Evaluation of a Playful, Learning-Rich Story Trails Pilot in Philadelphia

Final Report

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Photos of the Story Trails included in this report were taken by the data collection team.

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Executive Summary

Starting in fall 2024, *Too Small to Fail* and KABOOM! piloted playful, learning-rich Story Trails in five public parks across Philadelphia. These literacy-rich walking paths use panels from children's books followed by playful tactile activities to support early literacy in everyday park experiences. To assess how families used the Story Trails and whether the installations effectively support playful, learning-rich experiences, SRI Education conducted a formative evaluation from fall 2024 through summer 2025.

Key Findings

During initial data collection, engagement with Story Trails was limited and locations did not align with where families spent time. During 14 hours of fall data collection, on a weekend with favorable weather, only one family meaningfully used the Story Trails. Although some families passed Story Trails and did not use them, the Story Trails were typically located in areas with low foot traffic and few families nearby. These included locations out of the way of resources families want and need, as well as a site with health and safety concerns.

After a follow-up data collection activation at Marconi Plaza, the final analytic sample included 13 families at Story Trails sites (Marconi Plaza and Mallery Playground) and 21 families at the comparison sites. Most families who used the Story Trails did so with either a parent or an older sibling walking through the Story Trail with a younger child.

Younger Children (Ages 0–4)

Children relied on adults or older siblings to read the Story Trails to them, while engaging with pictures and prompts.

Visits were typically shorter, quickly moving through the panels.

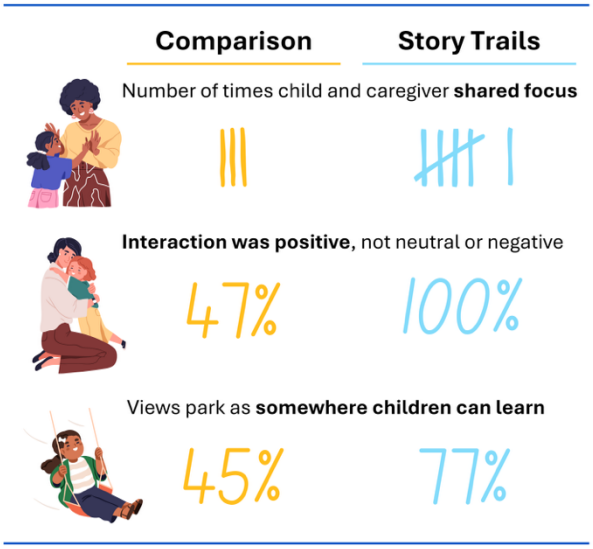
Older Children (Ages 5–8)

Children often led or co-led reading the Story Trails, with help from adults or older siblings.

Visits were typically longer, engaging with most of the panels.

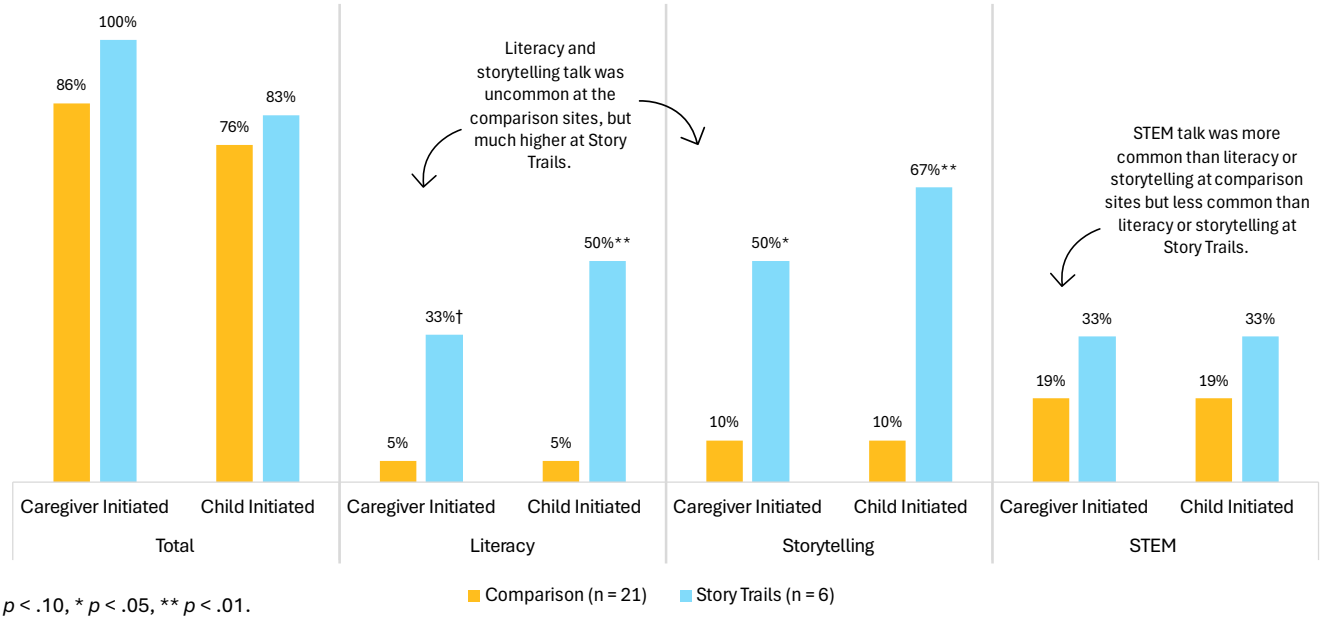
How families used Story Trails depended on the age of the child, but most engaged in pairs and focused on the stories rather than the playful learning elements. Families with older children (ages 5–8) typically spent more time at the Story Trails than those with younger children (ages 0–4). Most families engaged with the pictures, words, and letters, but only half of children and caregivers engaged with the playful learning prompts.

Families at Story Trails sites were more likely to share focus, have positive interactions, and view the park as a place where children can learn than families at comparison sites. While data were limited to only two Story Trails sites, families at the Story Trails sites shared focus more and had more positive rather than neutral interactions compared with families at comparison sites. Families at Story Trails sites were also more likely to view the park as a place where children can learn, and nearly all families agreed that Story Trails can help children learn. Families' other perceptions and use of the park, however, did not differ significantly across Story Trails and comparison sites.



Literacy and storytelling talk was more common at Story Trails than at comparison sites. Families at Story Trails and comparison sites had similar rates of both caregiver- and child-initiated *conversational turns* (i.e., times when the caregiver or child initiates a conversation and the other replies). However, literacy and storytelling conversations—which were very uncommon at comparison sites—were significantly more common at Story Trails.

Child-caregiver interactions by talk type across Story Trails and comparison sites



† $p < .10$, * $p < .05$, ** $p < .01$.

Recommendations

- **Install Story Trails in places where families typically go.** Findings indicate that families choose to spend time in parks or in areas of parks that have resources they want and need, such as safe and age-appropriate playgrounds. Selecting Story Trails sites in neighborhoods with few other play and learning resources can effectively support equitable access. However, the choice of where to install Story Trails *within* the neighborhoods may be better driven by where neighborhood families already spend time, rather than by where the neighborhood lacks resources. By meeting families where they physically are, Story Trails can gain visibility and more families can use them as a brief learning opportunity during their everyday activities.
- **Integrate more active, hands-on play throughout Story Trails.** Findings suggest that in their current form, Story Trails do not fully align with how families primarily use parks and playgrounds: for play and to support social-emotional and physical development. As a result, learning interventions in these settings need to be designed to bridge play and learning. Rather than placing the interactive, playful learning elements at the end of Story Trails, integrating these elements throughout can better meet children where they are developmentally. Particularly for younger children who cannot read, as well as for families going to the park for physical play opportunities, placing interactive, multisensory elements throughout Story Trails can support sustained engagement and learning.

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The first years of children's lives are critical for the development of early language skills (Duncan et al., 1998; Fox et al., 2010). In particular, caregivers' early language interactions, such as sustained, responsive interactions and the amount and complexity of the words they use when talking to their children, have a profound effect on children's vocabulary size, processing speed, and literacy development (Adamson et al., 2020; Hurtado et al., 2008; Pan et al., 2005). Two key facilitators of caregiver engagement in language-rich interactions with children are (1) access to resources, such as books and other educational materials, and (2) knowledge of early brain and language development, including how to engage in responsive, language-rich interactions (Leung & Suskind, 2020; Rowe, 2008).

To foster these critical early language experiences, researchers and practitioners have developed interventions that leverage everyday spaces—such as pediatricians' offices, public transportation, laundromats, libraries—where caregivers spend time with their children (e.g., Canfield et al., 2020; Klass et al., 2009; Neuman et al., 2020). The Playful Learning Landscapes (PLL) model, in particular, has been found to support positive child-caregiver interactions in Philadelphia and other communities around the world (Bustamante et al., 2019). Interventions in parks (Bustamante et al., 2020), supermarkets (Gunderson & Levine, 2011; Hanner et al., 2019; Ridge et al., 2015), bus stops (Hassinger-Das et al., 2018), and libraries (Hassinger-Das, Zosh et al., 2020) have been linked with positive interactions, increased understanding of the connection between play and learning, and caregivers' greater use of language.

Building on this evidence base, *Too Small to Fail* (*TSTF*, the early education initiative of the Clinton Foundation) and KABOOM! piloted playful, learning-rich Story Trails in five public parks across Philadelphia, with support from Read by 4th, Philadelphia Parks & Recreation, and the Playful Learning Landscapes Action Network (PLLAN). These literacy-rich walking paths with panels from children's books combine storytelling, movement, and play to support early literacy in everyday park experiences, featuring playful prompts throughout the story and interactive tactile elements at the end of each Story Trail. This report details the findings of a formative evaluation of the Story Trails pilot that used the PLL Metrics Framework (Hadani et al., 2021) to address research questions focused on implementation and short-term outcomes.

Overview of the Story Trails Pilot

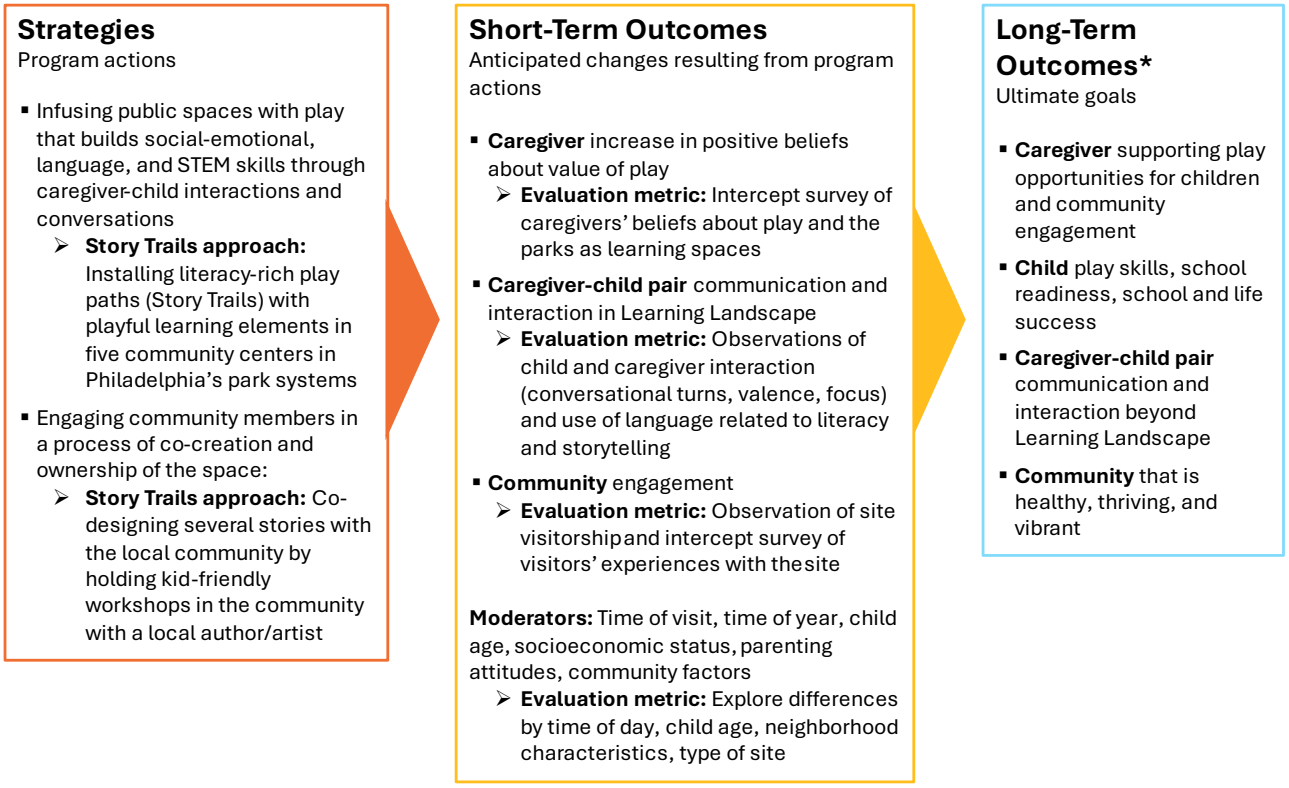
For the Story Trails pilot, partners installed literacy-rich play paths with playful elements in Philadelphia's public parks system. The Story Trails include durable panels that feature pages of a children's book along a walking path, with the purpose of encouraging child-caregiver use of language in outdoor spaces and supporting children's vocabulary skills and school readiness. Two of the Story Trails feature the storybook *DJ's Busy Day / El Ocupado Día de DJ* (both English and Spanish versions), developed by *TSTF* and Scholastic Inc. The other three Story Trails feature community-developed stories created as part of a workshop with school-age children, led by the Philadelphia nonprofit Read by 4th in partnership with local artist Andre Chaney.

To deepen engagement, the panels include written prompts embedded throughout the story, inviting families to pause and interact by playing rhyming games, pointing out new words, or making connections between the story and children's everyday experiences. At the end of the trail, a series of interactive physical games give children a chance to extend their learning through movement and play. Examples of the games include a rotating tic-tac-toe game where children match images with similar characteristics (such as colors or story characters) and a periscope game of "I Spy" that encourages children to explore their surroundings by identifying objects in the park by color, shape, or distance (Exhibit 1).

Exhibit 1. Examples of games at the end of a Story Trail

The evaluation framework for the Story Trails pilot was based partially on the PLL model, an interdisciplinary approach to supporting young children's early learning and development. This model draws on urban planning, public health, and developmental science to reimagine places where young children spend their time as places to encourage play and learning (Bustamante et al., 2019). As shown in the theory of change in Exhibit 2, this is done through two primary *strategies*: Programs incorporate play into public spaces in a way designed to foster "serve-and-return" interactions between children and caregivers (Fisher et al., 2016; National Scientific Council on the Developing Child, 2007), and they engage community members in the creation and ownership of those spaces.

Exhibit 2. Story Trails theory of change



Note. This figure is derived from the PLL theory of change (Bustamante et al., 2019). *Longterm outcomes are outside the scope of this evaluation.

These program strategies are intended to directly promote *short-term outcomes* (called "target" outcomes in the original PLL theory of change; Bustamante et al., 2019) for caregivers and communities, including caregiver beliefs about play, child-caregiver communication and interaction, and community engagement (see Exhibit 2). In turn, these short-term outcomes are intended to support the *long-term outcomes* of caregiver-supported play opportunities, child play skills and school readiness, child-caregiver communication and interaction beyond the site, and a vibrant community (Bustamante et al., 2019).

The Story Trails pilot evaluation focused on associations between the program strategies and the short-term outcomes—caregiver beliefs about play, child-caregiver interaction, and community engagement. Specifically, we aimed to examine Story Trails strategies and short-term outcomes by addressing two sets of research questions: *implementation* research questions, which examined how Story Trails strategies are enacted through families' interactions with Story Trails; and *short-term outcome* research questions, which examined how Story Trails support playful, learning-rich interactions and community engagement compared to sites without Story Trails.

Implementation Research Questions

1. How do children and their caregivers engage with Story Trails?
2. Do Story Trails offer a physical space that is easy and convenient to access, feels inclusive and inviting to visitors, and reflects community cultures and values?

Short-Term Outcome Research Questions[1]

3. Does incorporating Story Trails encourage children and their caregivers to engage in more playful, learning-rich activities (i.e., talking, reading, playing) and perceive the park as a space where children can learn when compared to areas without Story Trails?
4. Does incorporating Story Trails encourage greater use of and more positive perceptions of the space compared to areas without Story Trails?

Study Design and Methodology

To address the implementation and short-term outcome research questions, we used a site-level matched comparison approach to identify how families' use and opinions of public sites differ across sites with and without Story Trails. The study design draws on the PLL Metrics Framework and included (1) structured observations of how families use and interact with and through Story Trails; (2) intercept surveys about caregivers' perceptions of the sites, including accessibility, value to the community, and support for children's learning; and (3) observation maps of general site visitorship. Below, we describe our sample, procedures, measures, and analyses in more detail.

Sample

Philadelphia Parks & Recreation selected the five sites where Story Trails were installed (Concourse Lake Trail, Mallery Playground and Recreation Center, Marconi Plaza, McPherson Square Library, and Penrose Recreation Center) based on the priorities of Philadelphia Parks & Recreation, infrastructure, and its understanding of the project goals, with consultation of KABOOM! playspace equity data. Families who visited these sites and interacted with the Story Trails constituted our treatment group. With support from *TSTF*, KABOOM!, and Philadelphia Parks & Recreation, we identified a matched comparison site for each Story Trails site. Families who visited the selected comparison sites constituted our comparison group. Matched comparison sites were identified using the following characteristics:

- **Site type:** Within the Philadelphia public parks system and, to the extent possible, similar types of sites (e.g., recreation center, walking trail, playground).
- **Location:** Between 0.25 and 1.5 miles of a Story Trails site to stay within the same general neighborhood but avoid scenarios in which families visit both the Story Trails and comparison sites during the data collection window.
- **Neighborhood demographics:** Similar populations with respect to race/ethnicity, linguistic background, and socioeconomic status (American Community Survey census tract data).

[1] Because of low engagement with the Story Trails during the data collection periods, our ability to rigorously address the short-term outcome questions is limited by a small sample. We provide responses to Research Questions 3 and 4 in this report, noting that the results should be interpreted with the small sample in mind. However, we did not have a sufficient sample to look at the originally proposed Research Question 5 (Are there aspects of the initiative that are most effective in promoting playful, learning-rich interactions and community engagement?) because we did not have enough observations to look at differences *within* the Story Trails sites.

- **Neighborhood access and opportunity**: Similar neighborhood transit scores (Walk Score data) and child opportunity (diversitydatakids.org's Child Opportunity Index).
- **Community input:** Philadelphia Parks & Recreation confirmed that sites were comparable beyond the included characteristics and have sufficient visitorship to meet data collection goals.

We identified the following matched comparison sites using the Philadelphia Parks & Recreation finder tool (https://www.phila.gov/parks-rec-finder/#/locations). We checked sites for similar characteristics (see Appendix A for site characteristics) and shared a proposed list with *TSTF*, KABOOM!, and Philadelphia Parks & Recreation for feedback. Morton and Schmidt Playgrounds were recommended by Philadelphia Parks & Recreation staff.

- **Marconi Plaza, opposite playground:** The playground on the opposite corner of Marconi Plaza was the comparison site for the Marconi Story Trails site. The two locations are 0.3 miles apart in the same neighborhood and a very similar setting.
- **Morton Playground:** Morton Playground was the comparison site for Mallery Playground and Recreation Center. Morton is located 0.8 miles from Mallery in a neighborhood with a similar population. Morton was recommended by Philadelphia Parks & Recreation staff.
- **Parkside Evans Recreation Center:** Parkside Evans Recreation Center was the comparison site for Concourse Lake Trail. Parkside Evans is located 0.5 miles from Concourse Lake in a neighborhood with a similar population. Parkside Evans was also selected because it has a walking trail nearby (similar to Concourse Lake).
- **Schmidt Playground:** Schmidt Playground was the comparison site for McPherson Square Library, recommended by Philadelphia Parks & Recreation staff. Schmidt is located 1 mile from McPherson in a neighborhood with a similar population (both with large Spanish-speaking populations).
- **Winchester Playground:** Winchester Playground was the comparison site for Penrose Recreation Center. Winchester is located 0.5 miles from Penrose in an area with similar neighborhood characteristics, and the sites offer similar programming.

Data collection resulted in a total of 36 participating families across five sites: Mallery Playground, Marconi Plaza Story Trails, Marconi Plaza Comparison, Morton Playground, and Winchester Playground (Exhibit 3). Details on the low rates of participation are provided in the Findings section.

Exhibit 3. Story Trails pilot sample

Site	Story Trails/ Comparison	Number of Observations	Number of Intercept Surveys
Concourse Lake Trail	Story Trails	0	0
Mallery Playground	Story Trails	1	1
Marconi Plaza, Activation	Story Trails	9	12

Site	Story Trails/ Comparison	Number of Observations	Number of Intercept Surveys
Marconi Plaza, Playground	Comparison (Marconi)	15	14
McPherson Square Library	Story Trails	0	0
Morton Playground	Comparison (Mallery)	6	6
Parkside Evans Recreation Center [a]	Comparison (Concourse Lake)	–	–
Penrose Recreation Center	Story Trails	0	0
Schmidt Playground [b]	Comparison (McPherson)	–	–
Winchester Playground [c]	Comparison (Penrose)	2	2

[a] The data collection team did not visit Parkside Evans Recreation Center because it was scheduled for the second data collection trip, and, in consultation with *TSTF* and KABOOM!, we opted to prioritize additional data collection at the Story Trails sites and not the comparison sites due to low visitation during the first data collection trip.
[b] The data collection team did not visit Schmidt Playground because it was unexpectedly closed (with a padlock on the gates) during the data collection period.
[c] Data from Winchester Playground were dropped from analyses because the Story Trails site at Penrose Recreation Center, for which Winchester was the comparison site, did not have any participation.

Procedures and Measures

Data collection activities primarily occurred in October 2024, with an additional data collection event in June 2025. Each site was staffed by two SRI data collectors: an interviewer who consented families and administered the intercept survey and an observer who conducted the observations. All SRI staff members wore name tags and Story Trails branded shirts. Three of the five data collectors were proficient in Spanish. Although we did not collect any personally identifiable information (PII, such as names, addresses, phone numbers, emails), we obtained institutional review board (IRB) approval for exemption and verbal informed consent for participation because the surveys involved direct interaction with participants and children were part of the observation.

To **recruit the sample**, the interviewer identified every family with a young child who interacted with the site (i.e., interacted with the Story Trails panels or, for comparison sites, spent sustained time at the site instead of just passing through) and approached to invite them to participate in the study. The interviewer provided families with a brief study description in plain English or Spanish as well as an information postcard with the consent information and a QR code to learn more about the study. Study participants were offered a copy of the book, *DJ's Busy Day / El Ocupado Día de DJ*, as a token of appreciation. During the June 2025 data collection, recruitment was supported by *TSTF* and KABOOM! staff, who provided free food and drinks, recruited families at a nearby playground, and directed families to the Story Trails site using chalk art, balloons, and signage. If a family was eligible and the caregiver agreed to participate, the interviewer assigned them a unique ID number and told them that they would follow up later to ask them some questions about the park, once they had a chance to spend some time there.[2] The interviewer then

[2] Families were eligible for the survey if at least one of their children visiting the park was age 8 or younger (the period of early childhood; American Academy of Pediatrics, n.d.) and at least one caregiver was age 18 or older.

texted the ID number and a brief description of the family to the observer so she could unobtrusively conduct the observation.

Following consent, observers completed unobtrusive **child-caregiver observations** focused on how children and families interacted at the sites (see Appendix B for the observation protocol). Each observation lasted approximately 8 minutes and was recorded using a paper observation protocol. Observers at the Story Trails sites observed families' interactions with the Story Trails, and observers at the comparison sites observed families' use of the park in general. The observers spent 5 minutes observing child-caregiver interactions, tallying the number of conversational turns and times when the children and caregiver shared focus. At the end of this section, they rated the overall valence of the interaction. At Story Trails sites only, observers then spent 3 minutes tallying certain interactions with the Story Trails. Finally, observers at all sites wrapped up by recording their perceptions of family characteristics (age, gender, race/ethnicity, and languages spoken) and noted any unique circumstances that may have impacted the observation (e.g., the family used a language the observer did not speak, interactions with Story Trails were between a young child and older sibling rather than caregiver). Observers noted which parts of the Story Trails families were interacting with at the beginning and end of each section of the observation. Observers were trained on the protocol and practiced conducting observations using videos of child-caregiver interactions to attain reliability.

Next, the interviewer verbally administered the **intercept survey** in English or Spanish to caregivers with at least one child age 8 or younger who consented to participate. The intercept survey was designed to last less than 5 minutes, to be minimally burdensome for caregivers and families. The survey included 12–16 questions intended to understand families' access to, use of, and perceptions of the sites (see Appendix C for the intercept survey).[3] As recommended in the PLL Metrics Framework and the Reimagining the Civic Commons measures toolkit (Civic Commons Learning Network & Interface Studio, n.d.), the interviewers used standard language while approaching and consenting families and administered the intercept survey verbally to all participants. Standing alongside caregivers so both could see the tablet screen, staff read survey items exactly as written, including all multiple-choice options, and entered participants' responses directly into a tablet-based offline Qualtrics form to ensure efficient data entry and analysis.

Finally, the interviewers completed **observation maps** using a revised version of the observation map worksheets from the Reimagining the Civic Commons measures toolkit. Specifically, staff completed an observation map that captured a snapshot of site visitors at the start of each hour. To do so, they recorded a snapshot of the total number of visitors and the number of visitors by demographics (perceived race/ethnicity, gender, age group). They also recorded the weather conditions; noted the locations of visitors on a map of the site; and, at Story Trails sites, noted how many visitors were using Story Trails. Additionally, interviewers tallied the cumulative number of people who passed by the sites to have a total number for the data collection period, rather than only snapshot.

[3] Two additional questions about families' prior exposure to Story Trails were added for the Marconi Plaza data collection activation, to understand the extent to which participating families had used Story Trails without the activation.

Analysis

Analysis for the **implementation research questions** (RQs 1–2) aimed to describe the experiences of children and families using Story Trails. Thus, analyses for these questions focused only on data from the Story Trails sites. First, we calculated descriptive statistics (i.e., frequencies, means, standard deviations) for each PLL metric related to patterns of engagement (RQ 1) and perceptions of the space (RQ 2) across sites (see Appendix D for details on each PLL metric), as well as additional operationalizations of the data that were identified as metrics of interest during the study design phase (e.g., the number of conversational turns that used literacy language).[4] Additionally, we used inductive qualitative coding methods to analyze the open-ended observation data. Themes were generated by one analyst and reviewed by another; any disagreements were discussed until consensus was reached.

Analysis for the **short-term outcome research questions** (RQs 3–4) aimed to examine whether playful, learning-rich interactions (RQ 3) and perceptions and use of the sites (RQ 4) varied across sites with and without Story Trails. As with the implementation research questions, we first calculated descriptive statistics for each metric for Story Trails and comparison sites, respectively.[5] Next, we compared how playful, learning-rich interactions and perceptions of the space differed across Story Trails and comparison sites. To do so, we first analyzed whether the differences in the descriptive statistics were statistically significant using bivariate regression analysis for continuous metrics and chi-squared tests for categorical metrics. Additionally, we conducted separate multivariate regression models for each outcome metric (e.g., number of conversational turns, whether caregivers view the park as a place where children can learn), controlling for child race/ethnicity, family language spoken, child gender, child age, number of caregivers and children in the family, and whether the site was Marconi Plaza or Mallery/Morton Playground. However, because the regression results were underpowered (sample sizes ranged from 20 to 27, depending on the outcome), we opted to prioritize the descriptive findings as the most reliable results.[6]

[4] The original study design included a comparison of patterns of engagement and perceptions of the space across site and family characteristics using regression analyses. This was not possible because of the low engagement in Story Trails.
[5] We had data from two families at Winchester Playground, the comparison site for Penrose Recreation Center. However, we dropped these data from the sample because they did not have a valid Story Trails comparison.
[6] All code used to clean and analyze data was quality-checked by SRI's data services staff.

Findings

Few families were around the Story Trails sites, and fewer used the Story Trails.

Research Question 1: How do children and their caregivers engage with Story Trails?

Overall, we observed low rates of engagement with Story Trails across sites. During our fall 2024 data collection, just one child and caregiver engaged with the Story Trails in over 14 hours of observation. Notably, this low engagement occurred during what we would expect to be a high-traffic time for the parks. Observations were conducted between 8:45 am and 6:30 pm on a Saturday and Sunday in October, when the weather was consistently sunny and temperatures ranged from 56 to 80 degrees Fahrenheit, with an average of 71 degrees. Yet, as shown in Exhibit 4, this low rate of engagement reflected low rates of people passing by the Story Trails in general, suggesting that the lack of engagement may have more to do with the accessibility of Story Trails than interest in Story Trails. In particular, the Story Trails sites were often located in parks with few to no families around, or in parts of parks that were further from where families spend time. The one exception was Marconi Plaza, where the rates of passersby were higher, yet Story Trails engagement was still low. The observer noted that about half of these passersby were families and, on three separate occasions, children briefly engaged with the tactile elements (e.g., periscope, matching game) for a few seconds before parents moved them along.

Exhibit 4. Story Trails engagement during October 2024 data collection

Site	Hours at Site [a]	Hourly Passersby	Hourly Engagement
Mallery Playground	3.5	N/A [b]	<1
Marconi Plaza	3.5	16	0
Penrose Recreation Center	3.5	4	0
Concourse Lake Trail	2.75	5	0
McPherson Square Library	1	0	0

[a] Data collectors only stayed 1 hour at McPherson given the low attendance and a data collector feeling unwell. At Concourse Lake, data collectors arrived 45 minutes into the data collection window because they had originally planned to be at comparison site, Schmidt Playground, which was closed.

[b] The number of passersby is not available for Mallery Playground because these data were not part of our initial plan to collect and Mallery was the first site. After the low engagement rates at Mallery, we recorded these data at all other sites.

To address the lack of information about how families engage with Story Trails, *TSTF* and KABOOM! co-hosted an activation event at the Marconi Plaza Story Trails site in June 2025. The event was designed to encourage families to use the Story Trail while the SRI team was collecting data. *TSTF* provided free books, tote bags, food, and drinks. *TSTF* and KABOOM! staff actively recruited nearby families, by using chalk art to advertise the event and direct families to the Story Trails and by having a staff person at the comparison playground across the street inform families about the event and Story Trails.

During the activation, engagement was much higher, with eight people engaging with the Story Trails each hour on average. Most families (75%) were visiting the Story Trails for the first time. Overall, families did not spend much time at the Story Trails. Of the nine completed observations at the event, only five lasted the full 8 minutes needed to complete the protocol. For the other four observations, families only spent

enough time at the Story Trails for the observer to complete the 3-minute section on how they engaged with the Story Trails, but not the 5-minute section on child-caregiver interactions. Nevertheless, the event provided sufficient data to identify patterns of how families engaged with the Story Trails.

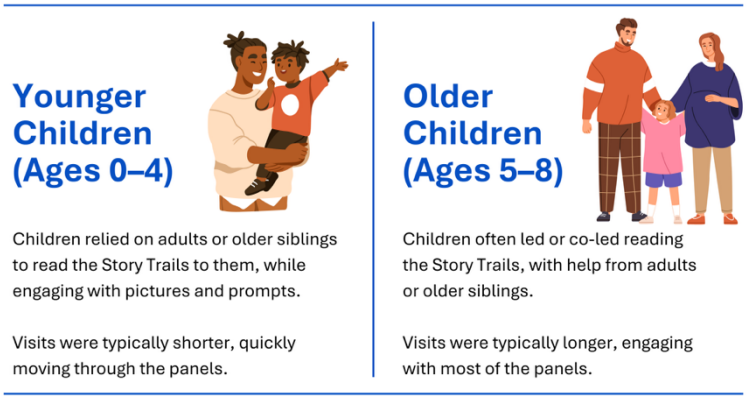
How families used the Story Trails depended on the age of the child, but most families engaged with the stories more than the playful learning prompts.

Research Question 1: How do children and their caregivers engage with Story Trails?

The sample that data collectors observed interacting with Story Trails included 10 family units: nine at Marconi Plaza alongside the activation and one at Mallery Playground. The Marconi Plaza Story Trail featured the dual-sided English-Spanish bilingual *DJ's Busy Day / El Ocupado Día de DJ* story. The Mallery Playground Story Trail featured a single-sided community-developed story called *When Friendship Takes Flight*. Of the focal children observed, observers perceived six to be between the ages of 0 and 4 and four to be between the ages of 5 and 8. Observers perceived half of the children as White, two as Black/African American, two as Hispanic/Latino, and one as Asian (see Appendix E for additional details on participant demographics). Most families (80%) spoke only English; two families spoke both English and Spanish.

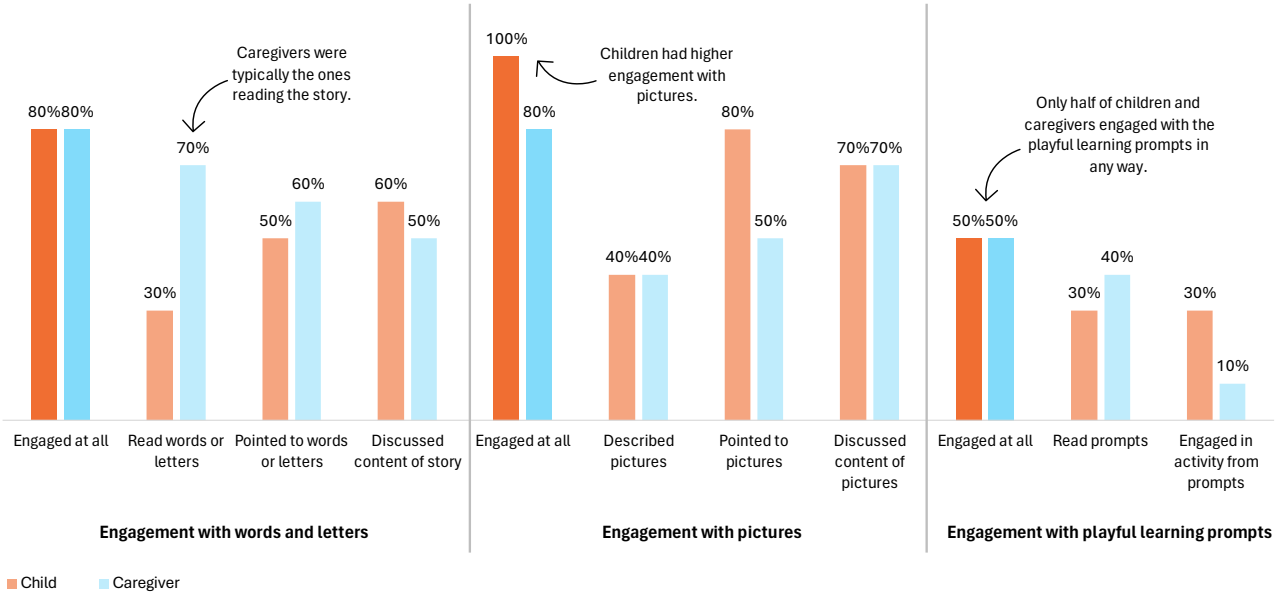
Based on the qualitative analysis of open-ended observation data, most families engaged with the Story Trails as dyads. A dyad was typically one caregiver and one child, including when two caregivers were present (one would watch). In two cases, however, families had three children and paired off so that the caregiver was with one child and the other two children were together.

How families interacted with the Story Trails differed based on the age of the child. For children in the 0–4 age range, visits were typically short. Families in the four observations that lasted only the first 3 minutes all had focal children ages 0–4. Visits were longer and, based on the open-ended observation data, engagement was more sustained when children were in the 5–8 age range and could participate in the reading and activities themselves. In the two cases where older children led a younger sibling through the Story Trails, engagement was also high. This included a case where a teenager led a child aged 7 or 8, as well as a case where a child aged 7 or 8 led a child aged 4 or 5.



Overall, when interacting with the Story Trails, families typically engaged with the stories (letters, words, and pictures) more than the playful learning prompts (Exhibit 5). All focal children engaged with the pictures in some way, with most also engaging with the words or letters (80%) but only half engaging with the playful learning prompts. Most caregivers engaged with words and letters (80%) as well as pictures (80%). When families engaged with words and letters, caregivers were more likely to read than children (60% of children were under age 5 and therefore unlikely to be able to read). Children, however, were more likely to point to the pictures and engage in activities from the playful learning prompts.

Exhibit 5. Family engagement with Story Trails components

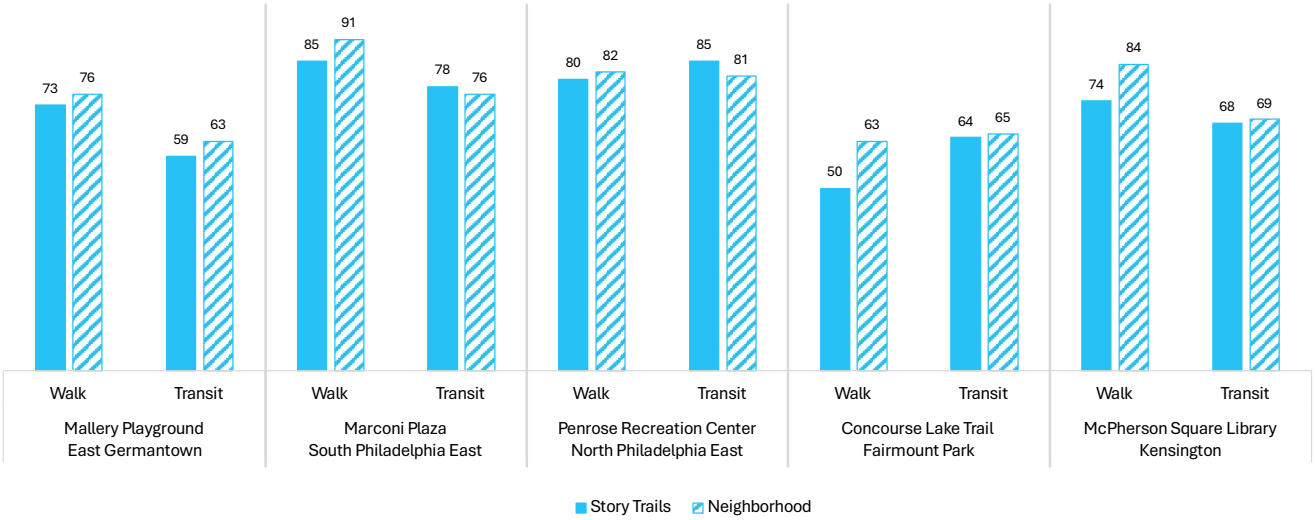


Story Trails are mostly located in areas accessible via walking or public transit, but low rates of visitors suggest limited ease and convenience of access.

Research Question 2: Do Story Trails offer a physical space that is easy and convenient to access, feels inclusive and inviting to visitors, and reflects community cultures and values?

Most Story Trails are located in areas that visitors can access by walking or via public transit, but the low rates of visitors suggest that the ease and convenience of access may be limited. Story Trails sites were walkable and accessible by public transit at levels mostly on par or higher than the Philadelphia average walk score of 75 and average transit score of 67. Walk scores for Story Trails sites ranged from *somewhat walkable* (50, Concourse Lake Trail) to *very walkable* (85, Marconi Plaza), although the scores were always slightly below the averages for their respective neighborhoods. Transit scores ranged from *good transit* (59, Mallery Playground) to *excellent transit* (85, Penrose Recreation Center) and typically reflected neighborhood averages (Exhibit 6). This walkability is reflected in how most families surveyed at Marconi Plaza and Mallery Playground got to the sites: 85% reported walking, and 15% reported using a car.

Exhibit 6. Public transit and walk scores by Story Trails site



Note. We determined walk and transit scores by entering the park address into the Walk Score website (https://www.walkscore.com/), which is used by real estate websites like Zillow and Redfin. Scores range from 0 to 100. For details on the methodology, see How Walk Score Works.

However, the low rates of passersby across Story Trails locations (see Exhibit 4) suggest these locations may not be easy and convenient for families to access. For example, data collectors noted that the majority of people who passed by the Story Trails site at Concourse Lake Trail were adults without children; the one family who passed by was in transit to catch a bus, not on a stroll. Additionally, at Marconi Plaza, families had to walk 5 minutes and cross a busy street to get from the comparison playground (where most families were spending time because it had shade and equipment for young children) to the part of the park where the Story Trail was located.

Whether the Story Trails sites were inclusive, welcoming, and reflective of community culture and values varied across sites and visitor opinions.

Research Question 2: Do Story Trails offer a physical space that is easy and convenient to access, feels inclusive and inviting to visitors, and reflects community cultures and values?

Survey respondents were mixed on their perceptions of the parks where Story Trails were located (Marconi Plaza and Mallery Playground). While most reported that the park made a good first impression for families (69%) and is a place where children can learn (77%), fewer agreed that the park reflects the culture and values of the neighborhood: 39% said yes, 31% said somewhat, 15% said no, and another 15% were unsure. Likewise, responses were mixed on accessibility for people with disabilities: 46% said yes, 23% said somewhat, 15% said no, and another 15% were unsure (see Appendix F for detailed findings). Yet when asked about Story Trails specifically, responses were more consistently positive: 92% said they help children learn (8% said they *somewhat* help children learn), and 62% said they reflect the culture and values of the neighborhood (23% *somewhat*, 15% *unsure*).

Although survey data are unavailable from the other three sites (Concourse Lake Trail, McPherson Square Library, and Penrose Recreation Center), the data collection team visited all sites and logged observations about the sites in general. One common theme was that families were often nearby in the neighborhood, but not particularly close to the Story Trails. For example, at Mallery Playground, many families with children were nearby at soccer practice or in a nearby playground that had more equipment for young children, whereas the Story Trail was on a path leading to a playground with equipment for older children. At Concourse Lake Trail, families were nearby at a large event happening in another part of the park, but few families used the walking path where the Story Trail was located. At Penrose Recreation Center, the playground was sparsely used, primarily by children without adults present.

Additionally, the data collection team did not observe any families at McPherson Square Library. McPherson was selected as a Story Trails site as part of a placemaking strategy for neighborhood families, with support from librarians interested in more investment in learning activities in the space. However, the playground near the Story Trail was functionally unusable because of broken glass and excrement, and many adults were using drugs nearby.[7] Families were, however, present at Hissey Playground, a recently renovated playground located about a quarter mile down the street (Kenney Administration, 2017).

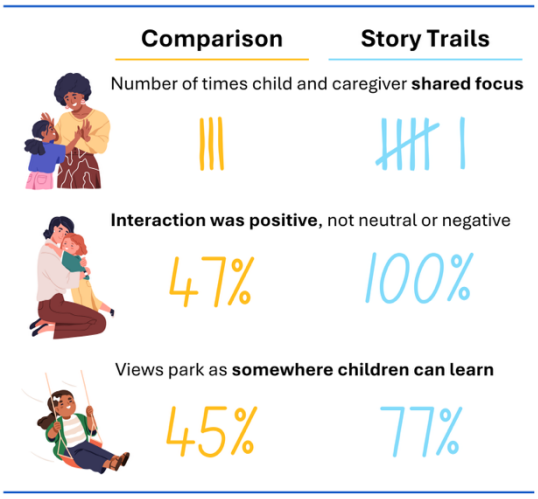
In sum, more families were spending time in nearby parks or at playgrounds in the same park rather than at the Story Trails. This finding could be due to challenges around accessibility and safety (e.g., needing to cross busy streets, dangerous objects on the playground) or due to families' preferences for spending their time. For example, families of young children may prioritize gross motor play (e.g., soccer practice, free play on playground equipment) over literacy activities while at a park.

Families at Story Trails sites were more likely to use literacy and storytelling talk, have positive interactions, share focus, and view the park as a place where children can learn than families at comparison sites.

Research Question 3: Does incorporating Story Trails encourage children and their caregivers to engage in more playful, learning-rich activities and perceive the park as a space where children can learn when compared to areas without Story Trails?

Although the data were limited, we were able to compare child-caregiver interactions across a small sample of participants at two Story Trails sites (Marconi Plaza and Mallery Playground) and their respective matched comparison sites (Marconi Plaza Playground and Morton Playground). The matched comparison mostly worked as intended: Samples did not differ significantly across Story Trails and comparison sites in terms of the number of caregivers and children, perceived ages, gender, or race/ethnicity. The one exception was languages spoken: Families at Story Trails sites were more likely to speak only English (80%) compared to families at comparison sites (57%; p = .06; see Appendix F for details).

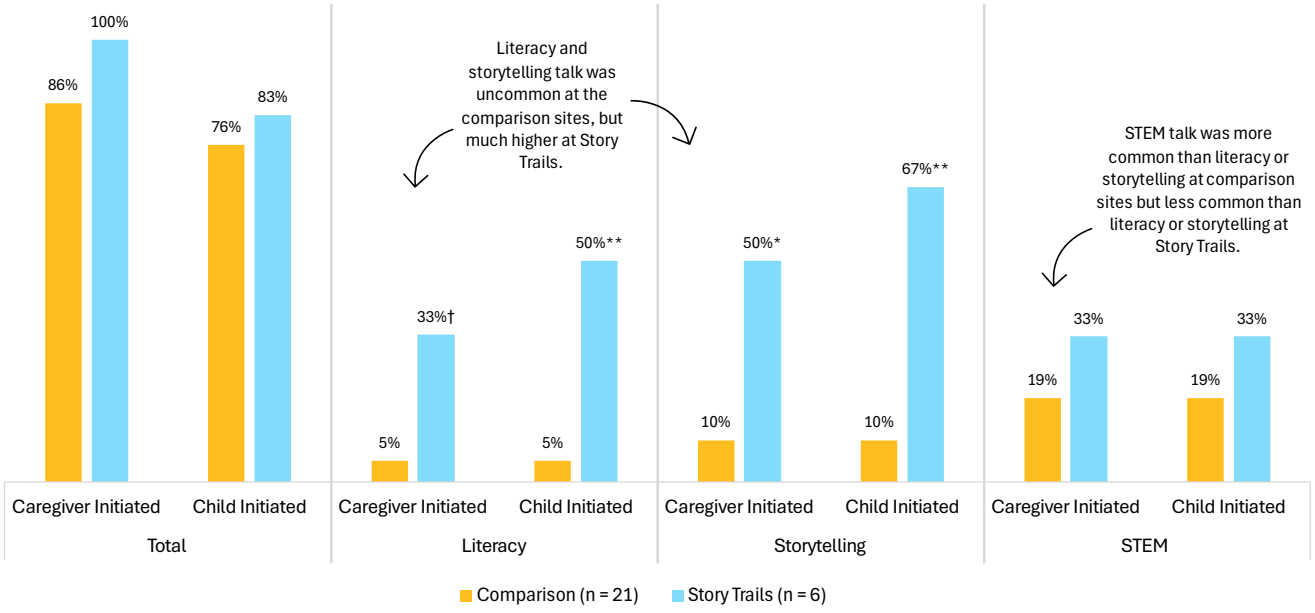
[7] For one example of a community member's call for increased investment in McPherson Square Library, see Daisie Cardona's (2022) article in the Kensington Voice.



Children and caregivers at Story Trails sites had a higher number of shared focus moments (counted as each time they switched focus to a new thing, together) than families at comparison sites (6.3 at Story Trails compared to 2.7 at comparison sites; $p = .002$). Additionally, all observations at Story Trails sites were rated as having a positive valence of interaction overall, compared to 47% of comparison observations (with 53% being coded as a "neutral" valence—no negative interactions were observed; $p = .022$).[8] Further, most families at Story Trails sites (77%) said the park is a place where children can learn, compared to just 45% of families at comparison sites ($p = .07$).

Families at Story Trails sites were also more likely than families at comparison sites to have caregiver-initiated and child-initiated conversational turns (defined as when the caregiver or child initiates a conversation and the other replies) that focused on literacy and storytelling ($p = .002$–$.052$; see Exhibit 7). However, there were no significant differences in families' likelihood to have conversations in general or conversations that use STEM talk. There were also no significant differences in the average number of conversational turns overall at Story Trails (8.8) compared to comparison sites (9.1).

Exhibit 7. Child-caregiver interactions by talk type across Story Trails and comparison sites



† $p < .10$, * $p < .05$, ** $p < .01$.

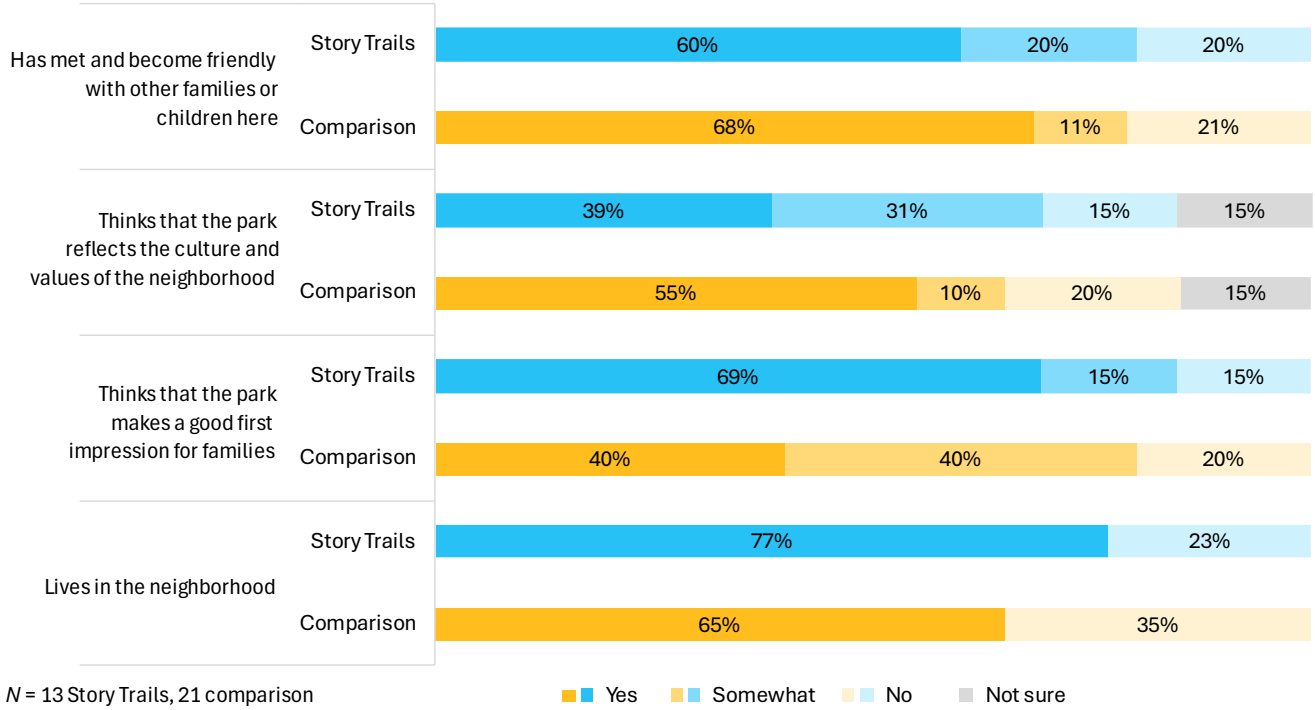
[8] Regression results were relatively consistent with the descriptive findings and are reported in Appendix G. However, because the regression results were underpowered ($n = 24$), they should be interpreted with caution. In particular, an absence of statistically significant findings should be interpreted as being unable to detect an association *not* that an association does not exist, because a very large effect size is needed to detect associations in such a small sample.

Families' perceptions and use of the park did not differ significantly across Story Trails and comparison sites.

Research Question 4: Does incorporating Story Trails encourage greater use of and more positive perceptions of the space compared to areas without Story Trails?

Families reported visiting the park sites for approximately 1 hour, on average, across both Story Trails sites (57 minutes) and comparison sites (67 minutes). Differences in the percentage of participants who were from the neighborhood and the percentage who reported meeting other families at the site who they had become friendly with were not statistically significant. Additionally, caregivers' opinions of the park sites did not vary significantly based on whether the sites had Story Trails (Exhibit 8).

Exhibit 8. Families' use and perceptions of Story Trails and comparison sites



Conclusion and Recommendations

Taken together, the findings suggest that Story Trails may promote children and caregivers' use of literacy-rich language, but that the ability of Story Trails to impact long-term outcomes, such as children's literacy skills, is limited by low rates of engagement. To better understand this limitation, we applied a root cause analysis protocol recommended by the National Implementation Research Network (2024) called the Five Whys. In this approach, analysts state a challenge in a community or intervention and ask "Why?" at least five times to identify the root cause of the challenge. If one Why yields two separate answers, the activity branches into two separate roots. For the Story Trails pilot, answers to each Why were informed by the pilot data and findings, observations and informal conversations with community members during data collection, and extant research on child development and playful learning interventions. While the actual root cause is more nuanced, answers to each Why are straightforward and intentionally simplistic to spark conversation and reflection. Exhibit 9 displays our root cause analysis, which branched into two separate root causes after the first Why.

Exhibit 9. Five Whys root cause analysis

Challenge	**Preliminary evidence suggests the pilot Story Trails may be minimally effective in promoting long-term outcomes, such as children's literacy skills.**	
Why?	Families do not engage with the Story Trails. Without an activation, only one family used the Story Trails across 14 hours of data collection.	
Why?	Few families passed by the Story Trails.	Families were not interested in engaging with the Story Trails.
Why?	The Story Trails are not located in places that families frequent.	The Story Trails did not successfully grab families' attention and engagement.
Why?	The Story Trails are not located near other things families want and need (e.g., age-appropriate playgrounds), and sometimes the Story Trails were in locations with possible safety concerns.	Families primarily visit park spaces to support their children's social-emotional health and gross motor physical development rather than their literacy development (Schaefer & Lin, 2025a, 2025b).
Why?	The Story Trails sites were selected to provide a playspace and learning resource in spaces where families did not already have access to playspaces and learning resources.	Access to parks is associated with social-emotional and physical health for young children, whereas existing evidence does not link typical park use to literacy skills (Reuben et al., 2020).

Using this analysis, we developed two recommendations on how to improve the Story Trails and support scalable engagement for families. First, we recommend focusing on installing Story Trails where families already spend time, rather than in spaces with limited play and learning resources for families. Second, we recommend better integrating the literacy-rich Story Trails with developmental supports aligned to the social-emotional and physical development needs that bring families to parks.

Recommendation 1: Install Story Trails in places where families typically go.

We recommend installing Story Trails in locations where families already spend time. The Story Trails pilot sites were partially selected based on KABOOM!'s playspace equity data, which provides excellent information for how to prioritize neighborhoods for equitable investment of new playspaces.[9] Yet while the principle of locating Story Trails in areas with few other play and learning resources may work well at the *neighborhood level*, decisions about where exactly to install Story Trails *within the neighborhood* may be better informed by where families already spend time. For example, the location of the Story Trail at Marconi Plaza was about a 5-minute walk across a busy street from the playground where families spent time. Although families who used this Story Trail felt positively about it, few had encountered the Story Trail in the 10 months prior to the data collection event despite visiting Marconi Plaza often. Likewise, at McPherson Square Library, the playground that the Story Trail was near was very under-resourced with numerous health and safety issues and no families present. Families were instead at Hissey Playground, a quarter mile down the street. These examples and others suggest that families choose to spend time in parks or in areas of parks that have resources they want and need, such as safe and age-appropriate playgrounds. If Story Trails are not located near these other park resources, families may be unlikely to encounter and use them.

We acknowledge that this recommendation assumes that families will not actively go out of their way to visit Story Trails. We make this assumption for two reasons. First, families cannot go out of their way for Story Trails if they do not know about them. While other methods of publicizing Story Trails (e.g., flyers, press releases, social media campaigns) may be effective, locating Story Trails in places where families encounter them naturally may better guarantee that families learn about them and can also save costs on promotional activities. Second, Story Trails in their current form are too brief of an activity for families to go out of their way to visit (nearly half of families spent fewer than 5 minutes using the Story Trails). The engagement rates we observed in this study were closer to the participation rates in lighter touch PLL interventions such as Supermarket Speak (approximately two families observed per hour in the space, not necessarily using the resource;[10] Ridge et al., 2015), than to the rates in studies that had multiple playful learning activities such as Urban Thinkscape (approximately five families observed an hour; Hassinger-Das, Palti et al., 2020). Thus, an alternative to locating Story Trails in places where families spend time could be to make Story Trails part of a broader playful learning intervention that is integrated with other activities to support children's literacy and STEM skills as well as their social-emotional and physical development.

Recommendation 2: Integrate more active, hands-on play throughout Story Trails.

We recommend integrating more interactive and multisensory activities throughout Story Trails rather than concentrating them at the end. During both data collection periods, families showed minimal interest in engaging with the Story Trails. For example, during the October 2024 data collection, families who passed by the installation were reluctant to stop and read through the story, even when children paused to play

[9] For more information on playspace equity data in Philadelphia, visit KABOOM!'s Mapping Playground Access in Philadelphia.
[10] Data on how many families interacted with the Supermarket Speak resource was not reported.

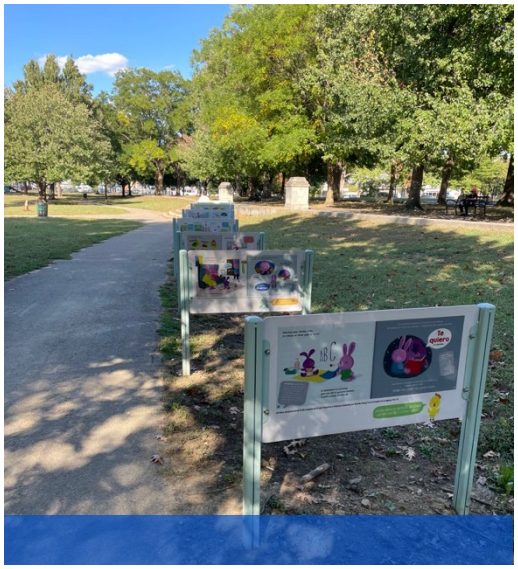
briefly with the tactile features such as the periscope or tic-tac-toe matching game. Similarly, many families at the Marconi Plaza activation spent less than 5 minutes at the installation, especially those with younger children (ages 0–4) who tended to move quickly from panel to panel and often did not complete the story. This may also reflect the finding that families typically read the letters and words but often did not engage with the playful learning prompts.

These findings suggest that, in their current form, Story Trails do not fully align with how families primarily use parks and playgrounds: for play and to support social-emotional and physical development (Schaefer & Lin, 2025a, 2025b). Other playful learning interventions, such as those located in supermarkets or bus stops, occupy spaces where children are typically idle and their movements are relatively constrained (Gunderson & Levine, 2011; Hanner et al., 2019; Hassinger-Das et al., 2018; Ridge et al., 2015). By contrast, families visit parks for the specific purpose of play. As a result, learning interventions in these settings need to be designed differently to embed learning into the play experience.

Incorporating more physical and multisensory elements throughout the entire Story Trails experience can create a stronger bridge between physical play and learning. As museum education research for young children suggests, adding interactive features—such as flaps or doors that can be opened to reveal answers or translations, or sliding panels that uncover hidden images or characters—would encourage children to actively explore the stories and stay engaged from start to finish (Andre et al., 2017; Eardley et al., 2018). These design choices would allow younger, pre-reading children to participate more actively rather than just listening to older siblings or adults read aloud and pointing to pictures. For emerging readers, these features could also make stories that are at a more advanced reading level, such as the community-developed Story Trails, more accessible and enjoyable. For example, an activity may include letting children lift a flap to learn the meaning of a new word. Embedding such multisensory, interactive elements *throughout* Story Trails may make them more engaging, dynamic, and developmentally supportive for a wide range of developmental stages across the 0–8 age span.

Conclusion

In conclusion, we recommend improvements to Story Trails that meet children and families where they are. This includes physically installing Story Trails in places where neighborhood families pass through or spend time, as well as meeting the developmental needs of young children who are visiting a park to play. Families reported positive perceptions of the Story Trails and engaged in literacy language while using them. However, changes that increase engagement—in terms of both the number of families using Story Trails and the level of engagement when families use them—are critical to ensuring that Story Trails support the long-term goals around improving language and literacy skills for young children.



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Appendix A. Characteristics of Story Trails and Comparison Sites

	Site Details		Neighborhood Demographics		Access & Opportunity		
Site	**Story Trails/ Comparison**	**Address**	**Child Race/ Ethnicity [a]**	**Household Language [b]**	**Child Opportunity Index [b]**	**Transit Score [c]**	**Walk Score [c]**
Concourse Lake Trail	Story Trails	Concourse Lake Trail, Philadelphia, PA 19131	100% Black/African American	92% English only 3% Spanish 5% other	Very low	59	50
Parkside Evans Recreation Center	Concourse Comparison	5300 Parkside Ave, Philadelphia, PA, 19131	98% Black/African American 2% Hispanic/Latino	88% English only 2% Russian/Polish/Slavic language 1% Spanish 9% other	Low	66	76
Mallery Playground	Story Trails	100 E Johnson St, Philadelphia, PA 19144	87% Black/African American 9% Hispanic/Latino 4% White	78% English only 13% Spanish 9% other	Very low	59	77
Morton Playground	Mallery Comparison	88 E Haines St, Philadelphia, PA 19144	99% Black/African American <1% Hispanic/Latino <1% White	97% English only 3% other	Very low	64	86
Marconi Plaza *Story Trails*	Story Trails	2800 S Broad St, Philadelphia, PA 19145	61% Asian/Pacific Islander 33% White 3% Black/African American 3% Hispanic/Latino	72% English only 12% Chinese 6% Vietnamese 3% Spanish 7% other	Moderate	78	85
Marconi Plaza *Playground on other side of the park*	Marconi Comparison	2800 S Broad St, Philadelphia, PA 19145	61% Asian/Pacific Islander 33% White 3% Black/African American 3% Hispanic/Latino	72% English only 12% Chinese 6% Vietnamese 3% Spanish 7% other	Moderate	78	85

	Site Details		Neighborhood Demographics		Access & Opportunity		
Site	**Story Trails/ Comparison**	**Address**	**Child Race/ Ethnicity [a]**	**Household Language [b]**	**Child Opportunity Index [b]**	**Transit Score [c]**	**Walk Score [c]**
McPherson Square Library	Story Trails	601 E Indiana Ave, Philadelphia, PA 19134	73% Hispanic/Latino 26% Black/African American 1% White	68% Spanish 31% English only 1% other	Very low	68	85
Schmidt Playground	McPherson Comparison	113-23 W. Ontario St., Philadelphia, PA, 19140	92% Hispanic/Latino 6% White 2% Black/African American	75% Spanish 25% English only	Very low	61	75
Penrose Recreation Center	Story Trails	1101 W Susquehanna Ave, Philadelphia, PA 19122	96% Black/African American 4% Hispanic/Latino	77% English only 3% Spanish 3% Arabic 17% other	Very low	84	85
Winchester Playground	Penrose Comparison	2326 N 15th St., Philadelphia, PA, 19132	100% Black/African American	95% English only 4% Spanish 1% other	Very low	82	82

Source: [a] Census tract data from diversitydatakids.org; [b] American Community Survey 2022 5-Year Estimates census tract data; [c] Redfin.com.

Appendix B. Observation Protocol

Observation Protocol – Story Trails Pilot Evaluation

Observer ID:	Site ID:	Date:	Family ID:	Start time:

# of caregivers (14+):	# of children age 8 or younger:	# of children 8-14:

Section 1: Child-Caregiver Interactions

First, describe context.

What part of the Story Trails panels or playground/park is the family interacting with at the **start of this section?**

Next, observe interactions.

For 5 minutes, tally the number of conversational turns and following the focus that occur between the caregiver and a child aged 8 or younger.

Conversational turns

Tally the number of back-and-forth exchanges between the caregiver and any child age 8 or younger.

	Caregiver Initiated		Child Initiated	
	Caregiver Serves	Child Returns	Child Serves	Caregiver Returns
Literacy Language that points out letters and sounds, such as "B says "b, b, b." or defines a new word.				
Storytelling Language that encourages or involves a child telling or acting out a story				
STEM Language that relates to numeracy, spatial concepts (e.g., shapes, directions), patterns, sorting, or measurement				
Other Any other language				

Following child-caregiver focus

Tally the number of times the caregiver and at least one child age 8 or younger are paying attention to the same thing.

Finally, wrap up this section.

Valence of interaction: Rate the overall affect of the interaction between caregiver and focal children.

1. **Negative** frowning, harsh tone of voice
2. **Neutral** verbal discussions without much emotion
3. **Positive** smiling, positive tone of voice

What part of the Story Trails panels or playground/park is the family interacting with at the **end of this section?**

Section 2: Story Trails Engagement [Story Trails sites only]

First, describe context.

What part of the Story Trails panels or playground/park is the family interacting with at the **start of this section?**

Next, observe interactions.

For 3 minutes, tally how often caregivers and children engage with the words, pictures, and playful learning prompts on the Story Trails panels.

	Caregiver	Children
Story – Words or letters		
Reads words or letters aloud		
Points to words or letters		
Discusses content of story		
Other engagement with words or letters		
Notes on other engagement with words or letters:		
Story – Pictures		
Describes pictures		
Points to pictures		
Discusses content of pictures		
Other engagement with pictures		
Notes on other engagement with pictures:		
Playful Learning Prompts		
Reads prompt		
Engages in activity from prompt		
Other engagement with prompts		
Notes on other engagement with playful learning prompts:		

Notes

Finally, wrap up this section.

What part of the Story Trails panels or playground/park is the family interacting with at the **end of this section?**

Section 3: Wrap Up

First, describe the participants.

As best you can, describe the following characteristics of the caregivers and children. If there are more than 3 children age 8 or younger or more than 2 caregivers, describe those most involved in your observation.

	Caregiver 1	Caregiver 2	Child 1	Child 2	Child 3
Perceived **age range**					
Perceived **gender**					
Female	☐	☐	☐	☐	☐
Male	☐	☐	☐	☐	☐
Nonbinary	☐	☐	☐	☐	☐
Unsure	☐	☐	☐	☐	☐
Perceived **race/ethnicity** check all that apply					
Asian	☐	☐	☐	☐	☐
Black/African American	☐	☐	☐	☐	☐
Hispanic/Latine	☐	☐	☐	☐	☐
White	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐
Unsure	☐	☐	☐	☐	☐
Languages spoken check all that apply					
English	☐	☐	☐	☐	☐
Spanish	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

List other language if known:

Next, wrap up the observation.

Describe any unique circumstances that may have impacted interactions or the observation:
E.g., older child leading interactions with Story Trails, language spoken that observer does not understand

Briefly describe how the family engaged with the Story Trails/park:
E.g., proceeded through the Story Trails panel, briefly interacting and then became disengaged, played on playground

Other notes or reflections:

End time: _____

Appendix C. Intercept Survey

Playful Learning Story Trails Pilot Study: Caregiver Intercept Survey

Hi! Is now a good time to ask you those few questions about your experiences at the park today?

[If yes – continue. If no – ask if we can try again a bit later.]

This survey is about what caregivers of young children think about the park and learning activities here. You can answer any questions you like and can skip questions you'd prefer not to answer. Based on what you say, we hope to make the park even better.

1. What is your relationship to the children? *Select all that apply to any child under 8.*
   - ☐ Parent
   - ☐ Grandparent
   - ☐ Sibling
   - ☐ Other relative
   - ☐ Babysitter/nanny
   - ☐ Friend

2. Do you live in this neighborhood?

Yes

No

Skipped

3. Have you visited this park before today?

Yes

No

Not sure

Skipped

4. *[If #3 = Yes]* How often do you visit this park? Would you say several times a week, once a week, twice per month, once per month, every few months, or once a year?
   - ○ Several times per week
   - ○ Once per week
   - ○ Twice per month
   - ○ Once per month
   - ○ Once every few months
   - ○ Once a year
   - ○ Not sure
   - ○ Did not answer

5. How did you get to the park today? Did you walk, bike, take the bus, take a train, or use another mode of transportation? *Select all that apply.*





Walk Bike Bus Train Drive Other *Skipped*

6. Do you think that the park makes a good first impression for families?




Yes Somewhat No Not sure *Skipped*

7. Do you think that the park reflects the culture and values of the neighborhood?




Yes Somewhat No Not sure *Skipped*

8. Do you think the park is a place where children can learn?




Yes Somewhat No Not sure *Skipped*

9. Would you say that this park is accessible for people with disabilities?




Yes Somewhat No Not sure *Skipped*

10. Have you ever met other families or children here that you became friendly with?
[skipped if first time visiting park, #3 = No]




Yes Somewhat No Not sure *Skipped*

11. About how much time do you plan to spend here today?
    Open response. Data collector will enter a number and whether it is minutes or hours. There will also be an option to select:
    - *Dependent response (e.g., "Until the kids get hungry." Or "Until their mom gets off work.")*
    - *Other response*
    - *Not sure*
    - *Skipped*

12. About how much time do you typically spend when you visit here? *[skipped if first time visiting park, #4 = No]*
    Open response. Data collector will enter a number and whether it is minutes or hours. There will also be an option to select:
    - *Dependent response (e.g., "Until the kids get hungry." Or "Until their mom gets off work.")*
    - *Other response*
    - *Not sure*
    - *Skipped*

13. *[Story Trails sites only]* Do you think that the Story Trail reflects the culture and values of the neighborhood?




Yes Somewhat No Not sure *Skipped*

14. *[Story Trails sites only]* Do you think that the Story Trail helps children learn?




Yes Somewhat No Not sure *Skipped*

15. *[Marconi Plaza activation only]* Have you visited this Story Trail before today?



Yes No Not sure *Skipped*

16. *[Marconi Plaza activation only]* Have you visited any other Story Trails in Philadelphia?



Yes No Not sure *Skipped*

Appendix D. Detailed Research Questions, Metrics, and Data Sources

Research Question	Metric	PLLMF Signal	Data Source	Description [a]
RQ 1. How do children and their caregivers engage with Story Trails? *Data from Story Trails sites only*				
RQ 1a. What percentage of families at the park engage with Story Trails?	Percentage of families that engage with Story Trails	N/A	Passerby tracking	Average number of families engaging with Story Trails divided by the total number of families that pass by
RQ 1b. What elements of Story Trails do children and caregivers with? How do they engage with these elements?	Elements of Story Trails that children and caregivers engage with	N/A	Child-caregiver observation	Multiselect check box of different aspects of Story Trails
	How families engage with Story Trails	N/A	Child-caregiver observation	Multiselect check box of ways families may engage with Story Trails, with an open-ended option for other ways of interacting
RQ 1c. What is the observed age, race/ethnicity, gender, and language used of children engaging with Story Trails?	Age, race/ethnicity, gender, and languages of children engaging with Story Trails	N/A	Child-caregiver observation	Observer perceptions of demographics of children engaging with Story Trails
RQ 2. Do Story Trails offer a physical space that is easy and convenient to access, feels inclusive and inviting to visitors, and reflects community cultures and values? *Data from Story Trails sites only*				
RQ 2a. Are Story Trails sites accessible via public transit or walking?	Neighborhood transit score	Accessible	Walk Score	Index of transit access, based on number of stops and frequency of transit service in the area and walkability (100 is most transit-served/walkable and 0 is least)
	Walking and transit access to site	Accessible	Intercept survey	Respondents walked or took transit to the site
RQ 2b. Are Story Trails sites accessible for people with special needs?	Accessibility for people with special needs	Accessible	Intercept survey	Respondents say the site is accessible for people with special needs

Research Question	Metric	PLLMF Signal	Data Source	Description [a]
RQ 2c. Do Story Trails sites make a good first impression and reflect the cultures and values of the neighborhood?	Perception of the site	Inviting	Intercept survey	Respondents say the site makes a good first impression (e.g., cleanliness, beauty, places to sit, and well maintained)
	Reflection of neighborhood culture and values	Inviting	Intercept survey	Respondents think the site reflects the culture and values of the neighborhood
RQ 3. Does incorporating Story Trails encourage children and their caregivers to engage in more playful, learning-rich activities (i.e., talking, reading, playing) and perceive the park as a space where children can learn when compared to areas without Story Trails? *Data from Story Trails sites and matched comparison sites*				
RQ 3a. Do families at Story Trails sites engage in more positive child-caregiver interactions?	Conversational turns	Child and caregiver interaction	Child-caregiver observation	The number of back-and-forth exchanges between the caregiver and child and/or between children
	Valence of interaction	Child and caregiver interaction	Child-caregiver observation	Overall effect of the interaction, reported as the positive (smiling, positive tone of voice), neutral (verbal discussions without much emotion), or negative (frowning, harsh tone of voice)
	Following caregiver or child focus	Child and caregiver interaction	Child-caregiver observation	Involves the child and caregiver paying attention to the same item (e.g., pointing or verbally addressing the same object); reported as the number of times "following the focus" occurs during an interaction
RQ 3b. Do families at Story Trails sites engage in more talk to support language, literacy, and STEM development?	Talk about literacy skills [b]	Language and literacy	Child-caregiver observation	Any language that builds literacy skills ("B says b, b, b"), reported as whether children and adults use literacy skill language
	Talk about storytelling skills [b]	Language and literacy	Child-caregiver observation	Any language that builds storytelling skills, reported as whether children and adults use language related to storytelling skills
	Talk about STEM	STEM	Child-caregiver observation	Any language that refers to numeracy, spatial reasoning, patterns, sorting, or measurement

Research Question	Metric	PLLMF Signal	Data Source	Description [a]
RQ 3c. Do more caregivers report understanding the park as a space where their children can learn?	Perception of the park as a place where children can learn	N/A	Intercept survey	Respondents think the park is a place where children can learn
RQ 4. Does incorporating Story Trails encourage greater use of and more positive perceptions of the space compared to areas without Story Trails? *Data from Story Trails sites and matched comparison sites*				
RQ 4a. Do sites have more visitors from both within and outside the neighborhood?	Site visitorship	Public life	Observation map, passerby tracking	Visitorship (individual [child and adult] and family level) of the sites
	Citywide site visit (i.e., where in town do they live?)	Mixing on site	Intercept survey	Respondents report living outside of the neighborhood
	Inclusivity	Public life	Intercept survey	Respondents report living in the neighborhood where the Story Trails site is located
RQ 4b. Do families spend more time at Story Trails sites?	Frequency of visits	Public life	Intercept survey	Respondents say they visit the sites at least weekly
	Length of visits	Public life	Intercept survey	Length of time respondents say they plan to spend at the site
RQ 4c. Do more families have a positive perception of the site with Story Trails?	Perception of the site	Inviting	Intercept survey	Respondents think the site makes a good first impression (e.g., cleanliness, beauty, places to sit, and well maintained)
RQ 4d. Do more families think the Story Trails site reflects the culture and values of the neighborhood?	Reflection of neighborhood culture and values	Inviting	Intercept survey	Respondents think the site reflects the culture and values of the neighborhood
RQ 4e. Do more families report meeting new people at Story Trails sites?	Opportunities to meet new people	Mixing on site	Intercept survey	Respondents say they have made acquaintances at the sites

[a] Where relevant, metric descriptions are pulled directly from the Playful Learning Landscapes (PLL) Metrics Framework (Hadani et al., 2021).

[b] Storytelling and literacy skills are collapsed into one category for the PLL Metrics Framework. Given Story Trails' focus on supporting each of these skills, we have disaggregated into separate categories.

Appendix E. Participant Demographics

	Comparison (*N* = 23)		Story Trails (*N* = 10)		Difference	
	Freq.	%	Freq.	%	Diff.	*p* Value
Perceived Family Characteristics						
Number of caregivers (age 14+)						.749
1	15	71%	7	70%	-1%	
2	5	24%	3	30%	6%	
3	1	5%	0	0%	-5%	
Number of children age 8 or younger						.418
1	11	52%	8	80%	28%	
2	6	29%	1	10%	-19%	
3	2	10%	1	10%	1%	
4	2	10%	0	0%	-10%	
Perceived Age Ranges						
Caregiver 1						.306
25–34	6	32%	2	20%	-12%	
35–44	9	47%	8	80%	33%	
45–64	3	16%	0	0%	-16%	
65+	1	5%	0	0%	-5%	
Caregiver 2						.497
14–17	0	0%	1	33%	33%	
25–34	1	17%	1	33%	17%	
35–44	3	50%	1	33%	-17%	
45–64	1	17%	0	0%	-17%	
65+	1	17%	0	0%	-17%	
Child 1						.705
0–4	10	53%	6	60%	7%	
5–8	9	47%	4	40%	-7%	
Child 2						.061
0–4	3	33%	2	67%	33%	
5–8	6	67%	0	0%	-67%	
9–13	0	0%	1	33%	33%	
Child 3						.171
0–4	3	75%	0	0%	-75%	
5–8	1	25%	1	100%	75%	
Perceived Gender						
Caregiver 1: Female	11	55%	4	40%	-15%	.439
Caregiver 2: Female	5	83%	2	67%	-17%	.571
Child 1: Female	10	53%	3	30%	-23%	.244
Child 2: Female	7	78%	2	100%	22%	.461
Child 3: Female	2	67%	0	0%	-67%	.248

	Comparison (*N* = 23)		Story Trails (*N* = 10)		Difference	
	Freq.	%	Freq.	%	Diff.	*p* Value
Languages Spoken						
Family Languages Spoken						.060
English only	12	57%	8	80%	23%	
Spanish only	3	14%	0	0%	-14%	
Other language	4	19%	0	0%	-19%	
English + Spanish	0	0%	2	20%	20%	
English + other language	2	10%	0	0%	-10%	
Caregiver 1: Languages Spoken						.231
English only	12	57%	8	80%	23%	
Spanish only	3	14%	1	10%	-4%	
Other language	4	19%	0	0%	-19%	
English + Spanish	0	0%	1	10%	10%	
English + other language	2	10%	0	0%	-10%	
Caregiver 2: Languages Spoken						.276
English only	5	83%	2	67%	-16%	
Other language	1	17%	0	0%	-17%	
English + Spanish	0	0%	1	33%	33%	
Child 1: Languages Spoken						.080
English only	13	62%	8	80%	18%	
Spanish only	3	14%	0	0%	-14%	
Other language	4	19%	0	0%	-19%	
English + Spanish	0	0%	2	20%	20%	
English + other language	1	5%	0	0%	-5%	
Child 2: Languages Spoken						.058
English only	7	70%	1	50%	-20%	
Other language	3	30%	0	0%	-30%	
English + Spanish	0	0%	1	50%	50%	
Child 3: Languages Spoken					0%	.505
English only	2	67%	1	100%	33%	
Other language	1	33%	0	0%	-33%	
Perceived Race/Ethnicity						
Caregiver 1: Race/Ethnicity						.864
Asian	3	14%	1	10%	-4%	
Black/African American	3	14%	2	20%	6%	
Hispanic/Latino	4	19%	2	20%	1%	
White	8	38%	5	50%	12%	
Other	1	5%	0	0%	-5%	
Unsure	2	10%	0	0%	-10%	
Caregiver 2: Race/Ethnicity						.441
Asian	2	33%	0	0%	-33%	

	Comparison (*N* = 23)		Story Trails (*N* = 10)		Difference	
	Freq.	%	Freq.	%	Diff.	*p* Value
Black/African American	1	17%	1	33%	17%	
Hispanic/Latino	0	0%	1	33%	33%	
White	2	33%	1	33%	0%	
Unsure	1	17%	0	0%	-17%	
Child 1: Race/Ethnicity						.847
Asian	3	14%	1	10%	-4%	
Black/African American	4	19%	2	20%	1%	
Hispanic/Latino	4	19%	2	20%	1%	
White	7	33%	5	50%	17%	
Other	1	5%	0	0%	-5%	
Unsure	2	10%	0	0%	-10%	
Child 2: Race/Ethnicity						.700
Asian	1	10%	0	0%	-10%	
Black/African American	2	20%	0	0%	-20%	
Hispanic/Latino	1	10%	1	50%	40%	
White	3	30%	1	50%	20%	
Other	2	20%	0	0%	-20%	
Unsure	1	10%	0	0%	-10%	
Child 3: Race/Ethnicity						.659
Hispanic/Latino	1	25%	0	0%	-25%	
White	2	50%	1	100%	50%	
Unsure	1	25%	0	0%	-25%	

Appendix F. Descriptive Results Tables

Exhibit F1. Observed child-caregiver interactions

	Comparison (*N* = 21)		Story Trails (*N* = 6)		Difference	
	Mean/%	*SD*	Mean/%	*SD*	Diff.	*p* Value
Literacy Talk						
Use of Literacy Language						
Child or caregiver used literacy language	5%	.	67%	.	62%	<.001
Child used literacy language	5%	.	50%	.	45%	.005
Caregiver used literacy language	5%	.	67%	.	62%	<.001
Literacy Conversational Turns						
Caregiver initiated, caregiver served	5%	.	50%	.	45%	.005
Caregiver initiated, child returned	5%	.	33%	.	29%	.052
Child initiated, child served	5%	.	50%	.	45%	.005
Child initiated, caregiver returned	5%	.	50%	.	45%	.005
Number of caregiver serves	0.10	0.44	0.50	0.55	0.41	.069
Number of child returns	0.05	0.22	0.33	0.52	0.29	.052
Number of child serves	0.14	0.66	0.83	0.98	0.69	.052
Number of caregiver returns	0.10	0.44	0.67	0.82	0.57	.029
Storytelling Talk						
Use of Storytelling Language						
Child or caregiver used storytelling language	14%	.	67%	.	52%	.008
Child used storytelling language	10%	.	67%	.	57%	.002
Caregiver used storytelling language	14%	.	67%	.	52%	.008
Storytelling Conversational Turns						
Caregiver initiated, caregiver served	14%	.	50%	.	36%	.067
Caregiver initiated, child returned	10%	.	50%	.	41%	.024
Child initiated, child served	10%	.	67%	.	57%	.002
Child initiated, caregiver returned	10%	.	67%	.	57%	.002
Number of caregiver serves	0.19	0.51	3.67	6.25	3.48	.014
Number of child returns	0.10	0.30	1.17	1.94	1.07	.017
Number of child serves	0.48	1.50	1.67	1.63	1.19	.105
Number of caregiver returns	0.43	1.36	1.33	1.37	0.90	.164
STEM Talk						
Use of STEM Language						
Child or caregiver used STEM language	24%	.	83%	.	60%	.006
Child used STEM language	24%	.	67%	.	43%	.052
Caregiver used STEM language	24%	.	83%	.	60%	.006
STEM Conversational Turns						
Caregiver initiated, caregiver served	19%	.	67%	.	48%	.024
Caregiver initiated, child returned	19%	.	33%	.	14%	.477
Child initiated, child served	19%	.	50%	.	31%	.137
Child initiated, caregiver returned	19%	.	33%	.	14%	.477

	Comparison (*N* = 21)		Story Trails (*N* = 6)		Difference	
	Mean/%	*SD*	Mean/%	*SD*	Diff.	*p* Value
Number of caregiver serves	0.29	0.64	1.83	1.94	1.55	.004
Number of child returns	0.19	0.40	0.50	0.84	0.31	.210
Number of child serves	0.57	1.36	0.83	1.17	0.26	.673
Number of caregiver returns	0.33	0.80	0.67	1.21	0.33	.428
Other Talk						
Use of Other Language						
Child or caregiver used other language	100%	.	100%	.	0%	.
Child used other language	91%	.	100%	.	10%	.452
Caregiver used other language	100%	.	100%	.	0%	.
Other Conversational Turns						
Caregiver initiated, caregiver served	100%	.	100%	.	0%	.
Caregiver initiated, child returned	86%	.	83%	.	-2%	.890
Child initiated, child served	76%	.	100%	.	24%	.200
Child initiated, caregiver returned	71%	.	83%	.	12%	.575
Number of caregiver serves	9.24	5.91	5.00	3.80	-4.24	.111
Number of child returns	4.67	4.69	2.50	2.59	-2.17	.293
Number of child serves	5.62	4.93	3.33	1.86	-2.29	.282
Number of caregiver returns	3.19	3.09	1.67	1.75	-1.52	.263
Total Talk						
Use of Other Language						
Child or caregiver used any language	100%	.	100%	.	0%	.
Child used any language	91%	.	100%	.	10%	.452
Caregiver any language	100%	.	100%	.	0%	.
Total Conversational Turns						
Total number of conversational turns	9.05	7.97	8.83	4.12	-0.22	.950
Caregiver initiated, caregiver served	100%	.	100%	.	0%	.
Caregiver initiated, child returned	86%	.	100%	.	14%	.345
Child initiated, child served	76%	.	100%	.	24%	.200
Child initiated, caregiver returned	76%	.	83%	.	7%	.723
Number of caregiver serves	9.81	6.02	11.00	5.33	1.19	.666
Number of child returns	5.00	4.78	4.50	3.02	-0.50	.811
Number of child serves	6.81	6.42	6.67	4.13	-0.14	.960
Number of caregiver returns	4.05	4.24	4.33	3.62	0.29	.882
Shared Child-Caregiver Focus						
Number of times the caregiver and child are paying attention to the same thing	2.73	2.25	6.33	1.75	3.60	.002
Interaction Valence						
Neutral	53%	.	0%	.	-53%	.022
Positive	47%	.	100%	.	53%	

Exhibit F2. Observed Story Trails engagement

	Story Trails (*N* = 10)	
	Mean/%	*SD*
Engagement With Words or Letters in the Story		
Child or caregiver engaged with words or letters	**90%**	**.**
Child or caregiver read words or letters	80%	.
Child or caregiver pointed to words or letters	70%	.
Child or caregiver discussed content of story	60%	.
Child or caregiver had other engagement with words or letters	30%	.
Child engaged with words and letters	**80%**	**.**
Child read words or letters	30%	.
Child pointed to words or letters	50%	.
Child discussed content of story	60%	.
Child had other engagement with words or letters	30%	.
Number of times child read words or letters	1.20	1.93
Number of times child pointed to words or letters	0.80	0.92
Number of times child discussed content of story	1.50	1.65
Number of times child had other engagement with words or letters	0.40	0.70
Caregiver engaged with words and letters	**80%**	**.**
Caregiver read words or letters	70%	.
Caregiver pointed to words or letters	60%	.
Caregiver discussed content of story	50%	.
Caregiver had other engagement with words or letters	20%	.
Number of times caregiver read words or letters	4.00	4.00
Number of times caregiver pointed to words or letters	1.30	1.64
Number of times caregiver discussed content of story	1.10	1.60
Number of times caregiver had other engagement with words or letters	0.30	0.68
Engagement With Pictures in the Story		
Child or caregiver engaged with pictures	**100%**	**.**
Child or caregiver described pictures	50%	.
Child or caregiver pointed to pictures	90%	.
Child or caregiver discussed content of pictures	70%	.
Child or caregiver had other engagement with pictures	0%	.
Child engaged with pictures	**100%**	**.**
Child described pictures	40%	.
Child pointed to pictures	80%	.
Child discussed content of pictures	70%	.
Child had other engagement with pictures	0%	.
Number of times child engaged with pictures	0.80	1.14
Number of times child described pictures	2.00	1.56
Number of times child pointed to pictures	2.40	2.07

	Story Trails (*N* = 10)	
	Mean/%	*SD*
Number of times child discussed content of pictures	0.00	0.00
Caregiver engaged with pictures	**80%**	**.**
Caregiver described pictures	40%	.
Caregiver pointed to pictures	50%	.
Caregiver discussed content of pictures	70%	.
Caregiver had other engagement with pictures	0%	.
Number of times caregiver engaged with pictures	0.50	0.71
Number of times caregiver described pictures	1.70	2.11
Number of times caregiver pointed to pictures	1.80	1.75
Number of times caregiver discussed content of pictures	0.00	0.00
Engagement With Playful Learning Prompts		
Child or caregiver engaged with playful learning prompts	**50%**	**.**
Child or caregiver read playful learning prompts	50%	.
Child or caregiver engaged in activity from playful learning prompts	30%	.
Child or caregiver had other engagement with playful learning prompts	30%	.
Child engaged with playful learning prompts	**50%**	**.**
Child read playful learning prompts	30%	.
Child engaged in activity from playful learning prompts	30%	.
Child had other engagement with playful learning prompts	30%	.
Number of times child read playful learning prompts	0.30	0.48
Number of times child engaged in activity from playful learning prompts	0.90	2.18
Number of times child had other engagement with playful learning prompts	0.40	0.70
Caregiver engaged with playful learning prompts	**50%**	**.**
Caregiver read playful learning prompts	40%	.
Caregiver engaged in activity from playful learning prompts	10%	.
Caregiver had other engagement with playful learning prompts	30%	.
Number of times caregiver read playful learning prompts	0.70	1.06
Number of times caregiver engaged in activity from playful learning prompts	0.40	1.27
Number of times caregiver had other engagement with playful learning prompts	0.50	0.97

Exhibit F3. Intercept survey responses

	Comparison (*N* = 20)		Story Trails (*N* = 13)		Difference	
	Freq.	%	Freq,	%	Diff.	*p* Value [a]
Background Information						
Respondent relationship to the children						
Parent	1	37%	0.923	28%	-9%	.606
Grandparent	0	37%	0	0%	-37%	.173
Sibling	0	22%	0	0%	-22%	.450
Other Relative	0	41%	0.077	28%	-13%	.406
Survey language						.530
English	17	85%	12	92%	7%	
Spanish	3	15%	1	8%	-7%	
How did you get to the park today?						.157
Walk	10	50%	10	77%	27%	
Bike	1	5%	0	0%	-5%	
Car	9	45%	2	15%	-30%	
Walk + Bike	0	0%	1	8%	8%	
Do you live in this neighborhood?						.466
No	7	35%	3	23%	-12%	
Yes	13	65%	10	77%	12%	
Time planning to spend here today, in minutes (Mean, *SD*)	*M* = 66.75	*SD* = 28.99	*M* = 57.08	*SD* = 34.98	-9.67	.39
Prior Park Experience						
Have you visited this park before today?						.120
No	1	5%	3	23%	18%	
Yes	19	95%	10	77%	-18%	
How often do you visit this park?						.160
Several times per week	3	17%	5	50%	33%	
Once per week	7	39%	1	10%	-29%	
Twice per month	5	28%	1	10%	-18%	
Once every few months	2	11%	1	10%	-1%	
Once a year	1	6%	2	20%	14%	
Have you ever met other families or children here that you became friendly with?*						.65
Yes	13	68%	6	60%	-8%	
Somewhat	2	11%	2	20%	10%	
No	4	21%	2	20%	-1%	
Opinions on the Park						
Do you think that the park makes a good first impression for families?*						.101
Yes	8	40%	9	69%	29%	
Somewhat	8	40%	2	15%	-25%	
No	4	20%	2	15%	-5%	

	Comparison (*N* = 20)		Story Trails (*N* = 13)		Difference	
	Freq.	%	Freq,	%	Diff.	*p* Value [a]
Do you think that the park reflects the culture and values of the neighborhood?						.315
Yes	11	55%	5	39%	-17%	
Somewhat	2	10%	4	31%	21%	
No	4	20%	2	15%	-5%	
Not sure	3	15%	2	15%	0%	
Do you think the park is a place where children can learn?						.07
Yes	9	45%	10	77%	32%	
Somewhat	6	30%	2	15%	-15%	
No	5	25%	1	8%	-17%	
Would you say that this park is accessible for people with disabilities?						N/A
Yes	3	15%	6	46%	31%	
Somewhat	6	30%	3	23%	-7%	
No	8	40%	2	15%	-25%	
Not sure	3	15%	2	15%	-25%	
Story Trails Experience *Marconi Plaza activation only*						
Have you visited this Story Trail before today?						
No	.	.	9	75%		
Yes	.	.	3	25%		
Have you visited any other Story Trails in Philadelphia?						
No	.	.	10	83%		
Yes	.	.	2	17%		
Opinions on Story Trails *Story Trails sites only*						
Do you think that the Story Trail reflects the culture and values of the neighborhood?						
Yes	.	.	8	62%		
Somewhat	.	.	3	23%		
Not sure	.	.	2	15%		
Do you think that the Story Trail helps children learn?						
Yes	.	.	12	92%		
Somewhat	.	.	1	8%		

[a] *p* values are drawn from comparisons of "Yes" responses to all other responses.

Appendix G. Regression Results

Exhibit G1. Regressions predicting child-caregiver interactions from Story Trails

	Conversational Turns	Positive Valence of Conversation	Following the Focus
Story Trails	-0.35 (0.58)	0.22 (0.19)	1.07 (0.49)
Covariates			
Child race/ethnicity: White	*-0.48* *(0.44)*	*-0.13* *(0.29)*	*-0.36* *(0.50)*
Family speaks language besides English	*-1.01* *(0.56)*	*-0.29* *(0.22)*	*-0.35* *(0.66)*
Child is female	*0.23* *(0.51)*	*-0.27* *(0.24)*	*-0.02* *(0.50)*
Child is 5–8 years old	*0.18* *(0.46)*	*-0.06* *(0.26)*	*-0.46* *(0.54)*
Number of caregivers	*-0.14* *(0.15)*	*0.14* *(0.15)*	*-0.01* *(0.20)*
Number of children ages 0–8	*-0.28* *(0.17)*	*-0.15* *(0.11)*	*-0.05* *(0.19)*
Site: Mallery/Morton Playground	*-0.79* *(0.60)*	*-0.12* *(0.25)*	*1.42* *(0.78)*
Intercept	*0.75* *(0.68)*	*0.94*** *(0.29)*	*0.26* *(0.67)*
Number of observations	24	20	20

Note. Standardized betas are reported and can be interpreted as effect sizes. Models use robust standard errors, reported in parentheses. Child statistics refer to Child 1, or the focal child. Linear probability models are used for binary outcomes because the sample size was insufficient for logistic regression.
** $p < .01$.

Exhibit G2. Regressions predicting type of talk from Story Trails

	Uses Literacy Language	Uses Storytelling Language	Uses STEM Language
Story Trails	0.71***	0.41	0.49
	(0.14)	(0.21)	(0.25)
Covariates			
Child race/ethnicity: White	*-0.16*	*-0.14*	*0.19*
	(0.14)	*(0.18)*	*(0.32)*
Family speaks language besides English	*0.06*	*-0.39*	*-0.18*
	(0.13)	*(0.22)*	*(0.32)*
Child is female	*0.23*	*0.23*	*0.15*
	(0.15)	*(0.18)*	*(0.20)*
Child is 5–8 years old	*-0.04*	*0.09*	*0.00*
	(0.15)	*(0.14)*	*(0.14)*
Number of caregivers	*0.03*	*-0.07*	*-0.11*
	(0.06)	*(0.08)*	*(0.08)*
Number of children ages 0–8	*-0.12*	*-0.24**	*-0.10*
	(0.08)	*(0.09)*	*(0.09)*
Site: Mallery/Morton Playground	*-0.18*	*0.01*	*0.06*
	(0.19)	*(0.19)*	*(0.26)*
Intercept	*0.02*	*0.26*	*0.22*
	(0.13)	*(0.22)*	*(0.32)*
Number of observations	24	24	24

Note. Standardized betas are reported and can be interpreted as effect sizes. Models use robust standard errors, reported in parentheses. Child statistics refer to Child 1, or the focal child. Linear probability models are used for binary outcomes because the sample size was insufficient for logistic regression.
* $p < .05$, *** $p < .001$.

Exhibit G3. Regressions predicting child-caregiver interactions from Story Trails

	Time Spent at the Park	Visits the Park at Least Weekly	Lives in the Neighborhood	Has Met People at the Park
Story Trails	-0.64	0.03	0.10	-0.23
	(0.48)	(0.25)	(0.23)	(0.25)
Covariates				
Child race/ethnicity: White	*0.19*	*-0.05*	*0.11*	*0.53**
	(0.53)	*(0.26)*	*(0.21)*	*(0.22)*
Family speaks language besides English	*-0.01*	*0.08*	*-0.01*	*-0.10*
	(0.49)	*(0.27)*	*(0.26)*	*(0.29)*
Child is female	*-0.29*	*0.11*	*0.07*	*-0.19*
	(0.45)	*(0.22)*	*(0.23)*	*(0.23)*
Child is 5–8 years old	*-0.03*	*0.50*	*0.08*	*0.26*
	(0.43)	*(0.25)*	*(0.24)*	*(0.21)*
Number of caregivers	*-0.13*	*-0.15*	*-0.04*	*-0.02*
	(0.15)	*(0.11)*	*(0.11)*	*(0.12)*
Number of children ages 0–8	*-0.16*	*0.13*	*0.02*	*-0.10*
	(0.19)	*(0.16)*	*(0.13)*	*(0.15)*
Site: Mallery/Morton Playground	*-0.05*	*-0.05*	*0.00*	*0.20*
	(0.34)	*(0.37)*	*(0.25)*	*(0.30)*
Intercept	*0.23*	*0.30*	*0.60**	*0.44*
	(0.61)	*(0.28)*	*(0.27)*	*(0.23)*
Number of observations	27	24	27	24

Note. Standardized betas are reported and can be interpreted as effect sizes. Models use robust standard errors, reported in parentheses. Child statistics refer to Child 1, or the focal child. Linear probability models are used for binary outcomes because the sample size was insufficient for logistic regression.
* $p < .05$.

Exhibit G4. Regressions predicting type of talk from Story Trails

	Park Is a Place Where Children Can Learn	Park Reflects Culture/Values of Neighborhood	Park Makes a Good Impression
Story Trails	0.29 (0.19)	-0.13 (0.23)	0.20 (0.21)
Covariates			
Child race/ethnicity: White	*0.15* *(0.20)*	*-0.42* *(0.27)*	*-0.26* *(0.26)*
Family speaks language besides English	*0.40* *(0.21)*	*0.19* *(0.23)*	*0.29* *(0.25)*
Child is female	*0.24* *(0.16)*	*0.08* *(0.19)*	*-0.19* *(0.18)*
Child is 5–8 years old	*0.07* *(0.15)*	*0.05* *(0.19)*	*0.17* *(0.22)*
Number of caregivers	*-0.15** *(0.06)*	*0.04* *(0.10)*	*-0.14* *(0.08)*
Number of children ages 0–8	*-0.04* *(0.09)*	*-0.08* *(0.07)*	*0.08* *(0.08)*
Site: Mallery/Morton Playground	*-0.58*** *(0.17)*	*0.45* *(0.25)*	*-0.25* *(0.29)*
Intercept	*0.19* *(0.26)*	*0.66* *(0.32)*	*0.51* *(0.30)*
Number of observations	27	24	27

Note. Standardized betas are reported and can be interpreted as effect sizes. Models use robust standard errors, reported in parentheses. Child statistics refer to Child 1, or the focal child. Linear probability models are used for binary outcomes because the sample size was insufficient for logistic regression.
* $p < .05$, ** $p < .01$.

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