



CULTIVATING BEHAVIORAL CHANGE

HOW THE BUILT ENVIRONMENT CAN REDUCE STRESS
REACTIONS IN CHILDREN AND CAREGIVERS

Vannessa Behan
The Stay, Play + Learn Indoor Garden



GRANT OBJECTIVE

Vanessa Behan (VB) is a non-profit organization in the Pacific Northwest with the following mission: provide safety for children, strengthen families, and create a healthier community in an environment of unconditional love. Within a 700-square-foot space called the Stay, Play + Learn Indoor Garden that had not yet accomplished the aspirational goals for the space, NAC partnered with VB to explore the impacts of transforming it.

The Stay, Play + Learn Indoor Learning Garden is an indoor play area with scheduled play times for homeless families, “mommy + me” classes and other groups to gather with their youngsters, typically from birth to 12 years old. A trained Facilitator from VB is on hand to provide ‘in the moment’ behavior, development, and social support. The Facilitator helps caregivers connect, teach, and guide their children in real-time situations. These families that are often isolated have the chance to connect with others in similar situations. Although the space is relatively small, exploring the impact of thoughtful design on creating an environment of calm to support families was embarked upon with this grant.



VB space prior to program kick-off

The objective of this grant is to understand how physical space can support high-risk children and their caregivers in the demanding job of parenting.



VB, our partners in this grant project, help parents who are having difficulty providing safe shelter and care for their children. They may be dealing with issues as complex as substance abuse, domestic violence, and homelessness, or they may just be exhausted and worn-out from the demands of parenting.

Primary services include 24-hour free child care for infants and children under the age of seven, parent education, crisis counseling for parents, and referrals to other community agencies.

VB was founded by a grassroots effort in 1987 in memory of Vanessa Behan, a two-year-old who died from traumatic child abuse injuries. Over the past 34 years, the organization has impacted over 103,000 children and their families.

HYPOTHESIS



Kids building with blocks and "Robin's Nest"

ADVERSE CHILDHOOD EXPERIENCES (ACES)

Overshadowing the lives of millions for generations is childhood trauma. A topic that until recently was not often examined or studied, its impact is far reaching for many. Trauma can include many different types of negative events or circumstances that a child may experience in their life and are commonly referred to as ACEs or adverse childhood experiences. Common causes of childhood trauma can include neglect, physical abuse, separation from a caregiver, violence, poverty, accident, or death of a loved one.

Hypothesis: Environmental interventions of biophilia and personal control paired together will reduce stress reactions and increase feelings of safety in high-risk young children and their caregivers. In this state, they will be better able to engage in connection and learning.

"Trauma is ubiquitous. In the general population 67% of us have experienced at least one ACE. In people of color, that figure is more likely to be 83%." (echotraining.org) Research also suggests a strong link between ACEs during childhood and poor physical health as an adult. The CDC suggests that "preventing ACEs could reduce the number of adults with depression by as much as 44%." The good news is that ACEs can be diminished through interventions that increase protective factors in the family and community.

(2021 Center for Disease Control and Prevention.

<https://www.cdc.gov/violenceprevention/aces/riskprotectivefactors.html>)



Foam Blocks: Part play and part seat, these blocks will be used by children to create their own space.



Foam Pads: These organic shaped foam pads can be used by kids to create their own space and add to the biophilic theme of the space.



"Log" Bench: This bench enhances our focus on nature and provides a playful seat for kids and adults.

"Robin Nest": Laying flat it can be a fun play "nest" for small children or turned on it's side it becomes a good place for a child to feel secure and safe when in crisis.

Puzzle Table and Motion Stools: The organic nature of the table allows kids to select the right spot for them. Motion stools aren't just for the wiggles but can help kids deal with nervous energy as they do activities with their caregiver.

"Rock" Bean Bags: Both for kid seating and to enhance the nature theme within the space.

Adult Soft Seating: Adults need to have choice just like the kids in this space. Adults can choose to sit higher or closer to the floor and read a book or play with their children.



Small Table: A large group table could be overwhelming to a young child, so a smaller more intimate table will be provided to allow for individual choice.

Chair Meets Rocker: This dual use chair can also be a rocker providing options for kids.

Adult Chairs: With a wide seat this chair will serve as a place for child and caregiver to read together. Caregivers come in all shapes and ages and this style of chair can be used by a number of different types of people.

The above image was the initial design plan for the Stay, Play + Learn Garden which was submitted with the grant proposal. The design is focused on incorporating elements of biophilia and furniture that supports personal control and choice to reduce stress reaction in children and caregivers.

EVIDENCE-BASED APPROACH

The intent of the approach outlined below is to create an optimal, child-centered environment that will reduce stress and increase learning. Stress reactions in children and adults are activated when an event/activity is perceived as threatening or unfamiliar.

When stress reactions are reduced, individuals are more able to attend to their environment, engage actively, and make connections with others.

Stress reactions vary by individual and are often more pronounced in people with higher ACE scores. We propose that environmental interventions can reduce or ease this automatic response of the human nervous system by providing the experience of nature (biophilia) and personal control.



GROWING THE GARDEN

A family with two children (5) & (8), who struggle with transitions, frustration, and using objects appropriately without occasionally becoming destructive spent time in the space. The caregiver noted that the children built with the large blocks and movable furniture, cooperatively, for nearly 40 minutes before they started to fight. The caregiver was excited at the length of positive play, engagement, and cooperation that occurred.



GROWING THE GARDEN

The Stay, Play + Learn Garden is a relatively new program for Vanessa Behan. Visitors requested some additional enrichment activities for the children. A Cellist from the local symphony was engaged and has been regularly coming to the Garden to fill the space with music - and get those little feet dancing.

BIOPHILIA

There is a growing body of research that shows that incorporating natural elements into the built environment can improve health and wellbeing. When nature is not available, the use of natural analogues (such as natural textures, patterns, colors, and images) can positively impact physiological stress responses as well. This effect has been shown repeatedly in the education environment (Nature Inside: A Biophilic Design Guide, 2020, Catherin Ryan and William Browning).

Biophilia refers to the innate human tendency to connect with nature.

CONTROL OF THE ENVIRONMENT

We all seek control in our lives, whether it's in the choice of how our day is arranged or a late-night clean out of the kitchen junk drawer. Control can provide a moment of calm in a world that is ever changing. The events of the recent past have reinforced that element of human nature. We continue to see personal choice and control influence the technology and furniture markets as well. Examples range from an electric sit-to-stand desk at your office, to your Alexa helping complete your shopping list. Control is something that we naturally seek, but for those whose lives are in crisis, control may not be something that feels within reach.

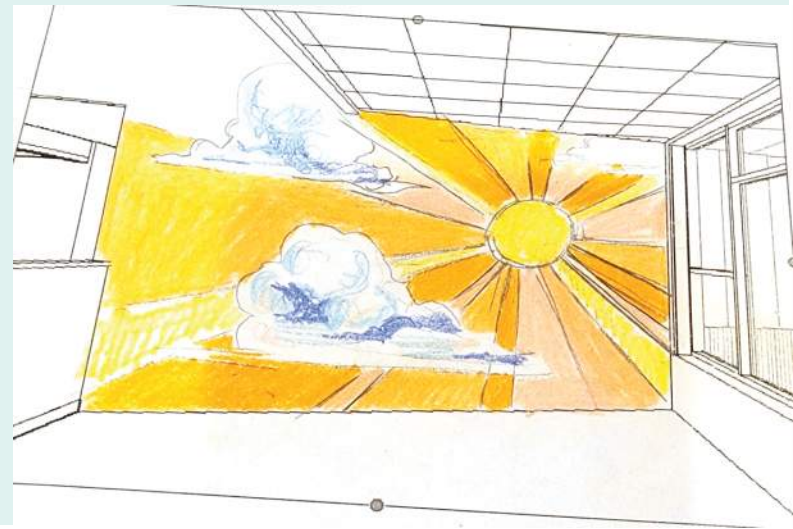
PROJECT PROCESS

THE MURALS

With a focus on creating a nature-inspired environment, the design team connected with local artist Toby Keough. Known for her vibrant, botanical-inspired art, Toby was the perfect fit for the project. A mother herself, Toby related to the mission of the space to support children and families.

During a walk, Toby came across a flower growing through the cracks in the street and was intrigued by the shape of the seed pod at the base of the flower. Upon further research, she discovered that the wildflower is called a White Campion.

The inspiration of something beautiful growing in a difficult situation resonated with Toby and the design team.

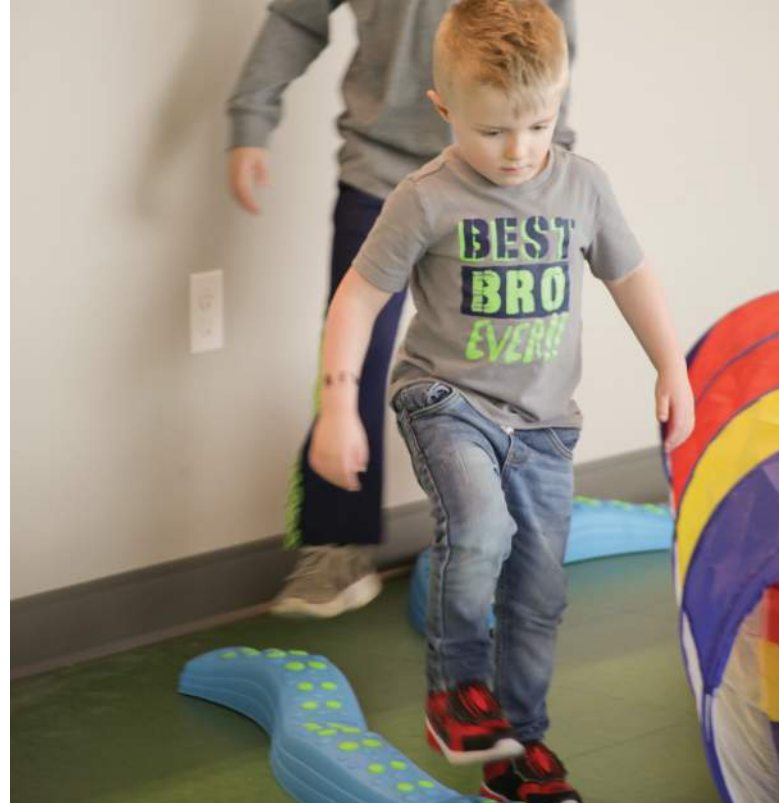


DATA COLLECTION PROCESS

As the design team waited for the space to be finished, attention was focused on the project data collection process and how to best understand the results of the stated hypothesis. A survey was developed for caregivers and children to take as they exited the space asking them to answer questions on how the built environment made them feel.

Privacy and discretion were critically important, so names were not requested. Due to the wide demographic of visitors, it was crucial that the survey be quick and intuitive for respondents to use.

Attention was given to ensure the survey was highly graphic for visitors for whom English may not be their first language. The survey used rating scales that included both numbers and visual faces, smiley to red frowny face, to help respondents communicate their current emotions. Wording of questions went through several drafts to ensure that questions were neutral and did not lead respondents toward any conclusions.

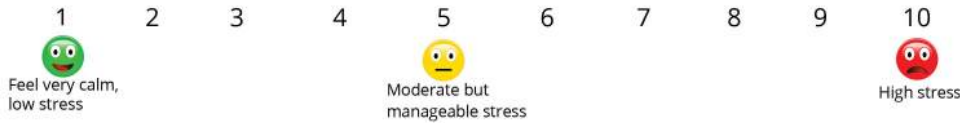


GROWING THE GARDEN

A parent came in wanting help with their little one's aggressive and difficult behaviors. During conversation with the family, information was shared that the parent was grieving a devastating personal loss. The child's extreme frustration and acting out decreased significantly with one-on-one direct engagement from the Facilitator, and the child was able to relax. The parent was able to take a break and receive some counseling and support during the visit. It is likely that the child's frustration came in part from being unable to reach the parent and engage with them because of the parent's grief. At the end of the visit, the parent and child were delightfully engaged in a lively game of "The floor is hot lava"!

Hello! Tell us about your visit:

a. Tell us how you felt prior to entering the space?



b. Tell us how you feel now exiting the space?



c. How did the Stay Play and Learn room make you feel?



d. Did you feel like you could use or adjust the Stay Play and Learn room as you wished?



e. Please circle up to (3) items that your child enjoyed using or playing with during their visit:



f. Please have your child choose the face that reflects how they feel upon exiting the space:



VBH Staff: _____ Length of Stay: _____ Number of Users: _____ Did Users Move Furniture In Space: _____

Because children and caregivers visit the Stay, Play + Learn Indoor Garden for many different reasons, it was important that the questions didn't suggest or assume families are necessarily stressed or in challenging circumstances. The goal of the program is to provide real-time parent support, which can benefit most families.

The questions focused on the topics of stress and energy levels of the families, as well as understanding if users felt they had control of the built environment, and which physical element their children engaged with the most.

Lastly, we asked children (with exception of very young children) how the space made them feel. Many of the questions from the survey are directed at caregivers. Understanding the caregivers' stress level can provide insight into the overall stress of the family.

Children are intuitive and can often identify that a parent is stressed without understanding the cause. Parents that can regulate stress and difficult emotions can then model those skills to their children and help them navigate difficult circumstances.

Example survey provided to visitors of SPL.

FINAL DESIGN & FLOOR PLAN

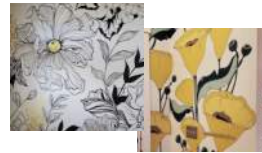
With biophilia and personal control the design focus, it was also important to the design team and VB that the furniture and fixtures specified within the space meet the demands of the Indoor Learning Garden. The demographic of visitors is broad, from homeless families to children with behavioral challenges that required the selections to be pragmatic. Items had to be cleanable, durable, and safe, as well as mirroring the natural world. The final design focuses on nature, with light fixtures in the shape of flowers and clouds in soothing off-white tones. Leaf-shaped acoustical panels reduce noise while referencing the natural world. A table with undulating edges was selected so children can choose where to sit at the table. Motion stools to help work out energy and/or nervous feelings.



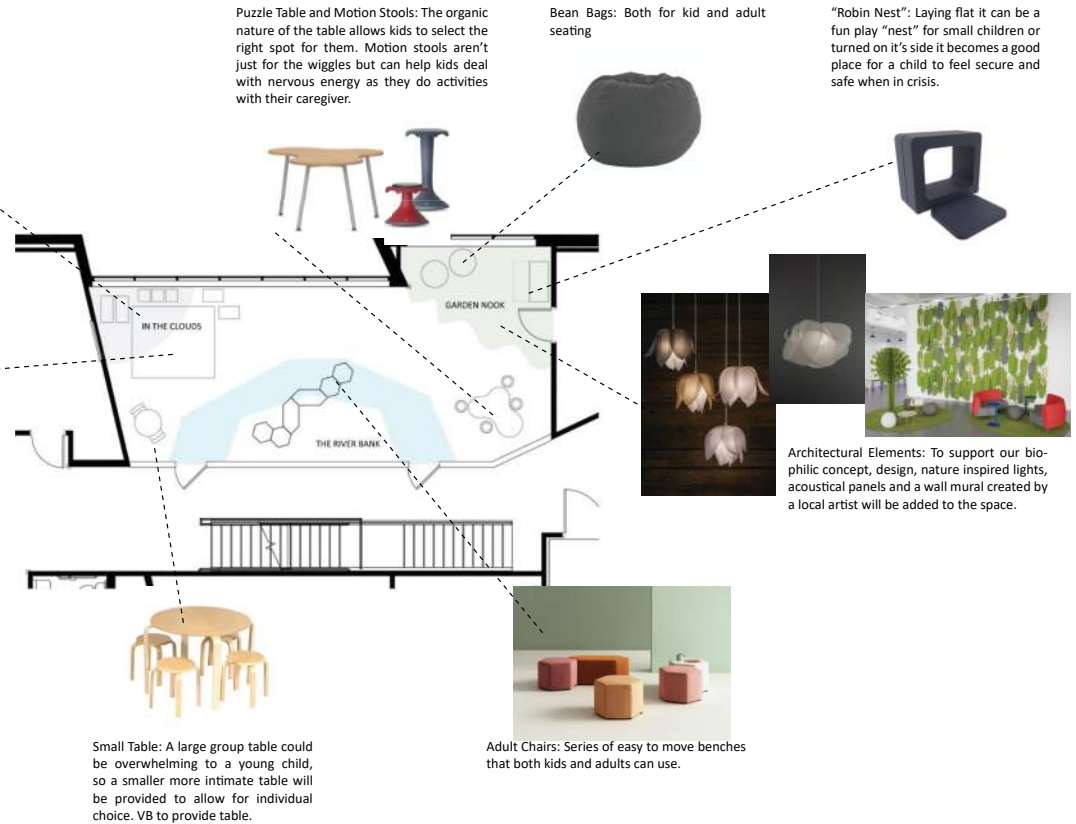
Foam Blocks: Part play and part seat, these blocks will be used by children to create their own space.



Foam Pads: These organic shaped foam pads can be used by kids to create their own space and add to the biophilic theme of the space.



Toby Keough: Suggested muralist for project. Extents and subject TBD.



Durable, double-lined bean bags provide both comfort and ease of movement. A "Robin's Nest" performs double duty as a cozy place to tuck in and read as well as play. Large building blocks allow for children to build forts and create their own space or create a cozy spot to read or play a game.

Prism benches inspired by rocks provide a place for parents and the Facilitator to sit and connect with kids as they play or for "mommy and me" classes. Flower and sky murals at either end of the space emphasize nature and create excitement for children.



Finished space waiting for families to enjoy.

BUDGET & FURNITURE - PRODUCT DELIVERY CONSTRAINTS

During the grant application process in the Spring 2021, the outlook of the current pandemic was optimistic that perhaps our communities had turned a corner. As another wave of COVID-19 impacted our nation in July and August 2021, it had a dramatic effect on already struggling timelines from manufacturers. These challenges in receiving products reduced our planned data collection period by approximately four to five weeks.



Space prior to design interventions.

FINISHED SPACE



Table and motion stools serve as a great place for art and games as kids connect with caregivers.



For homeless families a cozy spot to read is often a luxury.



Flower lights and mural help inspire imaginations.

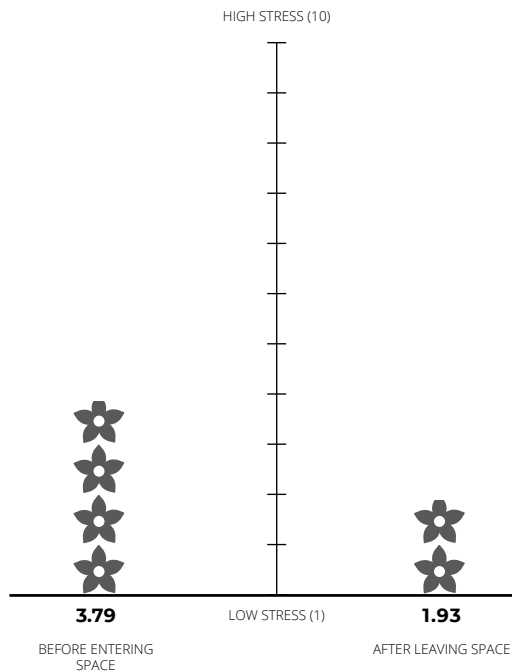


Moveable furniture allows for multiple groups to use the space.

RESULTS



Questions A & B requested visitors to rate their overall level of stress, according to the provided scale of 1 to 10, at their time of entry and again at their time of exit. The average rating at the time of entry was 3.79 (SD=1.50) with five (5) being the most frequently reported rating. While the average respondent was reporting moderate stress when entering the space, the average rating at the time of exit was 1.93 (SD=1.13) with one (1) being the most frequently reported rating. This amounts to an average 1.86 reduction in reported stress after a visit to the Stay, Play + Learn Indoor Garden (SPL).



A Wilcoxon Signed-Ranks Test was performed to compare the mean entry and exit ratings for Items A and B. The test indicated that the “Entry” stress level was rated more highly than the “Exit” stress level at a statistically significant level $Z = 4.89$, $p = <0.00001$. This demonstrates that the SPL serves as an effective intervention for reducing overall levels of stress of the respondents.

The data collection period ran from November 2021, through February 2022, with 29 families visiting the space for a total of 83 individual users.

The most frequent number of simultaneous users in the space was three visitors (a family) plus the Facilitator, and on average users stayed for about 90 minutes.



GROWING THE GARDEN

As many understand, the Pandemic has caused significant amounts of stress and damaged connections for many families. This sentiment was repeated by many of the visitors during the study. The simple act of families coming to the SPL and talking, engaging, and playing with one another and other families has lightened the heavy burden of isolation many have experienced.

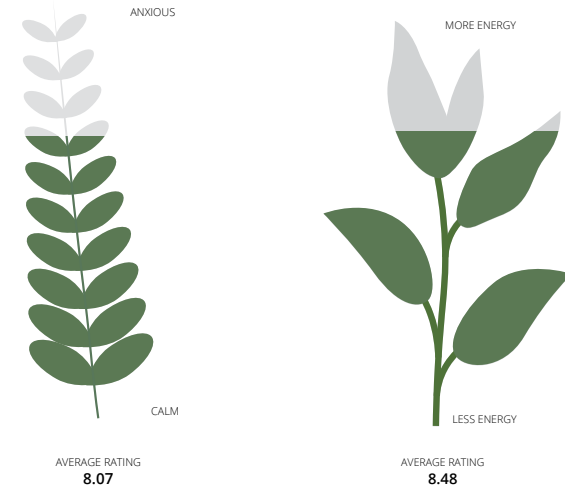


GROWING THE GARDEN

A primary goal for the program is to provide parenting support for families. In a safe environment such as the Garden, suggestions or modeling of parenting structure can be very effective if the parent or caregiver is not feeling overwhelmed or judged. The nature-inspired environmental theme helps create a calm space that allows the Facilitator to build a relationship with the families. They can then help model positive parenting techniques. It may be as simple as helping a parent navigate the child not wanting to leave the Garden. A few minutes of showing the parent a kind but firm way to handle the situation can truly resonate. Those techniques are often used again outside the center with the hope that the parent will build the skills to provide structure and boundaries when needed. Thus, the child will become more regulated. When children feel safe and understand boundaries, it can help support a happier life at home and school.



In **Question C**, 29 visitors completed the Anxious-Calm scale and reported an average rating of 8.07 (SD=1.53), with a range of 6 through 10. This demonstrates that users are leaving the space feeling “more calm” on average. Twenty-seven (27) respondents completed the Energy scale and reported an average rating of 8.48 (SD=2.00), with a range of 5 through 10. This demonstrates that users are leaving the space feeling “more energized.”

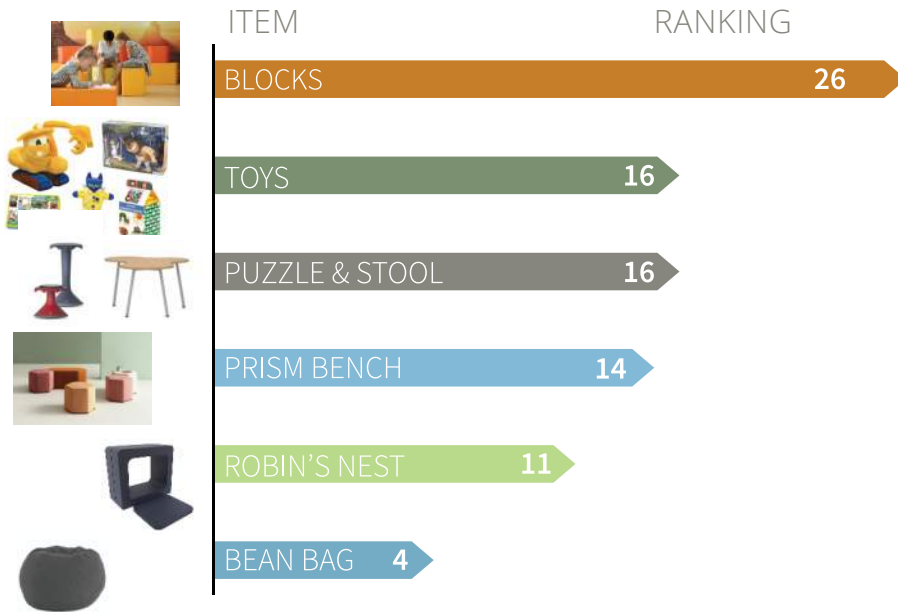


Question D asked, “Did you feel like you could use or adjust the Stay, Play + Learn room as you wished?” Twenty-nine (29) respondents provided a response to Item D. To gain a sense of whether the families felt a sense of agency (feeling in control) while in the space, they were asked to rate how they felt related to their ability to adjust the furniture in the space. On a scale of 1 to 10, the average response was 9.62 (SD=1.68) with the highest number of respondents choosing a rating of 10 “I adjust furniture etc. to make the room work for me and my child.”





Question E requested respondents to select up to three of their child's favorite items to use while in the space. The top three items favored by the children were the Foam Pads and Blocks, the center-provided toys and games, and the table and stools. The bean bags received the lowest rating.



Question F. The respondent was prompted to have their child circle one of five different colored faces. Each one shows a different expression ranging from upset to happy, asking them to show how they feel at the time they are exiting the space. The twenty-nine (29) responses all selected the two happiest expressions provided on the scale.



GROWING THE GARDEN

With only 700 square feet allocated for the SPL space, it was important that furniture items were easy to move and could serve multiple purposes. A ten-year-old who struggles to regulate her body movements and keep play appropriate used the "Robin Nest" furniture item to rock back and forth. The secure feeling of the nest allowed her to self soothe for an extended period of time. Upon leaving she requested to come back to the Garden so she could sit in the nest again because it "felt so good to move like that". Other kids later took the same nest furniture and turned it into a boat, and then a hot dog & coffee stand.

SUMMARY

Respondents experienced a measured drop in stress level from their initial stress level when entering the space and reported feeling calmer and more energized. This demonstrates that the built environment serves as an effective intervention for reducing stress levels.

The trend across the data suggests that space when paired with effective training and emotional support can lead to positive experiences that reduce stress in children and caregivers. Space alone cannot overcome generational trauma that may include neglect, poverty, or substance abuse, but this study does start to highlight that thoughtful design can support stress reduction in children and parents.



The reduction of stress within the body may allow for more impactful services, training, or counseling to occur with the potential to reduce the likelihood of additional ACEs occurring in a child's life. The products and graphics placed in the Stay, Play + Learn Indoor Garden were not expensive and could be easily added to other spaces or programs that support children.

Prior to the COVID-19 Pandemic, one in six adults experienced four or more types of ACEs as documented by the CDC. COVID-19 impacted everyone in our communities, and the stress of the pandemic on children and families is still not fully understood. But it is likely that the need for services and support will not decrease, and the built environment can be an important tool in combating trauma in our community.

Additional study will need to occur, but the data suggests that this approach to space could have impacts in many public spaces including, schools, healthcare facilities, daycare facilities, and civic buildings.



THE WORLD CAN ALWAYS BE MORE HUMANE. WE CULTIVATE CREATIVITY AND EXPERIENCES TO MAKE EVERYONE IMPORTANT, INCLUDED, INSPIRED. NAC IS A MISSION-DRIVEN FIRM WITH A PASSION FOR ENGAGING COMMUNITIES. WE WORK TO ADVANCE LEARNING, ENHANCE WELLNESS, AND ENRICH LIVES.

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