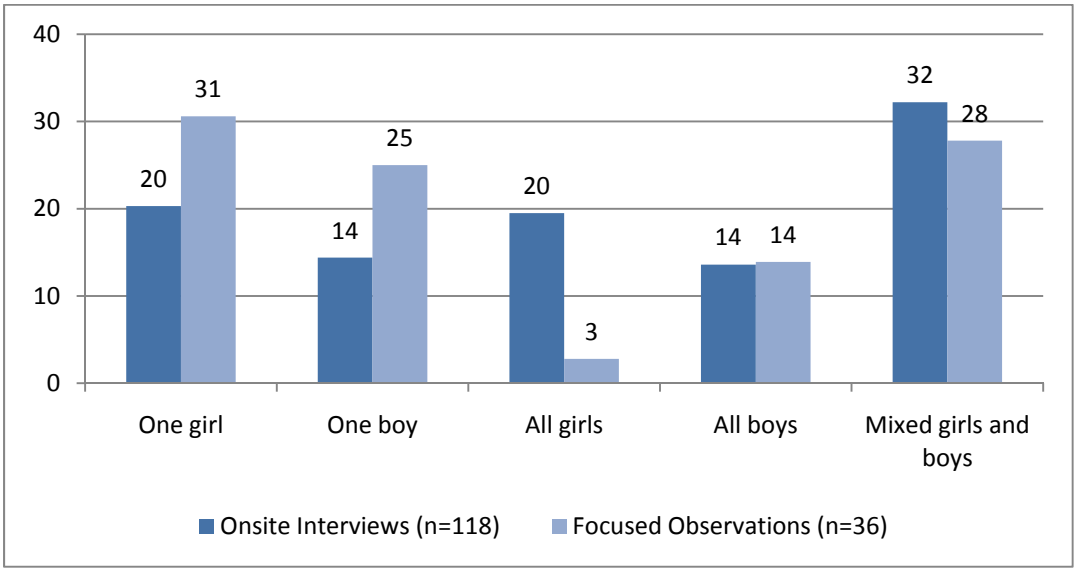
[8] Some individuals selected more than one ethnicity, so totals add to more than 100%.

Figure 3: Group Composition Based on Adults' Gender (percent)



The gender of participating children varied between the samples as well (Figure 4). As mentioned before, families participating in focused observations tended to have only one child (31% girls and 25% boys). Families in the onsite interviews had a greater percentage of girls, alone or with other girls (40%), than boys (28%).

Figure 4: Group Composition Based on Children' Gender (percent)



Prior Experiences with Exhibition Content

Prior experiences included prior visits to *Expedition Health*, whether someone in the family group worked in a science/biology or health/wellness-related field, and the frequency with which individuals in the group engaged in three specific science/biology or three health/wellness-related behaviors:

- Watch science/biology programs together;
- Visit science or science-related museums together;
- Talk about science/biology with each other;
- Discuss things they can do to be healthier;
- Go places where they can be active;
- Look up information about health/wellness.

The majority of the families in the two samples were visiting *Expedition Health* for the first time (66% of onsite interview groups and 53% of focused observation groups). Consistent numbers of families in both samples reported having worked or studied in a health/wellness-related field (29% of family groups in both the onsite interview sample and the focused observation sample). Interestingly, the study samples had more people in health/wellness-related fields than the U.S. population, since in the U.S. Census data from 2002 reports roughly 7% of U.S. adults 25 and older worked in health/wellness care or social assistance. Meanwhile, 25% of onsite interview families and 36% of focused observation families had someone in the group who worked or studied in a field related to science/biology.

In relation to the six behaviors mentioned above, in both samples the majority of the families engaged more frequently in health/wellness-related behaviors than science/biology-related behaviors (see Figure 5). Regarding the health/wellness-related behaviors, both samples were more likely to 'discuss things they can do to be healthier' or 'go places where they can be active' than they were to 'look up information about health' (see Figure 6). Regarding the science/biology-related behaviors, three-fifths of families in the focused observation sample said they frequently 'talk about science/ biology with each other,' and about a third said they frequently 'watch science/biology programs together' or 'visit a science-related museum.' About one third of those families in the onsite interviews engaged frequently or all the time in each of the science/biology-related behaviors (see Figure 7).

Figure 5: Average Percentage of Families That Engage in Science/Biology-Related and Health/wellness-Related Behaviors 'Frequently' or 'All the Time'

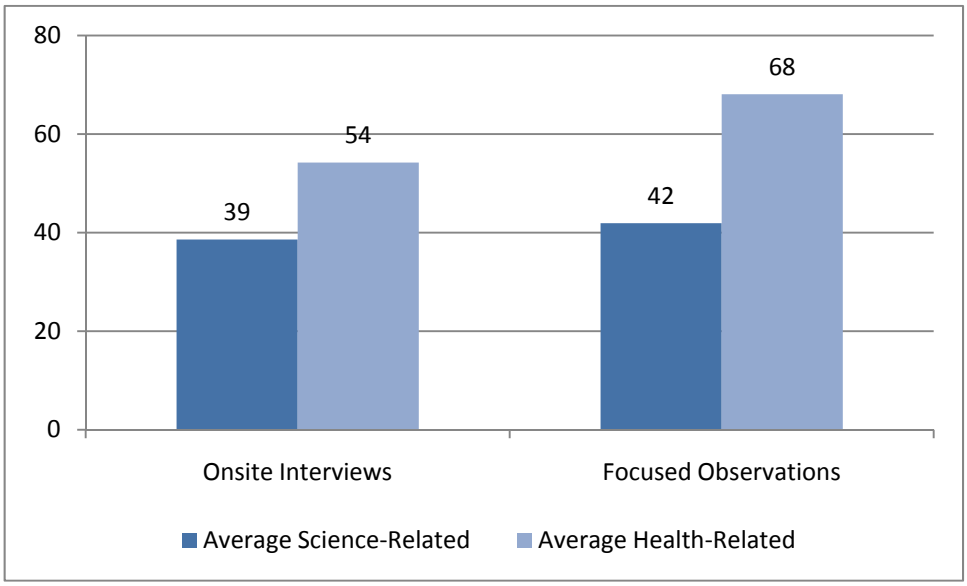


Figure 6: Percentage of Families That Engage in Health/wellness/Related Behaviors 'Frequently' or 'All the Time'

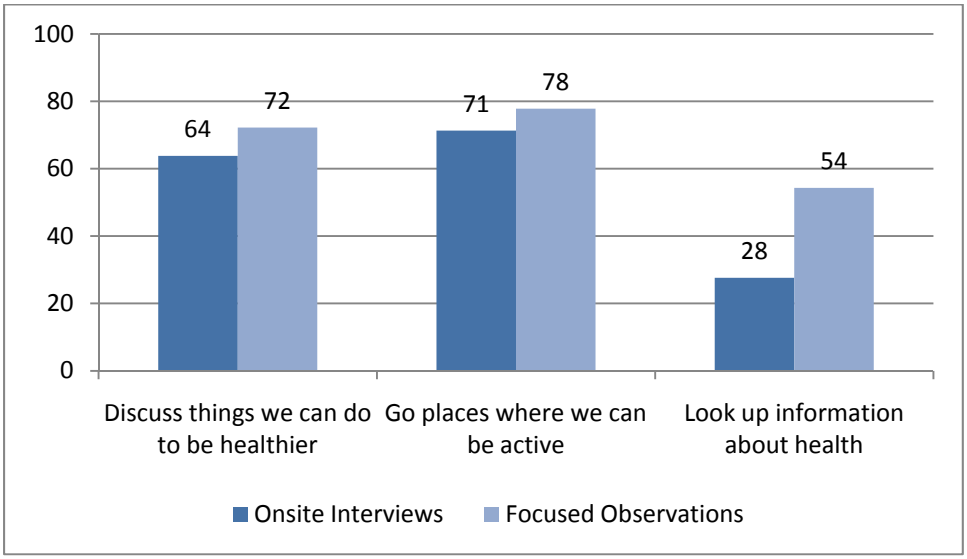
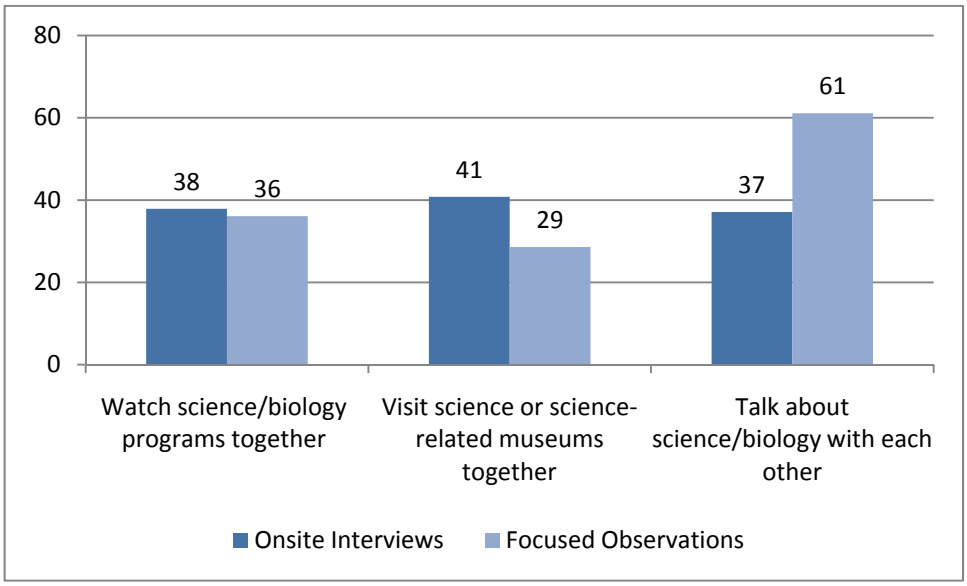


Figure 7: Percentage of Families That Engage in Science/Biology-Related Behaviors 'Frequently' or 'All the Time'



Results

The following section of the report presents key findings related to the six research questions driving this study. First, the report summarizes descriptive data on the nature of family groups' experiences and interactions in *Expedition Health*. Next, the report presents data for each of the six research questions in turn.

Description of Family Groups' Experiences in *Expedition Health*

As represented in the conceptual model that guided this study (see Figure 1), the groups' experiences during their visit to *Expedition Health* were assessed in two ways: 1) their choice of which exhibition components to engage with; and 2) the nature of their group interactions during their exhibition experience. These variables are used later in the report to explain variations in group outcomes; what follows is a brief description of trends within family group experience data.

Exhibition Component Choices: What do families do during their visit to *Expedition Health*?

Exhibition component choices included two metrics: 1) the specific combination of exhibition components families stopped at; and, 2) the total time families spent in *Expedition Health*. Additionally, exhibition choices were determined by the two dimensions mentioned earlier: science/biology versus health/wellness content focus and generic body versus own body interaction level.

Time spent in the exhibition ranged from 20 to 220 minutes; the median time was 79 minutes.[9] Forty-one percent of families spent 90 minutes or longer in *Expedition Health*.

Families were asked to retrace their steps through the exhibition from when they entered, indicating which exhibition components they stopped at during their visit. Of the 28 possible exhibition components, families recalled stopping at between 4 to 26 components; the median number of stops was 13. A moderately strong correlation was found between time spent in the exhibition and the number of stops families made. Specifically, the more stops a group made, the longer they spent in the exhibition. Eighty percent of families stopped at a minimum of 10 components. The breakdown of stops in each exhibition component, broken down a number of different ways, can be found in Appendix 5. The correlation between time spent in the exhibition and number of stops was also found to be true in the summative evaluation of *Expedition Health* completed by McNamara (2010; see www.informalscience.org for full report).

Generic and Own Body: Family visits to *Expedition Health* were further analyzed based on interaction level (generic body and own body)[10] and content focus (science/biology versus health/wellness) of the exhibition components where visitors stopped. Of the 28 possible stops,

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[9] The *Expedition Health* summative evaluation, completed by McNamara (2010; see www.informalscience.org for full report) provides comparative data for stay time. McNamara (2010) showed that In timing and tracking with 74 individual visitors (60 adults and 14 children age 8 or older) the median time spent in *Expedition Health* was 39 minutes. Therefore, the current study includes groups who are spending a significantly higher amount of time. It is important to note that the current study uses self-reported time in exhibition while McNamara conducted unobtrusive observation; thus, the different methods may account for some of the difference.

[10] The main distinction between 'own body' and 'generic body' was whether the exhibition component included a Peak Pass card. The Peak Pass allowed visitors to collect and record information about their own body at an exhibition component. For example, a component that measured heart rate would record it on the card and they could access this information after their visit.

10 components allowed the personalized use of Peak Passes and were thus considered to be about their 'own body;' the remaining 18 were 'generic body' components. Family stops in 'own body' components ranged from 2 to 10 and in 'generic body' components they ranged from 2 to 17; both had a median of seven stops. This points to the fact that both types of components were appealing to family groups.

In order to further classify and compare visits based on stopping behaviors at these types of exhibition components, a *strong focus* was considered as stopping in at least 60% of the total possible stops for a certain category. Fifty-two of families (44%) had visits strongly focused on 'own body' components, and 19% had a strong focus on both the 'generic body' and their 'own body.' None of the families had visits that focused only on 'generic body' components (see Figure 8), suggesting that the more personal 'own body' exhibition components employing the Peak Pass while not stopped at with greater frequency on an individual basis, were more thoroughly used (in terms of stops).

Science/Biology and Health/Wellness: Of 26 possible stops, 9 focused on science/biology, 5 focused on health/wellness, and 12 had a neutral focus, dealing with both science/biology and health/wellness. Families ranged from one to nine stops at the components with science/biology focus, and the median number of stops was four. Regarding components with health/wellness focus, families ranged from zero to five stops; the median number was three stops. Regarding components with equal focus on science/biology and health/wellness, families ranged from 2 to 12 stops, and the median number was five stops. This dimension also shared a relatively even appeal to family groups.

In terms of content focus, 36% of visits strongly focused on both science/biology and health/wellness. Less than one fifth of the visits focused on either science/biology (12%) or health/wellness (15%) by themselves (see Figure 9). This suggests that the groups were engaging in both the science/biology and the health/wellness aspects of the exhibition, rather than focusing on one or the other.

Figure 8: Percentage of Visits with Strong Focus In Each Interaction Level (n=118)

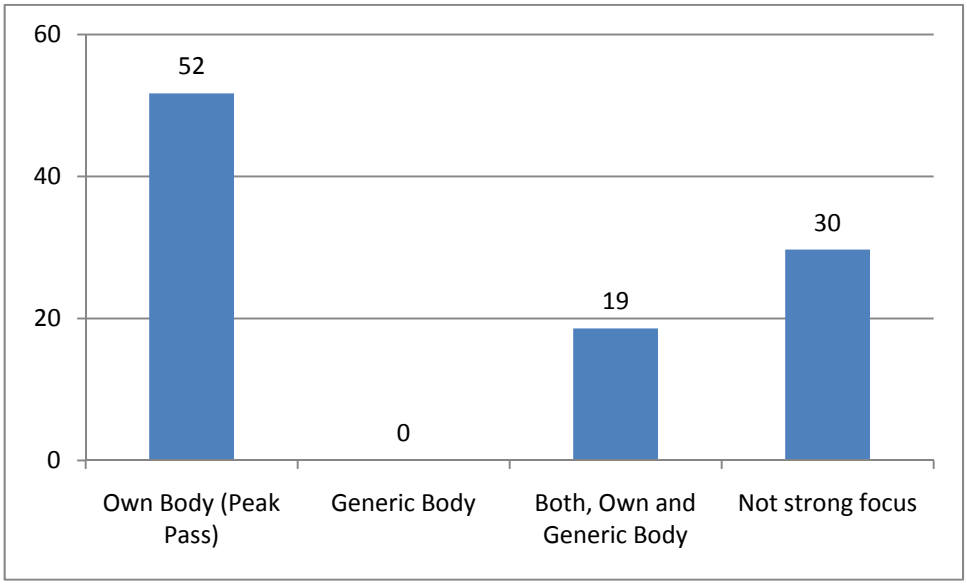
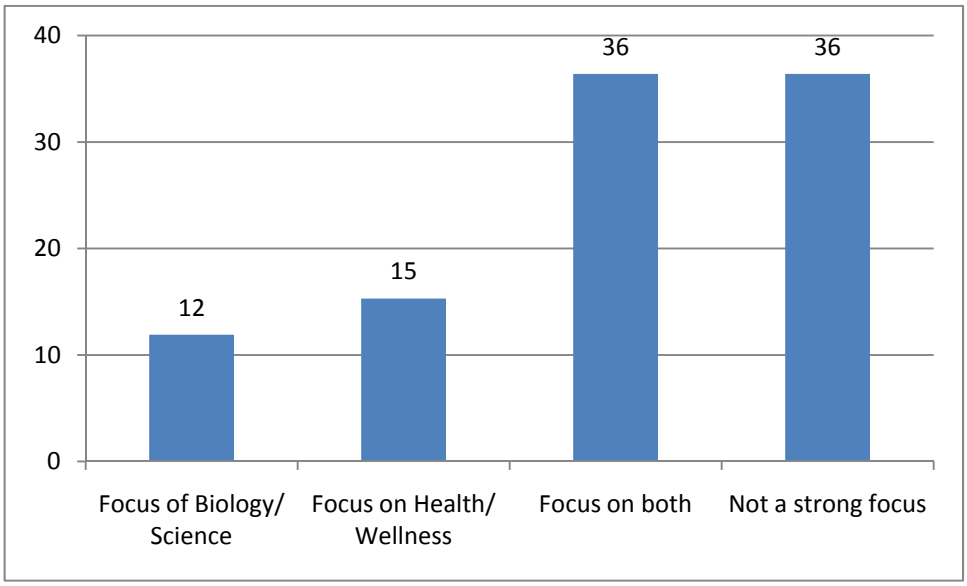


Figure 9: Percentage of Visits with Strong Focus In Each Content Focus (n=118)



Group Interactions: How do visitors interact with each other during their visit to *Expedition Health*?

Group interactions were defined as both the amount and quality of the interactions between group members while visiting *Expedition Health*. Interactions were measured by the amount of time spent together and the groups' behaviors while engaging with the components.

In general, groups tended to stay together while visiting the exhibition. The majority (62%) of those participating in the onsite interview were together for 75% of the time or more.

One of the goals of focused observations was to document the interactions between family members while they engaged with the 10 selected exhibition components.[11] Their interactions were captured mainly by audio-recordings of their conversations (what groups said), although some observations were made of what groups did. Five main types of interactions emerged from an analysis of group conversations: facilitation, instructions, general comments, specific comments, and troubleshooting (see Table 2).

> Facilitation referred to stimulating learning in others by 1) reading and/or paraphrasing labels out loud to one another; 2) explaining the exhibition content beyond reading the label; 3) discussing measurement results beyond simply describing them (e.g., explaining, comparing, speculating/"what if's"); and, 4) probing learning with questions.
>
> Instructions were guidance and steps on how to get ready, get started, and keep going. It also included cheering on, talking about how long it would take, and preparing so that one could "do" the components (getting rid of purses, emptying pockets, etc.).
>
> General comments were observations about the activity and about doing the activity (how one feels/ experiences it, how hard or easy it is).
>
> Specific comments included talking about the Buddy,[12] mentioning measurement results with another, and trying to guess what measurement will be, but without giving an explanation as to why.

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[11] Exhibition components included were: Size up Your Stride, Bioride, Hydrate, Superfood Heroes (program), Explore RX (cart), Food Is Fuel, Measure Up, Your Heart's Electricity, Tope Ten Traumas on the Trail, and Fate of a Granola Bar. See Figure 10 for how they were included on the two main component classification dimensions (Health/wellness versus Science/Biology and Generic Body/ Own Body).

[12] The Buddy is selected on check-in at the beginning of the exhibit and is "a virtual learning companion."-

Troubleshooting included uncertainty of what to do, commenting about a problem in the exhibition, not knowing why it does not work, and trying to resolve the mechanical/ physical aspects how an exhibition component works.

In addition to coding the interactions into the above five categories, researchers recorded two additional pieces of information: whether an adult or a child initiated the interaction, and to whom the interaction was directed (see Table 3). Adults were responsible for initiating most of the interactions compared to children (a ratio of about 2.5 to 1), although children also did so. Exactly half (50%) of all group interactions were from an adult to a child or children.

Table 2: Content of Family Interactions (Focused Observation)

Type of Interaction	**Number of Instances** [a]	**Number of Codes**
Facilitation	44	351
Instructions (Activity or General)	38	323
General Comment about Exhibition	40	213
Specific Comment about Exhibition	23	178
Troubleshooting	23	76
TOTAL	**54** [b]	**1141**

[a] These are not unique groups, as in some instances the same group participated in two components

[b] Of the 60 total cases, 6 did not have any conversations. They were 5 Superfood Heroes, which were not recorded and one Explore RX. As noted above, these two experiences were a program and a cart, respectively, so there would likely be more interaction with the facilitator than within the group (see Appendix 1 for descriptions of these exhibition components).

Table 3: Direction of Interactions (Focused Observations)

Who Initiated the Interaction	Number of Instances [a]	Number of Codes
Adult initiated	53	812
Adult to adult	*20*	*93*
Adult to child	*50*	*573*
Adult to group	*25*	*146*
Child initiated	45	331
Child to adult	*41*	*199*
Child to child	*12*	*31*
Child to group	*20*	*101*
TOTAL	**54** [b]	**1143**

[a] These are not unique groups, as in some instances the same group participated in two components

[b] Of the 60 total cases, 6 did not have any conversations. They were 5 Superfood Heroes, which were not recorded and one Explore RX. As noted above, these two experiences were a program and a cart, respectively, so there would likely be more interaction with the facilitator than within the group (see Appendix 1 for descriptions of these exhibition components).

How do group interactions differ based on exhibition component content focus and interaction level?

The focused observation/interviews occurred in 10 exhibition components selected for the specific purpose of representing cases where the extremes of content focus (science/biology and health/wellness) and interaction level (own body and generic body) were present. The researchers led the exhibition team through an exercise where they rated each of the 26 exhibition components in *Expedition Health* on the degree to which they dealt with each of two content areas: 1) science/biology versus health/wellness and 2) generic versus own body. [13]

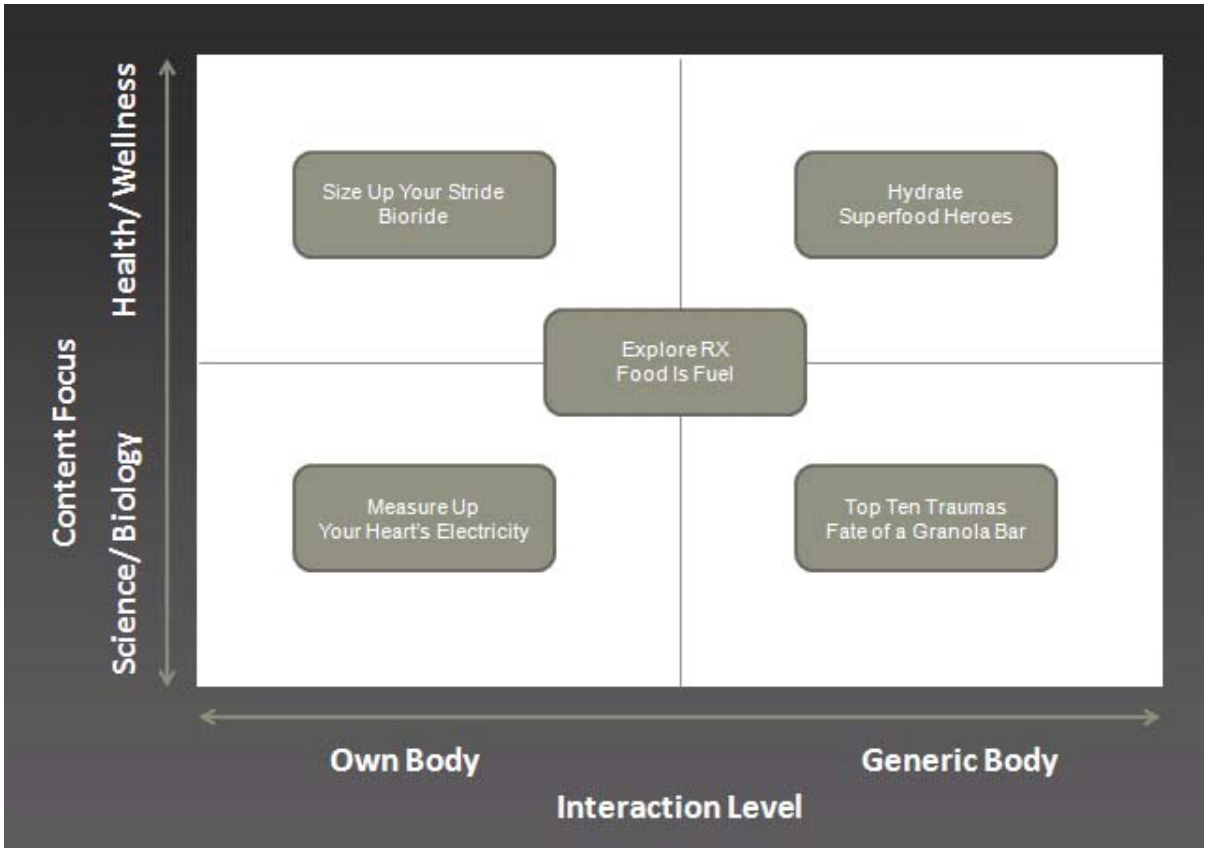
[13] The main distinction between 'own body' and 'generic body' was whether the exhibition component included a Peak Pass card. The Peak Pass allowed visitors to collect and record information about their own body at an exhibition component. For example, a component that measured heart rate would record it on the card and they could access this information after their visit.

Based on the ratings from the *Expedition Health* core team, the researchers grouped the exhibition components into five main groups:

1) Health/Wellness and Own Body;
2) Science/Biology and Own Body;
3) Health/Wellness and Generic Body;
4) Science/Biology and Generic Body;
5) Neutral, which focused in the middle on each of the two dimensions.

These five categories were used by the *Expedition Health* core team to select the 10 exhibition components to be looked at in-depth within the research. See Figure 10 for the breakdown of these components and Appendix 1 for a detailed description of the ten exhibition components.

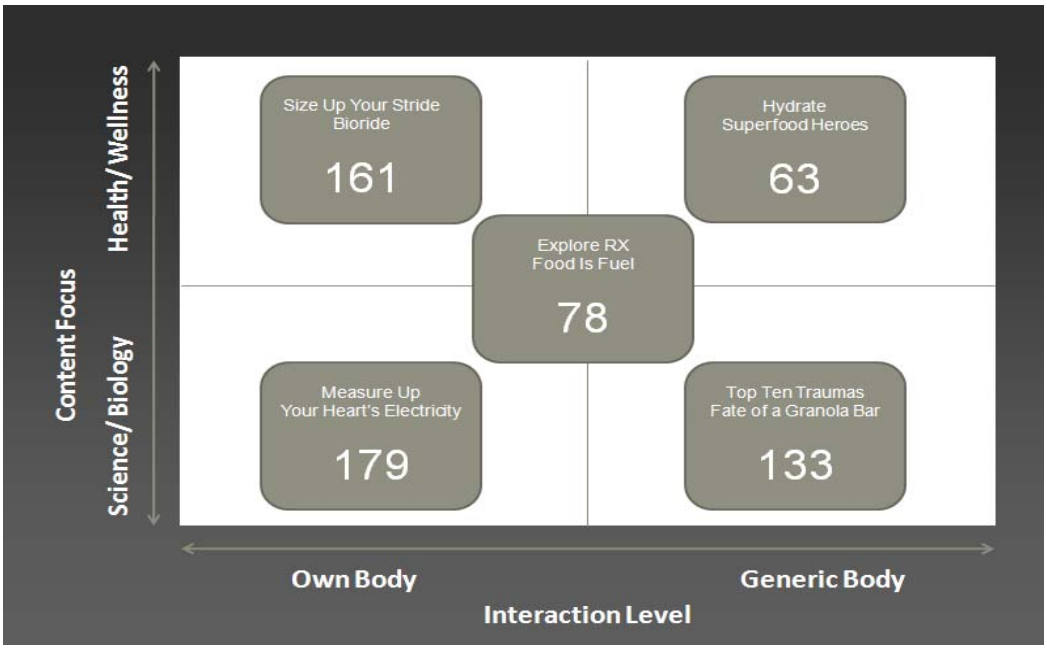
Figure 10: Specific Exhibition Components Selected for Study in the Focused Observations/Interviews



Exhibition Component Type and Interactions at Specific Exhibition Components: In general, the components with a focus on science/biology had a greater number of group interactions than the ones focusing on health/wellness (see Figure 11). Those components focusing on own body also had more group interactions than the ones about a generic body. The two components that focused on both science/biology and own body had the greatest number of group interactions. This suggests that components that allow for strong personal connections, at either the individual or group level, about how one's body functions or performs play a strong role in the visitor experience. The amount of social interaction increases with exhibition components that engage people about themselves; the fact that the personal connection involves measurements of one's own body likely makes it an even more appealing experience.

In fact, the personal connection was such a powerful factor that the exhibit components focusing on someone's own body were highest, regardless of whether they were about science/biology or health/wellness. It is important to note, however, that Superfood Heroes is a *program;* it provides a very interactive experience but is not designed to facilitate many interactions within visitor groups. Thus, the Health/Wellness and Generic Body category includes only the number of group interactions for Hydrate, so that an appropriate comparison can be made to the other categories.

Figure 11: Average Number of Group Interactions Per Exhibition Component in Each Dimension of Content Focus and Interaction Level (Focused Observations/Interviews)

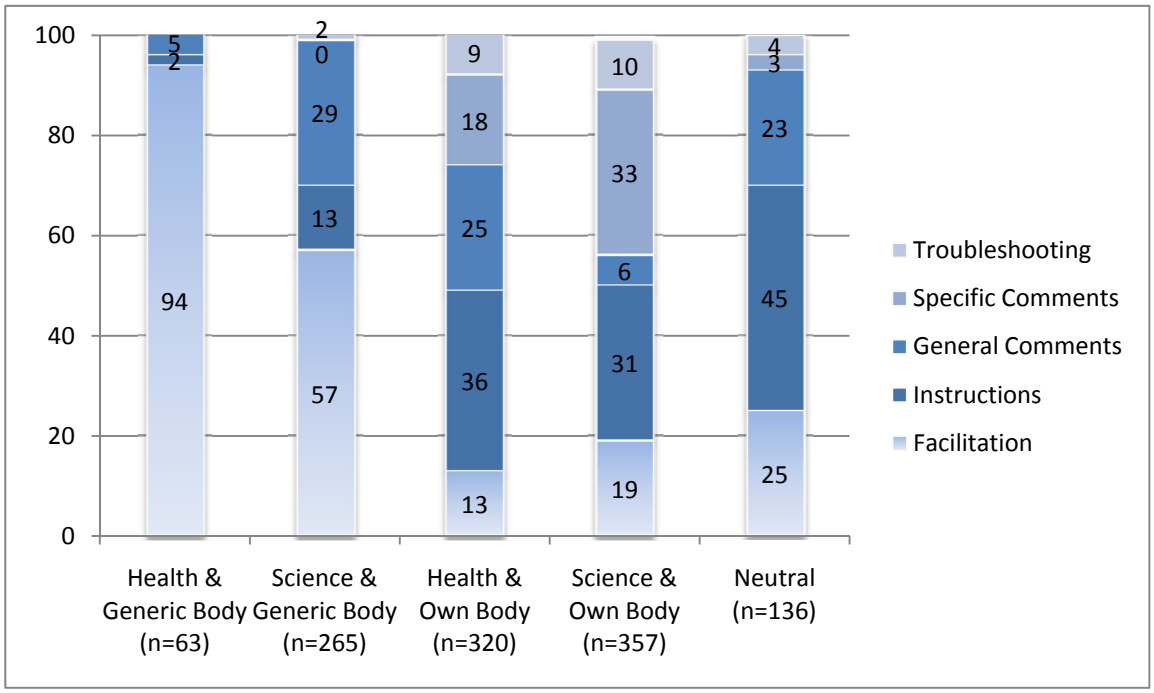


As mentioned before, there were five types of group interactions that emerged from coding the data: facilitation, instructions, general comments, specific comments, and troubleshooting. These specific group interaction categories were broken down into percentages of total interactions. See Table 34 in Appendix 5 for the breakdown for specific exhibition components.

- Health/Wellness and Own Body - Interactions were mostly about instructions (36%) and general comment (25%). This is not surprising given that the two components included in this category (Size Up Your Stride and Bioride) involved a lot of active participation, following directions from the computer and physical movement.
- Science/Biology and Own Body: In this group, most interactions were specific comments (33%) and instructions (31%). This group had the highest proportion, by far, of specific comments. Both of these components (Measure Up and Your Heart's Electricity) were about one's own body so many of the specific comments were about the results of the activities and measurements.
- Health/Wellness and Generic Body: These components had mostly facilitation interactions (94%). These interactions were *only* about the component Hydrate; Superfood Heroes was not audio-recorded since there were not many opportunities for within-group interactions. In Hydrate, adults did a great deal of label reading, probing with questions, and/or explaining the content, since this is less interactive and involves a more passive experience compared to many of the other components.
- Science/Biology and Generic Body: This category also presented a large amount of facilitation-type interaction (57%), followed by general comments (29%). Again, these components (Top Ten Traumas and Fate of a Granola Bar) were less interactive than the others so it makes sense that there was a lot of discussion/facilitation about the topics.
- Neutral components (Explore Rx cart and Food is Fuel) had mostly instructions (45%) and facilitation (25%).

Which types of group interactions occurred varied greatly depending on the two main dimensions of content focus and interaction level (see Figure 12). The Health and Generic Body group had largely facilitation interactions (94%), while the majority of Science/Biology and Generic Body interactions were facilitation (57%) or specific comments (29%). Health/Wellness and Own Body saw a split mostly between instructions (36%), general comments (25%) and specific comments (18%). The two most common types of interactions for Science/Biology and Own Body were specific comments (33%) and instructions (31%). Meanwhile, the neutral group had mostly instructions (45%), facilitation (25%) and specific comments (23%).

Figure 12: Group Interactions in Each Dimension of Content Focus and Interaction Level (Focused Observations/Interviews) (percent)



While adults initiated the majority of the interactions in all five dimensions, there was a statistically significant difference based on type of dimension for content focus and interaction level (see Figure 13).[14] When looking at the type of interaction by itself, adults tended to initiate facilitation and instructions more often than children, whereas children were more likely to make general or specific comments than adults (see Figure 14). Both groups seemed to do a similar amount of troubleshooting, but three-quarters (67%) of adult-initiated interactions were facilitation or instructions. While this is not surprising, it does point out the extent to which adults in family groups are focused on improving the experience for the child or children.

[14] Chi-square=86.533, df=4, n=1140

Figure 13: Who Initiated Group Interactions in Each Dimension of Content Focus and Interaction Level (Focused Observations/Interviews) (percent)

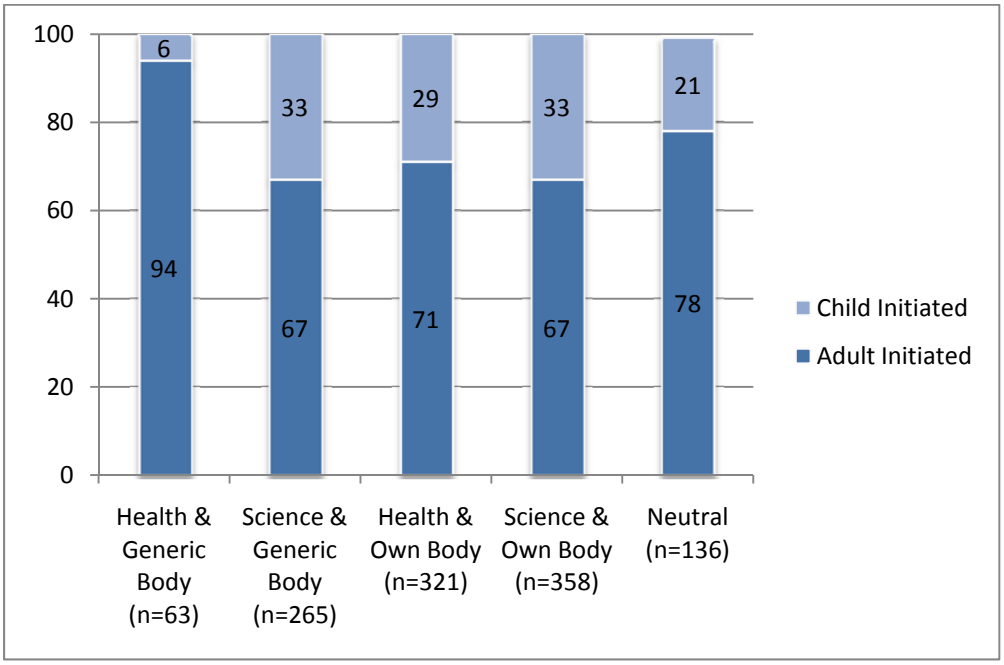
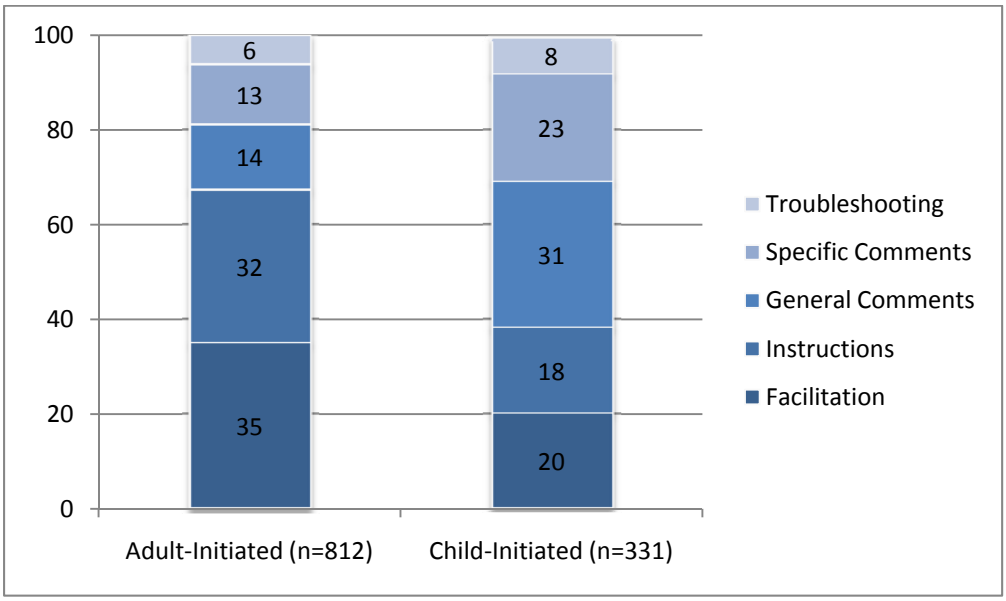


Figure 14: Group Interactions Initiated by Children and Adults (Focused Observations) (percent)



In summary, the two dimensions (content focus and interaction level) do impact the kinds of interactions families have. While the personal connection (own body) had resulted in the highest number of interactions, this was especially true for the own body and science/biology combination. The types of conversations that occurred were mostly instructions and specific comments – this last group was where people made comments relative to their specific experience. Adults initiated the majority of interactions, and the majority of their interactions were instructions and facilitation. The extent to which children initiated the interactions depended on the two dimensions as well.

Research Question 1

Which group outcomes related to science/biology and health/wellness occur as part of the *Expedition Health* experience?

This research study focused on four major group outcomes: personal connections, understanding/knowledge gain, changes in thinking, and changes in behavior. These outcomes were chosen by the researchers based on the objectives of the exhibition and discussions with the *Expedition Health* core team, as well through the onsite interview and focused observations/interviews at specific exhibition components. The outcomes categories and descriptions were as follows:

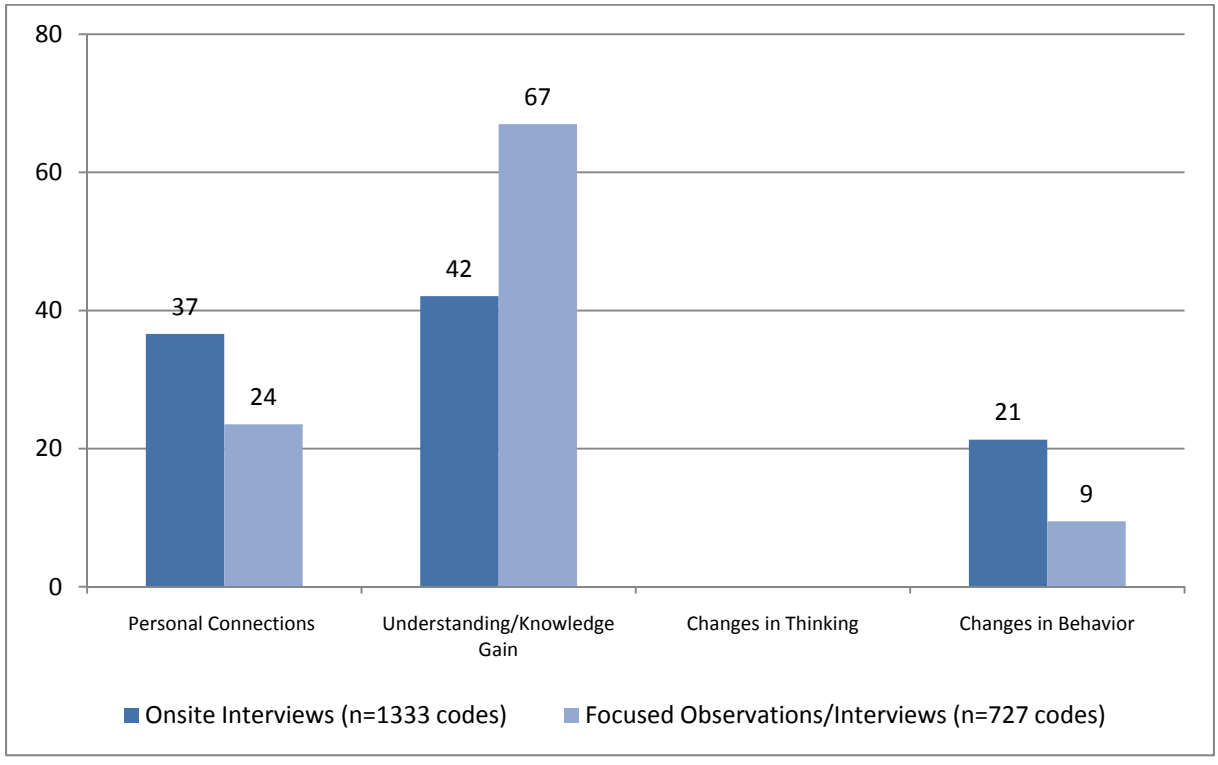
> Personal connections: How visitors related the content of *Expedition Health* to their own lives. Examples included staying active and exercising, engaging in healthy behaviors (e.g., healthy nutrition and food choices), health issues they or someone they know have, and lifespan changes (e.g., by aging).
>
> Understanding/knowledge gain: The extent to which families learned something new about the science/biology of the human body and how to take care of their body (health/wellness). Examples included learning new facts about the human body or one's own body, learning about health and healthy behaviors, remembering facts about the human body, and how to take care of it through exercise, nutrition, and other healthy behaviors.
>
> Changes in thinking: How visitors thought differently about topics related to the exhibition component content, such as health/wellness and science/biology. Note that changes in thinking did not appear in either the onsite interviews or the focused

observations/interviews (see Figure 15). This was mostly an artifact of the onsite interview questions, as there was not a question in either of the methods included below that asked directly about changes in thinking. Findings on changes in thinking are presented in detail in the section about group outcomes persisting and changing over time (see p. 39).

Changes in behavior: Both intentions to behave and actual changes in behaviors as a result of the exhibition experience were included in this category. Examples include staying active and exercising, healthy food and nutrition, and other healthy behaviors.

Families in both of the main samples (onsite interviews and focused observations/interviews) presented knowledge gain, followed by personal connections, and intentions to change behavior. As mentioned above, there were no changes in thinking, but this was more a function of which questions were asked in the group interviews. In the case of focused observations/interviews, for example, understanding/knowledge gain accounted for 67% of all the coded data (see Figure 15). The onsite interviews were more evenly split, with 79% of their codes occurring in understanding/knowledge gain (42%) and personal connections (37%).

Figure 15: Group Outcomes in *Expedition Health* (percent of total codes)



Another way of looking at the codes is to see to what extent each group had a particular type of

interaction. In the onsite interviews, personal connections were mentioned by 93% of the families, while this was the case for 85% of the focused observations/interviews[15].

Personal Connections: Almost three-quarters (73%) of the families in the onsite interviews had personal connections to how they stayed active and exercise (see Figure 16). Of these families, they also connected the exhibition with a health issue (57%) or other past experiences (56%; see Figure 16). Those participating in the focused observations/interviews also made connections with health issues and staying active, but less frequently than those in the onsite interviews (see Figure 17). For example, healthy nutrition was among the top three frequently mentioned codes and number of instances in the focused observations/interviews, but least frequently mentioned in onsite interviews.

One reason for the increased focus on health in the focused observations/interviews may be that to test the model looking at the two dimensions (content focus and interaction level) required many of the exhibition components to focus on health/wellness. These included Food is Fuel, Fate of the Granola, Hydrate, and Superfood Heroes (see Appendix 1 for a description of the specific exhibition components included). As such, individuals in family groups would often make comments about their health or nutrition. However, it should be noted that staying active and exercising, while not specifically about health content per se, is still a healthy activity.

Understanding/Knowledge Gain: All interviewed families, in both the onsite interviews and focused observations/interviews, indicated gaining some knowledge or understanding from the exhibition. The majority of families said they learned something new or were reminded of something about the human body, about how to take care of body, and/or about their own bodies (see Figures 18 and 19).

Changes in Behavior: Changes in behavior were mentioned by 88% of onsite families interviewed and in 72% of focused observations/interviews (see Figures 20 and 21). The top three specific behaviors mentioned most frequently were intentions to stay active and exercise, to eat better, and to engage in other healthy behavior (e.g., use of sunscreen). See the next section about outcomes persisting and changing over time for what visitors actually did 3 to 4 months after their visit.

[15] There were a total of 60 focused observations conducted. However, the number of families participating in the focused observations was 36. This was because the components were paired in order to facilitate data collection: Bioride with Heart's Electricity, Measure Up with Fate of the Granola Bar, Explore RX with Food is Fuel, Top Ten Traumas on the Trail with Size Up your Stride. Hydrate and Superfood Heroes were observed separately.

Figure 16: Number of Codes and Families In Each Type of Personal Connections (Onsite Interviews) (percent)

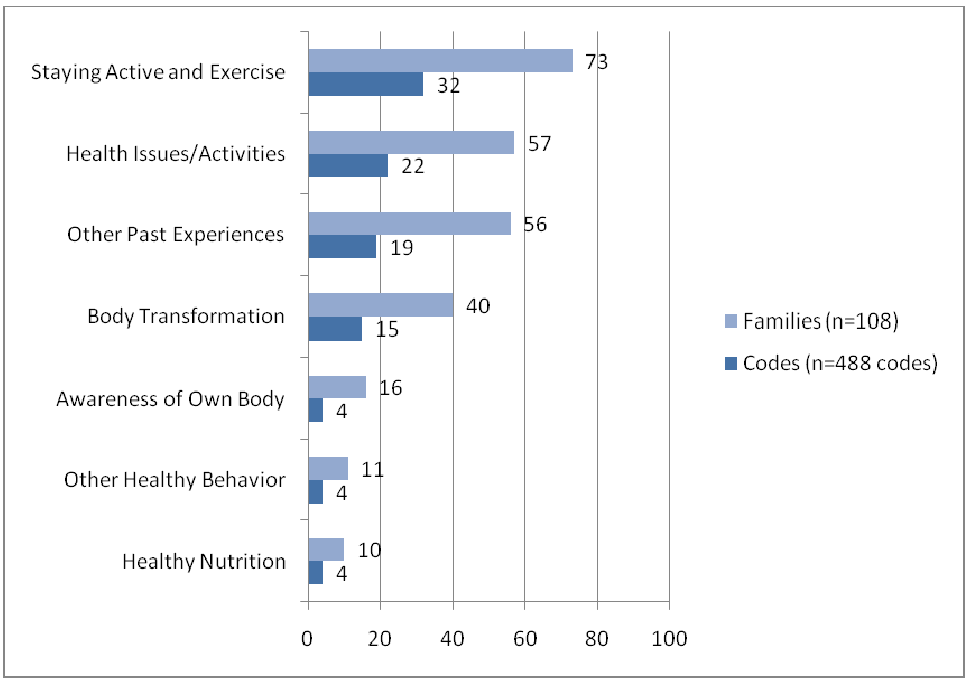


Figure 17: Number of Codes and Families In Each Type of Personal Connections (Focused observations/Interviews) (percent)

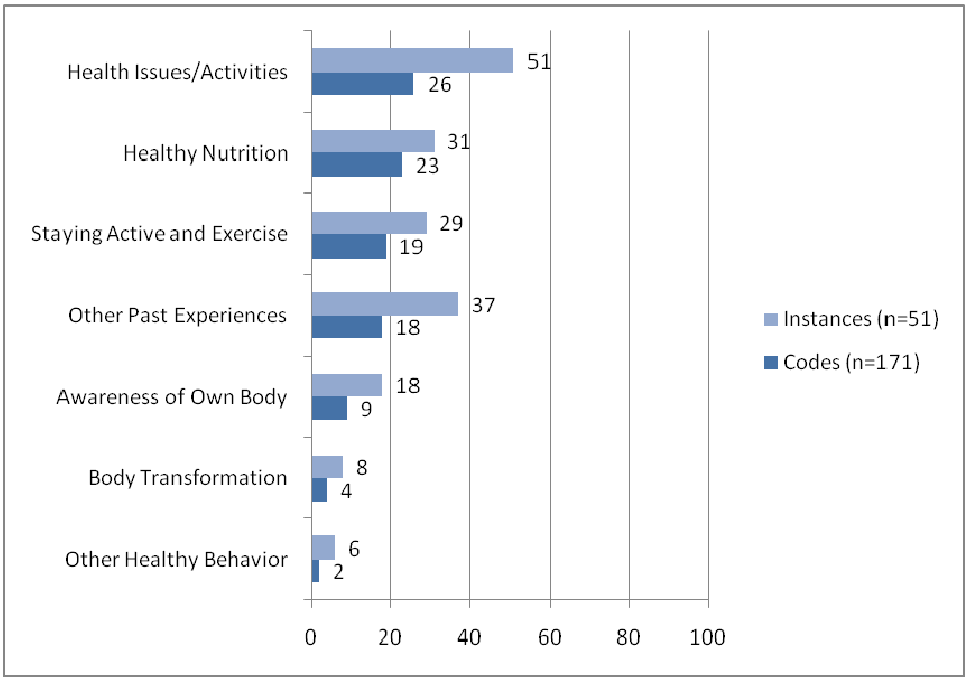


Figure 18: Number of Codes and Families In Each Type of Knowledge Gain/ Understanding (Onsite Interviews) (percent)

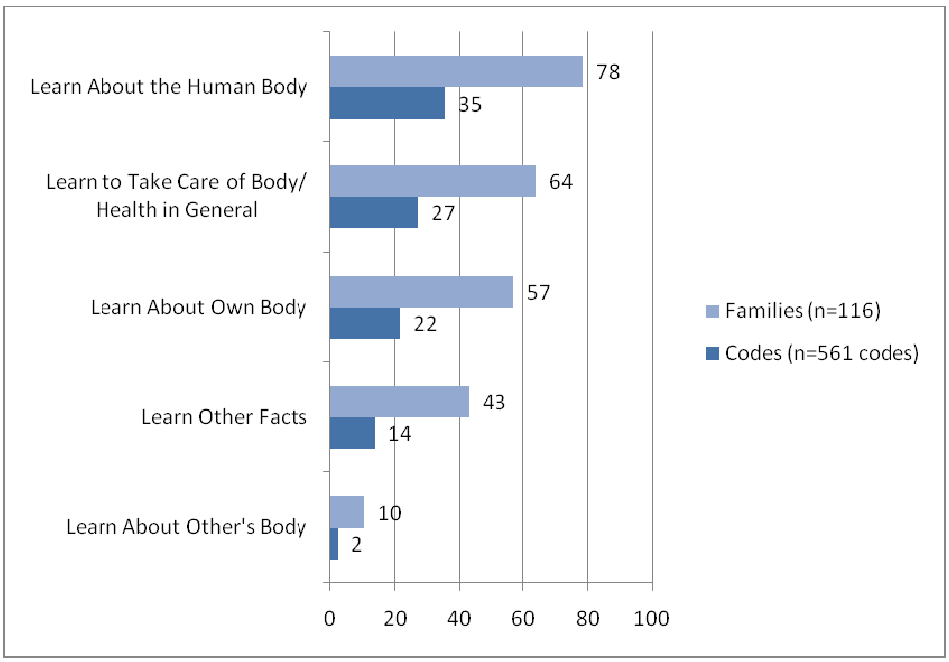


Figure 19: Number of Codes and Instances In Each Type of Knowledge Gain/ Understanding (Focused Observations/Interviews) (percent)

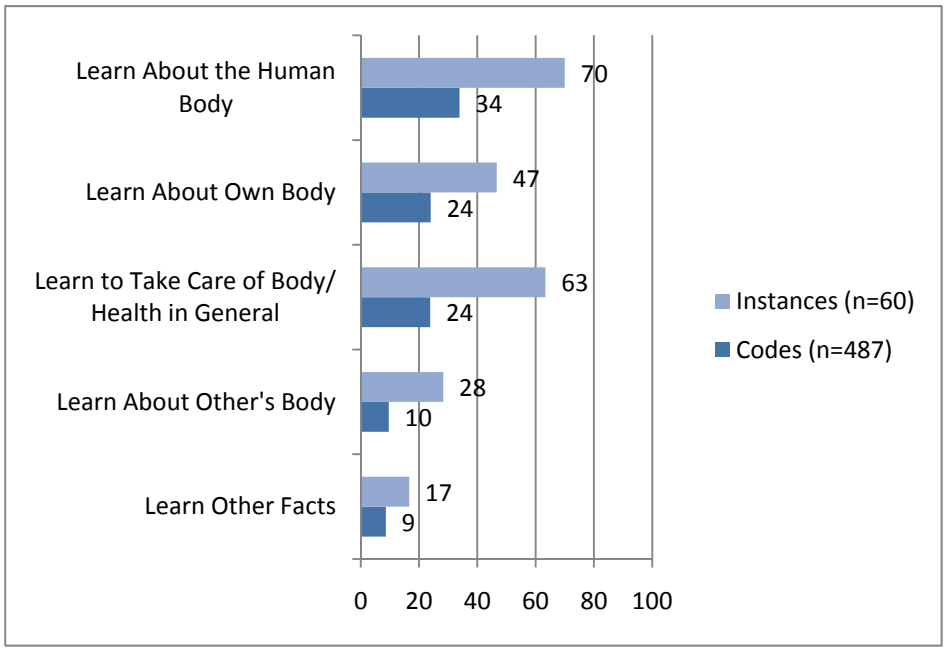


Figure 20: Number of Codes and Families In Each Type of Change in Behavior (Onsite Interviews) (percent)

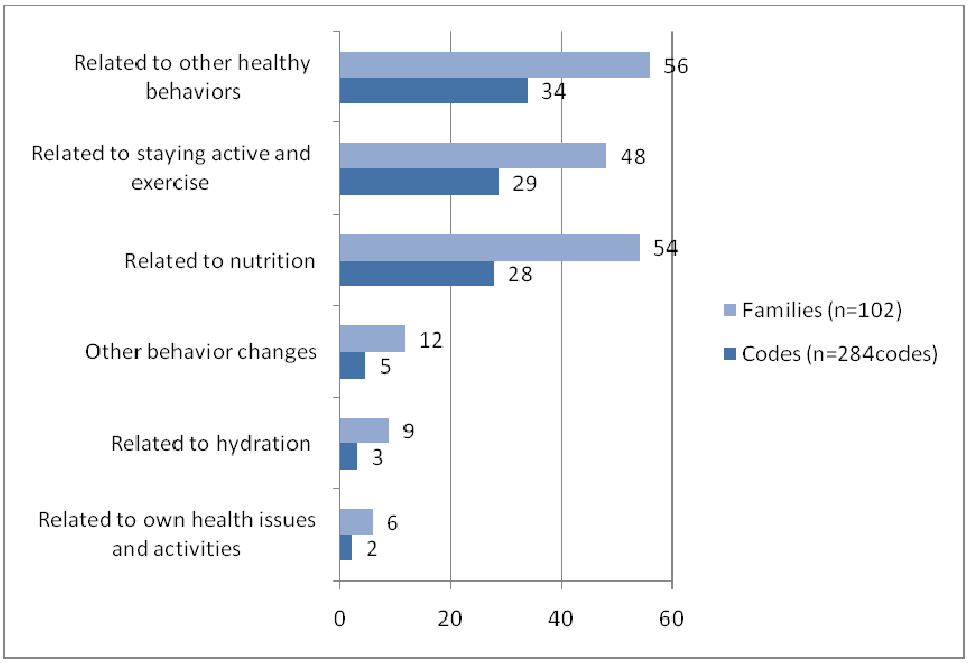
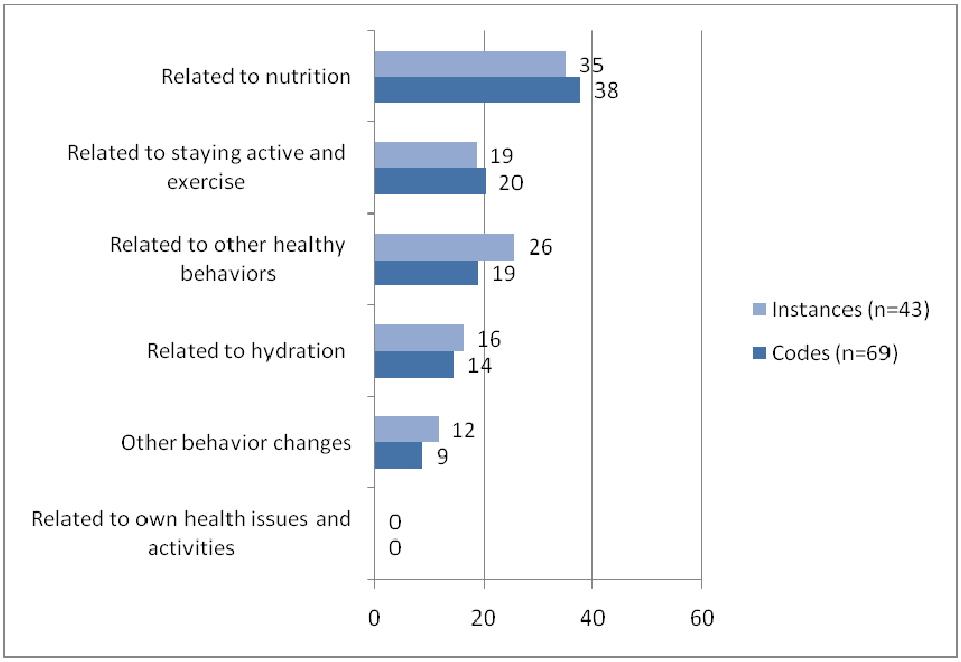


Figure 21: Number of Codes and Instances In Each Type of Change in Behavior (Focused Observations/Interviews) (percent)



Research Question 2

How do the group outcomes persist and change over time?

Families who were interviewed onsite shared their contact information and were asked to complete an online questionnaire three to four months after their visit. This method was used in order to assess whether immediate outcomes continued and/or changed over time. Outcomes immediately after a visit can change with the passage of time, as the information gets incorporated, modified, or forgotten. In order to gather information, online survey invitations were sent to the adult representative of the onsite interview group and they were asked to pass along the invitation to the other members of their group, including both adults and children. A total of 61 individuals completed an online questionnaire, including 43 adults and 18 children. The sample size is relatively small, so this should be taken into account when interpreting results in this section. Further research looking at the longer-term outcomes with larger sample sizes would be valuable.

What are visitors' most vivid memories of the exhibition?

There were some similarities between adults' and children's most memorable components in the exhibition (see Tables 4 and 5). See Yourself Age was the most memorable component for both, and there were three other exhibition components that were also in the top five for both adults and children. This means that four of the top five were the same for children and adults, although it is possible that the adults and children completed the online questionnaires as a group or while discussing their answers with others in the group. Either way, the top components remembered seem to include a strong personal connection (See Yourself Age, Bioride, Size Up Your Stride) or highly interactive and memorable experiences (Body Trek Theater, Lung Dissection). These are the kinds of experiences one would expect people to remember and, as with the previous sections, confirm the importance of enabling visitors to make a personal connection with the material.

Table 4: Adults' most vivid memories of *Expedition Health* (Adult online questionnaire)

Memory	Number of Instances	Percentage
See Yourself Age	7	17
Body Trek Theater	7	17
BioRide	6	14
Size Up Your Stride	5	12
Lung Dissection	5	12
Biology BaseCamp – Generic	4	10

Brain Challenge (crossing log)	2	5
Pirates of the Human Being	2	5
Heart Dissection	2	5
Food Chemistry	2	5
Drug Impacts	2	5
Superfood Heroes	1	2
Your Heart's Electricity	1	2
Blood Flow	1	2
Measure Up	1	2
See Your Cells	1	2
Unclear/Unspecified	5	12
TOTAL RESPONDENTS	**42**	**100**

Table 5: Children's most vivid memories of *Expedition Health* (Children's online questionnaire)

Memory	**Number of Instances**	**Percentage**
See Yourself Age	5	29
BioRide	5	29
Biology BaseCamp – Generic	4	24
Body Trek Theater	3	18
Lung Dissection	3	18
See Your Cells	2	12
Size Up Your Stride	1	6
Brain Challenge (crossing log)	1	6
Pirates of the Human Being	1	6
Food Chemistry	1	6
Drug Impacts	1	6
Your Heart's Electricity	1	6
Blood Flow	1	6
SignUp/SignOut/Peak	1	6
Unclear/Unspecified	3	18
TOTAL RESPONDENTS	**17**	**100**

Personal connections: What personal connections do people remember having in the exhibition, a few months after the visit?

More than three quarters of adults (79%) reported that there was something in the visit that reminded them of their own life (see Table 6). The large majority of these instances were classified as personal connections (see Figure 22), and they were most likely to be reminded of their own health (84% said quite a bit or very much) followed by being reminded of the health of someone they know (59% said quite a bit or very much; see Table7). It was somewhat surprising that nearly one third (30%) said they made a connection to their job, either quite a bit or very much.

There are no normative data about people remembering connections to their own lives while in an exhibition, but the fact that more than three-quarters reported occurrences of such memories is notable. Further research in this area would be very useful.

Table 6: Was there anything in the exhibition that reminded you of something in your own life? (Adult online questionnaire)

Response	Number of Instances	Percentage
Yes	34	79
No	9	21
TOTAL RESPONDENTS	**43**	**100**

Figure 22: What reminded them of their own life, Adults (percent of total codes)

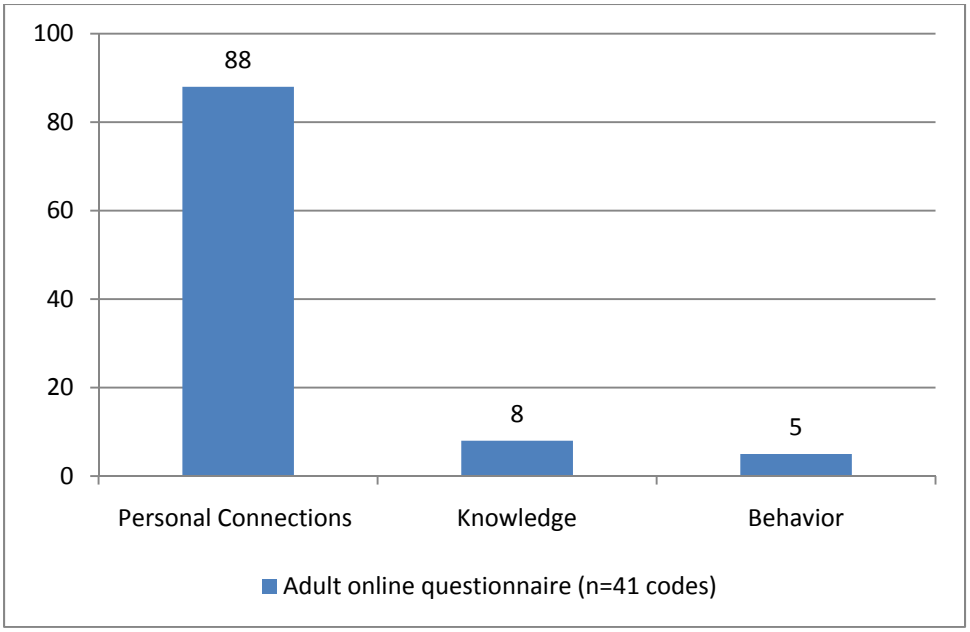


Table 7: Personal connections DURING the visit (Adult online questionnaire)

	Percent				
Response	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much**
I was reminded of my own health (n=43)	2	0	14	54	30
I was reminded of the health of someone I know (n=43)	5	2	35	40	19
I made a connection between the exhibit and my job (n=43)	33	26	12	16	14
I thought about how the exhibit related to a hobby I have (n=41)	15	24	32	22	7

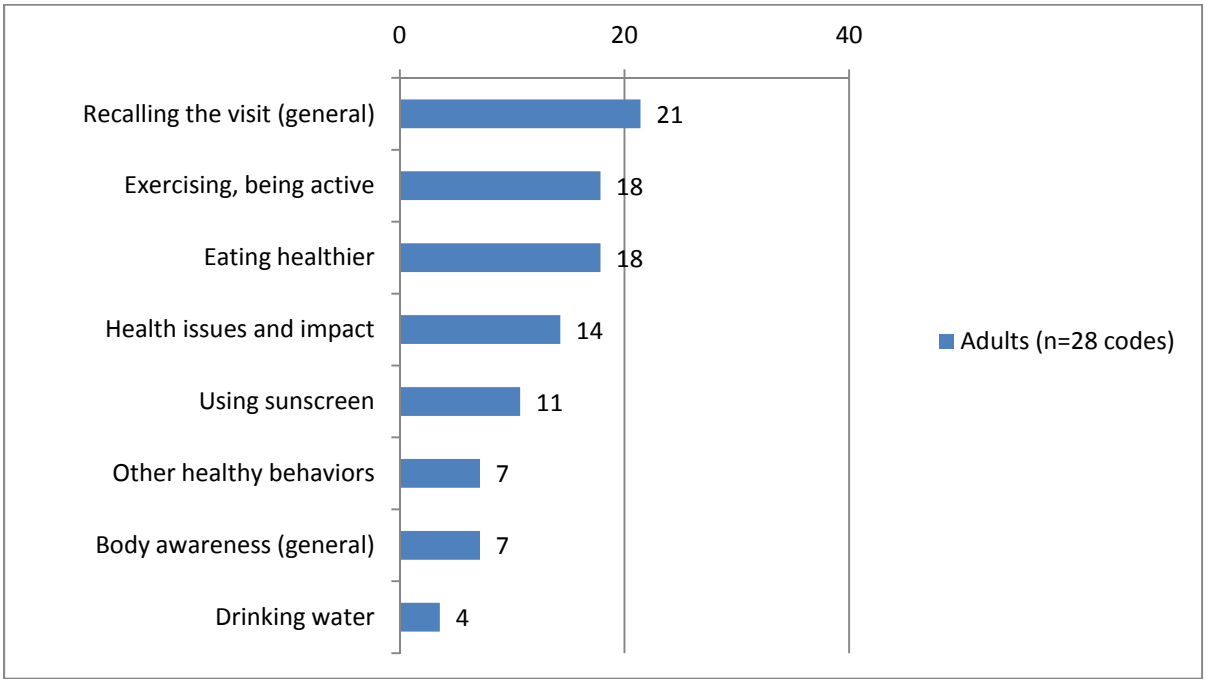
Personal connections: What personal connections do people report happening after the visit?

Asked about whether they had been reminded of their visit three to four months later, nearly two-thirds (65%) said yes (see Table 8). Again, having normative data on this would be extremely useful to determine whether this was influenced by the exhibitions themselves, the topics covered, or some other factor or factors.. When asked what exactly reminded them of their visit, most individuals referred generally to the visit, exercising/being active and eating healthier (see Figure 23).

Table 8: Since the visit have there been any instances in your day-to-day life that reminded you of *Expedition Health* (Adult online questionnaire)

Response	Number of Instances	Percentage
Yes	28	65
No	15	35
TOTAL RESPONDENTS	**43**	**100**

Figure 23: What reminded them of their visit, Adults (percent of total codes)



Understanding/Knowledge Gain: What do visitors say they learned during their visit, a few months after the visit?

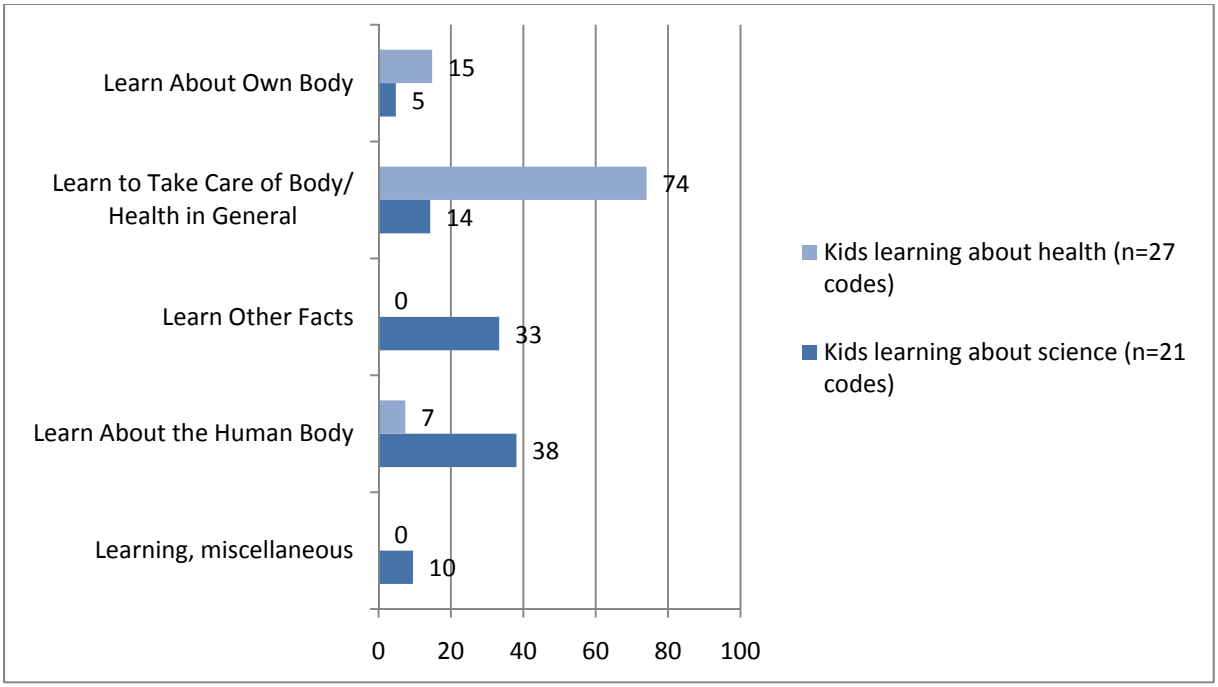
Adults said they recalled learning a lot, with 70% saying they learned quite a bit or very much from their visit (see Table 9). When asked specifically about health, 62% said they learned quite a bit or very much and another 47% said they learned quite a bit or very much about their own health. Meanwhile, 44% said the same thing for learning about how to keep them healthy and 72% said they learned quite a bit or very much about science. This suggests that the exhibition was helping visitors learn not only about science/biology and health/wellness, but they also learned about their own health/wellness, and these perceptions persisted over time.

Children were asked to report one thing they learned about science, and they most often reported learning facts about the human body, or other science facts. When asked the same question about health, they mostly said they learned how to take care of their body (see Figure 24). In addition to the adults, children reported having learned about science/biology and health/wellness during the visit.

Table 9: Percent of Understanding/Knowledge Gain DURING the visit (Adult online questionnaire)

	Percent				
Response	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much**
I learned something new (n=43)	5	2	23	33	37
I learned something new about health (n=43)	7	2	29	38	24
I learned something new about how my body works (n=42)	5	12	36	26	21
I learned something new about science (n=43)	5	5	19	56	16
I learned something new about how to keep myself healthy (n=42)	7	5	44	37	7

Figure 24: What kids learned about health/wellness and science/biology (percent of total codes)



Changes in thinking: How are visitors thinking differently a few months after the visit?

When asked about how the visit to *Expedition Health* had changed the way they thought about science/biology and health/wellness since the visit, visitors were slightly more likely to say it changed their thinking about health/wellness than science/biology (see Tables 10 and 11). Almost three-quarters (70%) said their visit changed their thinking about science/biology at least a little bit. This was true for the large majority (88%) when asked about their thinking towards health/wellness (see Tables 10 and 11). On the other hand, very few visitors said it changed their thinking very much (0% for science/biology; 5% for health/wellness).

Asked how it changed their thinking about science, adults gave a variety of answers or said they already knew some of the information – many said they were in health or science fields. When asked the same question about health, they most often referred to taking care of their own health and pointed out they already knew a good bit of the information (see Figure 25).

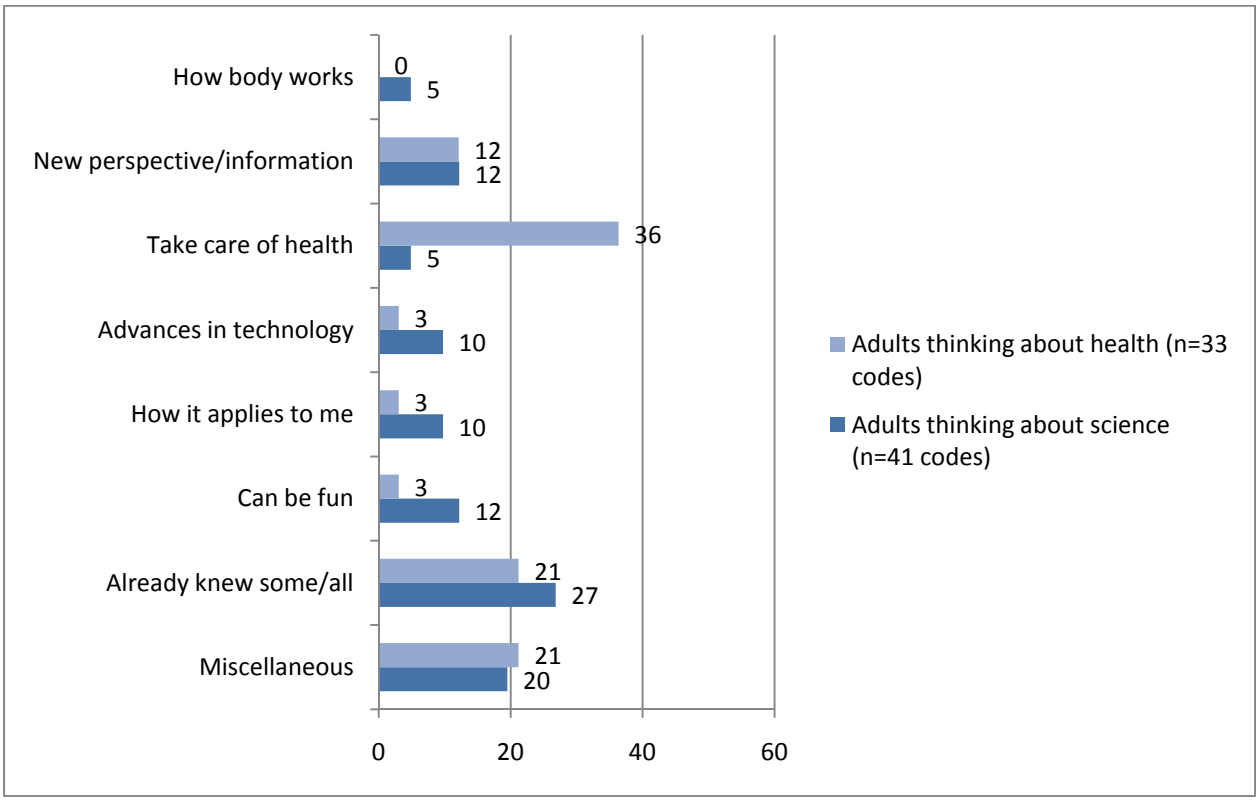
Table 10: Changes in thinking about science/biology AFTER the visit (Adult online questionnaire)

	Percent				
Response	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much**
How much did visiting *Expedition Health* change how you think about science (n=43)	30	19	34	16	0

Table 11: Changes in thinking about health/wellness AFTER the visit (Adult online questionnaire)

	Percent				
Response	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much**
How much did visiting *Expedition Health* change how you think about health (n=42)	12	31	29	24	5

Figure 25: Types of changes in thinking about science/biology and health/wellness, adults (percent of total codes)

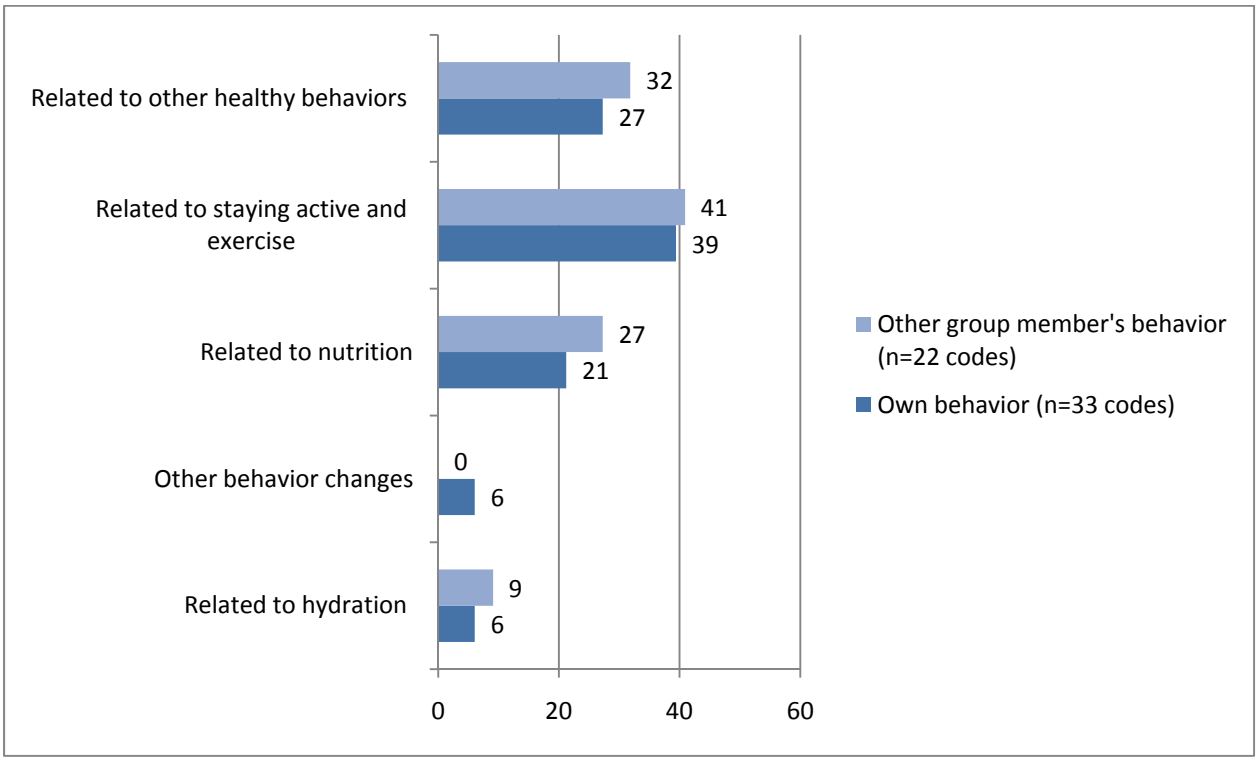


Changes in behavior: What evidence is there for visitors changing their behavior based on visiting the exhibition?

Visitors were asked the questions "What, if anything, are you doing differently as a result of visiting *Expedition Health*?" and "How about someone else in your group; are they doing anything differently?" to get at the groups' changes in behavior as a result of their visit to *Expedition Health*. In total, 40 of the 43 respondents said there was something they were doing different as a result of visiting. Of the same group, 35 of the 43 respondents mentioned something that someone besides them in their original visitor group was doing differently as a result of visiting the exhibition. The breakdown of those responses is below (see Figure 26). The large majority of responses had to do with staying active/exercising, healthy behaviors and nutrition.

While the sample size was rather small, it points to the potential for exhibitions to have at least some impact on visitors' behaviors.

Figure 26: Own and others' behaviors after visiting exhibition, Adults (percent of total codes)



Group Interaction: What kinds of group interactions related to the exhibition have occurred since visiting?

When asked about the frequency of six specific behaviors they could have done after visiting *Expedition Health*, all six behaviors showed some self-reported increase (see Table 12 for the behaviors). The largest increases were in discussing things they could do together to be healthier (44%), and going places where they could be active (30%). When asked whether the exhibition had influenced their decisions, nearly everyone said yes. Slightly less likely to be influenced were the behaviors of talking about science/biology and watching science/biology programs together, followed by looking up information about health and visiting science or science-related museum. However, all behaviors included showed at least some increase and it is useful to point out that the top two behaviors influenced were about health/wellness. The exhibition seems particularly useful for encouraging conversation around health after the visit.

Table 12: Changes in behavior AFTER the visit. What are you doing differently after visiting *Expedition Health?* (Adult online questionnaire)

	Percent			
Response	**More often**	**About the same**	**Less often**	**Percent influenced by *E.H.*?**
We are discussing things we can do to be healthier (n=43)	42	58	0	44
We are going places where we can be active (n=43)	30	70	0	28
We are talking about science/biology with each other (n=43)	19	81	0	19
We are watching science/biology programs together (n=43)	16	84	0	14
We are looking up information about health (n=43)	12	88	0	12
We are visiting science or science-related museums together (n=43)	7	93	0	7

Research Question 3

How do group composition and prior experiences relate to the outcomes?

In the research model developed for this study, one of the main assumptions was that group composition and prior experiences would influence group outcomes. In this section, these relationships are described for the onsite family interviews.

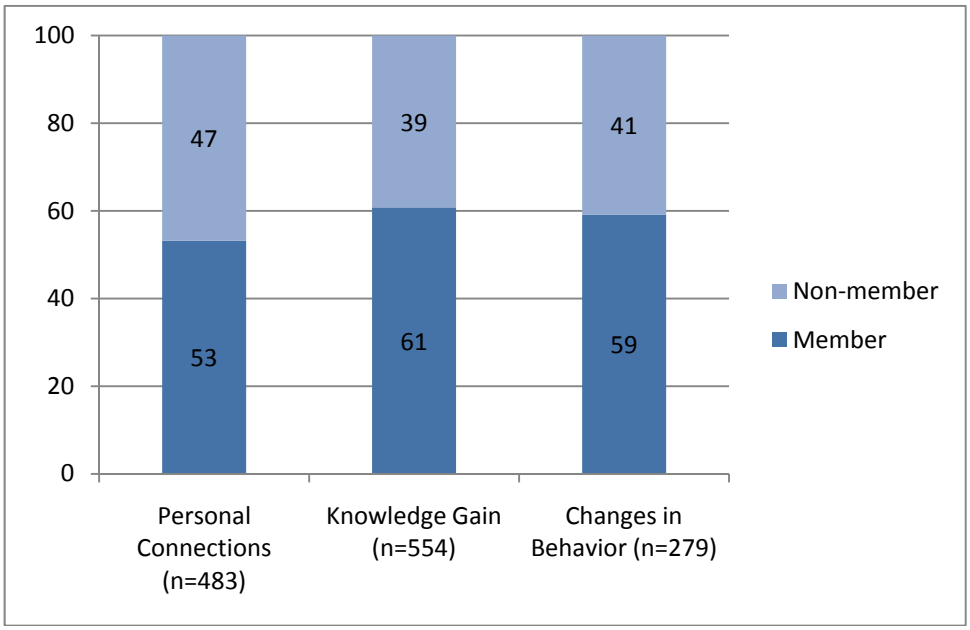
How does group composition relate to the outcomes?

Group composition factors included museum membership, gender of adults and children, age of the children and group size.

There were no statistically significant differences between DMNS members and non-members participating in the onsite interviews in the breakdown of main outcomes categories: personal connections, knowledge gain, and changes in behavior during the visit.[16] Non-members made slightly more personal connections than members (although it should be noted that while members contributed 53% of the codes, the average per group was smaller than non-members'). Members had more incidents of knowledge gain than non-members (63% of codes, and an average of 5.2 codes per group). Members and non-members had a similar changes in behavior (although members had 59% of the codes, their average per group was about 2.8 codes; see Figures 27 and 28). When group size was factored in, it did not correlate significantly with any of the three main outcomes; the size of the group did not impact the number of personal connections, knowledge gain or changes in behavior that occurred.

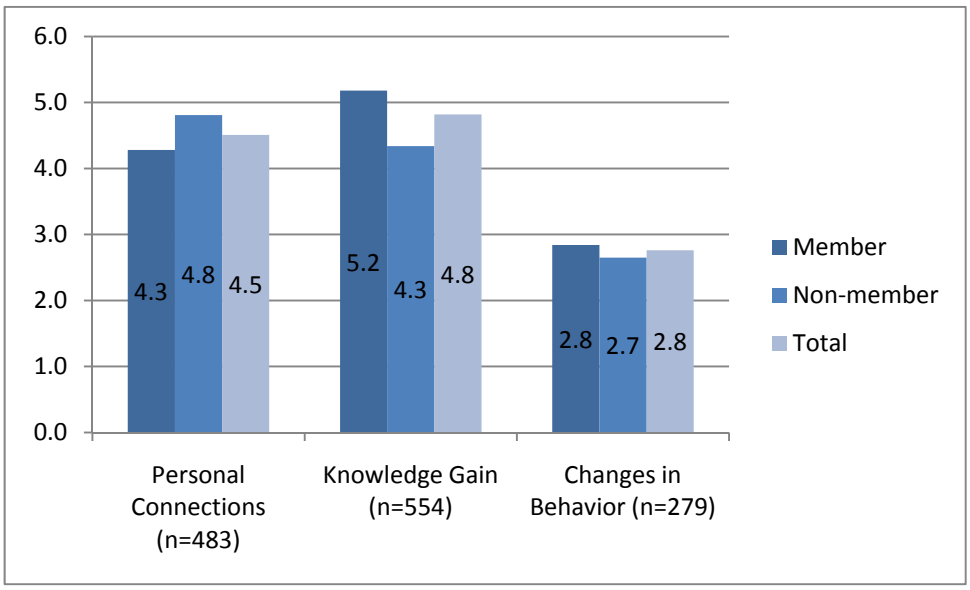
Note for figure below: Changes in thinking did not appear in either the onsite interviews or the focused observations/interviews (see Figure 15). As such, the changes in thinking category is not included in this section. This was mostly an artifact of the onsite interview questions, as there was not a question in either of the methods included below that asked directly about changes in thinking. Findings on changes in thinking are presented in detail in the section about group outcomes persisting and changing over time (see p. 39).

Figure 27: Percent of outcome codes by members and non-members (Onsite Interviews)



[16] Changes in behavior during the visit relate to intentions to change behavior in the future.

Figure 28: Mean number of outcome codes by members and non-members (Onsite Interviews)



When looking at gender of the children, the only statistically significant difference found was personal connections. Mixed groups - those with boys and girls - presented significantly more personal connection outcomes than any other group (i.e., only one girl, only one boy, all girls, and all boys). They accounted for 40% of the personal connections and averaged 5.5 personal connections per group. Interestingly, groups with only girls tended to show more changes in behavior than others (28% of the codes, and an average of 3.8 codes per group; see Figures 29 and 30).

These differences in the groups are interesting, but not fully explained by the data. There were no findings that explained why mixed groups had more personal connections, but one possibility may be that gender drives the types of personal connections being made with children. If boys and girls experience personal connections differently, then groups with children of both genders would, by necessity, have more personal connections occurring within their visit than groups with children of only one gender. One could also hypothesize that this applies to groups with mixed age children, that different age children might have different types of personal connections. While this was not the case in this study, it would be interesting to examine in future research. Further research on this how a child's gender impacts personal connections with biology/science and health/wellness content in exhibitions would be useful. It would also be useful to study why changes in behavior were more prevalent for groups with girls, as the data in this study are not able to explain this difference.

Figure 29: Percent of outcome codes by groups based on gender of children (Onsite Interviews)

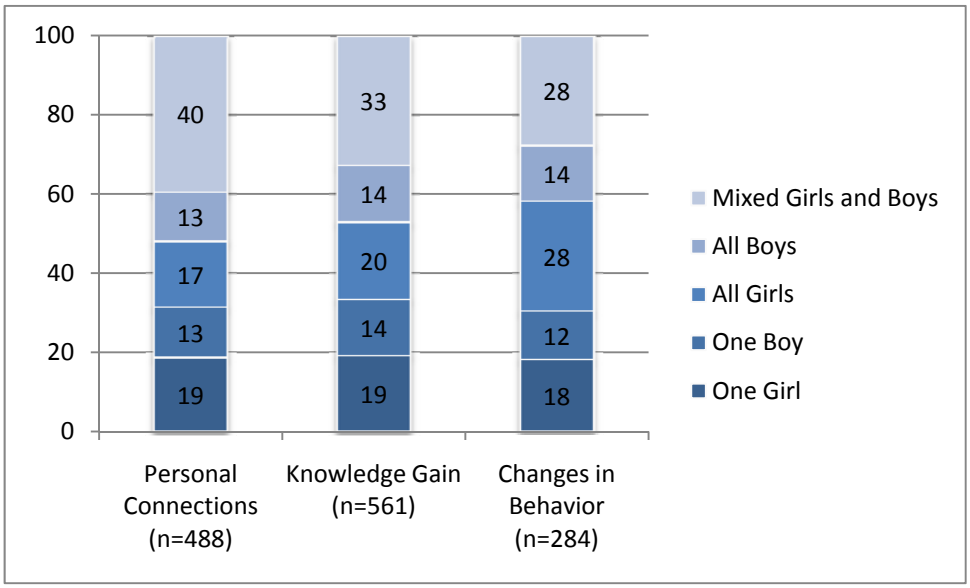
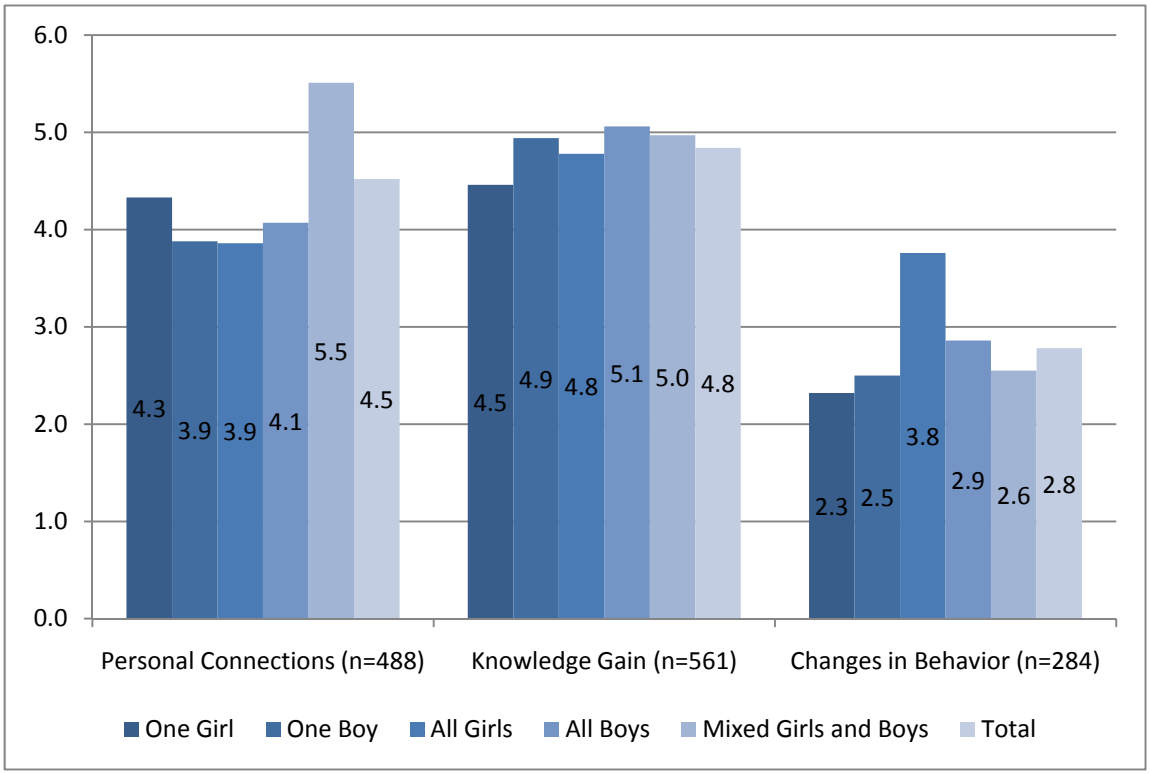
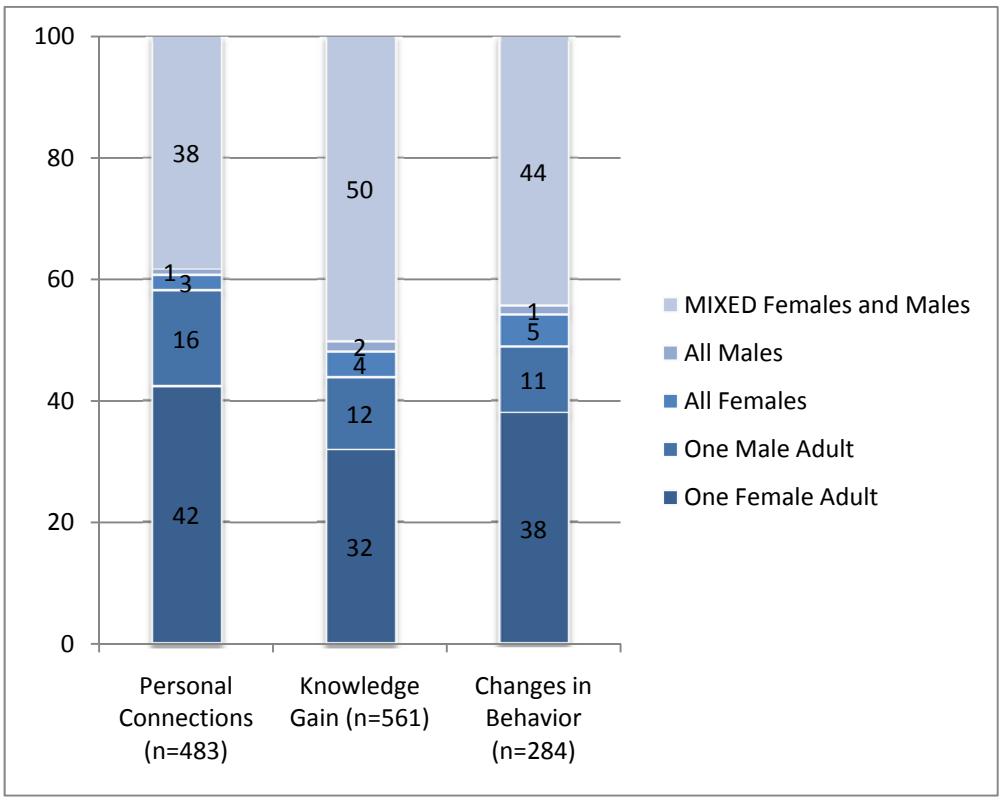


Figure 30: Mean number of outcome codes in groups based on gender of children (Onsite Interviews)



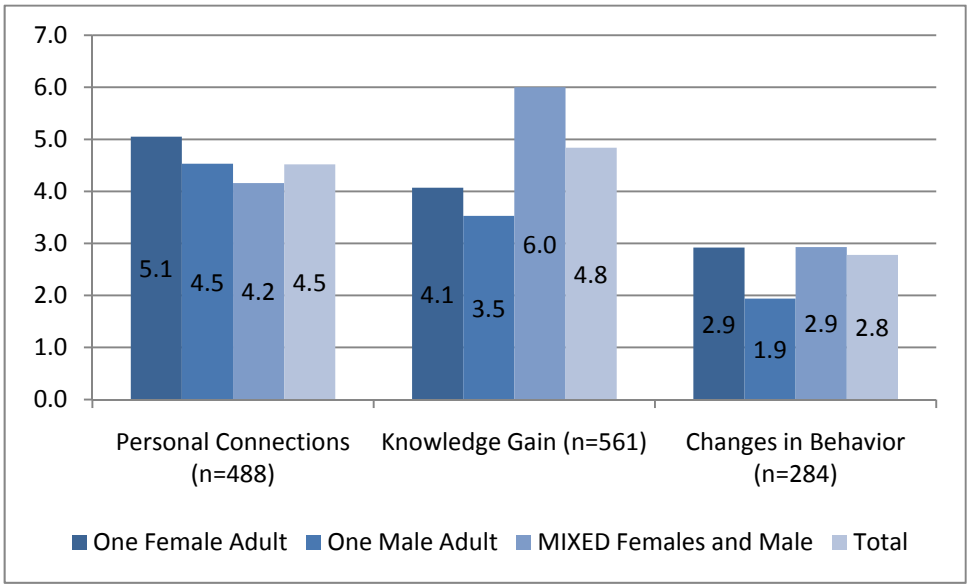
Related to gender of adults, groups with only one female tended to make more personal connections (42% of the codes, and an average 5.1 codes per group) and groups with one male adult tended to report fewer changes in behavior (11% of the codes, and an average 1.9 codes per group). However, these two differences were not statistically significant. Groups with mixed females and males, on the other hand, reported significantly more incidents of knowledge gain than those with only one female or one male[17]; these groups contributed 50% of knowledge gain codes and averaged 6 codes per group (see Figures 31 and 32). Again, it would be very useful to understand why mixed-gender groups had higher incidents of knowledge gain and whether this was drive by the mixed gender or some other factors.

Figure 31: Percent of outcome codes by groups based on gender of adults (Onsite Interviews)



[17] There were too few cases of 'more than one male' and 'more than one female' and they were not included in the statistical test.

Figure 32: Mean number of outcome codes in groups based on gender of adults (Onsite Interviews)



When comparing groups based on age of the children, those with more than one child in the target age (8 to 14) tended to have more outcomes than others (only one child in the target age or mixed children in and outside the target age; see Figure 33). There was also a statistically significant difference in the number of codes per group for knowledge gain; the more than one child in the target age range group accounted for 40% of the codes and averaged 5.7 codes per group. In addition, they presented significantly more instances of changes in behavior codes (39% of the codes, and average 3.2 codes per group) than groups with only one child (see Figures 33 and 34). There were no differences between this group and mixed target age groups or mixed target age and one child groups. In regards to personal connections, though not statistically significant, groups with more than one child in the target age accounted for more of the connections (37% of the codes, and average 4.9 codes per group; see Figures 33 and 34).

Figure 33: Mean number of outcome codes in groups based on age of children (Onsite Interviews)

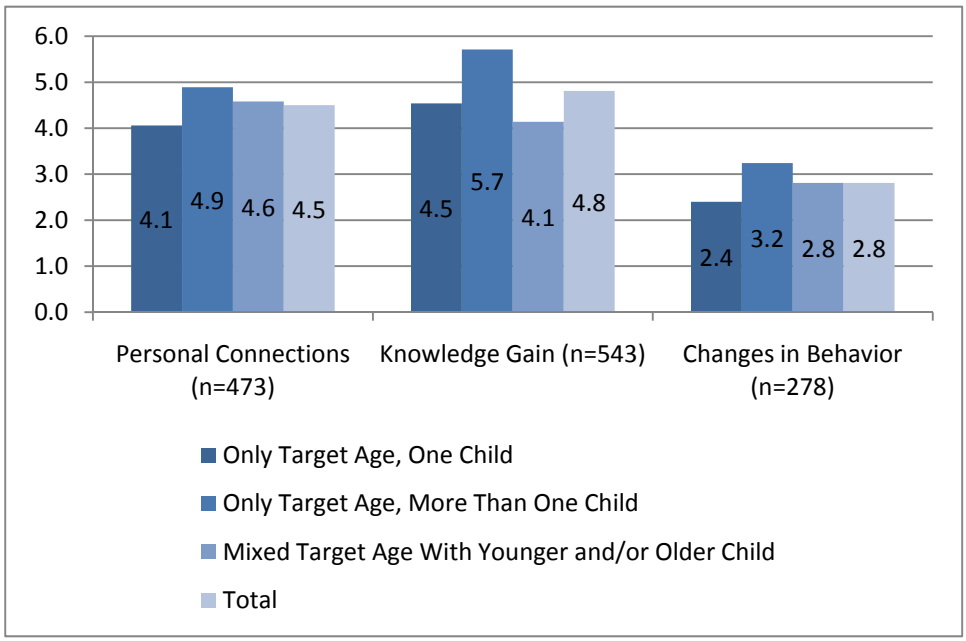
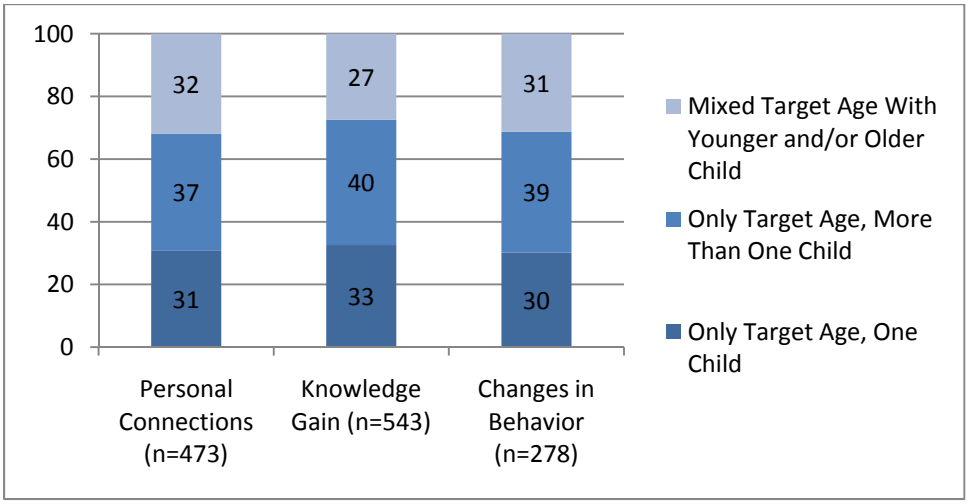


Figure 34: Percent of outcome codes by groups based on age of children (Onsite Interviews)



How do prior experiences relate to outcomes?

Outcomes were also looked at in relation to groups' prior experiences: 1) whether someone in the group worked in a science/biology or health/wellness-related field, and 2) the frequency with which they reportedly engaged in the six science/biology or health/wellness-related behaviors.[18]

First, when comparing the outcomes between groups with and without someone who works in a field related to science/biology, the only statistically significant difference found was in changes in behavior.[19] Those groups with someone who works or studies in a field related to science/biology had significantly less intention to change behavior (17% of the codes, and an average 2.1 codes per group). These groups also made fewer personal connections (23% of the codes, and an average 4.1 codes per group) and gained less knowledge (21% of the codes, and an average 4.1 codes per group), though these differences were not statistically significant (see Figures 35 and 36).

Second, no statistically significant differences were found in the outcomes (personal connections, knowledge gain, or changes in behavior) when comparing groups with and without someone who works/studies in a field related to health and wellness. Again, groups with someone who works in the field were less likely to make personal connections (24% of codes, average 3.9 codes per group) and intend to change behavior (26% of codes, average 2.5 codes per group). However, groups without someone working/studying in a field related to health/wellness accounted for 73% of the instances of knowledge gain, both groups averaged the same number of codes per group (4.8; see Figures 37 and 38). This may have occurred because those working in the field often reported that they already knew the information in the exhibition, thus they may have been less likely to report any understanding or knowledge gain. When these kinds of statements are made they do not necessarily mean that people think they know all the information presented, just that they are familiar with the various topics.

Third, the ratings on the six prior experience behaviors also did not show any statistically significant association with the personal connections, knowledge gain, and change in behavior. Overall, neither professional/academic ties nor past activities linked to science/biology and health/wellness appeared to significantly impact outcomes.

[18] The six activities were: 1. watch science/biology programs together, 2. visit science or science-related museums together, 3. talk about science/biology with each other, 4. discuss things they can do to be healthier, 5. go places where they can be active, and 6. look up information about health/wellness.

[19] t-test $t=2.015$, $p<.05$, $df=111$, $n=113$. Changes in behavior during the visit relate to intentions to change behavior in the future.

Figure 35: Percent of outcome codes in groups with and without someone who works/studies in a field related to science/biology (Onsite Interviews)

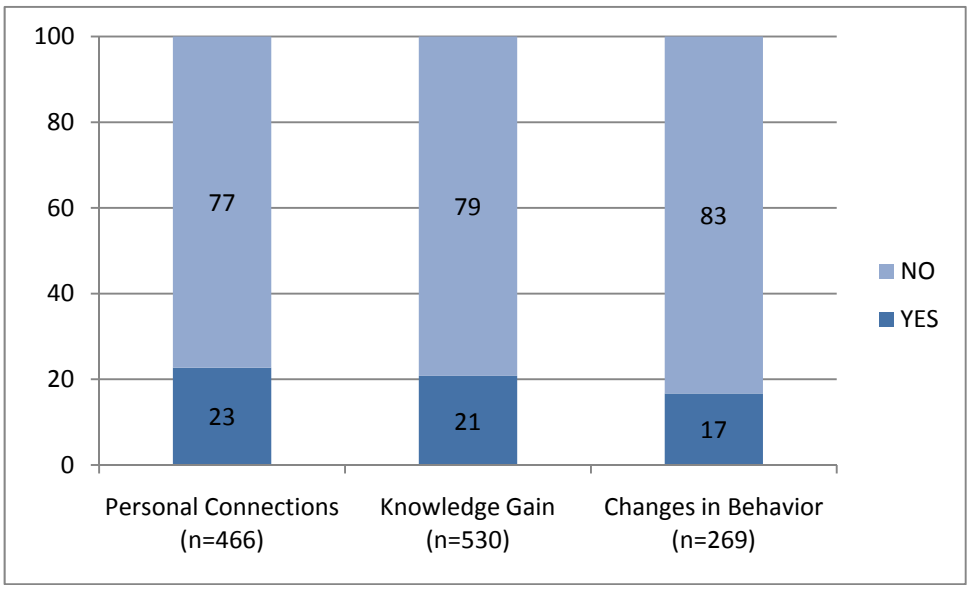


Figure 36: Mean number of outcome codes in groups with and without someone who works/studies in a field related to science/biology (Onsite Interviews)

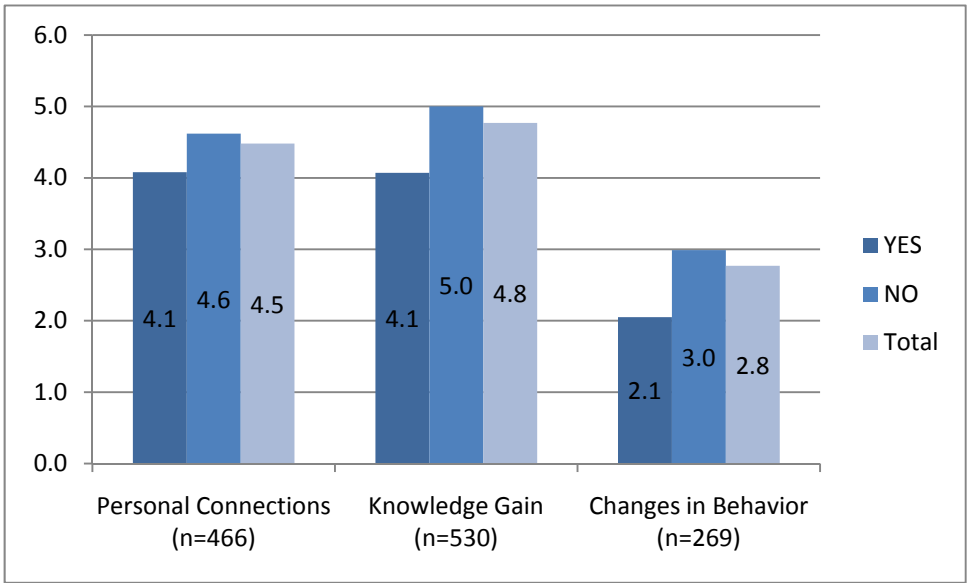


Figure 37: Percent of outcome codes in groups with and without someone who works/studies in a field related to health or wellness (Onsite Interviews)

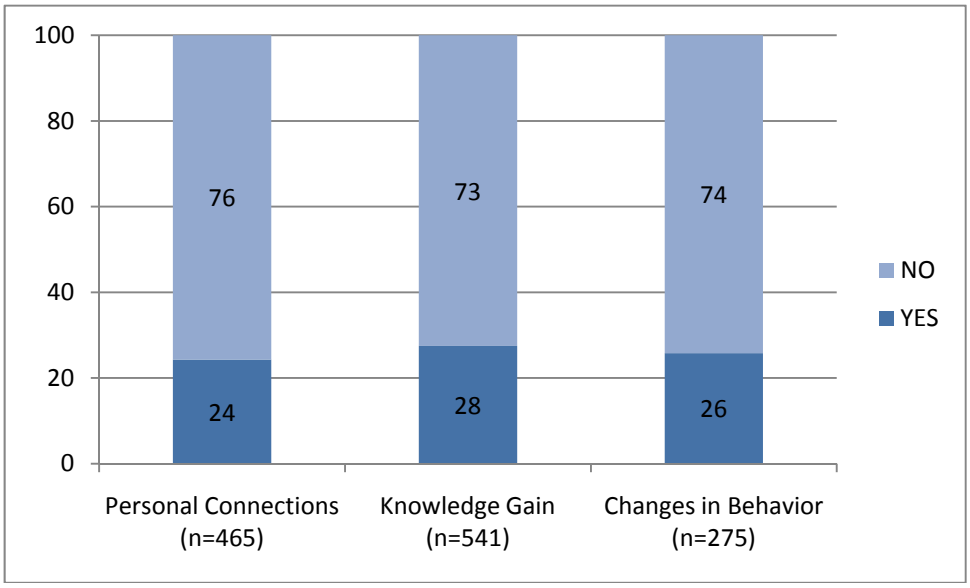
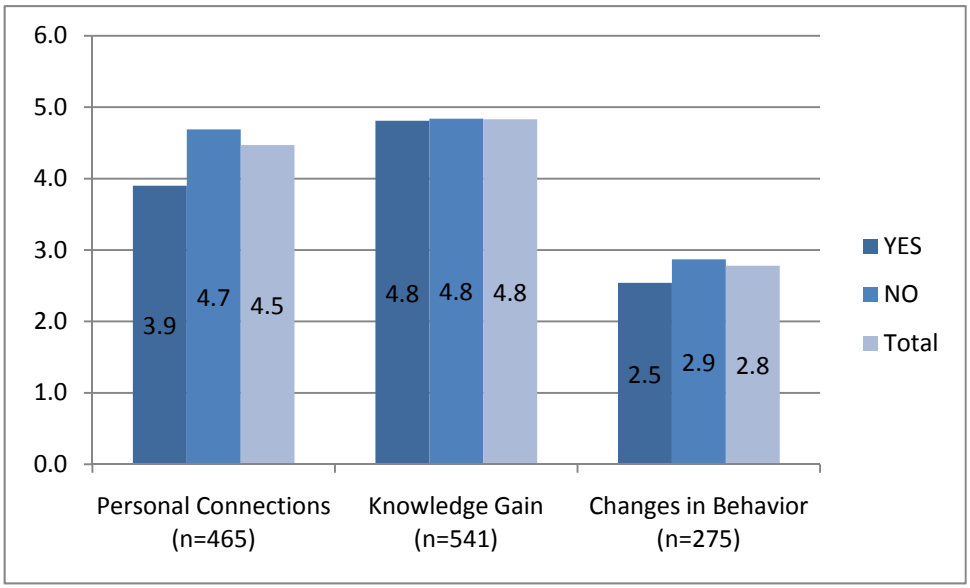


Figure 38: Mean number of outcome codes in groups with and without someone who works/studies in a field related to health or wellness (Onsite Interviews)



Research Question 4

How do groups' choices in the exhibition relate to the outcomes?

This section looks at how outcomes relate to group choices. Group choices in the exhibition assessed through onsite interviews were measured by how long families spent in *Expedition Health*, the number of components at which they stopped, and the breakdown of components they stopped at based on interaction level (own versus generic body) and content focus (science/biology versus health/wellness). Although during the focused observations/interviews groups did not choose their components (they were assigned to them), this section presents how outcomes relate to the characteristics of the components used in the focused observations/interviews.

As mentioned earlier in the report, these components were purposefully selected to represent components that have a strong focus on two dimensions: science/biology versus health/wellness, and own body versus generic body (see Figure 10 for the breakdown of exhibition components and Appendix 1 for a description of the exhibition components).

There is little evidence to support that length of the visit relates to the onsite group outcomes (personal connections, knowledge gain, and changes in behavior). First, no statistically significant differences were found when comparing the groups based on number of exhibition components they engaged with during their visit. Second, no statistically significant differences were found in outcomes when comparing the groups based on total time spent in *Expedition Health* (Up to 45 minutes, 46 to 90 minutes, 91 to 135 minutes, and 136 to 220 minutes). Though not statistically significant, those groups spending 45 minutes or less seemed to have made fewer personal connections (13% of the codes, averaging 3.7 codes per group) and changes in behavior (13% of codes, averaging 2.5 codes per group). On the other hand, they seem to have had more gains in knowledge (17% of the codes, but averaging 5.6 codes per group; see Figures 39 and 40).

Note for this section: Changes in thinking did not appear in the coded interviews that occurred on site. This was mostly an artifact of how the question was phrased in the interviews, which led respondents to give examples of intended behaviors rather than how they changed their thinking. Findings on changes in thinking are presented in detail in the section for how group outcomes persist and change over time.

Figure 39: Percent of outcome codes in groups based on total time spent in *Expedition Health* (Onsite Interviews)

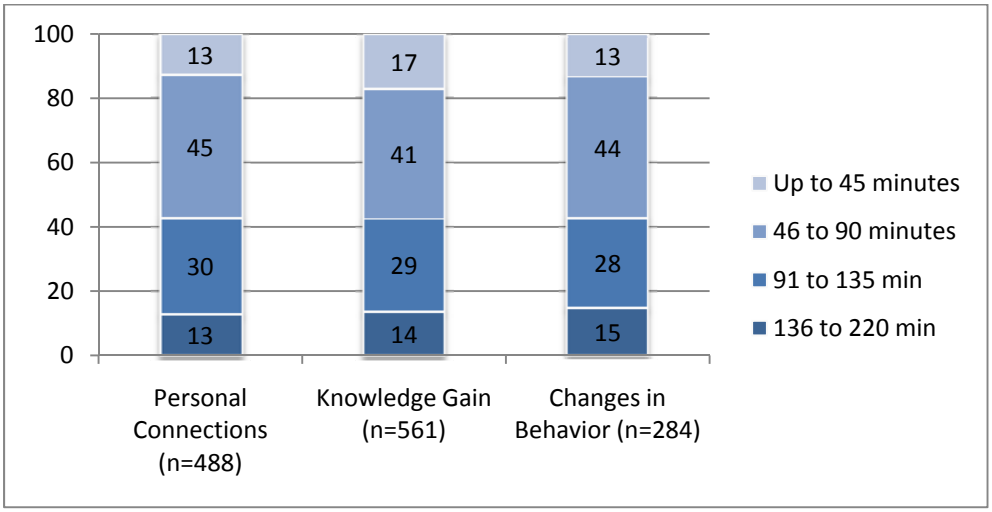
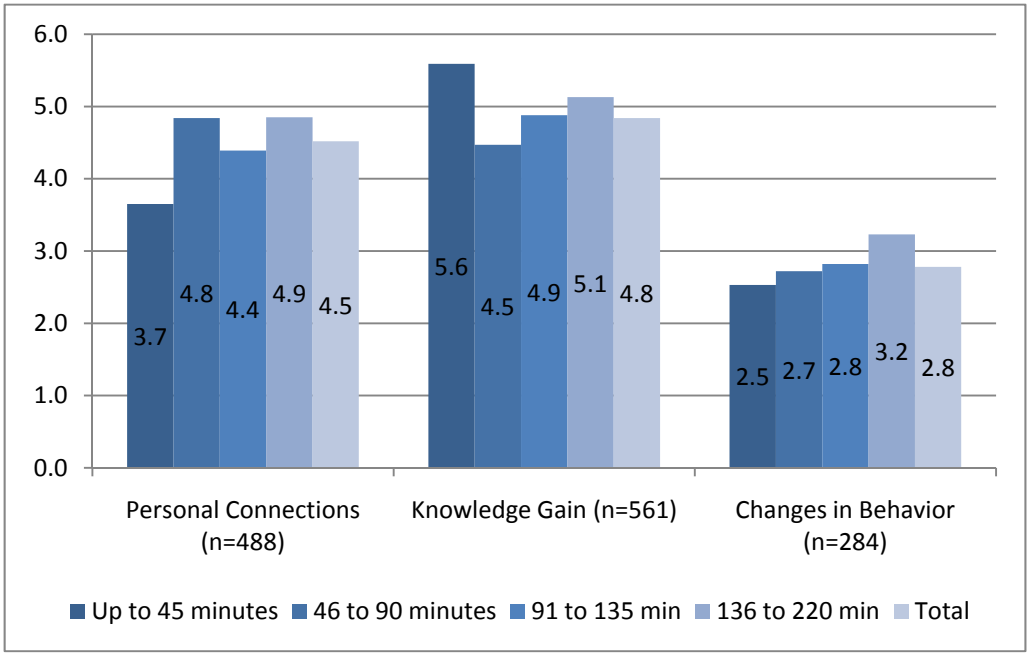


Figure 40: Mean number of outcome codes in groups based on total time spent in *Expedition Health*



The relationship between the three main outcome categories (personal connections, knowledge gain and changes in behavior) were also not clearly related to the types of exhibition components they visited. The types of components were classified on whether they visited at least 60% of the exhibition components classified on two dimensions: interaction level (own versus generic body) and content focus (science/biology versus health/wellness). If a group visited at least 60% of a certain type of exhibition component they were labeled as having a "strong focus" on this type of component.

When comparing groups based on interaction level of their visit (strong focus on own body, focus on own body and generic body, and no strong focus), the only statistically significant difference was found between groups with visits strongly focusing on own body and groups without a strong focus; the former showing significantly more knowledge gain (57% of the codes, and average 5.3 codes per group). Though not statistically significant, those in groups with a focus on both, own and generic bodies, tended to make more personal connections (23% of codes, and average 5.3 codes per group). In addition, those without a strong focus tended to indicate fewer intentions to change in behavior (23% of the codes, average 2.4; see Figures 41 and 42).

Note for this section: No groups in the study had a strong focus only on own body, so their percentage of codes in Figures 41 and 42 are 0%.

The largest proportion of codes for all three outcome categories was for those who focused on their Own Body. This ties in with the previous finding that the exhibitions focusing on own body had the highest number of interactions (see Figure 11). So exhibition components that focus on own body increase the number of interactions, and visitor groups who have a strong focus on own body exhibition components also have a high number of interactions. As mentioned previously, the personal connection piece seems to increase the interactions within family groups.

Figure 41: Percent of outcome codes in groups based on the interaction level (Onsite Interviews)

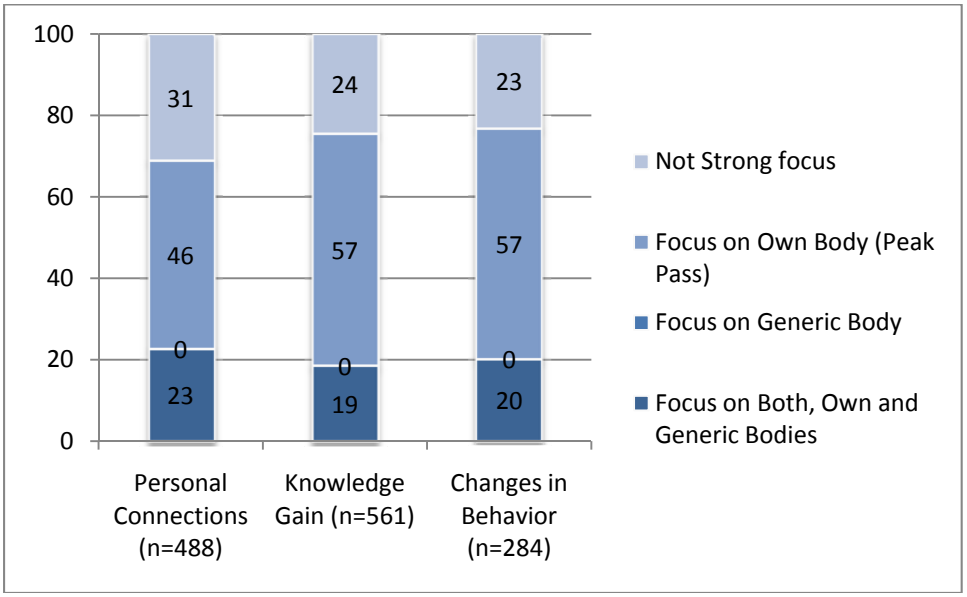
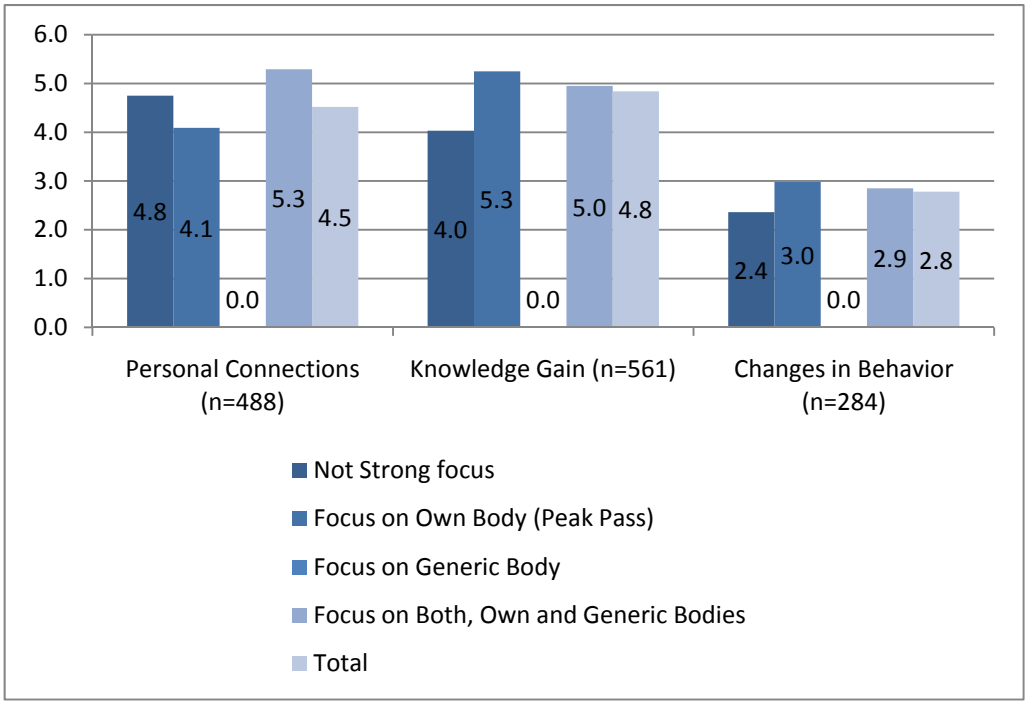


Figure 42: Mean number of outcome codes in groups based on the interaction level (Onsite Interviews)



In addition to looking at the two main dimensions together, the same set of analyses was run on each dimension. In comparing content focus (science/biology and health/wellness), no statistically significant differences were found in any of the outcomes (personal connections, knowledge gain, changes in behavior). However, those groups with a focus on science/biology tended to make fewer personal connections (9% of the codes, averaging 3.8 codes per group), but indicated more knowledge gain (12% of codes, averaging 5.6 codes per group) and changes in behavior (14% of codes, averaging 3.3 codes per group; see Figures 43 and 44). Based on these results, it may be easier for groups to make personal connections to health/wellness-related topics than to make connections to science/biology-related topics.

Figure 43: Percent of outcome codes in groups based on the content focus of the visit (Onsite Interviews)

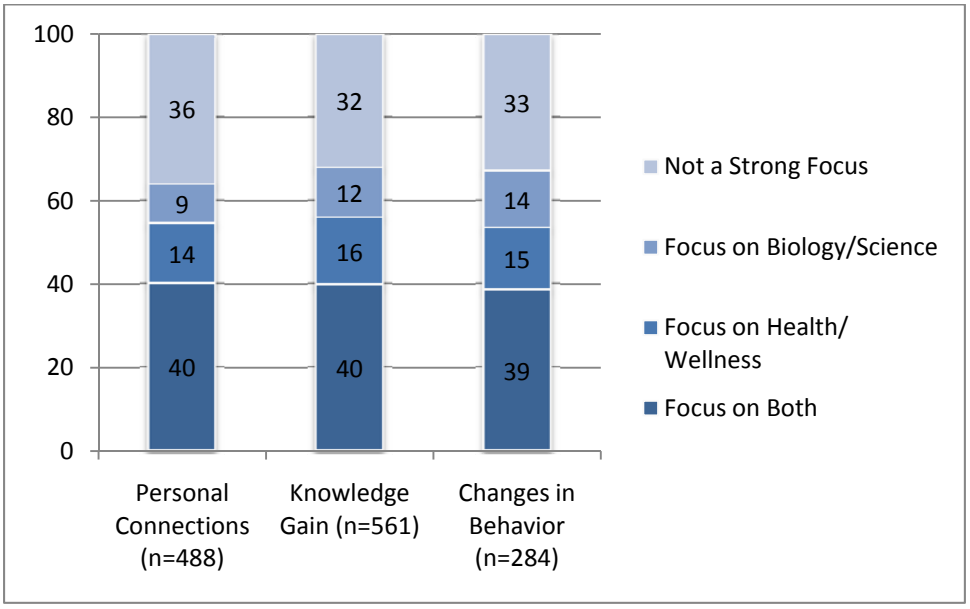
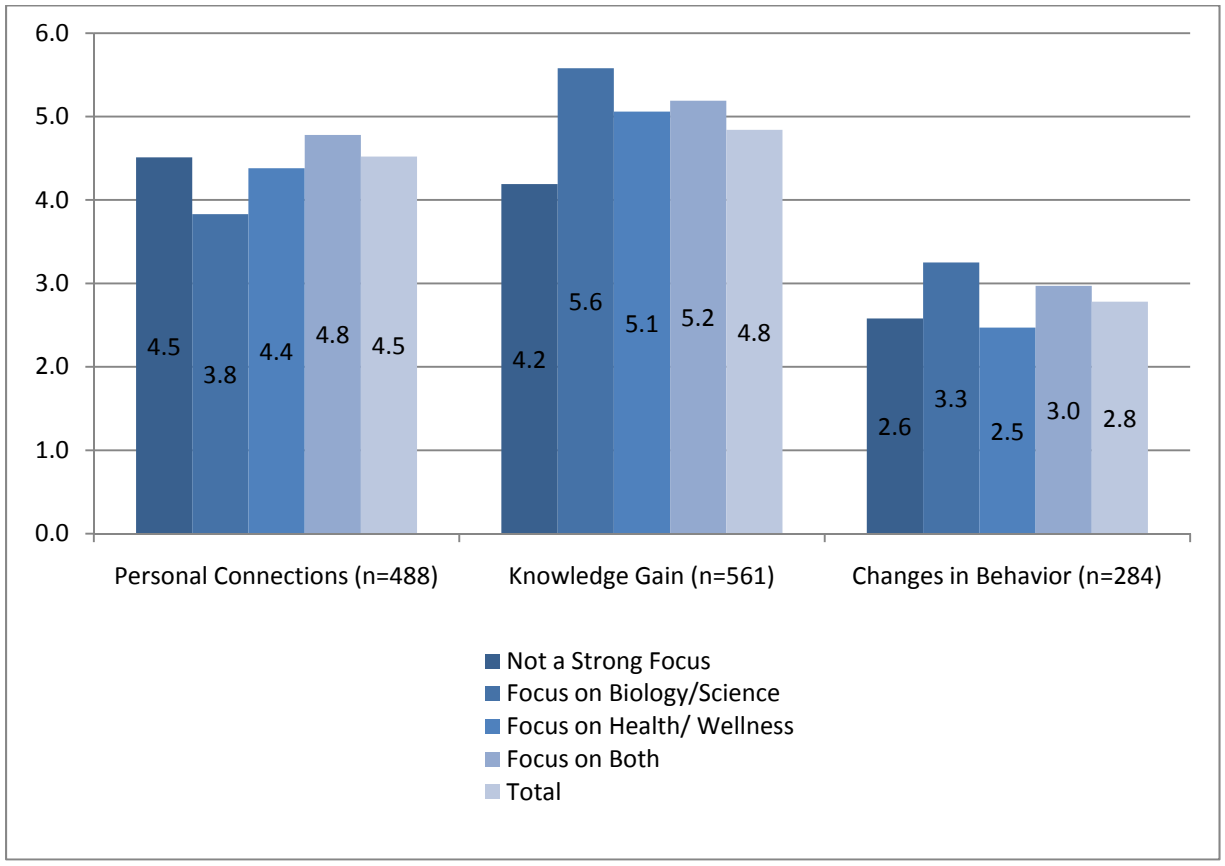


Figure 44: Mean number of outcome codes in groups based on the content focus of the visit (Onsite Interviews)



From focused observations/interviews it was also noted that outcomes were not strongly related to exhibition component choices. In comparing exhibit component content choices (focus on science/biology or health/wellness) to the outcome categories, no statistically significant differences were found (see Figures 43 and 44 above).

While not statistically significant, those stopping at components focusing on science and generic body had fewer personal connections (21% of codes, averaging 2.6 codes per group). Those in science and own body had the most knowledge gain (31% of codes, averaging 10.2 codes per group), but the fewest changes in behavior (19% of codes, averaging 1.2 codes per group; see Figures 45 and 46). Similar to other analyses above, the health/wellness components were most related to changes in behavior and the science/biology components were most related to knowledge gain.

Figure 45: Percent of outcome codes based on exhibition choices (Focused Observations/Interviews)

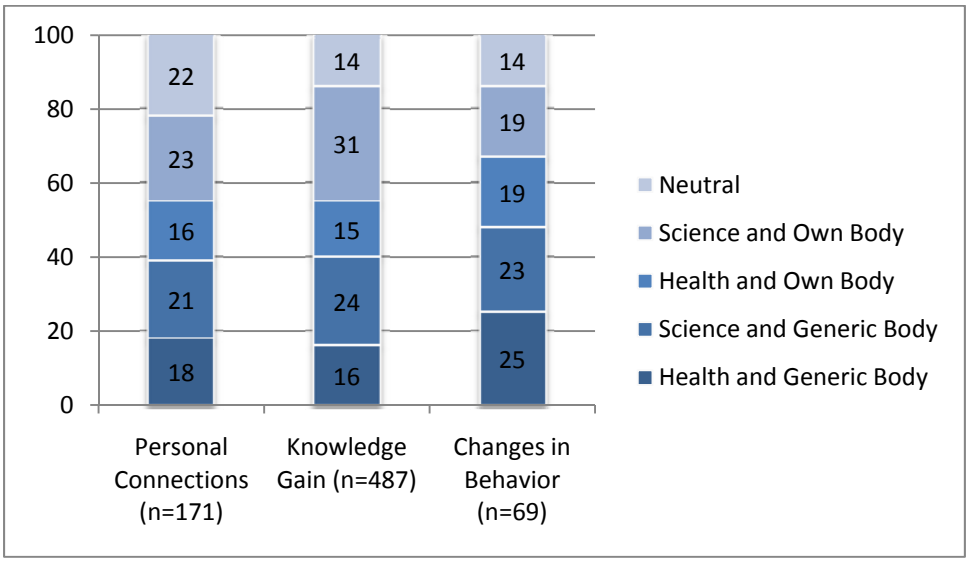
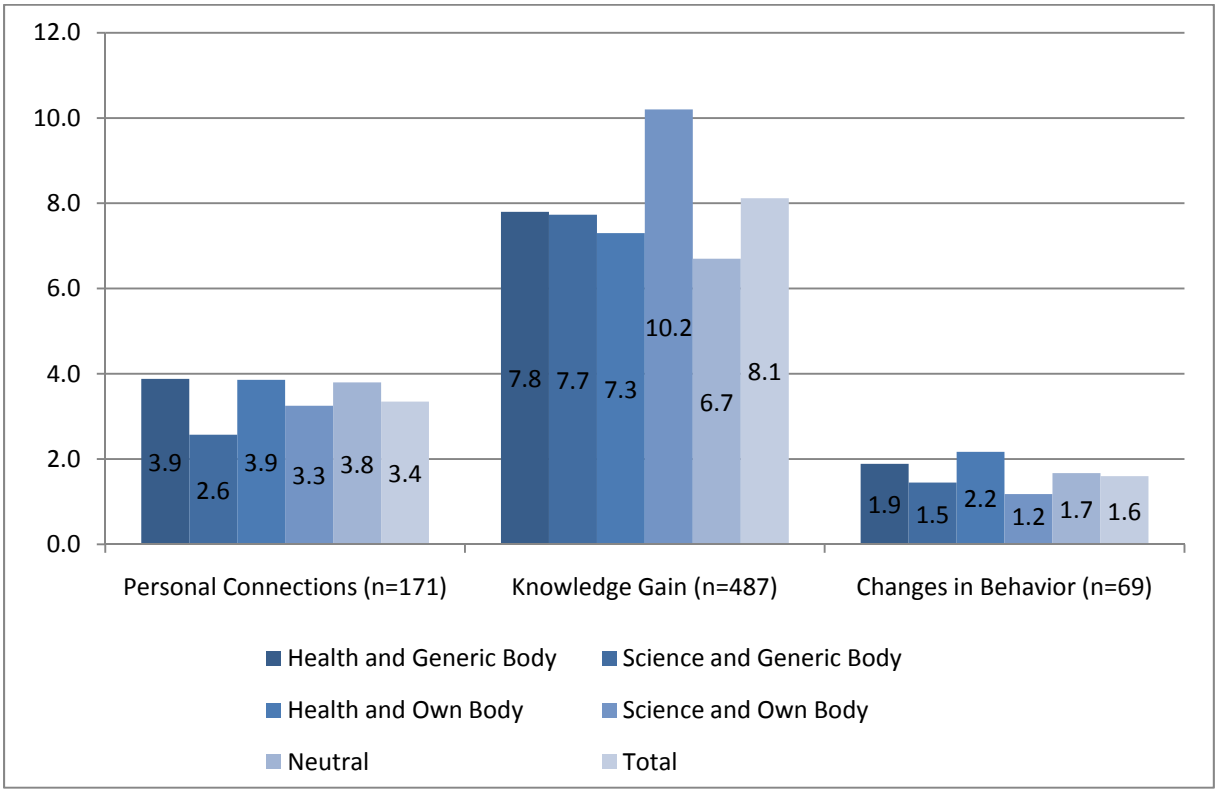


Figure 46: Mean number of outcome codes based on exhibition choices (Focused Observations/Interviews)



Research Question 5

How do group interactions relate to the outcomes?

Group interactions were measured by the amount of time groups spent together and the groups' behaviors while engaging with the exhibition. The latter included whether they did interactives together, called attention to parts of the exhibition, explained things to each other, helped each other out during the visit, talked to staff and volunteers, and talked to other visitors. When tested, there was no relationship between these behaviors and the main group outcomes (personal connections, knowledge gain, and changes in behavior). However, it should be noted that the data collection instrument used to evaluate behaviors asked whether the behaviors occurred during the visit (yes/no); a scale asking about the degree to which these occurred may have yielded more differences.

No statistically significant differences were found in outcomes (personal connections, knowledge gain, and changes in behavior) based on time spent together in the exhibition (proportion of time the group was together in the exhibition: 25% and less, 50%, 75%, 100%). Groups that reported spending the most time together (100%) were also most likely to make the fewest personal connections (28% of the codes, averaging 4.0 codes per group) and report the least gains in knowledge (26% of the codes, averaging 4.5 codes per group). Those spending 25% or less of their time together and those spending 75% of their time together indicated a lower likelihood intention to change behavior (respectively, 20% and 31% of the codes, and averaging 2.6 and 2.7 codes per group; Figures 47 and 48). The data do not suggest any particular reason for these last two findings, and it is difficult to speculate as to why this trend occurred.

Note for this section: Changes in thinking did not appear in the coded interviews that occurred on site. This was mostly an artifact of how the question was phrased in the interviews, which led respondents to give examples of intended behaviors rather than how they changed their thinking. Findings on changes in thinking are presented in detail in the section for how group outcomes persist and change over time.

Figure 47: Percent of outcome codes in groups based on time spent together in the exhibition (Onsite Interviews)

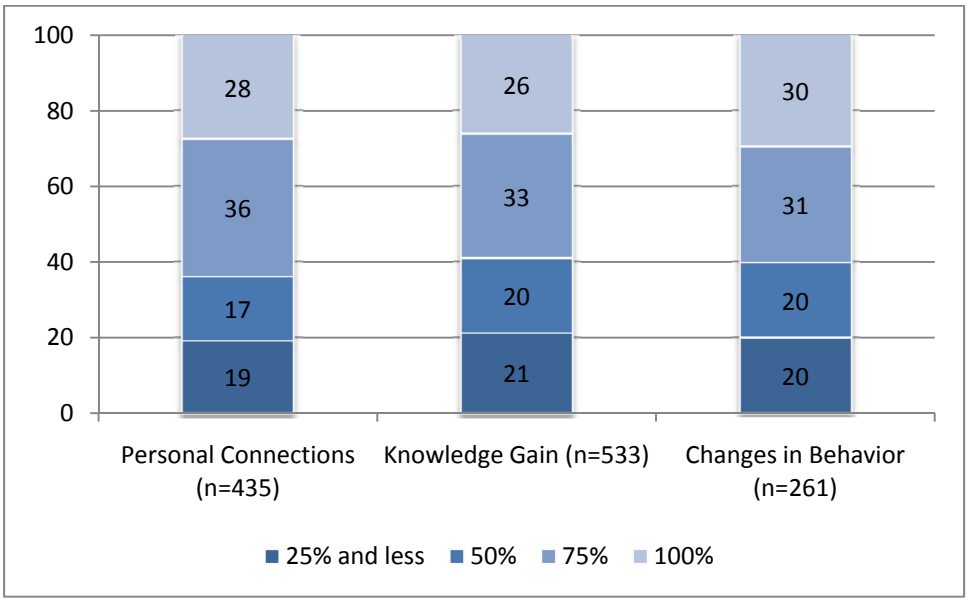
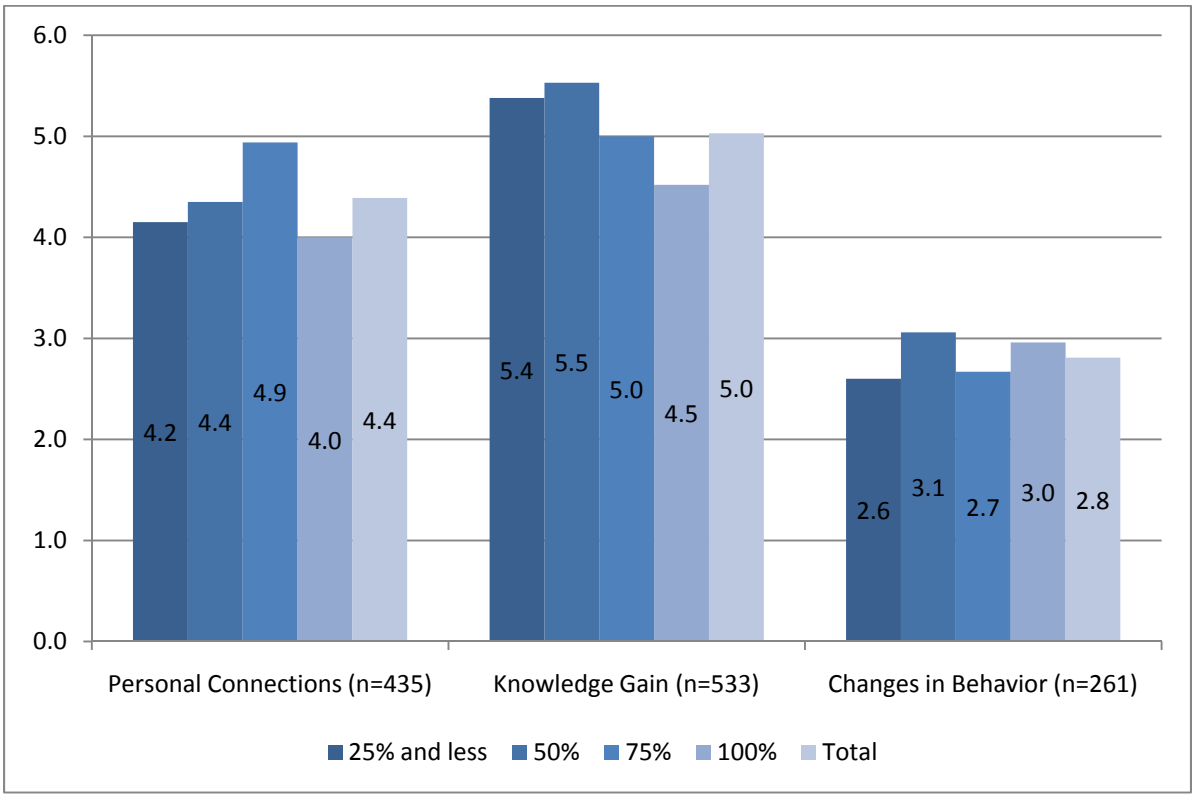


Figure 48: Mean number of outcome codes in groups based on time spent together in the exhibition (Onsite Interviews)



Only one correlation was found between the number of outcome codes (personal connection, knowledge gain, and changes in behavior) and group behavior (general comments, specific comments, instructions, facilitation, and troubleshooting). Specific comments and knowledge gain were positively correlated; making specific comments typically had to do with comments about the exhibit content, measurement results and other related comments. Given that these kinds of specific comments were often related to the content it is not surprising that these behaviors were correlated to knowledge gain.

Only one correlation was found between the number of outcome codes and the number of interactions initiated by an adult or a child. The number of personal connections was negatively correlated with the number of interactions initiated by a child. Perhaps what was happening here was that adults were more likely to make those personal connections for the group, so that if a child was initiating a lot of interactions they were talking about other things related to the exhibition components.

Research Question 6

How do student groups react to the exhibition?

While the other sections of the report deal with multiple data sets, this section includes only data collected from students' questionnaires (see Appendix 2). A total of 108 students from two Denver-area schools (Bryant Webster and Crawford) filled out the questionnaire; students were in either 3rd or 5th grade.

Description of the students: See Appendix 9 for tables of the demographic information collected from students. Of all the students 74% were 3rd graders from Crawford and 26% were 5th graders from Bryant Webster. They were relatively evenly split between males and females, although slightly more females visited. Almost two-thirds of the students spoke some other language besides English at home, with by far the most common languages spoken being Spanish (94%).

Previous experience: About three-quarters, or 76%, of the students had been to the Museum before, and about half (48%) had been to *Expedition Health* before (see Table 13). When asked about six specific past health/wellness-related behaviors, [20] they were most likely to say they had watched science/biology programs with other students and talk about science/biology with other students (see Table 14). Of the six, they were least likely to say they had gone places to be active or play with other students (41% said never).

Table 13: Prior visits to Museum and *Expedition Health* (Student Questionnaires)

	Percentage		Number
Response	**Yes**	**No**	
Has been to the museum before	76	24	104
Has been to Expedition Health before	48	52	99

[20] The six activities were watch science/biology programs together, visit science or science-related museums together, talk about science/biology with each other, discuss things they can do to be healthier, go places where they can be active, and look up information about health/wellness.

Table 14: Past health/wellness-related behaviors (Student Questionnaires)

	Percent				
Response	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much**
With other students, watch science/biology programs (n=95)	20	10	41	4	25
With other students, visit science or science-related museums (n=84)	7	17	49	10	18
With other students, talk about science/biology (n=87)	18	10	36	13	23
With other students, discuss ways to be healthier (n=80)	9	11	31	23	26
With other students, go places to be active/play (n=80)	6	13	28	13	41
With other students, look up information about health/wellness (n=78)	10	6	35	17	32

Group and individual experiences: Groups were most likely to stick together, although 30% of the students said they went through the exhibition mostly on their own (see Table 15). When asked about specific behaviors, more than 9 out of 10 said they helped each other out, did interactives/hands-on components together, or called someone's attention to something. Meanwhile, 86% said they explained things to each other, and a full 80% said they interacted with museum staff or volunteers in the exhibition (see Table 16).

Table 15: Time on own versus with others (Student Questionnaires)

Response	Number	Percentage
Mostly on my own	28	30
About same by myself and with others	42	46
Mostly with others	23	24
TOTAL RESPONDENTS	**94**	**100**

Table 16: Exhibition component behaviors with others in group (Student Questionnaires)

	Percentage		Number
Behavior	**Yes**	**No**	
Help each other out in any way	94	6	102
Interactive, hands-on components	93	7	105
Call each others' attention to cool/interesting things	93	7	104
Explain things to each other	86	14	101
Talk to any museum staff or volunteers	80	20	98
Talk to any other visitors not part of your group	69	31	100

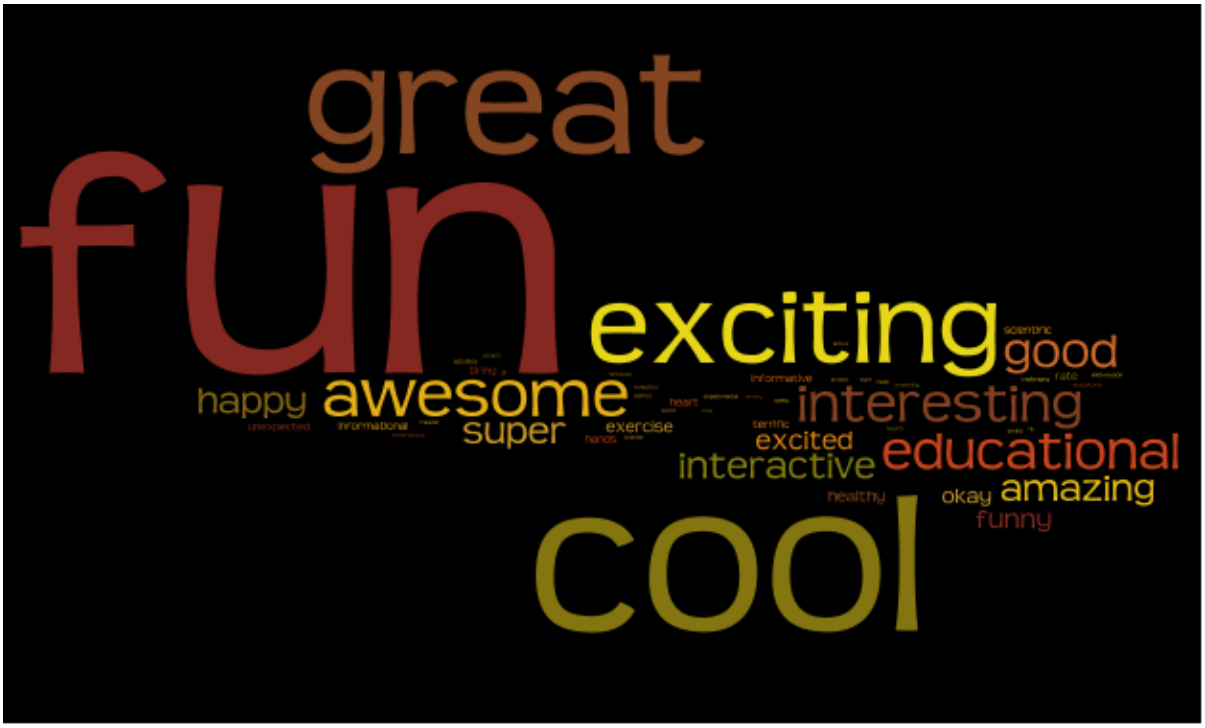
When asked to describe their visit, the top four words were fun, cool, great and excited (see Table 17 and Figure 49). While the descriptions were overwhelmingly positive, they do not give a sense of specific components or experiences in the exhibition that they found memorable. Consistent with the previous finding, when students were given a choice between rating their visit to *Expedition Health* as Great, Good, Okay or Bad, 93% rated it as Great (see Table 18).

Table 17: Words used to describe *Expedition Health* (Student Questionnaires)

Word	Number
fun	64
cool	41
great	29
excite/excited/exciting	26
educational	11
awesome	10
good	9
interesting	9
happy	8
amazing	7
super	7
funny	6
interactive	6
okay	4
science/scientific	4
exercise	3
healthy	3
information/informative	3
unexpected	3
variety of activities	3
active	2
breathing	2
hands on	2
heart rate	2
terrific	2
tiring	2
miscellaneous	16
TOTAL WORDS	**284**

The following Wordle represents the words the students used when asked to *"Write 3 words to describe Expedition Health to someone who has never seen it:"* The larger the word, the more frequently the word was used by students in their answers.

Figure 49: Wordle of students' description of *Expedition Health* (Student Questionnaire)



Wordle (word cloud) created at www.wordle.net. A wordle is a visual representation of a group of text; the larger the word, the more frequently it was mentioned.

Table 18: Overall enjoyment of exhibition (Student Questionnaires)

Rating	Number	Percentage
Great	99	93
Good	5	5
Okay	1	1
Bad	1	1
TOTAL RESPONDENTS	**107**	**100**

Asked to say what they enjoyed the most, the two most common answers were "biking" and "theater/movie." These were followed by the "lab" and "being a scientist," which were likely referring to the same experience (see Table 19).

Table 19: What they enjoyed the most (Student Questionnaires)

Response	**Number**
Biking	27
Theater/movie	14
Space (not E.H.)	10
Everything	7
Laboratory	7
Being a scientist	6
Baseball (not E.H.)	5
Wii (not E.H.; part of *Passport to Health* program)	5
Climbing wall	3
Germs	3
Brain ball	2
Experiment	2
Miscellaneous	9
TOTAL COMMENTS	**100**

Students' responses were measured and coded in the same was as family group responses shown throughout this report.

Personal Connections: (see Table 20 and Figure 50) Asked whether something in the exhibition reminded them of their own life, 66% of the students said yes, and they were most likely to refer to bike riding (over one-third, 35%) as the personal connection. The next most common were learning about nutrition (12%) and a specific exhibition component activity (12%).

Understanding/Knowledge Gain: (see Figures 51 and 52) When asked to mention one thing they learned as a result of visiting the exhibition, students were most likely to

mention new facts about the human body (24%), learning a specific fact (24%) or a specific behavior change (24%).

Changes in thinking: (see Table 21) When asked whether visiting the exhibition made them care more or less about their own body or health, or whether it didn't change this, 82% said it made them care more about their own body or health.

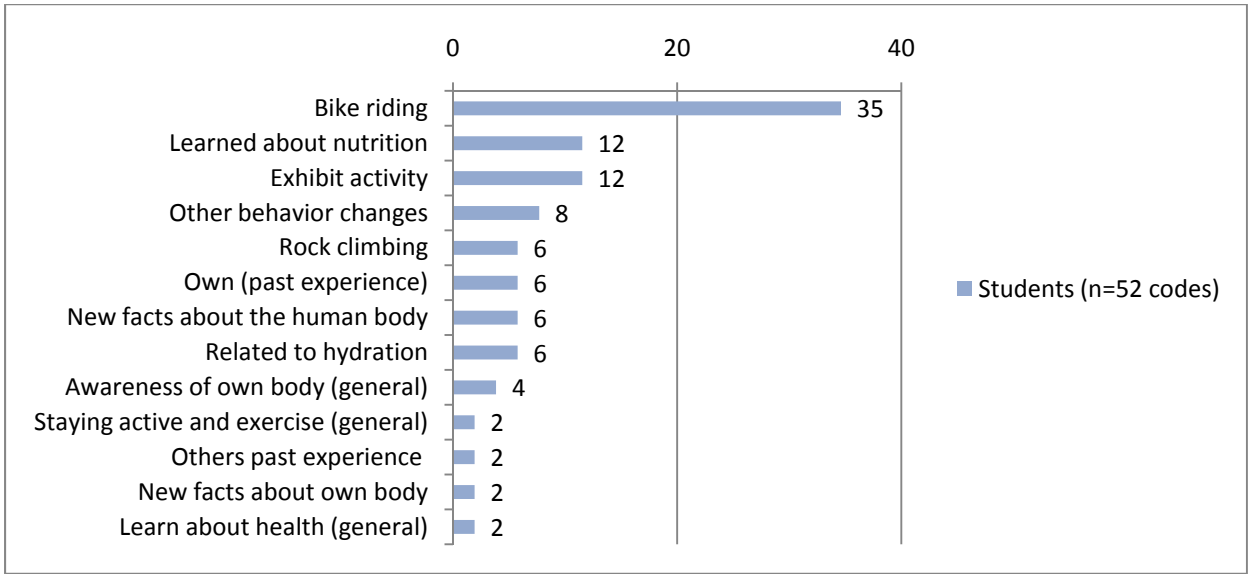
Changes in behavior: (see Tables 22 and 23) Asked whether they would tell others their own age to visit *Expedition Health*, 89% said yes. When asked whether they would like to come back to *Expedition Health* with their family, 98% said yes.

PERSONAL CONNECTIONS

Table 20: Reminded of own life by exhibition (Student Questionnaires)

Response	Number	Percentage
Yes	67	66
No	35	34
TOTAL RESPONDENTS	102	100

Figure 50: Percentage of what *Expedition Health* reminded them of own their life? (Student Questionnaire)



UNDERSTANDING/KNOWLEDGE GAIN

Figure 51: Percentage of what they learned about science (Student Questionnaire)

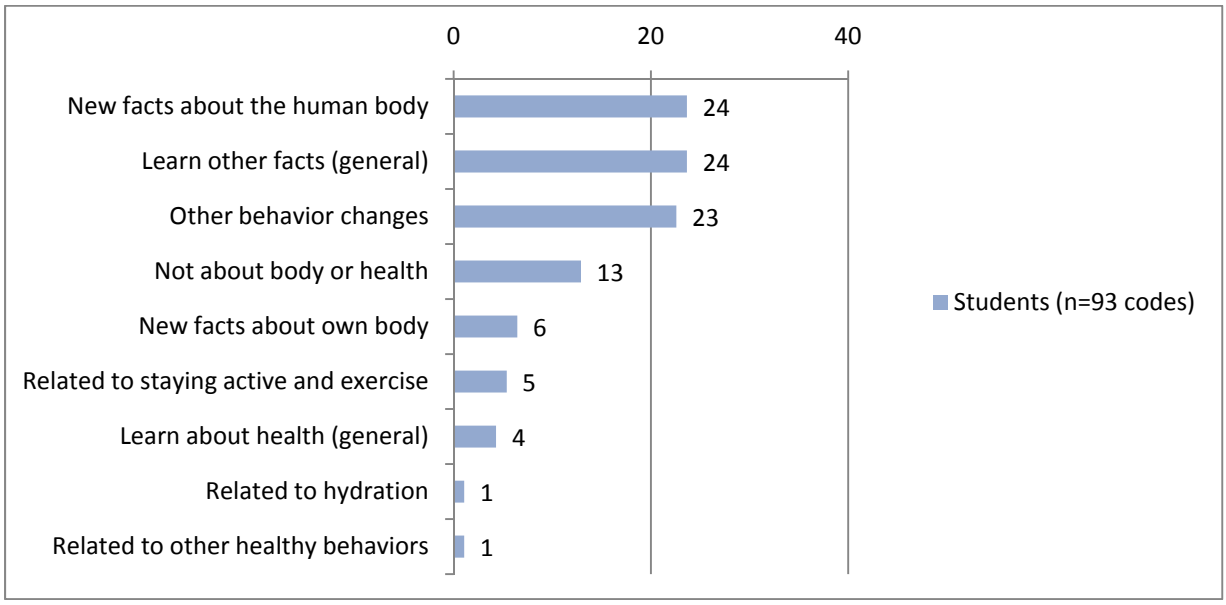
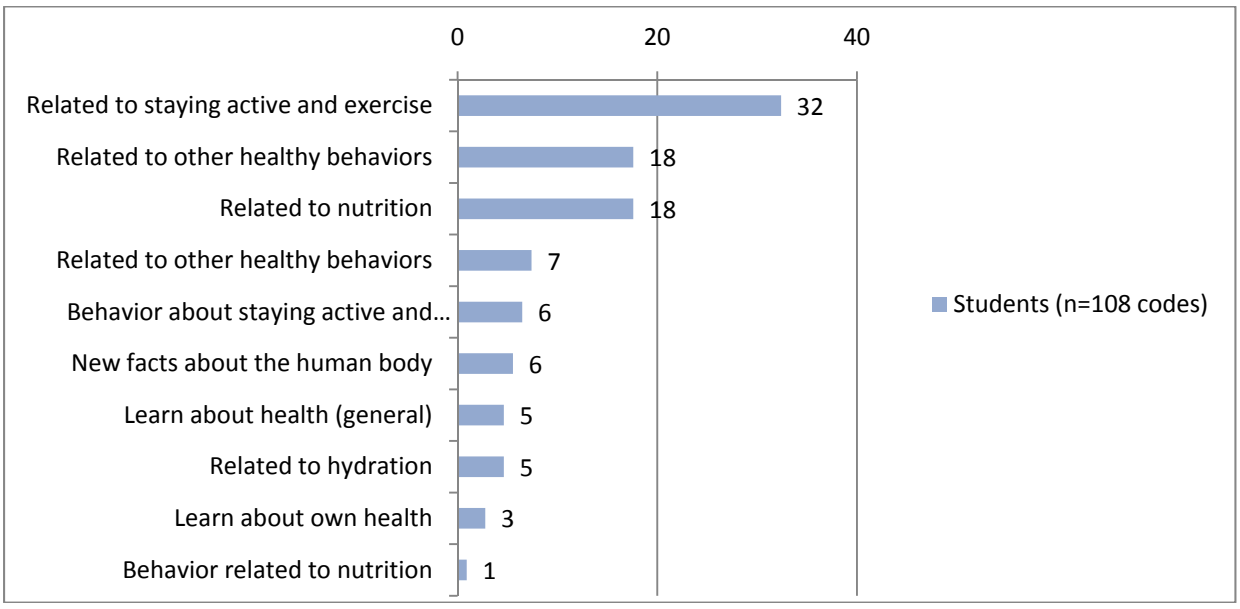


Figure 52: Percentage of what they learned about health/wellness (Student Questionnaire)



CHANGES IN THINKING

Table 21: Exhibition impact on student attitudes towards own health (Student Questionnaires)

Response	Number	Percentage
Made me care more about my own body or health	78	82
Made me care less about my own body or health	7	7
Did not change how I feel about my own body or health	10	11
TOTAL RESPONDENTS	**95**	**100**

CHANGES IN BEHAVIOR

Table 22: Would students tell others to visit *Expedition Health?* (Student Questionnaires)

Response	Number	Percentage
Yes	95	89
No	12	11
TOTAL RESPONDENTS	**107**	**100**

Table 23: Would students like to come back to *Expedition Health* with their families? (Student Questionnaires)

Response	Number	Percentage
Yes	105	98
No	2	2
TOTAL RESPONDENTS	**107**	**100**

Conclusions and Future Areas for Research

CONCLUSIONS:

Group Outcomes: All four of the main categories of group outcomes (personal connections, understanding/knowledge gain, changes in thinking and changes in behavior) occurred for most groups, although the degree to which they occurred varied. Understanding and knowledge gain were the most common, followed by personal connections, changes in behavior and changes in thinking. The fact that personal connections were nearly as prevalent as understanding/knowledge gain show the exhibition does a good job of helping family groups make personal connections. This likely resulted from both the personal nature of the exhibition focus, health, as well as the fact that the Peak Pass and other elements allowed for a more personalized, and thus personal, experience. When looking at the types of personal connections that were made, many of them focused on health; this occurred both right after and a few months after the experience.

Personal connections: Personal connections played a large role in this study, both in terms of the design and the results. For family groups, making personal connections seemed to be an important factor in having a meaningful experience.

- These occurred for almost all of the families in the onsite interviews and the large majority of those in the focused observations/interviews. The exhibition allowed for a variety of personal connections, and this seemed to be one of the strengths of the exhibition.
- The most common personal connections were about staying active and exercising, health issues or activities , healthy nutrition and other past experiences.
- Personal connections having to do with exhibition components focusing on own body were highest, regardless of whether they were about science/biology or health/wellness, and components utilizing the Peak Pass appeared especially able to help groups make personal connections. Additionally, groups also made connections related to healthy activities and conditions/ illnesses they or other people have faced.
- A few months later, almost two-thirds of visitors said they had been reminded of their visit to *Expedition Health* since visiting. In addition to recalling specific parts of the exhibition, visitors mentioned health-related behaviors such as exercising and eating healthier.

Understanding/knowledge gain: There was ample evidence of knowledge gain about both science/biology and health/wellness. Both adults and children were able to recall things they

had learned during the visit, both right after and a few months later. Much of the understanding/knowledge gain focused on the human body (science/biology), but when asked to recall things a few months later the health/wellness components were more present, perhaps because of the personal connections made in these areas.

- All families interviewed mentioned some kind of knowledge gain from the *Expedition Health* experience. The three main areas of knowledge gain were about learning about the human body, learning how to take care of the body and learning about their own body.
- A few months after the visit, almost two thirds of visitors said they were reminded of their visit by something after the visit, including recalling the visit in general, exercising and being more active, eating healthier and general health issues. The most commonly mentioned specific issue was using sunscreen, which was the focus of two exhibition components: Protect Your Skin and See Yourself Age.
- Adults recalled learning a lot during their visit, and a few months later the large majority said they learned quite a bit or very much from their visit; 95% said they learned something new during the visit.

Changes in thinking: For this study, changes in thinking were more likely to show up a few months after the visit and related to health/wellness.

- These did not show up much in the onsite data collection methods, partly due to the interview items being asked, but did occur after the visit.
- A few months after the visit, visitors were slightly more likely to say it changed their thinking about health/wellness compared to science/biology; almost one third said it changed their thinking about health/wellness quite a bit or very much. Mostly, these individuals talked about taking care of their own health.
- The changes in thinking seemed to focus more on health/wellness, which suggests that there is an opportunity for museum exhibitions to have an impact on how people think about their health and taking care of themselves.

Changes in behavior: While changes in behavior were self-reported, the number of people who reported changes not only in their own behaviors but other group members' behaviors was quite high. It would be useful to dig deeper into what degree of behavior change occurred (i.e., how many times did the behavior occur) and whether these behavior change last over time. While they said the exhibition influenced behaviors after the visit, it would be interesting to see which aspects of *Expedition Health* influenced these behavior changes the most.

- These were mentioned in the large majority of both onsite interviews and focused

observations/interviews. These were mainly about healthy behaviors, nutrition, staying active and exercising.

- Related to changes in behavior, almost all of the visitors three to four months after the visit said there was something they were doing differently as a result of the visit. They were most likely to mention staying active and exercising, nutrition and other healthy behaviors.
- The large majority were also able to come up with something specific someone in their original visiting group was doing differently. The same trends occurred, focusing on staying active and exercising, nutrition and other healthy behaviors.
- The groups reported doing some behaviors more frequently as a result of visiting *Expedition Health*. They reported increases in discussing things together to be healthier, going places to be active and talking about science/biology with each other. Many of these groups said *Expedition Health* influenced these increases.

Content Focus and Interaction Level: As mentioned above, the study was designed to look at the visitor experience based on content focus (science/biology versus health/wellness) and interaction level (own body versus generic body). In many areas of the study the importance of making a personal connection was shown, and that was confirmed when comparing the selected exhibition components on the content focus and interaction level. Regardless of whether the content was science/biology or health/wellness, the own body components resulted in a greater number of group interactions. It seems like the more groups are able to relate the content to their own lives, the more they have to say to each other about the experience. These findings would be useful to replicate in other content areas and in other exhibitions.

- Of the ten exhibition components studied in depth, the components focusing on own body also had more group interactions than the ones about a generic body. The two components that focused on both science/biology and own body had the greatest number of group interactions. This suggests that components that allow for strong personal connections, at either the individual or group level, about how one's body functions or performs play a strong role in the visitor experience.
- In multiple analyses, the health/wellness components were most related to changes in behavior and the science/biology components were most related to knowledge gain. It seems reasonable that the science/biology components focus more on communication of facts and knowledge, while the health/wellness components lend themselves more to personal connections.

Group Composition/Past Experiences: Most comparisons by group composition did not yield statistically significant differences. This may have occurred as a result of the specific demographic variables chosen, but the consistency of the non-significant results suggest that the group outcomes may simply not have heavily impacted the differences between groups in the study. One caveat is that there are a limited number of questions looking at past experiences, so a more in-depth study of groups' past experiences may yield different results.

The findings below about the group gender distribution suggest that adults and/or children are interacting differently based upon whether the children are male or female. This has potential implications for how group interaction can and should be encouraged in these types of exhibitions, and for how interpreters and program staff interact with groups.

- In looking at the gender distribution of children in the group, mixed groups with both boys and girls had significantly more personal connection outcomes than any other gender combination. Meanwhile, groups with only girls trended towards showing more potential changes in behavior than other groups. Those with more than one child in the target age range of 8 to 14 years also showed elevated incidents of group outcomes.
- When looking at the gender of the adults in the group, groups with both male and female adults showed more knowledge gain than single-gender adults groups. Both of these examples suggest that having both males and females in the group can positively impact group outcomes; this finding was independent of group size.
- The findings above are very interesting, yet the data do not offer specific reasons as to why this may be the case. Interestingly, there were no group composition differences found for the onsite interviews which looked at the whole visit, yet there were differences found at the exhibition component level. This suggests that the differences occur at individual components. Further research is warranted.

Group Interactions: Again, personal connections played a large role in the level and kinds of interactions that were occurring within groups. The own body components had a higher number of interaction, and groups that had a strong focus on these types of components also had a higher number of interactions. Not surprisingly, adults focused more on facilitating the experience for the children.

- While onsite interviews showed that both types of exhibition components were popular, there was a higher degree of social interaction at the exhibition components about own body.
- Visitor groups who chose to interact with the majority of own body components available to them also had a high number of interactions.
- Both adults and children initiated interactions while viewing exhibition components,

but adults initiated the majority of interactions. Three-quarters of adult-initiated interactions were about facilitating the experience or giving instructions about how to use the component.

The research study did provide evidence for the conceptual model that was developed for this study, in a number of ways. The four main group outcome categories (personal connections, understanding/knowledge gain, changes in thinking, changes in behavior) did provide a useful group of variables to study that proved meaningful in understanding family experiences and outcomes in *Expedition Health*. Furthermore, the classification of exhibition components on the two dimensions of content focus (science/biology and health/wellness) and interaction level (own and generic body) proved a useful way to classify the exhibition components for the study. While the demographic variables were not very predictive of group outcomes, other group factors did influence group outcomes. This study has added to the understanding of family experiences in exhibitions dealing with science/biology and health/wellness content, and should provide some direction for future research on the topic.

FUTURE AREAS OF RESEARCH: As with most research studies, while this study was able to answer some of the questions about family experiences in an exhibition like *Expedition* Health it led to many more areas of research that would be useful to pursue would be useful to study:

- Generalizability of findings to other visitor groups: As mentioned above, it would be interesting to see whether the findings apply to non-family groups. Since the type of interactions that occurred were impacted by the group type – many of the adult interactions were related to facilitation and instructions – studying non-family groups or adult-only groups would be very interesting. Another area to study would be the extent to which groups without children had conversations about the exhibition after the visit.
- Generalizability to other topics: *Expedition Health* deals primarily with science/biology and health/wellness. It would be very useful to see if the findings apply to other topics, particularly ones tied to strong personal connections. Finding out whether the outcomes occur when there is a personal connection with other topics would be useful to understanding whether some of the success of the exhibition was due to the topic chosen for the exhibition.
- Impact of mixed gender groups on outcomes: There were some interesting findings about how mixed gender groups, and the role of gender of adults and children, impacted the main outcome categories (personal connections,

understanding/knowledge gain, changes in behavior). While differences were found, the data did now allow for a deeper understanding of why gender played a role in the main outcome categories. These findings are especially intriguing given that very few of the demographic or group variables impacted the outcomes. Future studies looking specifically at gender would be useful, especially if the study could include gathering information about how these groups interact outside of a museum. This could provide patterns of how gender relates to learning about biology/science and health/wellness.

Appendices

Appendix 1 Specific Exhibition Components Included in Focused Observations/Interviews

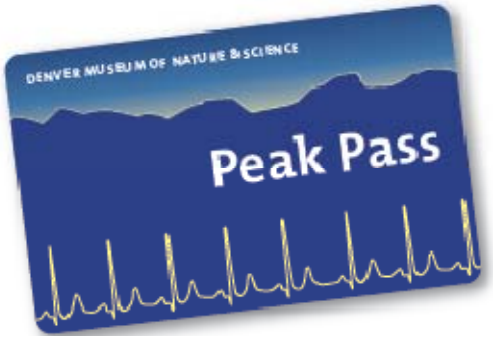
The following pages include descriptions of the specific exhibition components included in the focused observations/interviews. A description of the entrance of the exhibition where visitors attain their Peak Passes and select a buddy ("virtual learning companion) is also included.

The one exhibition component of the ten selected for the focused observations/interviews that is not included is the *Explore RX* cart. This is a hands-on interpretive cart experience where visitors discover how the chemistry behind many drugs used by people today were actually derived from or inspired by chemical properties of plants and animals from around the world.

Exhibition Entrance and Sign In

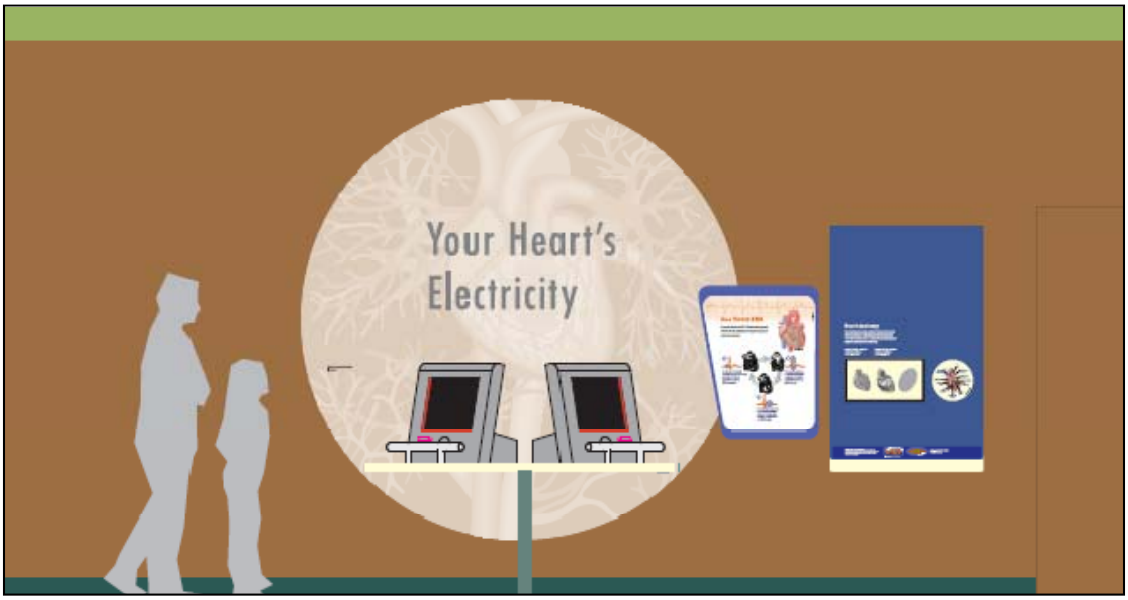
Peak Pass

The *Expedition Health* entry experience is designed to be easy and efficient, with ten sign-in stations to ease crowding and avoid bottlenecks. Each visitor picks up a Peak Pass card and checks in at a sign-in station. This is the first connection that visitors make within the exhibition, as they enter their first name, birth month, and day and choose a "virtual learning companion" from among the expedition buddies. Photos identify buddies by name, hometown, and



hobbies or interests. The visitors' information is entered into a database that records their data at Peak Pass–activated exhibits throughout the exhibition.

<u>Your Heart's Electricity : Science/Biology and Own Body quadrant</u>Peak Pass/Specimens

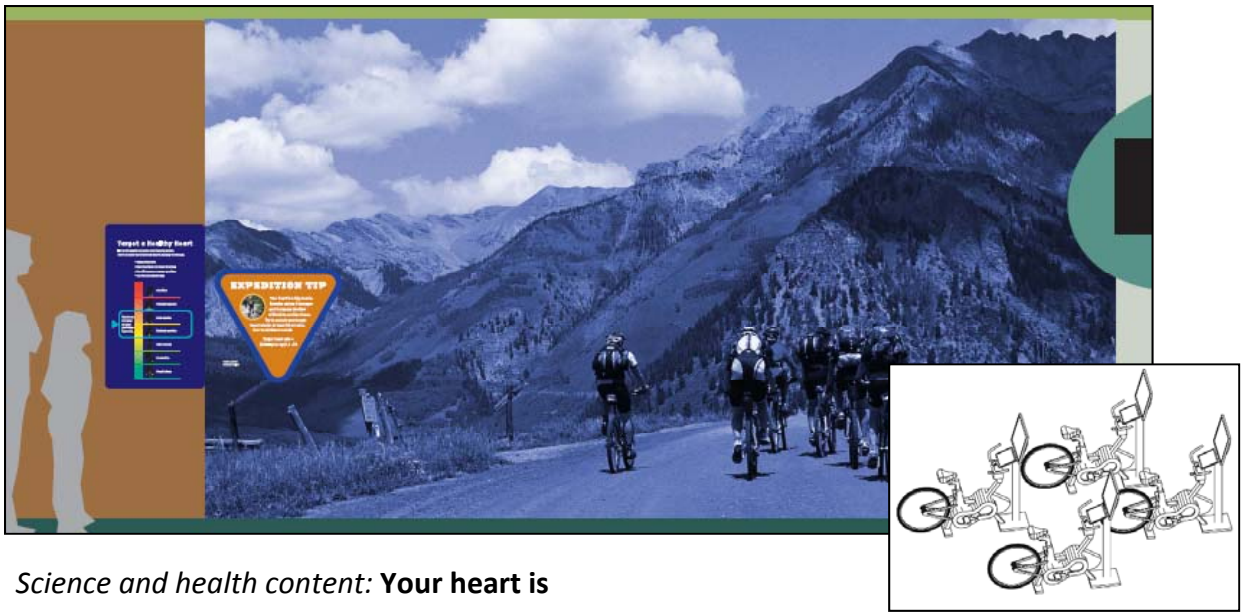


Science and health content: **Heart valves and chambers. Electricity makes your heart beat.**

Visitor experience: The steady "lub-dub" of a beating heart is a universally reassuring sound, but what does it mean? After inserting a Peak Pass at one of two stations, the visitor grabs the handles at this exhibit component with both hands. The visitor's heart rate displays onscreen both as an EKG and in beats per minute, in sync with a scientific animation of a beating heart. The visitor's expedition buddy appears onscreen, as the electrical activity occurring inside the body—and the EKG that illustrates it—is explained.

Visitors observe two preserved human hearts in a nearby display. One heart is intact, with the main arteries attached, while the other is shown in cross section to reveal the interior valves and chambers.

BioRide: Health/Wellness and Own Body quadrantPeak Pass



Science and health content: **Your heart is a muscle.**
Exercise your heart.

Visitor experience: After inserting his or her Peak Pass, the visitor pedals a virtual-reality stationary bike along a simulated mountain trail. Onscreen, the visitor's heart rate is displayed with his or her target heart rate (determined by age and gender from the Peak Pass database). The visitor's buddy appears onscreen, and scientific animations and narration describe how the cardiovascular system uses red blood cells to deliver more oxygen throughout the body during exercise, and how exercising improves endurance and strengthens heart muscle fibers.

Measure Up: Science/Biology and Own Body quadrant

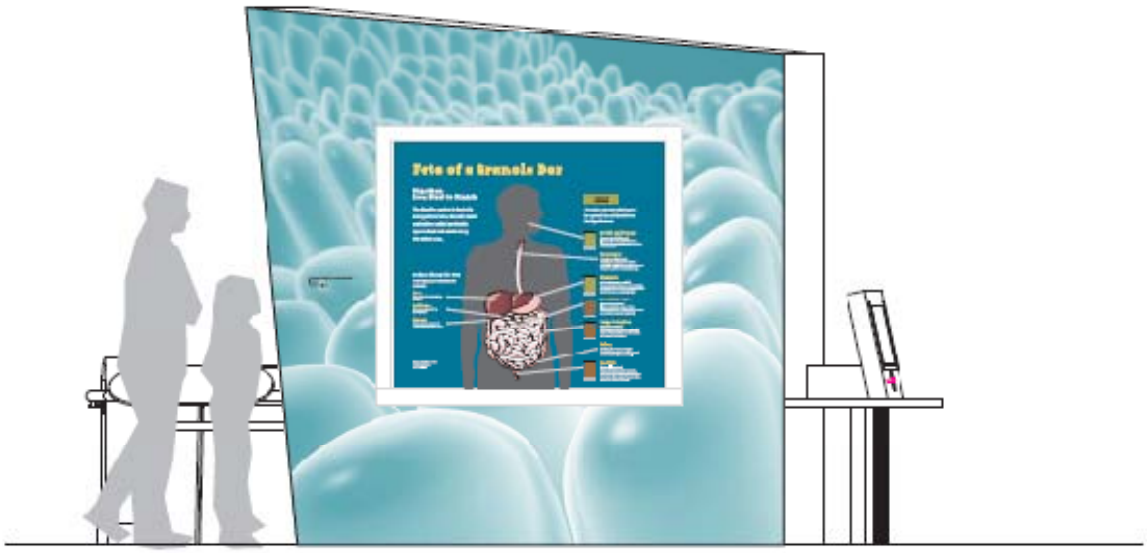
Peak Pass

Science and health content: **Genetics, age, and environment influence body size.**

Visitor experience: Some people are tall and others are short, but people are biologically proportioned in similar ways. After swiping the Peak Pass, visitors spread their arms wide to have their height and reach captured on video and displayed real-time on a large video monitor. The visitor's height and arm span data are plotted on a graph and displayed onscreen at a computer kiosk, where they can be compared with other people, the visitor's buddy, and rock climbers—for whom long arms are an advantage!

Fate of a Granola Bar: Science/Biology and Generic Body quadrant

Specimens

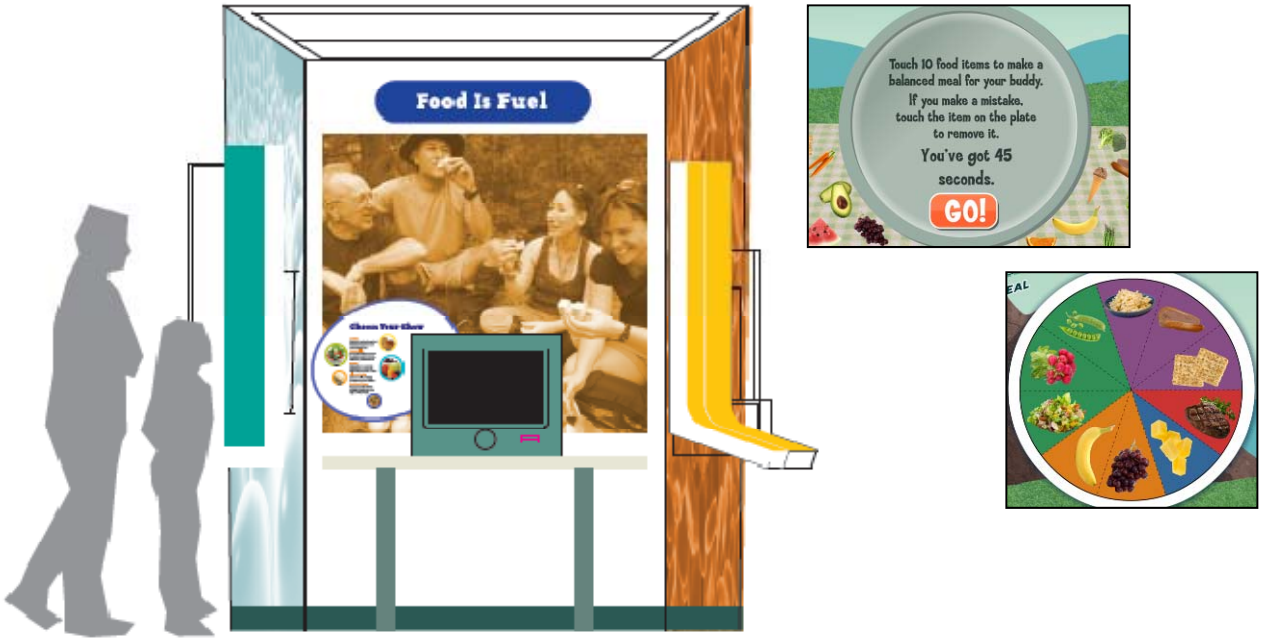


Science and health content: **Digestion. Nutrient absorption.**

Visitor experience: What happens to the food you eat? From the esophagus through the rectum, visitors trace the fascinating progress of a granola bar as it goes on an expedition of its own through the human digestive system. Glass vials containing simulated food illustrate the state of the granola bar at every stage of digestion.

An entire plastinated human digestive tract is the centerpiece of this exhibit component. Interpretation and the glass vials are arranged around the specimen for visitors to examine.

<u>Food Is Fuel: Neutral (comparison component) quadrant</u>Peak Pass



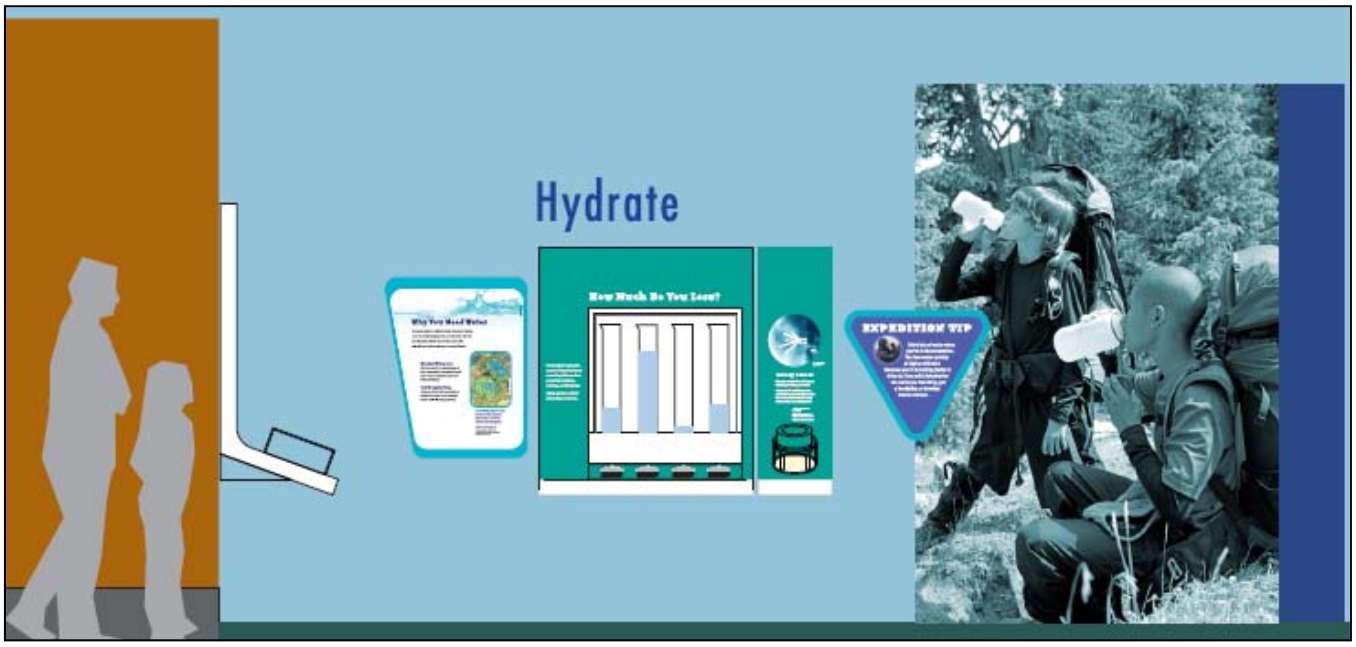
Science and health content: **Balanced nutrition. Eat smart. Fuel your body with a balanced diet.**

Visitor experience: It's a race to the top of Mount Evans! Visitors choose food to fuel their

buddy's expedition to the top of the mountain in this lively touch screen computer interactive. Visitors who choose a balanced meal "win" (30% grains, 30% vegetables, 20% fruit, 10% meat and beans, 10% milk and dairy). Along the way, visitors learn why a balanced diet is crucial to good health. This engaging activity underscores key messages of the new USDA food pyramid and gets to the crux of Center for Disease Control and Prevention (CDC) warnings about Americans' food choices.

Hydrate: Health/Wellness and Generic Body quadrant

Specimens

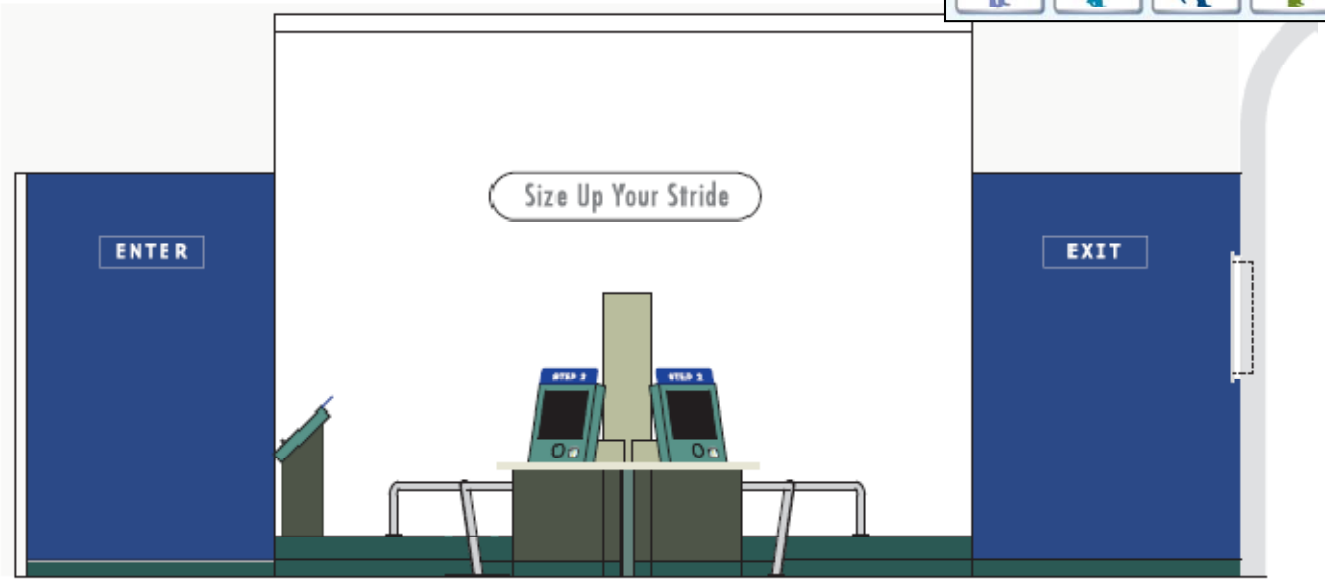


Science and health content: **Your body uses and needs water. Stay hydrated.**

Visitor experience: You'd be surprised how much water you lose during a normal day in Denver. Visitors compare cylinders of water and try to guess how much water is eliminated daily from perspiring, breathing, defecating, and urinating, even when you're not working hard. Flip labels display the correct—and surprising—answers. Interpretive graphic panels explain why the body needs water, how it is used, and the impacts of dehydration.

Nearby, a display of real human kidney stones illustrates one (painful!) result of lack of sufficient water intake. Insufficient hydration can cause calcium and phosphates (salts) to collect and harden in the kidneys.

Size Up Your Stride: Health/Wellness and Own Body quadrant Peak

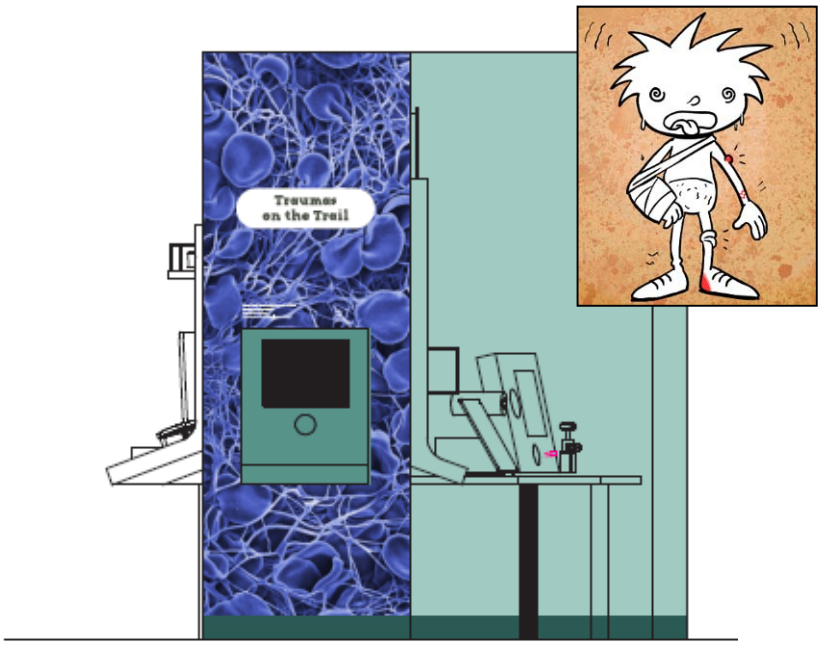


Pass

Science and health content: **Body movement, stride, and speed. The more you move the more energy you use.**

Visitor experience: Few people reflect on the effect of moving—whether walking, running, or wheeling—on their biology and health. In this interactive, the visitor's walking silhouette is captured on video and displayed in motion on projection screens, surrounded by moving silhouettes of other visitors. Visitors have fun identifying their own images and those of friends and family. Stride length, speed, and an energy score are captured for each visitor, and they are challenged to move more and in different ways to get a higher energy score.

Traumas on the Trail (a.k.a. "Top Ten Traumas"): Science/Biology and Generic Body quadrant



Science and health content: **Top ten injuries/illnesses that occur on expeditions. The biological processes that heal them.**

Visitor experience: Visitors learn the amazing ways that the body heals itself at the cellular level in this fun, engaging touch screen computer interactive. Visitors view and choose among the top ten injuries and illnesses that occur on expeditions, presented in playful cartoon-style animations. For example, visitors can select Mosquito Bites to see a red blood cell character become the evening meal for a mosquito before the immune system snaps to attention, using histamine to fight off the irritants in the mosquito's injected saliva. Swelling and itching result.

Summit Science Stage

This vibrant, flexible-use stage area is both a live demonstration space and the hub of facilitated educational experiences for visitors to *Expedition Health*. The Summit Science Stage features engaging shows and health science demonstrations throughout the day. After each show, visitors can experience the science behind the show through hands-on activities and real specimens. The stage is outfitted with two large-screen monitors, a projection screen, and a state-of-the-art audio system to create a rich visual and audio environment. The area seats up to 35 visitors, with overflow room for an additional 15 or more.

***THE SUPERFOOD HEROES™* stage show: Health/Wellness and Generic Body quadrant**

Antioxidant and the rest of the animated SuperFood Heroes use their antioxidant powers to protect cells and DNA from damage when Cell City is attacked by the Free Radical Rascals! In this lively program, visitors learn how free radical molecules are created and how "super foods" neutralize them. Visitors compete to become a SuperFood Hero themselves and take home a team emblem.

Appendix 2 Research Design

Table 1: Summary of Number of Respondents and Data Collection Period per Method

	Number of Groups	Number of Individuals	Data Collection Period
Focus Groups	2	27	7/30/2009
Adults		*G1=5 + G2=7*	
Children		*G1=12+ G2=3*	
Student questionnaires	2	108	10/15/2009 and 10/22/2009
3rd Grade (Crawford)		*80*	
5th Grade (Bryant Webster)		*28*	
Onsite Family Interviews	118	418	8/15/2009 through 9/27/2009
Online Family Questionnaires	43	62	1/15/2010 through 2/03/2010
Adults	*42*	*43*	
Children	*13*	*18*	
Focused Observation/ Interviews	36	105	11/21/2010 through 12/21/2010
TOTAL	**201**	**720**	
PERCENTAGE OF MATCHED ONLINE AND ONSITE DATA	**36%**	**15%**	

Appendix 3 Data Collection Instruments

Focus Group Guide

INSTITUTE FOR LEARNING INNOVATION

Denver Museum of Nature & Science
Family Focus Group Guide
July 30, 2009

Focus groups:

1. Warm up (10:00 to 10:10)
    a. *The purpose of talking to you is for the museum to find out how Expedition Health is working. So, we're only going to be talking about this exhibit today. It's a new exhibit that they hope will be fun, educational and useful for everyone who visits. By talking to us today about your experiences, what you liked, didn't like, and other things, we'll be able to improve the experience for everyone. Another thing, there are definitely no right or wrong answers – this is not a test! Ready to begin?*
    b. [Introductions]
    c. Did everybody visit Expedition Health? When did you visit?
    d. Where would you say you usually learn about science? *[Probe: anywhere else?]*
    e. What kinds of science topics are you most interested in? Which science topics do you enjoy most? *[Probe: It can be any kind of science…]*
2. Overall experience (10:10 to 10:20)
    a. What did you like most, and why?
    b. What did you think was the coolest thing you saw or did, and why?
    c. Raise your hand if you used the Peak Pass. What did you think about it?
        i. Did you know you could see what you did on the internet after the visit?
        ii. Do you think you'll do that? If yes, what do you hope to do?
3. Exhibit choices. (10:20 to 10:30)
    Now we want to talk a little bit about how you chose what to do.
    a. It's almost impossible to do everything in the exhibit. How did you decide what to do?
        i. Did you decide more as a group like voting, did one person decide…?
    b. Were there certain kinds of exhibits or things you found yourself doing more than others? *[Probe: Were there any patterns you could see in what you chose to do?]*
    c. Were there certain things you were more likely to skip?
    d. Did you see any of the programs?
        i. If Yes, Why did you watch that/those program(s)?
        ii. If Yes, Did you talk about them afterwards – what did you talk about?
    e. Did you visit any of the carts?
        i. If Yes, Why did you stop at that/those cart(s)?
        ii. If Yes, Did you talk about them afterwards – what did you talk about?
4. Personal connections (10:30 to 10:45)
    a. Was there anything in the exhibit that you or your family has a particular connection to?
        i. In terms of activities or hobbies?
        ii. In terms of science?

iii. In terms of health?
iv. In terms of experiences?

b. Were there topics about science that you and your family were more drawn to or had more interest in? Why was this?
c. [Follow up on any particular health issues that come up, if they're willing to share]

5. Social interaction (10:45 to 11:00)
   a. Were there any places where you had a particularly good or interesting conversation? Tell us a little bit about those conversations.
   b. Did you find yourselves talking to each other a lot while you were in the exhibit?
      i. If yes, what did you talk about? Where were you talking to each other?
      ii. If no, why do you think that was?
   c. Were there any places where you talked a lot about a particular biology or science topic? Tell us a little bit about those conversations?
   d. Were there any places where you talked a lot about a particular health-related topic? Tell us a little bit about those conversations?
   e. How about places where you learned from or taught something to each other?
   f. Did you talk to other people while you were in the exhibit?
      i. Staff or volunteers?
      ii. Other visitors not in your group?
6. Prior experiences / attitudes (11:00 to 11:15)
   a. Where do you usually get information about biology? How about health?
   b. What sorts of things do you do as a group that are related to science?
      i. Were there any places in the exhibit that talked about that?
   c. What sorts of things do you do as a group to keep healthy?
      i. Were there any places in the exhibit that talked about that?
   d. Are there any topics covered here that you know a lot about?
      i. Were there any health issues that you think or talk about at home?
   e. What kinds of connections did you make between the exhibits you saw here today and things you've done or experienced before visiting?
      i. [If nothing about science] Can you think of any examples that specifically have to do with the science in the exhibits?
      ii. [If nothing about health] Can you think of any examples that specifically have to do with the health information in the exhibits?
7. After the visit (11:15 to 11:30)
   a. Was there anything you saw or did in Expedition Health today that you think you'll follow up on after the visit? *[Probe: This could be learning more about a topic, doing something new, changing how you already do something…]*
   b. Based on your experiences in the exhibition today, is there anything you are likely to think differently about?
   c. Is there anything you are likely to feel differently about?
   d. How about anything you are likely to do differently?
8. Final comments, closing thoughts, thank you's.

DENVER MUSEUM OF NATURE AND SCIENCE
EXPEDITION HEALTH STUDENT SURVEY

Thanks so much for answering our questions. There are no right or wrong answers. We're just trying to figure out how the new exhibit, Expedition Health, is working and what you think of it.

1. Today's date: ____/____/2009

2. Which grade are you in?
❑ 5th ❑ 6th ❑ 7th ❑ 8th

3. What is your school's name?

_____

4. Have you been to this museum before today?
❑ YES ❑ NO

5. Have you been to Expedition Health before today?
❑ YES ❑ NO

6. Expedition Health was.... [Check only one]
❑ Great
❑ Good
❑ Okay
❑ Bad

7. Which part of Expedition Health did you enjoy the most?

_____

Why did you enjoy that the most?

_____

_____

_____

8. Write 3 words to describe Expedition Health to someone who has never seen it:

1. _____ 2. _____ 3. _____

TURN PAGE AND CONTINUE

9. Would you tell other students your age that they should visit Expedition Health?

❑ YES ❑ NO

10. Would you like to come back to Expedition Health with your family?

❑ YES ❑ NO

11. Tell us one new thing that you learned today in Expedition Health about <u>science</u>.

_____

_____

12. What did you learn at Expedition Health about <u>your own body</u> and <u>how to better take care of it</u>?

_____

_____

13. Think about the time you spent in Expedition Health today. Did you do most things on your own or with other students/adults in your group?

❑ Mostly on my own
❑ About the same amount of time by myself and with other students/adults
❑ Mostly with other students/adults

14. When you did things in Expedition Health with the other students/adults in your group, did you….

	YES	NO
… do any of the interactive exhibits (hands-on/interactive things) together?	☐	☐
… call each others' attention to anything cool or interesting that you saw or did in the exhibit?	☐	☐
… explain things to each other?	☐	☐
… help each other out in any way?	☐	☐
… talk to any museum staff or volunteers?	☐	☐
… talk to any other visitors who weren't part of your group?	☐	☐

15. Pick <u>one</u> of these statements to describe your visit to Expedition Health.

❑ My visit to Expedition Health made me care <u>more</u> about my own body or health.
❑ My visit to Expedition Health made me care <u>less</u> about my own body or health.
❑ My visit to Expedition Health did not change how I feel about my own body or health.

TURN PAGE AND CONTINUE

16. Did you see anything in Expedition Health that reminded you of something in your life? Something that has to do with you, or that you can relate to?

❑ YES ❑ NO

If, YES, what?

_____

_____

_____

17. How often do you do each of the following <u>with other students in your class</u>?

	Not at all	Not very often	Sometimes	Frequently	All the Time
Watch science/biology programs together	☐	☐	☐	☐	☐
Visit science or science-related museums together	☐	☐	☐	☐	☐
Talk about science/biology with each other	☐	☐	☐	☐	☐
Discuss ways to be healthier	☐	☐	☐	☐	☐
Go places to be active/play together	☐	☐	☐	☐	☐
Look up information about health	☐	☐	☐	☐	☐

Now just a couple questions about you.

18. Are you a…

❑ BOY ❑ GIRL

19. At home, how often do you speak English?

❑ All the time
❑ Most of the time
❑ Some of the time
❑ A little bit of the time
❑ Not at all?

20. Do you speak any other language(s) at home? ❑ No other languages

❑ YES ❑ NO

If, YES, which one(s)?

_____

THANK YOU!!!

DMNS EXPEDITION HEALTH ONSITE INTERVIEW

Date (dd/mm/yy) _____ Exit Time (hh:mm, PM/AM) _____
RA Initials _____ Group Size Adults _____
ID _____ Children _____

1. Have you been to Expedition Health before? *[Record who has been to EH]*

☐ NONE ☐ SOME ☐ ALL

Adults: _____
Children: _____

2. What time did you enter the exhibit? *[Probe: If don't know, What does your timed ticket say?]*

_____ (hh:mm, PM/AM)

3. We're trying to get a sense of how people go through the exhibit. In just about 2 minutes would you please describe where you went, from the time you entered to the time you met us. So, when you walked in Expedition Health… *[Check places where someone in the group went]*

EXHIBITION COMPONENTS

- ☐ Entrance/ Sign In
- ☐ Resting Heart Rate
- ☐ Bikes/Heart Rate
- ☐ Vein Viewer
- ☐ Wind Chill (on hand)
- ☐ Pee/Urine Containers
- ☐ Mirror-Image Skeleton/Body
- ☐ Height/Arm Span
- ☐ Granola Bar
- ☐ Hiker's Healthy Meal/ Nutrition Game
- ☐ Log Over "Water"
- ☐ Climbing Wall
- ☐ Hydration Guessing Game
- ☐ Stinky Feet/ Footprints
- ☐ Walk/Stride Visualizer (with silhouettes)
- ☐ Sunscreen (makes skin black)
- ☐ UV Touch Screen
- ☐ "Traumas on the Trail" Injury Cartoons
- ☐ Pupil Dilation
- ☐ Mind Ball
- ☐ Face Aging
- ☐ Record Your Story on Video
- ☐ Exit/ Sign Out

CARTS

- ☐ Bones Alive
- ☐ Explore Rx
- ☐ Human Anatomy
- ☐ The Brain

SPECIALIZED LEARNING ENVIRONMENTS

- ☐ Biology Base Camp
- ☐ Body Trek Theatre
- ☐ Summit Science Stage
- ☐ Tykes' Peak

SUMMIT SCIENCE STAGE PROGRAMS

- ☐ Heart Dissection
- ☐ "Pirates of the Human Being" (microbes)
- ☐ Lung Dissection ("Spelunking")
- ☐ SuperFood Heroes

SPECIMENS (ALSO NOTE WHICH EXHIBIT ON LEFT)

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

FOLLOW-UP QUESTIONS: Ask the following, if not already checked above

	NO	YES
a. When you entered, did you pick up the Peak Pass card? *[show **pass**]*	☐	☐
b. Did you go to the sit-down theater, about the hike? *[Body Trek Theatre]*	☐	☐
c. Did you go into the lab area, where you had to put on a lab coat? *[Biology Base Camp]*	☐	☐
d. Did you stop to see any of the programs across from the theater? *[Summit Science Stage Prog.]* ➔ If YES, which one(s)? _____	☐	☐
e. Did you stop to see any of the carts? *[Carts]*. ➔ If YES, which one(s)? _____	☐	☐
f. When you exited, did you print your report? *[show printed **Peak Pass Personal Profile**]*	☐	☐

4. Now, I want to ask the kids something. Which part of the exhibit did you enjoy the most?
➔ **Why did you enjoy that the most?**

5. Same question for the adults. Which part did you enjoy the most?
➔ **Why did you enjoy that the most?**

6. Please complete the following sentence: *"Before my visit to Expedition Health, I never realized …"*

7. Now how about completing this sentence: *"Today's visit to Expedition Health reminded me …"*

8. Which words would you all use to describe Expedition Health to someone who had never seen it? *[Probe: Can you think of another word? (at least 2 words for all adults and 2 for children)]*

Adult: _____ _____ _____ _____ _____

Child: _____ _____ _____ _____ _____

9. What did you see here today that reminded you of something in your own life? *[Probe: What could you most relate to?]*
➔ **Where did you see that?**

10. What did you see here today that reminded you of your own health or the health of someone you know? *[Probe: What about health could you most relate to?]*
➔ **Where did you see that?**

11. Sometimes when people visit an exhibit together, they split up. During your visit today, would you say that your WHOLE group STAYED TOGETHER: less than 5% of the time, 25%, 50%, 75% or 100% of the time? [*If they disagree, probe "If you had to pick just one, what would it be?"*]

☐ Less than 5% ☐ 25% ☐ 50% ☐ 75% ☐ 100%

12. We're interested in learning about what people do when they are together in the exhibit. During today's visit to Expedition Health…

	NO	YES
… did you do any of the interactive exhibits together? ➔ If **YES**, can you give me an example?	☐	☐
… did you call each others' attention to anything interesting in the exhibit? ➔ If **YES**, can you give me an example?	☐	☐
… did you explain things to each other? ➔ If **YES**, can you give me an example?	☐	☐
… did you help each other out in any way? ➔ If **YES**, can you give me an example?	☐	☐
… did you talk to any staff or volunteers?	☐	☐
… did you talk to any other visitors not in your group?	☐	☐

13. Based on your experiences in the exhibit today, is there anything you are likely to think differently about or do differently? *[Probes: How will it change the way you think about things? How will it change what you do? Anything else? (until they say no)*]

YOUR GROUP: **Please answer the following questions thinking about what best represents your group.**

14. AS GROUP, how often do you do each of the following?

	Not at all	Not very often	Sometimes	Frequently	All the Time
Watch science/biology programs together	☐	☐	☐	☐	☐
Visit science or science-related museums together	☐	☐	☐	☐	☐
Talk about science/biology with each other	☐	☐	☐	☐	☐
Discuss things we can do to be healthier	☐	☐	☐	☐	☐
Go places where we can be active	☐	☐	☐	☐	☐
Look up information about health	☐	☐	☐	☐	☐

15. Who are you visiting the museum with today? List everyone in your group, including yourself.

		Sex		Age
1.	MYSELF	☐ F	☐ M	_____
	OTHERS: [Please indicate relationship to you – i.e. husband, friend, daughter, mother, etc.]			
2.	_____	☐ F	☐ M	_____
3.	_____	☐ F	☐ M	_____
4.	_____	☐ F	☐ M	_____
5.	_____	☐ F	☐ M	_____
6.	_____	☐ F	☐ M	_____
7.	_____	☐ F	☐ M	_____
8.	_____	☐ F	☐ M	_____
9.	_____	☐ F	☐ M	_____
10.	_____	☐ F	☐ M	_____

16. Which of the following ethnicities are represented in your group? Check all that apply. *[This helps the museum know how well we're reaching different communities]*

- ☐ African-American
- ☐ Asian/Pacific Islander
- ☐ Caucasian
- ☐ Hispanic/Latino
- ☐ Native American
- ☐ Other (please describe) _____
- ☐ Prefer not to answer

17. Does anyone in your group work or study....	NO	YES
... in a field related to science/biology?	☐	☐
... in a health-related field?	☐	☐

18. Are you currently a member of this museum (DMNS)?	NO	YES
	☐	☐

19. What is your U.S. Zip code, or if outside the U.S., which country are you from? _____

THANK YOU!

WE REALLY APPRECIATE YOUR THOUGHTS.

Please provide us with YOUR CONTACT INFORMATION

As part of this study, we're going to be talking to some of the groups a few months from now about their experiences in Expedition Health. Please include your contact information if you'd like to participate. We will NOT share your contact information or use it as part of any mailing list.

Name:_____

Email:_____ **Phone:**_____

Follow-up online questionnaire – for adults

DMNS Expedition Health - Adult Questionnaire

Welcome!

Thank you for speaking with us at the Denver Museum of Nature and Science a few months ago. We really enjoyed learning about your experiences at Expedition Health. We look forward to including your opinions in this part of the study as well.

This online questionnaire should take about 10 minutes. Once you have completed it, you will be entered in a raffle for one of three $100 Amazon.com Gift Cards.

If you have any questions about this study or problems completing the questionnaire, please contact Steve Yalowitz yalowitz@ilinet.org

Thank you again for participating in this research!

To get started, click "**Next Page**"

Before you begin, please enter your Participant ID# in the space below, which we need to examine your group's responses together.

Your ID# can be found in the email invitation that contained the link to this survey. The ID# is located just below the web link.

Participant ID#: _____

THINGS TO CONSIDER:

As you complete this questionnaire, please keep in mind three very important points:

Focus only on your experiences the day we talked to you...
We understand you may come to the museum a few times in the year. It is important that you try and remember that particular day (in August or September).

Focus on the group you went through Expedition Health with that day...
We understand that your experiences may change depending on who is visiting the museum with you.

Focus only on your visit to Expedition Health...
NOT the entire Denver Museum of Nature and Science and the other exhibits there. We are trying to understand your experiences related only to Expedition Health.

Expedition Health was the new permanent exhibit on the second floor that included lots of interactive exhibits about health and science, and also had a card that you may have used at various activities.

LET'S BEGIN...

PART 1: DURING YOUR VISIT

Please answer the next questions only about the visit when we talked to you. Like before when we met you and your group in person at the museum, we'd like to hear specifically about your experiences just in Expedition Health, not the whole museum.

Please describe your most vivid memory of Expedition Health.

_____
_____
_____

During that visit to Expedition Health, was there anything in the exhibit that reminded you of something in your own life?

- ❍ No
- ❍ Yes

Please describe.

_____
_____
_____

To the best of your recollection, please tell us about what happened <u>to you</u> DURING that visit to Expedition Health.

DURING that visit to Expedition Health…

	Not at all	A little	Somewhat	Quite a bit	Very much
I was reminded of the health of someone I know.	❍	❍	❍	❍	❍
I learned something new.	❍	❍	❍	❍	❍
I thought about how the exhibit related to a hobby I have.	❍	❍	❍	❍	❍
I felt encouraged to take on a different health-related behavior.	❍	❍	❍	❍	❍
I made a connection between the exhibit and my job.	❍	❍	❍	❍	❍
I learned something new about health.	❍	❍	❍	❍	❍
I learned something new about how to keep myself healthy.	❍	❍	❍	❍	❍
I was reminded of my own health.	❍	❍	❍	❍	❍
I learned something new about science.	❍	❍	❍	❍	❍
I felt encouraged to continue a healthy behavior I already do.	❍	❍	❍	❍	❍
I learned something new about how my body works.	❍	❍	❍	❍	❍

To the best of your recollection, please tell us about what happened <u>to someone in your group, other than yourself</u> DURING that visit to Expedition Health.

DURING that visit to Expedition Health, <u>someone in my group, other than myself</u>…

	Not at all	A little	Somewhat	Quite a bit	Very much
Talked about the health of someone we know.	❍	❍	❍	❍	❍
Talked about how their hobby related to the exhibit	❍	❍	❍	❍	❍
Mentioned something they learned about how the human body works.	❍	❍	❍	❍	❍
Talked about continuing a healthy behavior they already do.	❍	❍	❍	❍	❍
Talked about taking onstarting to do a different new health-related behavior	❍	❍	❍	❍	❍
Mentioned something they learned about how to stay healthy.	❍	❍	❍	❍	❍

<u>PART 2: AFTER YOUR VISIT</u>

The next questions ask specifically about the time period from when we first talked to you up until now. Basically, we are trying to find out what has happened to you and others in your group since you visited Expedition Health.

Have there been any instances in your day-to-day life that reminded you of Expedition Health?

❍ No
❍ Yes

If YES, what was it exactly that reminded you of Expedition Health?

_____
_____
_____

9) What words would you use to describe Expedition Health to someone who had never seen it? (Please enter each word in a separate box)

_____
_____
_____
_____
_____

Which of the following happened to you AFTER that visit?

	No	Yes
I went back to the Denver Museum of Nature and Science.	❍	❍
I went back to Expedition Health.	❍	❍

Since visiting Expedition Health, have you talked about the visit with someone <u>in your group</u>?

❍ No
❍ Yes

Who did you talk to about the visit to Expedition Health, from those <u>in your group</u>?

_____
_____
_____

What did you talk about?

_____
_____
_____

Are there any particular reasons why you did not talk about the visit to Expedition Health to someone <u>in your group</u>?

_____

_____

Since visiting Expedition Health, have you talked about the visit with someone <u>outside of your group</u>?

❍ No
❍ Yes

Who did you talk to about the visit to Expedition Health, from those outside of your group?

_____
_____
_____

What did you talk about?

_____
_____
_____

Are there any particular reasons why you did not talk about the visit to Expedition Health to someone outside of your group?

_____
_____
_____

How much did visiting Expedition Health change how you think about SCIENCE?

- ❍ Not at all
- ❍ A little
- ❍ Somewhat
- ❍ Quite a bit
- ❍ Very much

Please explain.

_____
_____
_____

How much did visiting Expedition Health change how you think about HEALTH?

- ❍ Not at all
- ❍ A little
- ❍ Somewhat
- ❍ Quite a bit
- ❍ Very much

Please explain.

_____
_____
_____

What, if anything, are you doing differently as a result of visiting Expedition Health? (please describe)

_____
_____
_____

How about someone else in your group; are they doing anything differently?

_____
_____
_____

As you answer the next questions, compare what you are doing currently to what you were doing before your visit to Expedition Health. In this case, "we" means the group that went with you to Expedition Health.

We are watching science/ biology programs together:

- ❍ Less often
- ❍ About the same
- ❍ More often

If MORE OFTEN, was this influenced by your visit to Expedition Health?

- ❍ No
- ❍ Yes

We are visiting science or science-related museums together:

- ❍ Less often
- ❍ About the same
- ❍ More often

If MORE OFTEN, was this influenced by your visit to Expedition Health?

- ❍ No
- ❍ Yes

As you answer the next questions, compare what you are doing currently to what you were doing before your visit to Expedition Health. In this case, "we" means the group that went with you to Expedition Health.

We are talking about science/ biology with each other:

- ❍ Less often
- ❍ About the same
- ❍ More often

If MORE OFTEN, was this influenced by your visit to Expedition Health?

- ❍ No
- ❍ Yes

31) We are discussing things we can do to be healthier:

- ❍ Less often
- ❍ About the same
- ❍ More often

If MORE OFTEN, was this influenced by your visit to Expedition Health?

- ❍ No
- ❍ Yes

As you answer the next questions, compare what you are doing currently to what you were doing before your visit to Expedition Health. In this case, "we" means the group that went with you to Expedition Health.

We are going places where we can be active:

- ❍ Less often
- ❍ About the same
- ❍ More often

If MORE OFTEN, was this influenced by your visit to Expedition Health?

- ❍ No
- ❍ Yes

We are looking up information about health:

- ❍ Less often
- ❍ About the same
- ❍ More often

If MORE OFTEN, was this influenced by your visit to Expedition Health?

- ❍ No
- ❍ Yes

Please tell us a little bit about yourself.

What is your age?

_____

Are you:

- ❍ Female
- ❍ Male

Is there anything else you would like to share with us about your group's experience at Expedition Health?

_____
_____
_____

As a thank-you for participating in this study, would you like to enter our drawing for one of three $100 Amazon.com Gift Cards?

- ❍ No
- ❍ Yes

Please provide us with your contact information, so we can send you the $100 Amazon.com Gift Card, if you are one of the winners of the drawing.

We will not use your contact information for any other purposes rather than notifying if you are the win the gift card.

Contact Information:

Name: _____
Email: _____
Phone: _____

To review your responses, click the "Previous Page" button.
Otherwise, click "Submit Survey" to send in your responses.

We would love to hear about your child(ren)'s experiences as well. After you hit "submit," you'll be linked to a short children's questionnaire, which we hope they

will be able to fill out. If your child(ren) participates, you'll be entered in another drawing of one of three $100 Amazon.com gift cards.

Please remember to forward the email to any other adults who came to Expedition Health with you that day. If they participate, they will also be entered in the drawing for one of three $100 Amazon.com gift cards.

Thank you for answering our questions. We really appreciate your time and effort in sharing your experiences with us. Your opinions enable the museum to develop meaningful exhibits for visitors like you and your group.

DMNS Expedition Health - Child/ Pre-Teen Questionnaire

Welcome!

Thank you for participating in this study as well! We look forward to including your child(ren)'s opinions in this part of the study.

We ask that you spend a few minutes completing the **first part** of the questionnaire. That is the part where you give your child permission to answer the questions. It is also when you tell us if you would like to enter the drawing for one of three $100 Amazon.com gift cards.

In the **second part**, your child will answer a brief questionnaire (3-5 minutes). While you may be there when your child answers the questions, we ask that he/she she answers them on his/her own. We really want to know what *your child* thinks!

If you visited Expedition Health that day with more than one child, we encourage that each of them complete a separate questionnaire. You will use the same ID number for each questionnaire and an adult will need to give each child permission to participate.

Please remember, **this invitation is only for the child(ren) who came to Expedition Health with you that day.**

If you have any questions about this study or problems completing the questionnaire, please contact Steve Yalowitz at yalowitz@ilinet.org

Thank you again for participating in this research!

To get started, click "**Next Page**"

PART 1: THIS FIRST PART IS FOR THE ADULT

This questionnaire is part of a research project to examine the visitor experience for young people and their families/ visitor groups within Expedition Health. If you agree to allow your child to participate, we will ask him or her to answer a few questions about their experiences

in the exhibition. The questionnaire should take about 5 minutes. Your child's responses will remain anonymous and only be used for the purpose of this research. At any time, he or she can choose to withdraw participating in the study.

In the next page, we ask you to indicate your permission for the minor child in your care.

In the page that follows, you will be asked whether you would like to enter in a drawing of $100 Amazon.com Gift Certificate, as a thank-you for your child's participation.

I hereby give permission for the minor (person under age 18) listed below to participate in this research. My child and I voluntarily agree to participate in this study. I am not waiving any of my legal rights.

- ❍ Yes
- ❍ No

All fields need to be completed.

Name of Person Consenting _____

Today's Date (MM/DD/YY) _____

Name of Minor Child (youth under age 18) _____

Minor's Date of Birth (MM/DD/YY) _____

Relationship to you _____

As a thank-you for participating in this study, would you like to enter a drawing for one $100 Amazon.com Gift Card?

- ❍ No
- ❍ Yes

Please provide us with your contact information, so we can send you the $100 Amazon.com Gift Card, if you are the winner of the drawing.

We will not use your contact information for any other purposes rather than notifying if you are the win the gift card.

Contact Information:

Name: _____
Email: _____
Phone: _____

5) Please enter your Participant ID# in the space below.

Your ID# can be found in the email invitation that contained the link to this survey. The ID# is located just below the web link.

Participant ID#:

_____

PART 2: NOW IT IS THE CHILD'S TURN!

We want to find out what you think about Expedition Health. These questions are about the time you visited the Museum and we talked to you as you were leaving the exhibit. If you've been to Expedition Health since then, please just focus on that one visit on the day we talked to you.

We ask that you answer the questions yourself, but if you need help understanding what a question means, please feel free to ask the adult(s) there with you.

What do you remember most from your visit to Expedition Health? (please tell us as much as you can)

_____
_____
_____

What 3 words would you choose to describe Expedition Health to someone who has never seen it? (Please enter each word in a separate box)

_____
_____
_____

What do you remember learning in Expedition Health about science?

_____
_____
_____

What do you remember learning in Expedition Health about your own body and how to better take care of it?

_____
_____
_____

What is your age?

_____

Are you:

- ❍ Girl
- ❍ Boy

Is there anything else you would like to share with us about your experience at Expedition Health?

_____
_____
_____

To review your responses, click the "Previous Page" button. Otherwise, click "Submit Survey" to send in your responses.

Please remember to ask any other child in your group to answer the questionnaire.

Please remember to forward the email to any other adults who came to Expedition Health with you that day. If they participate, they will also be entered in the drawing for one of three $100 Amazon.com gift cards.

Thank you for your participation in the study. We really appreciate your time and effort in sharing your experiences with us. Your opinions enable the museum to develop meaningful exhibits for visitors like you and your group.

Focused observations/interviews interview form with families at specific exhibit components

DMNS EXPEDITION HEALTH
FOCUSED EXHIBIT INTERVIEW

Exhibit: _____

Date (dd/mm/yy) _____
RA Initials _____ Group Size Adults _____
ID _____ Children _____

1. Have any of you been to Expedition Health before? *[Record who has been to EH]*

☐ NONE ☐ SOME ☐ ALL

Adults: _____
Children: _____

2. When you entered, did any of you pick up the Peak Pass card? *[Record who has card]*

☐ NONE ☐ SOME ☐ ALL

Adults: _____
Children: _____

Thanks, now we want to ask you some questions specifically about ___, the exhibit you just saw.

3. First we want to hear from the kids. What do you think this exhibit is about, what is it trying to show you?

4. Okay, now the adults. What do you think it's about?

5. What did you enjoy most about the exhibit you just did?
➔ Why did you enjoy that the most?

6. Which words would you all use to describe this exhibit to someone who had never seen it?
[Probe: Can you think of another word? (at least 2 words for all adults and 2 for children)]
Adult: _____ _____ _____ _____ _____
Child: _____ _____ _____ _____ _____

7. Was there anything you saw in this exhibit that any of you could really relate to? If yes, tell me about that.

8. What did you learn from this exhibit about how the human body works?

9. Did you learn anything about your own body? If Yes, what did you learn?

10. Did you learn anything about health from this exhibit? If Yes, what did you learn?

11. Based on using this exhibit today, is there anything you are likely to think differently about?
[Probes: How will it change the way you think about things? Anything else? (until they say no)]

12. How about something you think you'll do differently? [Probes: *How will it change what you do?]*

Thank you for your time.

YOUR GROUP: **Please answer the following questions thinking about what best represents your group.**

1. AS GROUP, how often do you do each of the following?

	Not at all	Not very often	Sometimes	Frequently	All the Time
Watch science/biology programs together	☐	☐	☐	☐	☐
Visit science or science-related museums together	☐	☐	☐	☐	☐
Talk about science/biology with each other	☐	☐	☐	☐	☐
Discuss things we can do to be healthier	☐	☐	☐	☐	☐
Go places where we can be active	☐	☐	☐	☐	☐
Look up information about health	☐	☐	☐	☐	☐

2. Who are you visiting the museum with today? List everyone in your group, including yourself.

		Sex		Age
1.	**MYSELF**	☐ F	☐ M	_____
	OTHERS: [Please indicate relationship to you – i.e. husband, friend, daughter, mother, etc.]			
2.	_____	☐ F	☐ M	_____
3.	_____	☐ F	☐ M	_____
4.	_____	☐ F	☐ M	_____
5.	_____	☐ F	☐ M	_____
6.	_____	☐ F	☐ M	_____
7.	_____	☐ F	☐ M	_____
8.		☐ F	☐ M	_____
9.	_____	☐ F	☐ M	_____
10.	_____	☐ F	☐ M	_____

3. Which of the following ethnicities are represented in your group? Check all that apply. *[This helps the museum know how well we're reaching different communities]*

- ☐ African-American
- ☐ Asian/Pacific Islander
- ☐ Caucasian
- ☐ Hispanic/Latino
- ☐ Native American
- ☐ Other (please describe)
- ☐ Prefer not to answer

4. Does anyone in your group work or study....	NO	YES
... in a field related to science/biology?	☐	☐
... in a health-related field?	☐	☐

5. Are you currently a member of this museum (DMNS)?	NO	YES
	☐	☐

6. What is your U.S. Zip code, or if outside the U.S., which country are you from? _____

PLEASE HAND THIS BACK TO THE PERSON WHO GAVE IT TO YOU.

Appendix 4 Group Composition and Past Experiences

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 2: Visitor origin

	Onsite Interviews		Focused Observations/Interviews	
State	**n**	**%**	**n**	**%**
Colorado	100	86.2	34	94.4
Wyoming	2	1.7	0	0
Other states (1 each)	13	11.0	2	4.6
International	1	.9	0	0
TOTAL	**118**	**100**	**36**	**100**

Table 3: Groups where respondent "is currently" a member of the DMNS

	Onsite Interviews			Focused Observations		
	n	**%**	**N**	**n**	**%**	**N**
Museum membership	51	43.6	117	10	27.8	36

Table 4: Group size distribution

	Onsite Interviews		Focused Observations	
Group Size	**n**	**%**	**n**	**%**
2	26	22.0	14	38.9
3	38	32.2	11	30.6
4	35	29.7	11	30.6
5	11	9.3	0	0
6	4	3.4	0	0
8	3	2.5	0	0
9	1	.8	0	0
TOTAL	**118**	**100**	**36**	**100**

Table 5: Ethnicity

	Onsite Interviews		Focused Observations/Interviews	
	n	**%**	**n**	**%**
African American	3	2.5	1	2.8
Asian Pacific Islander	3	2.5	1	2.8
Caucasian	105	89.0	32	88.9
Hispanic/Latino	16	13.6	6	16.7
Native American	4	3.4	1	2.8
Prefer not to answer/ did not answer	4	3.4	1	2.8
TOTAL	**135**	**114.4[a]**		**X[b]**

[a] Total adds up to more than 100% because some groups selected more than one ethnicity category: 13 groups had 2 categories and 3 groups had 3 categories.)

[b] Total adds up to more than 100% because some groups selected more than one ethnicity category: 4 groups had 2 categories and 1 group had 3 categories.

Table 6: Number of groups in each category of children's age

Age category	Onsite Interviews		Focused Observations/Interviews	
	n	**%**	**n**	**%**
Birth to 3	6	5.1	0	0.0
4 to 7	30	25.4	11	30.6
8 to 11	102	86.4	26	72.2
12 to 14	32	27.1	9	25.0
15 to 17	7	5.9	2	5.6
TOTAL	**177**	**149.9***	**48**	**133.3***

* Total adds up to more than 100% because groups may have had more than one age category

Table 7: Number of children in each of the age categories

Age category	Onsite Interviews		Focused Observations/Interviews	
	n	%	n	%
Birth to 3	6	2.73	0	0.0
4 to 7	35	15.91	13	24.1
8 to 11	135	61.36	30	55.6
12 to 14	37	16.82	9	16.7
15 to 17	7	3.18	2	3.7
TOTAL	**220**	**100**	**54**	**100.0**

Table 8: Group types based on target age

Age category	Onsite Interviews		Focused Observations/Interviews	
	n	%	n	%
Only target age, one child	40	34.8	21*	60
Only target age, more than one child	39	33.9	4	11.4
Target age with younger and/or older children	36	31.3	10	28.6
TOTAL	**115**	**100**	**35**	**100**

* Three cases had child age 7, instead of the minimum 8.

Table 9: Total number of individuals in the group

	Onsite Interviews		Focused Observations/Interviews	
	n	%	n	%
Adult Females	119	28.5	29	27.6
Adult Males	75	17.9	20	19.0
Girls	130	31.1	26	24.8
Boys	94	22.5	30	28.6
TOTAL	**418**	**100**	**105**	**100.0**

Table 10: Group types based on sex of adults in the group

Sex category - Adults	Onsite Interviews		Focused Observations/Interviews	
	n	%	n	%
One adult, female	44	37.3	16	44.4
One adult, male	19	16.1	8	22.2
All females	5	4.2	0	0
All males	1	.8	0	0
Mixed females and males	49	41.5	12	33.3
TOTAL	**118**	**100**	**36**	**100**

Table 11: Group types based on sex of children in the group

Sex category - Adults	Onsite Interviews		Focused Observations/Interviews	
	n	%	n	%
One girl	24	20.3	11	30.6
One boy	17	14.4	9	25.0
All girls	23	19.5	1	2.8
All boys	16	13.6	5	13.9
Mixed girls and boys	38	32.2	10	27.8
TOTAL	**118**	**100**	**36**	**100**

Table 12: Number of groups with someone in a field-related to the exhibition content

	Onsite Interviews			Focused Observations/Interviews		
	n	%	N	n	%	N
Works or study in a field related to science or biology	28	24.8	113	12	36.4	33
Works or study in a health-related field	33	28.9	114	10	28.6	35

Table 13: Number of groups with prior visit to *Expedition Health*

	Onsite Interviews		Focused Observations/Interviews	
	n	**%**	**n**	**%**
None	78	66.1	19	52.8
Some	19	16.1	13	36.1
Groups with only adults who never visited EH before	*0*		*1*	
Groups with only children who never visited EH before	*12*		*9*	
Groups with adults and children who never visited EH before	*7*		*3*	
All	21	17.8	4	11.1
TOTAL	**118**	**100**	**36**	**100**

Table 14: Frequency of engagement in science/biology and health/wellness behaviors as a group (onsite interviews)

AS GROUP, how often do you do each of the following?	**Percentage**						
	Not at all	**Not very often**	**Sometimes**	**Frequently**	**All the time**	**n**	**median**
Watch science/biology programs together	2.6	15.5	44.0	29.3	8.6	116	3.00
Visit science or science-related museums together	1.7	10.4	47.0	36.5	4.3	115	3.00
Talk about science/biology with each other	.0	11.2	51.7	31.9	5.2	116	3.00
Discuss things we can do to be healthier	.0	3.4	32.8	44.0	19.8	116	4.00
Go places where we can be active	.0	.9	27.8	56.5	14.8	115	4.00
Look up information about health	2.6	24.1	45.7	22.4	5.2	116	3.00

Table 15: Frequency of engagement in science/biology and health/wellness behaviors as a group (focused observations/interviews)

AS GROUP, how often do you do each of the following?	**Percentage**						
	Not at all	**Not very often**	**Sometimes**	**Frequently**	**All the time**	**n**	**median**
Watch science/biology programs together	0	11.1	52.8	36.1	0	36	3.00
Visit science or science-related museums together	0	14.3	57.1	25.7	2.9	35	3.00
Talk about science/biology with each other	0	5.6	33.3	52.8	8.3	36	4.00
Discuss things we can do to be healthier	0	2.8	25.0	47.2	25.0	36	4.00
Go places where we can be active	0	.0	22.2	38.9	38.9	36	4.00
Look up information about health	0	5.7	40.0	45.7	8.6	35	4.00

Appendix 5 Description of the Groups' Experiences in *Expedition Health*

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 16: Total time spent in *Expedition Health* (minutes)

	Mean	Median	Mode	Std. Dev.	Min.	Max.	N
Total time spent	87.22	79.00	60.00	39.22	20.00	220.00	118

Table 17: Group types based on total time spent in *Expedition Health* (minutes)

	n	%
Up to 45 minutes	18	15.3
46 to 90 minutes	52	44.1
91 to 135 minutes	33	28.0
136 to 220 minutes	15	12.7
TOTAL	**118**	**100**

Table 18: Total number of exhibition components visited (total number stops = 28; only one stop at a science stage program and cart is counted)

	Mean	Median	Mode	Std. Dev.	Min.	Max.	N
Number of exhibition components	13.97	13.00	13.00	5.11	4.00	26.00	118

Table 19: Group types based on total number of stops in *Expedition Health* (minutes)

	n	%
Up to 9 stops	23	19.5
10 to 15 stops	54	45.8
16 to 20 stops	23	19.5
21 to 26 stops	18	15.3
TOTAL	**118**	**100**

Table 20: Number of stops in each exhibition component

Exhibition Component	n	%
Entrance/ Sign In	118	100.0
Resting Heart Rate	89	75.4
Bikes/Heart Rate	100	84.7
Vein Viewer	62	52.5
Wind Chill (on hand)	63	53.4
Pee/Urine Containers	38	32.2
Mirror-Image Skeleton/Body	66	55.9
Height/Arm Span	85	72.0
Granola Bar	29	24.6
Hiker's Healthy Meal/ Nutrition Game	45	38.1
Log Over "Water"	91	77.1
Climbing Wall	60	50.8
Hydration Guessing Game	19	16.1
Stinky Feet/ Footprints	21	17.8
Walk/Stride Visualizer (with silhouettes)	96	81.4
Sunscreen (makes skin black)	55	46.6
UV Touch Screen	34	28.8
"Traumas on the Trail" Injury Cartoons	21	17.8
Pupil Dilation	42	35.6
Mind Ball	60	50.8
Face Aging	46	39.0
Record Your Story on Video	30	25.4
Exit/ Sign Out	117	99.2
Carts	49	41.5
Biology Base Camp	61	51.7
Body Trek Theatre	64	54.2
Tykes' Peak	15	12.7
Summit Science Stage	72	61.0

Table 21: Percentage of families that stopped in each exhibition component (n=118)

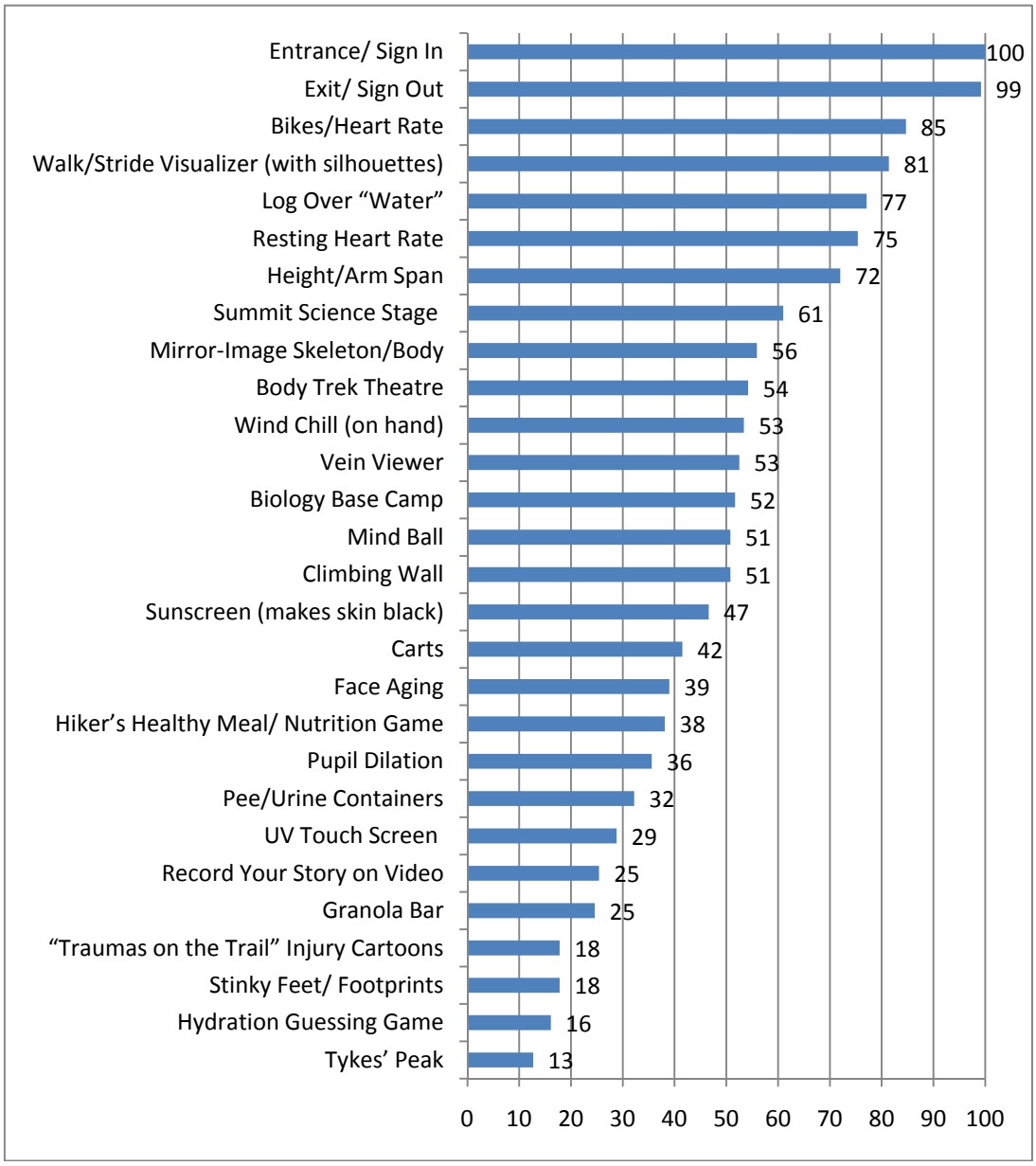


Table 22: Number of stops at exhibition components with and without Peak Pass (Of the 28 possible stops, 10 include ability to use Peak Passes)

	Mean	Median	Mode	Std. Dev.	Min.	Max.	N
Number of stops at exhibition component with Peak Pass	6.65	7.00	8.00	1.96	2.00	10.00	118
Number of stops at exhibition component without Peak Pass	7.31	7.00	4.00a	3.72	2.00	17.00	118

Table 23: Group types based stops to Peak Pass exhibition components

	n	%
2 to 4 stops	16	13.6
5 to 7 stops	57	48.3
8 to 10 stops	45	38.1
TOTAL	**118**	**100**

Table 24: Number of stops at exhibition components based on content focus

(Of the 28 possible stops, 9 had a strong focus on science/biology, 5 had a strong focus on health/wellness, and 13 focused equally on science/biology and health/wellness)

	Mean	Median	Mode	Std. Dev.	Min.	Max.	N
Number of stops at exhibition component with focus on science/ biology	4.61	4	3	2.25	1	9	118
Number of stops at exhibition component with focus on health/wellness	2.58	3	3	1.22	0	5	118
Number of stops at exhibition component with focus on both	5.75	5	5	2.14	2	12	118

Table 25: Types of Visits Based on Interaction Level and Content Focus

	Number of Components in the Category	**Number of Components Considered 60% of Stops**	**Percentage of Visits with *Strong Focus* in Each Category [a]**
Interaction Level	28		
Own Body (Peak Pass)	10	6	51.7
Generic Body	18	11	0
Focus on both	--	--	18.6
Not a strong focus	--	--	29.7
Content Focus	26 [b]		
Focus of Science/Biology	9	5	11.9
Focus on Health/ Wellness	5	3	15.3
Focus on both	--	--	36.4
Not a strong focus	--	--	36.4
Neutral Focus [c]	12	7	28.8

[a] Strong focus = Stops in 60% or more of the Possible Stops for the Category

[b] Carts and Summit Science Stage programs are not included.

[c] There is also overlap between components with neutral focus and focus on science/biology and health/wellness. They were not analyzed.

Table 26: Comparisons of time spent in the exhibition and number of stops

Total Time Spent (in Minutes)	**Statistically significant difference? (p<05, n=118)**	
		Pearson's r
Total Number of Stops	YES	.447
Number of stops at exhibition component with Peak Pass	YES	.386
Number of stops at exhibition component without Peak Pass	YES	.410
Number of stops at exhibition component with focus on science/biology	YES	.361
Number of stops at exhibition component with focus on health/wellness	YES	.364
Number of stops at exhibition component with focus on both	YES	.401

Cohen's strength of correlation convention: Small = +/- .10 to .29, Moderate=+/- .30 to .49; Large = +/- .50 to 1.0

Table 27: Comparisons of total stops in exhibition and stops in Peak Pass components

Total Number of Stops	**Statistically significant difference? (p<05, n=118)**	
		Pearson's r
Total Number of Stops in Peak Pass components	YES	.803**

Table 28: Percent of time spent together in *Expedition Health*

	n	**%**
25% or less	22	20.4
50%	19	17.6
75%	35	32.4
100%	32	29.6
TOTAL	**108**	**100**

Table 29: Groups' behaviors in *Expedition Health*

During today's visit to *Expedition Health*…	**YES**	**%**
… did you do any of the interactive exhibits together?	112	94.9
… did you call each others' attention to anything interesting in the exhibit?	109	92.4
… did you explain things to each other?	97	100
… did you help each other out in any way?	102	*100*
… did you talk to any staff or volunteers?	92	*100*
… did you talk to any other visitors not in your group?	73	61.9
TOTAL	**118**	**100**

Table 30: Conversation analysis for group interactions in focused observations/interviews

	Number of Codes	Number of Instances*
General comments about the exhibition component	213	40
Specific comments about the exhibition component	178	23
About the Buddy	21	8
About the measurement	157	22
Instructions on how to do the activity and general procedures	323	38
Facilitation	351	44
Reads a label out loud	71	21
Explains exhibition component content	151	33
Discuss measurement	81	22
Probe learning with questions	48	14
Troubleshooting	76	23
Not sure what to do	29	16
Troubleshooting	46	13
No conversations	1	1
TOTAL	**1141**	**54**

*These are not unique groups, as in some instances the same group participated in two components

Table 31: Descriptive statistics of group interactions in focused observations/interviews

	Mean	Median	Mode	Std. Dev.	Min.	Max.	N	#Codes
Facilitation	7.98	7.5	3	5.21	1	22	44	351
General Comment about Exhibition Component	5.33	3	1[a]	5.46	1	23	40	213
Instructions (Activity or General)	8.50	7	1	7.37	1	35	38	323
Specific Comment about Exhibition Component	7.74	5	4.00[a]	6.57	1	25	23	178
Troubleshooting	3.30	2	1	3.14	1	12	23	76

a. Multiple modes exist. The smallest value is shown

Table 32: Direction of conversation (Focused Observations/Interviews)

Who Initiated the Interaction		Number of Instances [a]	Number of Codes
Adult initiated		53	812
	Adult to adult	20	93
	Adult to child	50	573
	Adult to group	25	146
Child initiated		45	331
	Child to adult	41	199
	Child to child	12	31
	Child to group	20	101
TOTAL		**54** [b]	**1143**

[a] These are not unique groups, as in some instances the same group participated in two components

[b] Of the 60 total cases, 6 did not have any conversations. They were 5 Superfood Heroes, which were not recorded and one Explore RX.

Table 33: Overall distribution of conversation codes from focused observations/interviews, by component characteristic

Dimensions of Component Choice	Group Interactions									
	General comments		Specific comments		Instructions		Facilitation		Troubleshoot	
	n	#Codes	n	#Codes	n	#Codes	n	#Codes	n	#Codes
Health/wellness and Generic Body	2	3	0	0	1	1	5	59	0	0
Science and Generic Body	14	76	0	0	7	35	14	150	4	4
Health/wellness and Own Body	9	80	7	56	9	115	5	40	7	29
Science and Own Body	7	23	14	118	14	111	13	68	8	37
Neutral	8	31	2	4	7	61	7	34	4	6
Total	**40**	**213**	**23**	**178**	**38**	**323**	**44**	**351**	**23**	**76**

Table 34: Overall distribution of conversation codes from focused observations/interviews, by component characteristic

Group Interactions	Dimensions of Component Choice										Total #Codes	
	Health/wellness & Generic Body		Science & Generic Body		Health/wellness & Own Body		Science & Own Body		Neutral			
Facilitation	59	93.7%	150	56.6%	40	12.5%	68	19.0%	34	25.0%	351	30.8%
Instructions	1	1.6%	35	13.2%	115	35.9%	111	31.1%	61	44.9%	323	28.3%
General Comments	3	4.8%	76	28.7%	80	25.0%	23	6.4%	31	22.8%	213	18.7%
Specific Comments	0	0.0%	0	0.0%	56	17.5%	118	33.1%	4	2.9%	178	15.6%
Trouble-shooting	0	0.0%	4	1.5%	29	9.1%	37	10.4%	6	4.4%	76	6.7%
Total #Codes	**63**	**100**	**265**	**100**	**320**	**100**	**357**	**100**	**136**	**100**	1141	100.0%

Table 35: Overall distribution of conversation codes from focused observations/interviews, by exhibition component

Dimensions of Component Choice	Group Interactions										Total #Codes
	General comments		Specific comments		Instructions		Facilitation		Troubleshoot		
	n	#Codes	n	#Codes	n	#Codes	n	#Codes	n	#Codes	
Bioride	5	72	4	26	5	81	3	17	4	24	220
Explore RX	3	16	0	0	2	2	4	27	1	1	46
Food is Fuel	5	15	2	4	5	59	3	7	3	5	90
Fate of a Granola Bar	10	69	0	0	2	2	9	99	1	1	171
Heart Electricity	2	5	4	18	4	14	4	25	2	9	71
Hydrate	2	3			1	1	5	59	0	0	63
Measure Up	5	18	10	100	10	97	9	43	6	28	286
Size Up Your Stride	4	8	3	30	4	34	2	23	3	5	100
Superfood Heroes*	--	--	--	--	--	--	--	--	--	--	0
Traumas on the Trail	4	7	0	0	5	33	5	51	3	3	94
TOTAL	**40**	**213**	**23**	**178**	**38**	**323**	**44**	**351**	**23**	**76**	1141

* Conversations of the participants of Superfood Heroes were not recorded during the show.

Table 36: Frequencies of conversations in the exhibition components by component characteristics

Dimensions of Component Choice	Group Interactions										Total #Codes
	General comments		Specific comments		Instructions		Facilitation		Troubleshoot		
	n	#Codes	n	#Codes	n	#Codes	n	#Codes	n	#Codes	
Health/wellness and Generic Body	2	3	0	0	1	1	5	59	0	0	63
Hydrate	*2*	*3*	*0*	*0*	*1*	*1*	*5*	*59*	*0*	*0*	*63*
*Superfood Heroes**	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*0*
Science and Generic Body	14	76	0	0	7	35	14	150	4	4	265
Fate of a Granola Bar	*10*	*69*	*0*	*0*	*2*	*2*	*9*	*99*	*1*	*1*	*171*
Top Ten Traumas on the Trail	*4*	*7*	*0*	*0*	*5*	*33*	*5*	*51*	*3*	*3*	*94*
Health/wellness and Own Body	9	80	7	56	9	115	5	40	7	29	320
Bioride	*5*	*72*	*4*	*26*	*5*	*81*	*3*	*17*	*4*	*24*	*220*
Size Up Your Stride	*4*	*8*	*3*	*30*	*4*	*34*	*2*	*23*	*3*	*5*	*100*
Science and Own Body	7	23	14	118	14	111	13	68	8	37	357
Heart	*2*	*5*	*4*	*18*	*4*	*14*	*4*	*25*	*2*	*9*	*71*
Electricity Measure Up	*5*	*18*	*10*	*100*	*10*	*97*	*9*	*43*	*6*	*28*	*286*
Neutral	8	31	2	4	7	61	7	34	4	6	136
Explore RX	*3*	*16*	*0*	*0*	*2*	*2*	*4*	*27*	*1*	*1*	*46*
Food is Fuel	*5*	*15*	*2*	*4*	*5*	*59*	*3*	*7*	*3*	*5*	*90*
TOTAL	**40**	**213**	**23**	**178**	**38**	**323**	**44**	**351**	**23**	**76**	

* Conversations of the participants of Superfood Heroes were not recorded during the show.

Table 37: Direction of conversation (focused observations/interviews) by exhibition component characteristic

Dimensions of Component Choice	Who Initiated the Interaction					
	Adult Initiated		Child Initiated		Total	
	n	#Codes	n	#Codes	n	#Codes
Health/wellness and Generic Body	5	59	2	4	5	63
Science and Generic Body	14	177	14	88	15	265
Health/wellness and Own Body	10	228	9	93	10	321
Science and Own Body	15	240	14	118	15	358
Neutral	9	108	6	28	9	136
Total	**53**	**812**	**45**	**331**	**54**	**1143**

Table 38: Direction of conversation (focused observations/interviews) by exhibition component characteristic

Who Initiated the Interaction	Dimensions of Component Choice															Total #Codes		
	Health/wellness & Generic Body			Science & Generic Body			Health/wellness & Own Body			Science & Own Body			Neutral					
	n	#Codes	%	n	#Codes	%	n	#Codes	%	n	#Codes	%	n	#Codes	%	n	#Codes	%
Adult Initiated	5	59	94	14	177	67	10	228	71	15	240	67	9	108	78	53	812	71
Child Initiated	2	4	6	14	88	33	9	93	29	14	118	33	6	28	21	45	331	29
Total #Codes	5	63	100	15	265	100	10	321	100	15	358	100	9	136	100	54	1143	100

Table 39: Direction of conversation (focused observations/interviews) by exhibition component

Dimensions of Component Choice	Who Initiated the Interaction				Total	
	Adult Initiated		Child Initiated			
	n	#Codes	n	#Codes	n	#Codes
Bioride	5	154	5	67	5	221
Explore RX	4	35	2	10	4	45
Food is Fuel	5	73	4	18	5	91
Fate of a Granola Bar	9	111	10	60	10	171
Heart Electricity	5	59	4	13	5	72
Hydrate	5	59	2	4	5	63
Measure Up	10	181	10	105	10	286
Size Up Your Stride	5	74	4	26	5	100
Superfood Heroes*	--	--	--	--	--	--
Traumas on the Trail	5	66	4	28	5	94
TOTAL	**53**	**812**	**45**	**331**	**54**	**1143**

* Conversations of the participants of Superfood Heroes were not recorded during the show.

Table 40: Frequencies of conversations in the exhibition by exhibit component

Dimensions of Component Choice	Who Initiated the Interaction				Total	
	Adult Initiated		Child Initiated			
	n	#Codes	n	#Codes	n	#Codes
Health/wellness and Generic Body	5	59	2	4	5	63
Hydrate	*5*	*59*	*2*	*4*	*5*	*63*
*Superfood Heroes**	--	--	--	--	--	--
Science and Generic Body	14	177	14	88	15	265
Fate of a Granola Bar	*9*	*111*	*10*	*60*	*10*	*171*
Traumas on the Trail	*5*	*66*	*4*	*28*	*5*	*94*
Health/wellness and Own Body	10	228	9	93	10	321
Bioride	*5*	*154*	*5*	*67*	*5*	*221*
Size Up Your Stride	*5*	*74*	*4*	*26*	*5*	*100*
Science and Own Body	15	240	14	118	15	358
Heart Electricity	*5*	*59*	*4*	*13*	*5*	*72*
Measure Up	*10*	*181*	*10*	*105*	*10*	*286*
Neutral	9	108	6	28	9	136
Explore RX	*4*	*35*	*2*	*10*	*4*	*45*
Food is Fuel	*5*	*73*	*4*	*18*	*5*	*91*
Total	**53**	**812**	**45**	**331**	**54**	**1141**

Table 41: Conversations in the exhibition by direction of conversation (number of codes)

Group Interactions	Who Initiated the Interaction				Total	
	Adult-Initiated		Child-Initiated			
	#codes	%	#codes	%	#codes	%
General comments about the component	111	13.7	102	30.8	213	18.6
Specific comments about the component	103	12.7	75	22.7	178	15.6
About the Buddy	9	1.1	12	3.6	21	1.8
About the measurement	94	11.6	63	19.0	157	13.7
Instructions on how to do the activity and general procedures	263	32.4	60	18.1	323	28.2
Facilitation	284	35.0	67	20.2	351	30.7
Reads a label out loud	53	6.5	18	5.4	71	6.2
Explains component content	125	15.4	26	7.9	151	13.2
Discuss measurement	62	7.6	19	5.7	81	7.1
Probe learning with questions	44	5.4	4	1.2	48	4.2
Troubleshooting	50	6.2	25	7.6	76	6.6
Not sure what to do	14	1.7	15	4.5	29	2.5
Troubleshooting	36	4.4	10	3.0	46	4.0
No conversations	0	0.0	0	0.0	1	0.1
TOTAL	**812**	**100.0**	**331**	**100.0**	**1144**	**100.0**

Table 42: Chi-square - Conversations in the exhibition by direction of conversation (number of codes)

Group Interactions		Who Initiated the Interaction		Total
		Adult Initiated	Child Initiated	
General comments about the component	Count	111	102	213
	Expected Count	151.5	61.5	213.0
	% within who initiated interaction	13.7%	31.0%	18.7%
Specific comments about the component	Count	103	75	178
	Expected Count	126.6	51.4	178.0
	% within who initiated interaction	12.7%	22.8%	15.6%
Instructions on how to do the activity and general procedures	Count	263	60	323
	Expected Count	229.8	93.2	323.0
	% within who initiated interaction	32.4%	18.2%	28.3%
Facilitation	Count	284	67	351
	Expected Count	249.7	101.3	351.0
	% within who initiated interaction	35.0%	20.4%	30.8%
Troubleshooting	Count	50	25	75
	Expected Count	53.4	21.6	75.0
	% within who initiated interaction	6.2%	7.6%	6.6%
Total	**Count**	**811**	**329**	**1140**
	Expected Count	811.0	329.0	1140.0
	% within who initiated interaction	100.0%	100.0%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	86.533[a]	4	.000
Likelihood Ratio	85.000	4	.000
N of Valid Cases	1140		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.64.

Appendix 6 Which group outcomes related to science/biology and health/wellness occur?

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 43: Descriptive statistics of outcome codes reported in onsite interviews

	Mean	Median	Mode	Std. Dev.	Min	Max	N	N %	#Codes	#Codes %
Personal Connections	4.52	4	3[a]	2.719	1	16	108	93.1%	488	36.6%
Knowledge	4.84	5	3	2.557	1	12	116	100%	561	42.1%
Behavior	2.78	2	2	1.614	1	8	102	87.9%	284	21.3%
Total	**11.49**	**10**	**7**	**4.748**	**1**	**26**	**116**	**100%**	**1333**	**100%**

a. Multiple modes exist. The smallest value is shown

Table 44: Descriptive statistics of outcome codes reported in focused observations/interviews

	Mean	Median	Mode	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Personal Connections	3.35	3	2	1.853	1	8	51	85%	171	24%
Knowledge	8.12	8	7[a]	3.836	2	25	60	100%	487	67%
Behavior	1.6	1	1	0.903	1	5	43	72%	69	9%
Total	12.12	12	16	5.099	2	28	60	100%	727	100%

a. Multiple modes exist. The smallest value is shown

Table 45: Personal connections

Personal Connections	Onsite Interviews				Focused Observations/Interviews			
	Codes		Unique Groups		Codes		Instances*	
	n	%	n	%	n	%	n	%
STAYING ACTIVE/EXERCISE	154	32	79	73	33	19	15	29
Hiking	*37*	*8*	*29*	*27*	*4*	*2*	*4*	*8*
Bike riding	*75*	*15*	*53*	*49*	*15*	*9*	*5*	*10*
Rock climbing	*10*	*2*	*9*	*8*	*0*	*0*	*0*	*0*
School activities	*6*	*1*	*4*	*4*	*0*	*0*	*0*	*0*
Other outdoor activities	*14*	*3*	*11*	*10*	*5*	*3*	*4*	*8*
Fitness activities	*12*	*2*	*12*	*11*	*9*	*5*	*5*	*10*
HEALTHY NUTRITION	18	4	11	10	39	23	16	31
About nutrition	*14*	*3*	*9*	*8*	*29*	*17*	*12*	*24*
About hydration	*4*	*1*	*3*	*3*	*10*	*6*	*4*	*8*
OTHER HEALTHY BEHAVIOR	20	4	12	11	3	2	3	6
Own	*10*	*2*	*7*	*6*	*3*	*2*	*3*	*6*
Others	*10*	*2*	*8*	*7*	*0*	*0*	*0*	*0*
HEALTH ISSUES ACTIVITIES	109	22	62	57	44	26	26	51
Own	*44*	*9*	*33*	*31*	*26*	*15*	*18*	*35*
Others	*65*	*13*	*48*	*44*	*18*	*11*	*14*	*27*
BODY TRANSFORMATION	74	15	43	40	6	4	4	8
Getting older	*48*	*10*	*33*	*31*	*1*	*1*	*1*	*2*
Own	*30*	*6*	*22*	*20*	*0*	*0*	*0*	*0*
Others	*18*	*4*	*16*	*15*	*1*	*1*	*1*	*2*
How body changes	*26*	*5*	*18*	*17*	*5*	*3*	*3*	*6*
Own	*22*	*5*	*17*	*16*	*1*	*1*	*1*	*2*
Others	*4*	*1*	*3*	*3*	*4*	*2*	*3*	*6*
AWARENESS, OWN BODY	20	4	17	16	15	9	9	18
OTHER PAST EXPERIENCES	93	19	60	56	31	18	19	37
Own	*89*	*18*	*58*	*54*	*30*	*18*	*18*	*35*
Others	*4*	*1*	*4*	*4*	*1*	*1*	*1*	*2*
TOTAL	**488**		**108**		**171**		**51**	

*These are not unique groups, as in some instances the same group participated in two components

Table 46: Understanding and Knowledge Gain

Understanding and Knowledge Gain	Onsite Interviews				Focused Observations/Interviews			
	Codes		Unique Groups		Codes		Instances*	
	n	%	n	%	n	%	n	%
LEARN ABOUT human BODY	198	35	91	78	165	34	42	70
Learn about the human body in general	*17*	*3*	*13*	*11*	*0*	*0*	*0*	*0*
NEW facts about the human body	*151*	*27*	*84*	*72*	*161*	*33*	*42*	*70*
Remembered facts about the human body	*30*	*5*	*25*	*22*	*4*	*1*	*4*	*7*
LEARN ABOUT own BODY	121	22	66	57	117	24	28	47
LEARN ABOUT other's BODY	13	2	12	10	47	10	17	28
LEARN TAKE CARE OF BODY and HEALTH/WELLNESS general	152	27	74	64	116	24	38	63
Learn about health *in general*	*14*	*2*	*10*	*9*	*22*	*5*	*15*	*25*
Learn about health, *OWN*	*7*	*1*	*5*	*4*	*5*	*1*	*3*	*5*
Learn about health *OTHERS*		*0*		*0*	*1*	*0*	*1*	*2*
Related to staying active and exercise	*29*	*5*	*25*	*22*	*7*	*1*	*5*	*8*
Related to hydration	*9*	*2*	*8*	*7*	*20*	*4*	*5*	*8*
Related to nutrition	*52*	*9*	*33*	*28*	*55*	*11*	*16*	*27*
Related to other healthy *behaviors*	*41*	*7*	*31*	*27*	*6*	*1*	*6*	*10*
LEARN OTHER FACTS general	77	14	50	43	42	9	10	17
TOTAL	**561**		**116**		**487**		**60**	

*These are not unique groups, as in some instances the same group participated in two components

Table 47: Changes in behavior reported in onsite interviews

Changes in Behavior	Onsite Interviews				Focused Observations/Interviews			
	Codes		Unique Groups		Codes		Instances*	
	n	%	n	%	n	%	n	%
Related to staying active and exercise	81	29	49	48	14	20	8	19
Related to nutrition	79	28	55	54	26	38	15	35
Related to hydration	9	3	9	9	10	14	7	16
Related to other healthy behaviors	96	34	57	56	13	19	11	26
Related to own health issues and activities	6	2	6	6	0	0	0	0
Other behavior changes	13	5	12	12	6	9	5	12
TOTAL	**284**		**102**		**69**		**43**	

*These are not unique groups, as in some instances the same group participated in two components

Appendix 7 How do group composition and past experiences relate to the outcomes?

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 48: Descriptive statistics of personal connections by group composition

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Museum membership									
Member	4.28	4.00	2.90	1	16	60	56.1%	257	53.2%
Non-member	4.81	5.00	2.50	1	12	47	43.9%	226	46.8%
Total	4.51	4.00	2.73	1	16	107	100.0%	483	100.0%
Groups based on sex of adults									
One Female Adult	5.05	5.00	3.41	1	16	41	38.0%	207	42.4%
One Male Adult	4.53	4.00	2.07	1	9	17	15.7%	77	15.8%
All Females	3.00	2.50	1.41	2	5	4	3.7%	12	2.5%
All Males	5.00	5.00	.	5	5	1	0.9%	5	1.0%
MIXED Females and Male	4.16	4.00	2.26	1	10	45	41.7%	187	38.3%
Total	4.52	4.00	2.72	1	16	108	100.0%	488	100.0%
Group based on sex of children									
One Girl	4.33	3.00	3.55	1	16	21	19.4%	91	18.6%
One Boy	3.88	4.00	1.82	1	7	16	14.8%	62	12.7%
All Girls	3.86	3.00	2.41	1	10	21	19.4%	81	16.6%
All Boys	4.07	4.00	2.63	1	11	15	13.9%	61	12.5%

Mixed Girls and Boys	5.51	5.00	2.55	3	15	35	32.4%	193	39.5%
Total	4.52	4.00	2.72	1	16	108	100.0%	488	100.0%
Group based on age of children									
Only Target Age, One Child	4.06	3.50	2.91	1	16	36	34.3%	146	30.9%
Only Target Age, More Than One Child	4.89	4.50	2.85	1	12	36	34.3%	176	37.2%
Mixed Target Age With Younger and/or Older Child	4.58	4.00	2.44	1	15	33	31.4%	151	31.9%
Total	4.50	4.00	2.74	1	16	105	100.0%	473	100.0%

Table 49: Descriptive statistics of knowledge gain by group composition

	Mean	**Median**	**Std. Dev.**	**Min.**	**Max.**	**N**	**N %**	**#Codes**	**#Codes %**
Museum membership									
Member	5.18	5.00	2.60	1	12	65	56.5%	337	60.8%
Non-member	4.34	4.00	2.45	1	10	50	43.5%	217	39.2%
Total	4.82	5.00	2.56	1	12	115	100.0%	554	100.0%
Groups based on sex of adults									
One Female Adult	4.07	3.50	2.34	1	9	44	37.9%	179	31.9%
One Male Adult	3.53	3.00	1.90	1	7	19	16.4%	67	11.9%
All Females	4.80	5.00	1.48	3	7	5	4.3%	24	4.3%
All Males	9.00	9.00	.	9	9	1	0.9%	9	1.6%
MIXED Females and Male	6.00	6.00	2.57	1	12	47	40.5%	282	50.3%
Total	4.84	5.00	2.56	1	12	116	100.0%	561	100.0%

Group based on sex of children									
One Girl	4.46	4.00	2.34	1	9	24	20.7%	107	19.1%
One Boy	4.94	3.50	3.30	1	12	16	13.8%	79	14.1%
All Girls	4.78	5.00	2.28	1	9	23	19.8%	110	19.6%
All Boys	5.06	5.50	2.49	1	8	16	13.8%	81	14.4%
Mixed Girls and Boys	4.97	5.00	2.64	1	10	37	31.9%	184	32.8%
Total	4.84	5.00	2.56	1	12	116	100.0%	561	100.0%
Group based on age of children									
Only Target Age, One Child	4.54	4.00	2.67	1	12	39	34.5%	177	32.6%
Only Target Age, More Than One Child	5.71	6.00	2.18	1	9	38	33.6%	217	40.0%
Mixed Target Age With Younger and/or Older Child	4.14	4.00	2.46	1	10	36	31.9%	149	27.4%
Total	4.81	5.00	2.52	1	12	113	100.0%	543	100.0%

Table 50: Descriptive statistics of change in behavior by group composition

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Museum membership									
Member	2.84	2.00	1.69	1	8	58	57.4%	165	59.1%
Non-member	2.65	2.00	1.49	1	7	43	42.6%	114	40.9%
Total	2.76	2.00	1.61	1	8	101	100.0%	279	100.0%
Groups based on sex of adults									
One Female Adult	2.92	2.00	1.79	1	8	37	36.3%	108	38.0%
One Male Adult	1.94	2.00	0.68	1	4	16	15.7%	31	10.9%
All Females	3.00	2.00	1.41	2	5	5	4.9%	15	5.3%
All Males	4.00	4.00	.	4	4	1	1.0%	4	1.4%
MIXED Females and Male	2.93	3.00	1.68	1	7	43	42.2%	126	44.4%
Total	2.78	2.00	1.61	1	8	102	100.0%	284	100.0%
Group based on sex of children							0.0%		
One Girl	2.32	2.00	1.25	1	6	22	21.6%	51	18.0%
One Boy	2.50	2.00	1.91	1	8	14	13.7%	35	12.3%
All Girls	3.76	3.00	1.97	2	7	21	20.6%	79	27.8%
All Boys	2.86	3.00	1.29	1	5	14	13.7%	40	14.1%
Mixed Girls and Boys	2.55	2.00	1.36	1	6	31	30.4%	79	27.8%
Total	2.78	2.00	1.61	1	8	102	100.0%	284	100.0%
Group based on age of children							0.0%		
Only Target Age, One Child	2.40	2.00	1.54	1	8	35	35.4%	84	30.2%
Only Target Age, More Than One Child	3.24	3.00	1.60	1	7	33	33.3%	107	38.5%

Mixed Target Age With Younger and/or Older Child	2.81	2.00	1.70	1	7	31	31.3%	87	31.3%
Total	2.81	2.00	1.63	1	8	99	100.0%	278	100.0%

Table 51: Personal connections by group composition

Personal Connections by Group Composition	Onsite Interview	
	Stat. Sig. Difference? (p<.05)	
	Kruskal Wallis Test	Post Hoc - Mann-Whitney U
Museum membership		
• Member • Non-member	--	NO
Sex of participants		
Groups based on sex of adults: • FEMALE (One Female Adult) • MALE (One Male Adult) • MIXED (Females and Males) (All Males and All Females dropped from analysis due to small sample size)	NO	--
Groups based on sex of children: • GIRL (One Girl) • BOY (One Boy) • ALL GIRLS • ALL BOYS • MIXED (Girls & Boys)	YES (Chi-Square=10.991, df=4, n=108)	• MIXED (MR=32.11) greater than GIRL (MR=22.48) (MW=241.000, n=56) • MIXED (MR=33.33) greater than ALL GIRLS (MR=20.45) (MW=198.500, n=56) • MIXED (MR=29.03) greater than BOY (MR=19.38) (MW=174.000, n=51) • MIXED (MR=28.16) greater than ALL BOYS (MR=19.30) (MW=169.500, n=50) • GIRL = BOY, ALL GIRLS, ALL BOYS • BOY = ALL GIRLS, ALL BOYS • ALL GIRLS = ALL BOYS
Age of participants		
Groups based on age of children: • TARGET/One (Only Target Age, One Child) • TARGET/1+ (Only Target Age, More Than One Child)	NO	--

Personal Connections by Group Composition	Onsite Interview	
	Stat. Sig. Difference? (p<.05)	
	Kruskal Wallis Test	Post Hoc - Mann-Whitney U
• MIXED (Target Age With Younger and/or Older Child)		
Group Size	**Stat. Sig. Difference? (p<.05)**	
	Pearson's r	
	NO	

Table 52: Understanding and knowledge gain by group composition

Understanding/Knowledge Gain by Group Composition	**Onsite Interview**	
	Stat. Sig. Difference? (p<.05)	
	Kruskal Wallis Test	**Post Hoc - Mann-Whitney U**
Museum membership		
• Member • Non-member	--	NO
Sex of participants		
Group based on sex of adults: • FEMALE (One Female Adult) • MALE (One Male Adult) • MIXED (Females and Males) (All Males and All Females dropped from analysis due to small sample size)	YES (Chi-Square=17.686, df=2, n=110)	• FEMALE (MR=36.14) smaller than MIXED (MR=55.23) (MW=600.000, n=91) • MALE (MR=20.61) smaller than MIXED (MR=38.71) (MW=201.500, n=66) • FEMALE = MALE
Group based on sex of children: • One Girl • One Boy • All Girls • All Boys • Mixed Girls & Boys	NO	--
Age of participants		
Group based on age of children: • TARGET/One (Only Target Age, One Child) • TARGET/1+ (Only Target Age, More Than One Child) • MIXED (Target Age With Younger and/or Older Child)	YES (Chi-Square=9.357, df=2, n=113)	• TARGET/1+ (MR=45.03) greater than TARGET/One (MR=33.13) (MW=512.000, n=77) • TARGET/1+ (MR=44.38) greater than MIXED (MR=30.24) (MW=422.5000, n=74) • TARGET/One = MIXED
Group Size	**Stat. Sig. Difference? (p<.05)**	
	Pearson's r	
	YES .194, n=108	

Table 53: Changes in behavior by group composition

Changes in Behavior by Group Composition	Onsite Interview	
	Stat. Sig. Difference? (p<.05)	
	Kruskal Wallis Test	Post Hoc - Mann-Whitney U
Museum membership		
• Member • Non-member	--	NO
Sex of participants		
Groups based on sex of adults: • FEMALE (One Female Adult) • MALE (One Male Adult) • MIXED (Females and Males) (All Males and All Females dropped from analysis due to small sample size)	NO	--
Groups based on sex of children: • One Girl • One Boy • All Girls • All Boys • Mixed Girls & Boys	NO	--
Age of participants		
Groups based on age of children: • TARGET/One (Only Target Age, One Child) • TARGET/1+ (Only Target Age, More Than One Child) • MIXED (Target Age With Younger and/or Older Child)	YES (Chi-Square=6.174, df=2, n=99)	• TARGET/1+ (MR=40.39) greater than TARGET/One (MR=28.94) (MW=383.000, n=68) • TARGET/1+ = MIXED • TARGET/One = MIXED
Group Size	**Stat. Sig. Difference? (p<.05)**	
	Pearson's r	
	NO	

Table 54: Descriptive statistics of personal connections by past experiences

Works or study in field related to…	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Science/Biology									
YES	4.08	4.00	2.26	1	10	26	25.0%	106	22.7%
NO	4.62	4.00	2.90	1	16	78	75.0%	360	77.3%
Total	4.48	4.00	2.76	1	16	104	100.0%	466	100.0%
Health/wellness									
YES	3.90	4.00	1.82	1	7	29	27.9%	113	24.3%
NO	4.69	4.00	3.02	1	16	75	72.1%	352	75.7%
Total	4.47	4.00	2.76	1	16	104	100.0%	465	100.0%

Table 55: Descriptive statistics of knowledge gain by past experiences

Works or study in field related to…	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Science/Biology									
YES	4.07	4.00	2.23	1	8	27	24.3%	110	20.8%
NO	5.00	5.00	2.57	1	12	84	75.7%	420	79.2%
Total	4.77	5.00	2.52	1	12	111	100.0%	530	100.0%
Health/wellness									
YES	4.81	5.00	2.87	1	12	31	27.7%	149	27.5%
NO	4.84	5.00	2.45	1	10	81	72.3%	392	72.5%
Total	4.83	5.00	2.56	1	12	112	100.0%	541	100.0%

Table 56: Descriptive statistics of change in behavior by past experiences

Works or study in field related to…	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Science/Biology									
YES	2.05	2.00	1.05	1	5	22	22.7%	45	16.7%
NO	2.99	2.00	1.72	1	8	75	77.3%	224	83.3%
Total	2.77	2.00	1.64	1	8	97	100.0%	269	100.0%
Health/wellness									
YES	2.54	2.00	1.43	1	7	28	28.3%	71	25.8%
NO	2.87	2.00	1.69	1	8	71	71.7%	204	74.2%
Total	2.78	2.00	1.62	1	8	99	100.0%	275	100.0%

Table 57: Outcomes by Past Experiences (Onsite Interview)

	Stat. Sig. Difference? (Mann-Whitney, p<.05)		
	Personal Connections	Knowledge Gain	Change In Behavior
Works or study in a field related to science or biology	NO	NO	YES (MW=555.500, n=97) Do Not Work (MR=52.59) greater than Work (MR=36.75)
Works or study in a health-related field	NO	NO	NO

Table 58: Correlation Between Outcomes and Past Experiences (Onsite Interview)

Past Experience	Stat. Sig. Difference? (Spearman rho, p<.05)		
	Personal Connections	Knowledge Gain	Change In Behavior
Watch science/biology programs together	NO	NO	NO
Visit science or science-related museums together	NO	NO	NO
Talk about science/biology with each other	NO	NO	NO
Discuss things we can do to be healthier	NO	NO	NO
Go places where we can be active	NO	NO	NO
Look up information about health	NO	NO	NO

Appendix 8 How do groups' choices in the exhibition relate to the outcomes?

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 59: Descriptive statistics of personal connections by component choices

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Groups based on total time in EH:									
Up to 45 minutes	3.65	3.00	1.62	1	6	17	15.7%	62	12.7%
46 to 90 minutes	4.84	5.00	2.96	1	16	45	41.7%	218	44.7%
91 to 135 min	4.39	4.00	2.28	1	10	33	30.6%	145	29.7%
136 to 220 min	4.85	4.00	3.85	1	15	13	12.0%	63	12.9%
Total	4.52	4.00	2.72	1	16	108	100.0%	488	100.0%
Groups based on total of Peak Pass components visited:									
2 to 4 stops	4.13	4.00	1.64	1	7	15	13.9%	62	12.7%
5 to 7 stops	4.48	4.00	2.99	1	16	52	48.1%	233	47.7%
8 to 10 stops	4.71	5.00	2.70	1	15	41	38.0%	193	39.5%
Total	4.52	4.00	2.72	1	16	108	100.0%	488	100.0%
Groups based on interaction level of components							0.0%		0.0%
Focus on Own Body (Peak Pass)	4.09	4	2.23	1	10	55	50.9%	225	46.1%
Focus on Generic Body	--	--	--	--	--	--	--	-	--
Focus on Both,	5.29	5	3.88	1	16	21	19.4%	111	22.7%

Own and Generic Bodies									
Not Strong focus	4.75	5	2.53	1	12	32	29.6%	152	31.1%
Total	4.52	4	2.72	1	16	108	100.0%	488	100.0%
Groups based on content focus of components									
Focus on Science/Biology	3.83	3.50	1.80	1	7	12	11.1%	46	9.4%
Focus on Health/ Wellness	4.38	4.00	2.42	1	10	16	14.8%	70	14.3%
Focus on Both	4.78	4.00	3.21	1	16	41	38.0%	196	40.2%
Not a Strong Focus	4.51	4.00	2.55	1	12	39	36.1%	176	36.1%
Total	4.52	4.00	2.72	1	16	108	100.0%	488	100.0%

Table 60: Descriptive statistics of knowledge gain/understanding by component choices

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Groups based on total time in EH:									
Up to 45 minutes	5.59	5.00	2.94	2	12	17	14.7%	95	16.9%
46 to 90 minutes	4.47	4.00	2.46	1	10	51	44.0%	228	40.6%
91 to 135 min	4.88	5.00	2.60	1	9	33	28.4%	161	28.7%
136 to 220 min	5.13	6.00	2.36	1	9	15	12.9%	77	13.7%
Total	4.84	5.00	2.56	1	12	116	100.0%	561	100.0%
Groups based on total of Peak Pass components visited:									
2 to 4 stops	3.38	3.00	1.82	1	7	16	13.8%	54	9.6%
5 to 7 stops	5.09	5.00	2.55	1	12	56	48.3%	285	50.8%
8 to 10 stops	5.05	5.00	2.66	1	9	44	37.9%	222	39.6%
Total	4.84	5.00	2.56	1	12	116	100.0%	561	100.0%
Groups based on interaction level of components									
Focus on Own Body (Peak Pass)	5.25	5	2.52	1	10	61	52.6%	320	57.0%
Focus on Generic Body	--	--	--	--	--	--	--	--	--
Focus on Both, Own and Generic Bodies	4.95	4	2.82	1	9	21	18.1%	104	18.5%
Not Strong focus	4.03	3.5	2.33	1	12	34	29.3%	137	24.4%
Total	4.84	5	2.56	1	12	116	100.0%	561	100.0%
Groups based on content focus of components									
Focus on	5.58	6.00	2.39	1	8	12	10.3%	67	11.9%

Science/Biology Focus on Health/ Wellness	5.06	5.00	2.15	2	9	18	15.5%	91	16.2%
Focus on Both	5.19	5.00	2.78	1	10	43	37.1%	223	39.8%
Not a Strong Focus	4.19	4.00	2.46	1	12	43	37.1%	180	32.1%
Total	4.84	5.00	2.56	1	12	116	100.0%	561	100.0%

Table 61: Descriptive statistics of changes in behavior by component choices

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Groups based on total time in EH:									
Up to 45 minutes	2.53	2.00	1.46	1	6	15	14.7%	38	13.4%
46 to 90 minutes	2.72	2.00	1.46	1	7	46	45.1%	125	44.0%
91 to 135 min	2.82	2.00	1.79	1	8	28	27.5%	79	27.8%
136 to 220 min	3.23	3.00	2.01	1	7	13	12.7%	42	14.8%
Total	2.78	2.00	1.61	1	8	102	100.0%	284	100.0%
Groups based on total of Peak Pass components visited:									
2 to 4 stops	4.13	4.00	1.64	1	7	15	14.7%	62	21.8%
5 to 7 stops	2.92	2.00	1.72	1	8	50	49.0%	146	51.4%
8 to 10 stops	2.82	2.00	1.65	1	7	39	38.2%	110	38.7%
Total	2.78	2.00	1.61	1	8	102	100.0%	284	100.0%
Groups based on interaction level of components									
Focus on Own Body (Peak Pass)	2.98	3	1.63	1	7	54	52.9%	161	56.7%
Focus on Generic Body	--	--	--	--	--	--	--	--	--
Focus on Both, Own and Generic Bodies	2.85	2	2.06	1	8	20	19.6%	57	20.1%
Not Strong focus	2.36	2	1.13	1	6	28	27.5%	66	23.2%
Total	2.78	2	1.61	1	8	102	100.0%	284	100.0%
Groups based on content focus of components									
Focus on	3.25	3.00	1.60	1	6	12	11.8%	39	13.7%

Science/Biology									
Focus on Health/ Wellness	2.47	2.00	1.23	1	5	17	16.7%	42	14.8%
Focus on Both	2.97	2.00	1.86	1	8	37	36.3%	110	38.7%
Not a Strong Focus	2.58	2.00	1.50	1	7	36	35.3%	93	32.7%
Total	2.78	2.00	1.61	1	8	102	100.0%	284	100.0%

Table 62: Personal connections by group choices

Personal Connections by Group Choices	Statistically significant difference?		
	Pearson's r	Kruskal Wallis Test	Post Hoc - Mann-Whitney U
Time in EH	NO	--	--
Groups, total time in EH: • Up to 45 minutes • 46 to 90 minutes • 91 to 135 minutes • 136 to 220 minutes	--	NO	--
Exhibition components visited			
Total number of components	NO	--	--
Total of Peak Pass components visited	NO	--	--
Groups based on total of Peak Pass components visited: • 2 to 4 stops • 5 to 7 stops • 8 to 10 stops	--	NO	--
Groups based on interaction level of components • Focus on Own Body (Peak Pass) • Focus on Both, Own and Generic Bodies • Not Strong focus (There were no cases of Focus on Generic Body)		NO	--
Groups based on content focus of components • Focus on Science/Biology • Focus on Health/ Wellness • Focus on Both • Not a Strong Focus		NO	--

Table 63: Understanding and knowledge gain by group choices

Understanding and Knowledge Gain by Group Choices	Statistically significant difference?		
	Pearson's r	Kruskal Wallis Test	Post Hoc - Mann-Whitney U
Time in EH	NO	--	--
Groups based on total time in EH: • Up to 45 minutes • 46 to 90 minutes • 91 to 135 minutes • 136 to 220 minutes	--	NO	--
Exhibition components visited			
Total number of components	NO	--	--
Total of Peak Pass components visited	NO	--	--
Groups based on total of Peak Pass components visited: • 2 to 4 stops • 5 to 7 stops • 8 to 10 stops	--	NO	--
Groups based on interaction level of components • Focus on Own Body (Peak Pass) • Focus on Both, Own and Generic Bodies • Not Strong focus (There were no cases of Focus on Generic Body)		YES (Chi-square=5.612, df=2, n=116)	• OWN BODY (MR=53.11) greater than NOT STRONG FOCUS (38.82) (MW=725.000, n=95) • OWN BODY =FOCUS ON BOTH • NOT STRONG FOCUS = FOCUS ON BOTH
Groups based on content focus of components		NO	--

- Focus on Science/Biology
- Focus on Health/ Wellness
- Focus on Both
- Not a Strong Focus

Table 64: Changes in behavior by group choices

Changes in Behavior by Group Choices	Statistically significant difference?		
	Pearson's r	Kruskal Wallis Test	Post Hoc - Mann-Whitney U
Time in EH	NO	--	--
Groups based on total time in EH: • Up to 45 minutes • 46 to 90 minutes • 91 to 135 minutes • 136 to 220 minutes	--	NO	--
Exhibition components visited			
Total number of components	NO	--	--
Total of Peak Pass components visited	NO	--	--
Groups based on total of Peak Pass components visited: • 2 to 4 stops • 5 to 7 stops • 8 to 10 stops	--	NO	--
Groups based on interaction level of components • Focus on Own Body (Peak Pass) • Focus on Both, Own and Generic Bodies • Not Strong focus (There were no cases of Focus on Generic Body)		NO	--
Groups based on content focus of components • Focus on Science/Biology • Focus on Health/ Wellness • Focus on Both • Not a Strong Focus		NO	--

Table 65: Frequencies of personal connection codes by component choice (Focused observations/interviews)

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Health/wellness and Generic Body	3.88	4.00	1.458	2	6	8	16%	31	18%
Science and Generic Body	2.57	2.50	1.222	1	5	14	27%	36	21%
Health/wellness and Own Body	3.86	4.00	2.268	1	7	7	14%	27	16%
Science and Own Body	3.25	2.50	2.050	1	8	12	24%	39	23%
Neutral	3.80	3.00	2.251	1	8	10	20%	38	22%
Total	3.35	3.00	1.853	1	8	51	100%	171	100%

Table 66: Frequencies of knowledge gain codes by component choice (Focused observations/interviews)

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Health/wellness and Generic Body	7.80	7.00	3.120	3	14	10	17%	78	16%
Science and Generic Body	7.73	7.00	2.915	4	14	15	25%	116	24%
Health/wellness and Own Body	7.30	7.00	3.974	2	14	10	17%	73	15%
Science and Own Body	10.20	9.00	5.240	4	25	15	25%	153	31%
Neutral	6.70	7.50	2.111	3	9	10	17%	67	14%
Total	8.12	8.00	3.836	2	25	60	100%	487	100%

Table 67: Frequencies of changes in behavior codes by component choice (Focused observations/interviews)

	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
Health/wellness and Generic Body	1.89	1.00	1.364	1	5	9	21%	17	25%
Science and Generic Body	1.45	1.00	.688	1	3	11	26%	16	23%
Health/wellness and Own Body	2.17	2.00	.753	1	3	6	14%	13	19%
Science and Own Body	1.18	1.00	.603	1	3	11	26%	13	19%
Neutral	1.67	1.50	.816	1	3	6	14%	10	14%
Total	1.60	1.00	.903	1	5	43	100%	69	100%

Table 68: Outcomes by component choices (Focused observations/interviews)

	Stat. Sig. Difference? (Kruskal-Wallis, p<.05)		
	Personal Connections	Knowledge Gain	Change In Behavior
Exhibition Component Choices:	NO	NO	NO
Health/wellness and Generic Body			
Science and Generic Body			
Health/wellness and Own Body			
Science and Own Body			
Neutral			

Table 69: Overall group outcomes by exhibition component (Focused observations/interviews)

Dimensions of Component Choice	Group Outcomes						Total #Codes
	Personal Connections		Knowledge Gain		Changes in Behavior		
	n	#Codes	n	#Codes	n	#Codes	
Health/wellness and Generic Body	8	31	10	78	9	17	126
Hydrate	4	18	5	42	4	6	66
Superfood Heroes	4	13	5	36	5	11	60
Science and Generic Body	14	36	15	116	11	16	168
Fate of a Granola Bar	9	24	10	89	9	13	126
Top Ten Traumas on the Trail	5	12	5	27	2	3	42
Health/wellness and Own Body	7	27	10	73	6	13	113
Bioride	5	19	5	37	5	11	
Size Up Your Stride	2	8	5	36	1	2	46
Science and Own Body	12	39	15	153	11	13	205
Heart Electricity	4	17	5	46	4	4	67
Measure Up	8	22	10	107	7	9	138
Neutral	10	38	10	67	6	10	115
Explore RX	5	22	5	39	4	5	66
Food is Fuel	5	16	5	28	2	5	49
TOTAL	51	171	60	487	43	69	727

Appendix 9 How do group interactions relate to the outcomes?

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 70: Frequencies of personal connection codes by group togetherness

Time spent together in the exhibition	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
25% and less	4.15	4.00	2.08	1	8	20	20.2%	83	19.1%
50%	4.35	4.00	2.12	1	10	17	17.2%	74	17.0%
75%	4.94	4.50	2.71	1	15	32	32.3%	158	36.3%
100%	4.00	3.50	2.86	1	16	30	30.3%	120	27.6%
Total	4.39	4.00	2.55	1	16	99	100.0%	435	100.0%

Table 71: Frequencies of knowledge gain codes by group togetherness

Time spent together in the exhibition	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
25% and less	5.38	5.00	2.85	1	10	21	19.8%	113	21.2%
50%	5.53	5.00	2.01	1	9	19	17.9%	105	19.7%
75%	5.00	5.00	2.84	2	12	35	33.0%	175	32.8%
100%	4.52	4.00	2.32	1	9	31	29.2%	140	26.3%
Total	5.03	5.00	2.56	1	12	106	100.0%	533	100.0%

Table 72: Frequencies of changes in behavior codes by group togetherness

Time spent together in the exhibition	Mean	Median	Std. Dev.	Min.	Max.	N	N %	#Codes	#Codes %
25% and less	2.60	2.00	1.57	1	7	20	21.5%	52	19.9%
50%	3.06	3.06	3.00	1.52	1	17	18.3%	52	19.9%
75%	2.67	2.00	1.63	1	7	30	32.3%	80	30.7%
100%	2.96	2.00	1.93	1	8	26	28.0%	77	29.5%
Total	2.81	2.00	1.67	1	8	93	100.0%	261	100.0%

Table 73: Outcomes by group togetherness

	Stat. Sig. Difference? (Kruskal-Wallis, p<.05)		
	Personal Connections	**Knowledge Gain**	**Change In Behavior**
Time spent together in the exhibition: • 25% and less • 50% • 75% • 100%	NO	NO	NO

Table 74: Group Outcomes by group interaction (Focused observations/interview)

	Statistically significant difference? (Pearson's r, p<.05)		
	Personal Connection	**Knowledge Gain**	**Changes in Behavior**
General comments about the component	NO*	NO*	NO
Specific comments about the component	NO*	YES (.521, n=23)	NO*
Instructions on how to do the activity and general procedures	NO*	NO	NO
Facilitation	NO	NO	NO*
Troubleshooting	NO	NO	NO*

* These were not statistically significant, but trended negatively.

Table 75: Group Outcomes by direction of interaction (Focused observations/interview)

	Statistically significant difference? (Pearson's r, p<.05)		
	Personal Connection	**Knowledge Gain**	**Changes in Behavior**
Adult Initiated	NO*	NO	NO
Child Initiated	YES (-.402, n=44)	NO	NO

* These were not statistically significant, but trended negatively.

Appendix 10 How do student groups react to the exhibition?

This appendix includes additional analyses that were not included in the main report. While these analyses were not referred to directly in the report, they provide information that may be interesting to the reader and provide context in helping understand how the study answers the research question above.

Table 76: School (Student Questionnaires)

School	Number	Percentage
Bryant Webster	28	26
Crawford	80	74
TOTAL RESPONDENTS	**108**	**100**

Table 77: Grade Levels (Student Questionnaires)

Grade	Number	Percentage
5th	28	26
3rd	80	74
TOTAL RESPONDENTS	**108**	**100**

Table 78: Gender (Student Questionnaires)

Gender	Number	Percentage
Male	45	44
Female	57	56
TOTAL RESPONDENTS	**102**	**100**

Table 79: How often speak English at home (Student Questionnaires)

Frequency	Number	Percentage
All the time	27	26
Most of the time	18	18
Some of the time	23	23
A little bit of the time	21	21
Not at all	12	12
TOTAL RESPONDENTS	**101**	**100**

Table 80: Do you speak another language at home (Student Questionnaires)

Frequency	Number	Percentage
No	39	38
Yes	63	62
TOTAL RESPONDENTS	**102**	**100**

Table 81: Second language spoken, if speak other language (Student Questionnaires)

Language	Number	Percentage
Spanish	48	94
Chinese	2	4
French	1	2
TOTAL RESPONDENTS	**51**	**100**