

July 2025

# EXTERNAL EVALUATION FINAL REPORT

Brains On! the Move: STEM Podcasts  
as Facilitators of Automobile-Based  
Family Learning Experiences



# INTRODUCTION

The advisory board for *Brains On! The Move*, comprised of the individuals listed on the right, met nine times over the course of the four-year project and sought to help ensure that:

1. The project team addressed its stated research goals.
2. The research was rigorous and of high quality.
3. The knowledge generated from the research was valuable to a wide variety of researchers and practitioners in the ISE field.

In addition to answering the questions above, the advisory board members for the *Brains On! The Move* project were tasked with providing timely and constructive feedback on the research design, sampling methods, data collection instruments and protocols, analysis procedures, findings, and research to practice dissemination efforts. Project facilitators used input and feedback from advisory board members to make improvements to planned research and dissemination activities.

Prior to each advisory board meeting materials were shared with advisors by *Brains On! The Move* research team members. Each meeting included an update on project activities, followed by extensive dialogue between project team members and advisors.

The following sections summarize findings related to the aforementioned goals of the advisory board.

## ADVISORY BOARD

**Scott Pattison, Ph.D.**  
Research Scientist  
TERC

**Kiley Sobel, Ph.D.**  
Staff UX Researcher  
Duolingo

**Jennifer Borland, M.A.**  
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# 1. Accomplishment of Stated Research Goals

## *Brains On! the Move* Research Questions

1. How does the *Brains On!* podcast mediate STEM-based joint media engagement and family learning in an automobile setting?
2. What does STEM-based joint media engagement and family learning look and sound like in this setting?
  - a. How do family members engage with *Brains On!* content and each other while listening together in a vehicle?
  - b. What is the nature of the interactions and conversations? Who initiates them?
3. How do “in-automobile” factors foster or impede STEM-based joint media engagement and family learning?

Advisory board meeting transcripts and notes, along with all the products generated by the research team over the course of the project, collectively indicate that the *Brains On! the Move* team took great care to ensure that it was meeting its stated research goals at every step along the way.

### **Research Question 1: How does the *Brains On!* podcast mediate STEM-based joint media engagement and family learning in an automobile setting?**

The *Brains On! the Move* research team considered a wide range of podcast elements—including those that were intentionally designed to foster engagement, as well those that effectively fostered engagement but were not explicitly designed to do so. In order to isolate findings specific to podcast listening in automobiles, the team considered elements of podcast listening that varied from other types of in-car activities, as well as potential differences that can occur when family members listen to podcasts together in other environments. To that end, the research team reviewed an extensive amount of existing literature to help them identify the unique aspects of joint media engagement that results from podcast-listening in cars in contrast to other types of media or other settings for media engagement. The research team also collected and analyzed a considerable amount of data in order to provide answers that were put forth in various papers, handouts, and reports generated over the lifetime of the project.

## Research Question 2: What does STEM-based joint media engagement and family learning look and sound like in this setting?

- a. How do family members engage with *Brains On!* content and each other while listening together in a vehicle?
- b. What is the nature of the interactions and conversations? Who initiates them?

The second research question overlapped to some extent with the previous question, but its sub-questions enabled the *Brains On! the Move* research team to probe further into the important role of question-asking as part of joint media engagement experiences in cars. Specifically, the research team examined the types of questions that were being asked, who was asking those questions, and the extent to which the *Brains On!* Podcast seemed to have played a role in encouraging the asking of different types of questions.

## Research Question 3: How do in-automobile factors foster or impede STEM-based joint media engagement and family learning?

The *Brains On! the Move* research team analyzed the unique aspects of in-car listening that either benefited or impeded joint media engagement. As such, one of the unique challenges of this study was distinguishing between factors that were unique to in-car settings in contrast to differences in broader family interaction dynamics in general. The research team's analysis of car-related listening elements included things such as parents' use of rearview mirrors to see their children's reactions and pausing or turning down the podcast to better enable conversation. The *Brains On! The Move* team also considered the primary role that drivers had (i.e., operating the vehicle safely) as well as unique distractions that could be experienced while consuming media in an automobile.

**In summary, there is ample evidence to suggest that the *Brains On! the Move* team generated meaningful responses to each of the stated research questions for this project. Furthermore, consistent progress on addressing these questions was made throughout the project.**

## 2. Rigor and Quality of Research

The *Brains On! the Move* research team was committed to ensuring rigor at each stage of the research process and were successful in their efforts to deliver high-quality research findings. In previous evaluative reports we examined evidence of rigor and quality in terms of the research team's practices related to participant recruitment, data collection, and initial analysis of data. In the latter years of the project the most notable examples of the project's rigor and quality stemmed from the iterative processes employed for ongoing data analysis and the team's ongoing reflections on findings as well as broader implications for the study of joint media engagement.

### **Evidence of rigor and quality of research through data collection and analysis efforts:**

The research team developed systematic processes for recruiting participants, collecting data, and analyzing the resulting data. During the latter phases of the research process, the *Brains On! the Move* research team engaged in iterative refinement of their codebook, allowing their initial observations to evolve into refined analytical categories. The research team also sought to triangulate findings from a variety of different sources including video recordings of family interactions, interview transcripts, and other participant activities (e.g., the "Who's in your car and what are they doing?" activity). This multimodal approach allowed for a richer and more comprehensive understanding of family members' listening experiences and therein provided a unique lens through which to interpret family engagement and learning. The *Brains On! The Move* team approached data collection in ways that were not only rigorous, but also innovative. For example, the aforementioned "Who's in your car and what are they doing?" activity that children were asked to complete while the adult participants completed a post-observation session interview, helped to elicit valuable information from youth participants while making interviews more engaging and interactive. Care was also taken throughout the study to make it as easy and as comfortable as possible for families to participate successfully (e.g., providing clear and concise information about the processes related to participation and having the same researcher facilitate the data collection process with a given family throughout the entire study so as to establish trust).

**Evidence of rigor and quality of research through ongoing reflective practices:** The researchers were transparent and forthcoming about the challenges they faced, such as codes that were harder to distinguish between and difficulties breaking-up and categorizing different parts of families' in-car listening experiences. Researchers also reflected on the need to limit what they sought to code so that they did not get overwhelmed. As part of the ongoing reflection process they were ultimately able to hone in on aspects of the in-car podcast listening experiences that were of greatest interest. Their self-awareness and willingness to discuss unresolved methodological questions indicates a commitment to robust research and was an important factor in the resulting quality of their work.

**Across all four years of the the project, there was an abundance of evidence to support the rigor and quality of the work being done by the *Brains On! the Move* team. The rigor and quality of their work was evident not only in the processes utilized to conduct the research, but also in the resulting outcomes of the project which will be explored further in the next section of this report.**

### 3. Value to ISE Field

During the latter part of the project the *Brains On! the Move* team was actively engaged in disseminating what they had learned to members of the ISE field—including informal STEM educators and educational podcast creators—as well as others who have a vested interest in the new-found knowledge such as parents and formal educators. Rather than summarizing the research team’s key findings, this report seeks instead to examine *how* the *Brains On! the Move* team has had a significant impact on the field.

The *Brains On! the Move* team excelled in dissemination of their research findings. Numerous conference presentations have already taken place, along with a series of webinars, the creation of various resources for parents and media creators, and multiple publications in the works. The team has been strategic in their approach to dissemination—considering a variety of different audiences that have a vested-interest in the outcomes of this work as well as different information-presentation formats.

The projects’ focus on in-car podcast listening as a unique informal learning environment is novel. With the recent proliferation of podcasts—including those geared toward youth and families—the contributions of the *Brains On! the Move* team are certainly of great value to the ISE community. These contributions aid in our collective understanding of how informal learning happens in various contexts outside of traditional educational settings. When the team began its first NSF-funded study of the *Brains On!* podcast in 2017 there wasn’t much known about children’s podcasts. “The number of people doing this work is expanding,” noted one team member, and the knowledge that has been gained greatly benefits the broader ISE field in addition to children’s podcast creators.

A key aspect of the *Brains On! the Move* team’s ability to make so many and such important contributions to the ISE field stems from the integral involvement of *Brains On!* podcast creators. As one of the advisors noted: “It is so special to have *Brains On!* [staff] be involved in the sensemaking. So many studies I see written about are a tool or a system or a program or an app where [researchers] have no interaction with the actual people who developed it and don’t know what was intentional or unintentional...[It] strengthens a lot of [the team’s] claims because you have these folks involved.” The engagement of *Brains On!* staff members also had a significant and direct impact on that team’s ongoing efforts to develop engaging podcast programs. The ability for the show’s creators to learn new things about their program alongside the research team proved to be a valuable aspect of this project. Furthermore, project team members and advisors alike, demonstrated a commitment to ensuring that this research would not only be theoretically sound but also relevant in a practical sense.

**Advisory board meetings transcripts, recordings and notes—including active participation and insightful feedback from experts in the ISE field—along with the abundant dissemination efforts of the *Brains On! the Move* team provide a strong set of evidence suggesting that the knowledge generated by this project will have significant value and relevance for a diverse audience of researchers and practitioners working to advance the informal science education field.**

# Reflections on successful collaboration between researchers and advisors

It feels appropriate to conclude this report by highlighting some of the key-takeaways related to the effective collaboration between project team members and advisory board members for the *Brains On! the Move* project. Team members' reflections during the final advisory board meeting suggest that effective collaborations—such as those that were experienced throughout the *Brains On! the Move* project—are unfortunately the exception rather than the rule in many projects of this nature.

Advisory Board members felt that board meetings were **well-timed** and held at points in the project when advisor feedback could inform the team's work. Interestingly, members of the research team acknowledged that the commitment to having regular advisory board meetings meant that meetings were sometimes scheduled even though the team had not yet arrived at a point where they felt like their work was fully ready for feedback. However, rather than seeing that as a drawback, project team members ultimately noted that they were glad to schedule advisory board meetings nonetheless having come to realize that they always gained important insights from the advisors. They came to feel that instead of there being a *right* time to seek feedback, there were always questions that could be asked and they would always get helpful feedback from the advisors. This shift in thinking about the timing of advisory board meetings ultimately trickled out to work being done on other projects as well.

Research team members felt like the advisory board was able to address a good **balance** between specific questions (e.g., what conferences to present at or journals to submit articles to) and bigger, broader, and more theoretical questions. Both types of questions were important to the research team so it was helpful that the advisory board was capable and willing to tackle the range of questions that were ultimately presented for discussion.

Admittedly, research can be challenging—especially in instances with lots of logistical complexity as was the case with *Brains On! the Move*—so a key role that the advisory board played in this project was listening to the challenges being faced by the research team and helping them to realize it was okay to hone in on certain types of data in the interest of making the process of analyzing data more manageable. The advisory board helped project team members to **assess their research priorities** and assured team members that it was okay to focus on a reasonable amount of analysis that was well-aligned to the team's current research goals rather than trying to do all the analysis possible with more than 600 hours-worth of data.

Another key element in the ultimate success of the collaboration between the *Brains On! the Move* project team and the advisory board was the fact that both groups were able to **reflect on the resulting impacts** from contributions made in previous meetings and **celebrate joint accomplishments together**. [“It was great to see how the new knowledge gained has influenced the research process and the making of the show”](#) noted one team member.