

EXPLORING THE IMPACT OF GARDEN-BASED LEARNING ON CHILDREN'S
MENTAL HEALTH

by

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ABSTRACT

This study aimed to examine the impact of garden-based learning on children's mental health within Fort Worth Independent School District (FWISD)'s Morningside Elementary School. This study included individual interviews with Morningside teachers and a Qualtrics demographic data survey. The survey included gender, grade taught, years taught, and the Nature Relatedness Scale-6 (NRS-6), which measures one's connectedness to nature. The interviewer and teachers discussed students' behaviors before and after they spent time in the school garden and any teacher observations regarding the school garden. The interviews were held on Zoom per Centers for Disease Control and Prevention guidelines, and thematic content analysis was used to extract meaning from the data. Five main themes were identified: increases in attention and focus, self-confidence and resilience, physical health benefits, academic performance, and suggestions for sustainability. Garden-based learning can increase children's attention, self-confidence, physical health, and academic performance. Teachers suggested that bringing academic instruction outside into the garden and involving the community could improve garden usage and sustainability. Integrating lessons into the school garden is a simple and cost-effective way to improve the health and resilience of young children.

Introduction

School gardens have been a resource used by many elementary schools to achieve academic outcomes, such as learning about science and growing different types of fruits and vegetables (Bert et al., 2018). Emerging research suggests that school gardens may also improve students' mental health and that time spent in nature enhances elementary schoolers' attention, focus, and overall wellbeing (Johnson et al., 2019). The project aims to examine the impact of garden-based learning on children's mental health within Fort Worth Independent School District (FWISD)'s Morningside Elementary School. The project team aims to explore teachers' perceptions of the school garden and how time spent in a school garden can impact children's mental health.

Significance

Two significant issues that are facing the new generation of children are a decline in mental health due to the COVID-19 pandemic and an increased incidence of attention/hyperactivity disorders, leading the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, and the Children's Hospital Association to declare a national emergency regarding children's mental health amidst the pandemic (American Academy of Pediatrics, 2021). At the same time, the US Surgeon General released an advisory on mental health among children (American Academy of Pediatrics, 2021). In fact, from January 2019 to January 2022, emergency department visits due to mental health issues rose 24% among children ages 5-11 and 31% among children ages 12-17 (Radhakrishnan, L et al., 2022). Evidence indicates that children are experiencing increases in anxiety, depression, OCD, eating disorders, and more. Therefore, early intervention and evidence-based prevention are crucial.

Early intervention is also necessary to address the increasing incidence of ADHD in the United States. ADHD is the most common psychiatric disorder diagnosed in children, and according to Getahun et al., in 2019, ADHD affected 4% to 12% of children, and these rates are rising. These children have difficulty sitting still in classroom settings with limited ability to focus. There is a great need, especially now, for interventions used in the school setting.

Theoretical Framework

This research is based upon the Attention Restoration Theory, proposed in the 1980s and 90s by Rachel and Stephen Kaplan (Kaplan, 1995). They theorized that time in nature was restorative to humans' attention and focus. The premise of the ART is that one can only direct attention toward a specific object or idea, while also ignoring irrelevant stimuli, for a limited amount of time. Focusing on a task that consumes significant attention resources or is intrinsically uninteresting fatigues our direct attention. Evolutionary, this proves to be true. When our ancestors focused on one object or idea for an extended time, they were vulnerable to attack. A long time ago, intrinsically interesting objects, such as wild animals, were the most important. Similarly, what is most important in modern times, like studying for exams or submitting project proposals, is not always intrinsically interesting, and we must use our direct attention capabilities to avoid the distractors (Kaplan, 1995).

Numerous researchers have demonstrated that time in nature can improve attention, cognitive function, and memory (Stevenson et al., 2019). These components are all parts of the ART, with the hypothesis that nature is restorative, providing a sense of "getting away" from one's world. Natural environments provide calming stimuli that are intrinsically interesting and soothing to humans' subconscious. Nature, throughout history, has provided a fascination for our

minds to take a break from the direct attention that frequently consumes us (Kaplan, 1995). Therefore, our mind is wired to “reset” when in nature.

Review of the Literature

The following databases were used to search the literature: Medline Complete, CINAHL Complete, and Cochrane Library. The following search terms were used to identify the literature on nature and children’s mental health: *school garden, attention, children, ADHD, mental health, nature, and garden*. Only literature published in English and full articles were considered. Findings from the literature review are organized by themes appropriate for this plan of study and include attention, self-confidence/resilience, and garden sustainability.

Attention

Researchers in Canada implemented a quasi-experimental study design to examine the benefits of school gardens and their associated effects on children’s attention (Johnson et al., 2019). Using the ART as a theoretical framework, Johnson and his colleagues hypothesized that time in nature can help restore endogenous attention in children. Endogenous attention was operationalized as directed, voluntary attention, measured using the Combined Attention Systems Test (CAST). The research staff assigned 60 children into two groups: one took a walk through an urban environment, and the other walked through a more natural environment (a park). The CAST test was conducted both before and after the walks to measure the attention of the sample. The researchers found that the nature group’s average endogenous attention increased ($p = 0.85$, 95% CI), while the urban group’s average endogenous attention decreased or stayed the same. These statistically significant findings demonstrated that time in nature improved endogenous attention in this sample of 60 children (Johnson et al., 2019).

Also using the Attention Restoration Theory (ART) as a framework, Lam et al. (2019) used photovoice methods to conduct a qualitative study examining 16 high school students' experiences in their school garden. In this study, the students took pictures of their time spent working in the school garden and were later asked to reflect on them in focus groups. Data analysis was later done to code the transcripts and identify themes. The results of this study led to the conclusion that time in the school garden did, in fact, help with attention in this sample of high school students. Students conveyed that focusing on small, relatively easy gardening tasks helped them focus (Lam et al., 2019). School places high cognitive demands on children, so they perceive time in the garden as a way to direct their focus away from the emotions and thoughts of everyday life and complete simple tasks.

Self-confidence and Resilience

Another benefit of children spending time in school gardens is the development of self-confidence and resilience. One team of researchers studied children's interactions with nature at the Jemicy Elementary School in Baltimore. They used ethnographic research methods, including observing the children, taking field notes, interviewing them, and interviewing the teachers and parents. The students at the school had various options for their recess play, but these researchers focused on observing the students who chose to spend their time in the wooded area. After qualitative data analysis, they found that the students who chose to play in the woods showed decreased stress levels and problematic behavior, a sense of autonomy, and improved problem-solving skills (Chawla et al., 2014). The researchers anchored their research to Ulrich's psycho evolutionary theory stating that time in nature is restorative because our environment is associated with our ancestors' survival long ago. Physiological stress levels drop when we are in nature, and there is a rise in feelings of mental wellbeing (Chawla et al., 2014).

In the photovoice study with high school students, Lam et al. (2019) observed improved self-confidence from gardening. The gardening tasks were enjoyable and not extremely difficult, and participants reported taking the time out of the school day to do these things was soothing and comforting. Since they could see the direct impact of their work in the garden, they became empowered and confident in their abilities. The researchers identified themes of relaxation, improved overall wellbeing, self-confidence, and a sense of mastery (Lam et al., 2019).

Garden Sustainability

School gardens provide many advantages to students; however, they are often hard to sustain and fund over time. Burt et al. (2018) researched barriers that school gardens face and ways to sustain the gardens. Researchers sent out a 29-item survey to 99 school gardeners from 15 states, including qualitative and quantitative questions. Findings suggested the most common barriers were a lack of funding, community support, and time. One of the leading suggestions from participants to address these obstacles was integrating garden-based learning activities into the school's curriculum. Teachers would still be able to stay on track with lesson plans and benchmarks while their students could reap the numerous benefits of time in the school gardens. Participants identified curricular connections in the school garden in health, biology, and physical education learning standards. Participants also reported the importance of administrator perceptions of gardens as a significant way to improve children's academic performance, health, and mental wellbeing in order to prevent the gardens from being eliminated. All school stakeholders, including those in under-performing schools with fewer resources, can strategize for sustainability to obtain a garden's total return on investment.

Another idea for sustainability was to reach out to communities and develop partnerships with local businesses, food banks, and nonprofit organizations. Volunteer opportunities for

organizations in the community, advertising, partnerships with shops, and other things of this nature can help a school garden strengthen relationships with people in the community and keep it sustainable.

Methodology

Design

This research was a qualitative study that examined the impact of garden-based learning on children's mental health and focus in class. The study is part of a larger nature-based health promotion project, RxPLORE™: Prescribing Life Outdoors and Real Exploration, that started at Morningside Elementary School in Fort Worth, Texas, in the fall of 2019.

Sample/Setting

This descriptive study includes subjective data from the teachers at Morningside Elementary school through interviews designed to gain teacher insights/perspectives on the effects of a school garden on children's mental health.

Inclusion criteria were being a teacher/assistant at Morningside Elementary School. Additionally, teachers needed to be 18 years of age or older to participate in the study.

Recruitment Procedure

Recruitment proved to be a challenge during this research study, so the research team used various methods to connect with Morningside teachers. First, the research team reached out to the Morningside Elementary Principal and asked to speak at the first teachers' meeting in the fall. After this presentation, the principal sent an email addressed from the research team (Appendix A) to all teachers explaining the research and inquiring about teacher participation. After receiving emails from interested teachers, the research team emailed them individually to set up a date and time for their interview.

Consent

Informed consent was obtained through detailed consent forms (Appendix B). The teachers completed the consent form and emailed them back to the study team, where they were kept in a password-protected Box folder, only accessibly to the PI and Co-PI.

Responsible Conduct of Research

Members of the research team completed the CITI Training for Human Subjects Research and followed all guidelines for the ethical conduct of research. The team also received study approval from the affiliated institutional review board (IRB) and Fort Worth ISD.

Data Collection

The research team obtained completed consent and survey forms from the participants before the focus group. The demographic data survey (Appendix C) took about 5 minutes to complete and provided general information about each participant.

Each interview was about 15-20 minutes long and was conducted via Zoom during non-school hours. The research team scheduled each interview in collaboration with the teachers and accommodated their schedules. The teachers and researcher discussed topics related to nature's influence on children's mental health. More specifically, teachers spoke about their perceptions of the garden's impact on their students' focus and attention in class, the pros and cons of garden time during school hours, and ways to increase the utilization of the garden. The Zoom software transcribed each interview, and the research team analyzed the audio transcript following the interview. A semi-structured interview guide is found in Appendix D. Teachers were given a \$25 Amazon gift card as compensation for their time if they completed the survey and participated in the interview. These funds were graciously provided by TCU Nursing's Elizabeth Brackin Allen Endowment Fund.

Measures

Qualtrics survey items included grade taught, gender, race, area of collegiate study, number of years of teaching experience (in general and at Morningside), and a few questions about their utilization of gardens at the school and home. It also included the Nature Relatedness Scale-6 (NRS-6), which assessed their perceptions of nature. This scale is comprised of 6 questions (listed in Appendix B), and it drew from the earlier 21-item Nature Relatedness scale. Elizabeth Nisbet and John Zelenski created the NRS-6 in 2013 as a shorter, easier-to-use tool to measure one's connectedness to nature. Research has shown that objective contact with nature does not predict one's connectedness to their natural environment, so this scale has been helpful in studies of sustainability and human wellbeing (Nisbet & Zelenski, 2013). The new NRS-6 can be applied in various research projects, and convergent validity with the original NR scale was 0.64 to 0.75 (Nisbet & Zelenski, 2013). Nisbet & Zelenski (2013) concluded that the six questions still accurately assessed differences in nature-relatedness while remaining quick and simple.

Data Analysis

The demographic data were extracted into an excel file and organized. Descriptive statistics were used to interpret demographic data from the sample, using IBM SPSS Statistics version 26 (IBM Corp, 2019).

The Zoom focus groups were all recorded, and the meetings were transcribed verbatim by the Zoom software. The research team used thematic content analysis to make sense of the data (Vaismoradi et al., 2016). Codes were assigned to common ideas and phrases used, and these codes were compiled into an Excel sheet and organized. Similar codes were grouped and

combined into themes. These themes helped to shape the final narrative, and meaning was extracted from the data collected.

Results

Sample

There was a total of five participants in the research study. The sample consisted of female teachers at Morningside, and they taught Pre-K (20%), Kindergarten (10%), first grade (10%), and third grade (10%). There was an extensive range of time spent teaching (1-27 years) and teaching specifically at Morningside (1-14 years). The average length of teaching was 9.8 years, with an average of 5.2 years taught at Morningside. The majority of the teachers were Caucasian (60%), but one was African American, and one was Hispanic. Three of the five teachers studied Education in college and graduate school.

The average Nature-Relatedness Score (NR-6) was 3.8 (range of 3.0-4.2). This result indicates that the teachers have a slightly above-average connection to nature.

Themes

There were five main themes extracted from the research, and they are listed below.

Mental Health Benefits

The first theme that emerged was an improvement in focus and attention in the children after spending time in the garden. One of the ways the garden may improve focus in children is by allowing a space for them to combat restlessness. One of the teachers stated, "I feel like it kind of combats some of that restlessness and allows for that break. Then going back inside, they are able to focus and get work done." Adults are able, for the most part, to step out of a situation when they are feeling restless or anxious and compose themselves before stepping back in. However, children in the school setting do not often have that ability. Allowing the children to

have a break to get some of their energy out has the potential to improve their attention capabilities in the classroom. Another teacher stated, “I know my kids do act better after they've gone outside... I spent a lot of time outside, and I know that after being able to get my energy out and do everything outside, it was just easier to focus on whatever I was doing.” This idea reinforces Kaplan’s Attention Restoration Theory; our direct attention can only focus on one object or idea for a limited amount of time before it fatigues. Time in nature can help restore this attention because nature inherently stimulates our indirect attention (Kaplan, 1995).

In our sample, 80% of the teachers stated that they have, in fact, seen an improvement in their students’ behaviors after spending time in the garden, and 60% of them said that they have specifically seen an improvement in focus after the garden time. One of the teachers said, “They may have a hard time self-regulating in the class, but once they get outside, and they're able to use that shovel or that hoe or weed and be able to use their hands in a more constructive way, it kind of calms them down. You can just see how happy they are.” Spending structured, productive time in the garden can improve self-regulation in these children, which is an essential life skill that they will need to use throughout their lives. Being able to get their energy out in a constructive way, as this teacher says, is an excellent opportunity for these children.

The second theme related to mental health is an improvement in the confidence and mental well-being of the children. Every teacher stated that they believed spending time in the garden had mental health benefits for these children. There are many contributing factors to this, from a boost in confidence to just the simple impact of fresh air and a change in routine. In addition, 80% of the sample described their students as being more confident after spending time in the garden. Also, the joy and enthusiasm on the students’ faces provide some evidence that the garden can improve their mental health. One teacher explained, “They're outdoors. They can

learn so much from the garden, and then there's just something about being outside, and being able to interact with nature, that just gets them in that positive mood." After school, the study team spent time in the garden and saw the joy that the children possessed there. Each of the teachers emphasized that the children's happiness while in the garden is a reason to work to sustain it and integrate it into schooltime.

Physical Benefits of the Garden

One great contributor to mental health is physical health. Improving one's physical health is a way to improve his/her mental health (Ohrnberger et al., 2017). After researching garden-based learning's impact on mental health, the study team found it to be a great way to improve physical health. In addition to the physical activity that accompanies the garden time, introducing new foods to these children is a benefit of the garden. Up to 80% of the teachers said that they believed spending time in the garden increases their students' interest in trying new foods. Since most of the foods grown in the garden are fruits and vegetables, garden-based learning has the potential to improve the diets of these children.

Morningside Elementary is located in a "food desert," which is a term that describes an area in which there is a lack of access to healthy foods. In the United States, areas with a high percentage of minorities and lower socioeconomic status households are frequently considered "food deserts" (Beaulac et al., 2009). There is a higher proportion of unhealthy food options in the Morningside Elementary area, such as fast food, than healthy options, such as grocery stores and fresh produce markets. The school garden at Morningside can be advantageous for these children because it can introduce them to fruits and vegetables. Many of the teachers said that their students can eat the foods they grow when harvested. This ability has the potential to

increase the children's resilience when it comes to food intake. As expressed by the teachers, the students are more likely to try new and healthy foods if they grow them in the garden.

Academic Integration and Benefits

Elementary school teachers can utilize school gardens to teach their students about more than just gardening and planting. Our study sample mentioned they have taught various lessons such as science, math, reading, and writing. There are flexible seating options such as benches and shaded areas. 80% of the sample said that they can easily integrate academic lessons into the garden, and 60% stated that they have actually seen an improvement in academic performance after learning in the garden. Part of this may be attributed to the sensory and kinesthetic learning that often occurs in the garden. One of the teachers stated, "When they interact with something and they get to touch it, feel it, smell it, use all their senses. It just helps them learn it better. They retain it a lot better." Using different teaching methods raises the probability that the students will remember that material, so the garden can be an easy tool to help achieve that goal.

One of the teachers mentioned that time in the garden helps lower their students' "affective filter," making it easier to retain information. The term "affective filter" was coined by linguist Stephen Krashen, who believed that students learn best in low-anxiety situations. He stated that positive emotions/feelings lowered the affective filter, and then knowledge/input would be able to flow into the brain easier. When the learner has negative feelings like stress, anxiety, or a lack of motivation, his/her affective filter is higher, which impedes the flow of knowledge (Bailey et al., 2021). The Morningside teachers use this term to emphasize that the garden can be used to lower the children's affective filter by decreasing stress levels and fostering positive mental health. Therefore, the students can learn better and retain more information.

Teacher Suggestions for Sustainability

Even though the Morningside school garden has many benefits for the children, there are still barriers preventing it from being used as much as possible. 80% of the teachers said that there is a lack of knowledge among teachers and administrators about the specific benefits of the garden. These teachers suggested that there be more teacher and administrative education about how using the garden can improve focus in class, mental health, and academic performance. If these teachers understand that incorporating lessons in the garden can actually increase test scores and improve focus in the classroom, they would more likely utilize this garden. Also, one teacher recommended that the administration should create some sort of incentive for teachers to bring their classes into the garden, such as a competition with prizes.

Another barrier the teachers mentioned was scheduling and timing. They suggested that a schedule be created to set specific times for classes to be held in the garden. If there was a master garden schedule, teachers would likely feel less overwhelmed and would be able to plan their lessons accordingly.

The last barrier that was mentioned was a lack of teacher support/help. Teachers, especially newer teachers, often feel overwhelmed bringing a group of 20 to 30 students into the garden by themselves. They suggested that bringing in outside help/volunteers would ease much of their own stress, and there would be more supervision for the children. Morningside is partnering with Blue Zones (2022), a wellness organization in the community. The Blue Zones gardener, Mary Jo Greene, will be visiting Morningside more frequently to help with lessons in the garden, garden cleanups, and the after-school garden club. If teachers have the support they need, they may be more likely to integrate academic lessons into the garden.

Teachers also suggested that the community should be involved to increase the garden's sustainability in the long run. Promoting the garden on social media, hosting community events on the weekends, and encouraging teachers and students to bring their families to these community events are great ways to bring more awareness and attention to the garden. All of the teachers stated that there is significant potential in the school garden, but it does need work. The community can be a valuable tool to beautify the garden and teach others about the benefits of both learning and playing in nature.

Discussion

Overall, garden-based learning has the potential to improve children's attention and focus, mental health, physical health, and academic performance. The study results supported Kaplan's 1995 Attention Restoration Theory and the findings from Johnson et al.'s research in 2019, which was focused on studying children's attention after spending time in nature. Most of the teachers have seen an improvement in attention after garden time, as time in nature helps to decrease direct attention fatigue (Kaplan, 1995). Also, every participant strongly believed that time in the garden could improve children's mental health in some way. Completing small gardening tasks can create a sense of accomplishment in these children (Lam et al., 2019), and these teachers could observe this as well. In addition to confidence-building, spending time in the garden allows these children to refine problem-solving skills and increase autonomy, which was also demonstrated in Chawla et al.'s study in 2014. The teachers also suggested ways to make the garden more sustainable and to involve more of the community. Similar to Burt et al.'s (2018) research, the teachers identified strategic use of social media and promoting the garden workdays in the community to increase garden usage and knowledge.

None of the teachers said they could think of any disadvantages to time spent in the garden. Garden-based learning can be implemented in so many different ways, and each school may have a different way they go about integrating lessons into the garden. School gardens may be challenging to get started, but many schools have spaces that are partially developed but underutilized. Spreading knowledge about the variety of benefits time in the garden has for these children may hopefully incentivize schools to utilize their gardens more and start bringing academic lessons outside. Outdoor learning can be highly beneficial for these students, as it lowers their “affective filter,” incorporates sensory learning, and improves mental health along the way. Students can then return to class in a more focused state and potentially even do better on quizzes and exams due to the outdoor learning. Even schools that do not have gardens can use this research to incorporate more learning outside. A simple lesson on the benches outside or sitting on blankets on the grass can give children a “brain break” and utilize their indirect attention that is used when one spends time in nature (Kaplan, 1995).

This study contributes to the idea that time in natural settings can improve one’s resilience. These results are essential because Morningside Elementary School in Fort Worth is in a low-income area. Many of their students face stressors regarding inadequate parental supervision, food insecurity, financial difficulties, and more. A functioning school garden would give them an area to improve their mental health and build resilience, significantly improving their lives in the long run.

Limitations/Challenges

This study had some limitations, the most notable being the COVID-19 pandemic, a small sample size, and the social desirability bias. Conducting research during a global pandemic was a very lengthy and challenging process, especially when dealing with human subjects. This project

development began in January 2021, and the research was not completed until April 2022. The original plan looked completely different from the final product, primarily because the pandemic put high restrictions on conducting human research. The research team was originally going to conduct an experimental study focusing on the effects of nature on children's attention in class, and software such as the CAST test would be used to measure attention. However, during the summer of 2021, Morningside Elementary School reported that no research could be conducted on school property due to COVID-19. The entire research plan had to be changed and adapted to an online format. After the new proposal was completed, the project had to go through an extensive risk review and approval through TCU IRB, which took a few months. After this, the research team needed to go through Fort Worth ISD to receive their approval. This process took a few more months, and participant recruitment did not begin until the beginning of December 2021.

Teacher participation proved to be a challenge in this study, as only five teachers participated after months of recruitment. Teachers have endured extra stress and hardship due to the pandemic, and even considering the \$25 compensation, an undergraduate research project is not at the top of their priorities. The study team was very thankful for the participants, and the teachers provided instrumental insight. However, more teacher involvement may have boosted interest in the garden and made the findings more relevant to a larger percentage of the faculty. Even so, this small sample provided useful information that the school can apply.

The social desirability bias came into play in this research, as well. This type of bias is present when participants answer questions in a way that will seem favorable to others. Each of these teachers assumed that the garden had benefits for these children since it was the research project's focus. Since the study team is passionate about garden-based learning and nature in

general, teachers may have felt inclined to answer in a way that positively reflected the school garden.

Implications for Future Research

Since the topic of garden-based learning is relatively new to public health and nursing science, this study holds implications for future research. To date, a growing body of research focuses on the effects of time in nature on our mental health. However, future experimental studies should focus on how garden-based learning influences focus and attention in the classroom. A few tools have been used to measure attention, such as the CAST tool (Johnson et al., 2019), but these tests are costly and take a significant amount of time to administer. New tools developed to measure attention in children would be very useful in determining the effectiveness of garden-based learning and other interventions to improve children's focus.

Conclusion

This project produced primarily qualitative research that can inform school administrators and teachers about the benefits of garden-based learning from the perspective of the Morningside Elementary School teachers who participated. The findings can also stimulate further research. Hopefully, as more research emerges regarding nature's benefits, children will spend more time outdoors, and teachers will be incentivized to transition learning outside of the classroom and into natural spaces such as school gardens. As our virtual world grows around us, it is crucial to ensure that children and families are spending adequate outside and in nature. There is extensive research supporting the benefits of time spent in nature, and we must advocate for the health of future generations.

TABLE 1: SAMPLE DESCRIPTION

Statistics

	Mean	Standard Deviation	Minimum	Maximum
# of years you have been a teacher	9.8	10.28	1	27
# of years you have been a teacher at Morningside	5.2	5.36	1	14
NR-6 Score	3.8	0.49	3.0	4.2

Frequency Table

	n (%)
Which grade do you teach?	
Pre-K	2 (40%)
Kindergarten	1 (20%)
1 st	1 (20%)
3 rd	1 (20%)
Gender	
Female	5 (100%)
Race	
White/Caucasian	3 (60%)
African American	1 (20%)
Hispanic	1 (20%)
Area studied in college/graduate studies	
Education	3 (60%)
Other	2 (40%)
Do you utilize the school garden with your students?	
Yes, currently	1 (20%)
Yes, in the past	3 (60%)
No, but I would be open to the idea	1 (20%)
Do you garden at home?	
Yes, occasionally	2 (40%)
Yes, in the past	1 (20%)
No, but I would like to in the future	2 (40%)

How interested are you in earning professional development focused on gardens and garden-based learning?	
Very interested	3 (60%)
Somewhat interested	2 (40%)

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APPENDIX A: EMAIL TO TEACHERS

Dear Ms./Mr. _____,

My name is Amy Davin, and I am an Honors student researcher working with Dr. Gina Alexander at Texas Christian University (TCU).

We are conducting a research study at Morningside Elementary school to examine the impact of garden-based learning on children's mental health. The project team aims to explore whether time spent learning in a school garden will improve children's symptoms of inattention, trouble focusing, and other behavioral issues. Participation is completely voluntary, and the data will be kept secure in a digital Box folder only accessible to the Primary Investigator (Dr. Alexander) and myself.

If you are interested, participation will include a 5-minute survey and a 30-45 minute interview via Zoom. I have attached a brief description of the research study as well as a teacher consent form with more details. If you are willing to participate in this study, please digitally sign the consent form and email it back to me at amy.davin@tcu.edu. Then, you can complete and submit the Qualtrics survey. An email will follow regarding the date for the interview.

Compensation includes a \$25 gift card for completing the survey and participating in the interview.

If you have any questions, please do not hesitate to contact me at amy.davin@tcu. I am looking forward to working with you.

Thank you for your consideration,

Amy Davin

John V Roach Honors College Departmental Honors Research

Texas Christian University Harris College of Nursing and Health Sciences Class of 2022

APPENDIX B:
CONSENT TO PARTICIPATION IN RESEARCH

Title of Research: Exploring the Impact of Garden-Based Learning on Children’s Mental Health

Principal Investigator: Gina Alexander, PhD, MPH, MSN, RN
[Co-investigators:] Amy Davin

Overview: You are invited to participate in a research study. In order to participate, you must be a teacher at Morningside Elementary School and over 18 years old.

Study Details: This study is being conducted virtually via email, Qualtrics, and Zoom. The purpose of this study is to determine if time in school gardens has any impact on children’s attention, focus, and overall mental health. More generally, we are trying to see if time in nature may decrease behavior problems such as lack of focus in class.

If you choose to participate, the research study will include a 5-minute survey and a 30-45 minute interview.

Participants: You are being asked to take part because you are a teacher at Morningside Elementary School. If you decide to be in this study, you will be one of up to 20 total participants. All teachers are welcome to join this study regardless of whether they utilize the school garden with their students.

Voluntary Participation: Your participation is voluntary. You do not have to participate and may stop your participation at any time. Your employment and standing with the school will not be negatively affected if you do not wish to participate in the study. There will be no consequences for removing yourself from the study at any time.

Confidentiality: Even if we publish the findings from this study, we will keep your information private and confidential. Anyone with authority to look at your records must keep them confidential.

What is the purpose of the research?

The objectives of this project are to explore whether time spent learning in a school garden will improve children’s symptoms of inattention, trouble focusing, and other behavioral issues, as well as improve their overall mental health.

What is my involvement for participating in this study?

If you consent to participating in the study, you will sign this consent form, and email it to amy.davin@tcu.edu.

Once the research team receives signed consent forms, we will schedule an interview to set a convenient date/time during non-school hours. Participants will be able to interview to discuss the perceived effects of the school garden on children’s mental health, including focus in class.

Prior to the interview, we ask that you complete a demographic survey that will take about 5 minutes. The survey includes questions about ethnicity, gender, collegiate studies, length of time teaching, and the utilization of garden space. The survey also includes a few general questions asking about your perceptions of nature. This survey is by Qualtrics, and it is linked in the email.

During the interview, you will then be asked open-ended questions that relate to both your perceptions of the school garden and observations of children in the garden.

You can also discuss your own children's experiences in nature/gardens, perceived benefits of nature on children, and more.

More specifically, we will focus on the potential impacts of time in the school garden on the Morningside students' mental health and ability to focus in class.

We expect your participation in both the survey and interview to take about 30-45 minutes.

Are there any alternatives and can I withdraw?

You do not have to participate in this research study. You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study.

You are free to withdraw at any time. Participating in the study or choosing not to participate will not affect your standing with the school in any way.

You do not have to answer any questions you do not want to answer. If you decide to withdraw before this study is completed, you can contact the student investigator at any time by emailing amy.davin@tcu.edu.

You can also withdraw from the interview at any point. If you participate with your camera on, you are consenting to have your video recorded. If you do not consent to having your profile or video image recorded, you may choose to keep your camera off. If you un-mute during the discussion and participate, you are consenting to have your voice recorded. If you do not want to participate in the discussion with the microphone, you may communicate just using the Zoom chat feature.

What are the risks for participating in this study and how will they be minimized?

We don't believe there are any risks from participating in this research that are different from risk that you encounter in everyday life. The recorded interview will be electronically protected in a Box folder accessible only to the investigator and faculty mentor. The typed transcript of each interview will be kept in a password-protected Word file.

What are the benefits of participating in this study?

Although you will not directly benefit from being in this study, you will be helping the research and practice community to better understand the effects of gardening and time in nature on attention and focus in children. This growing topic of research will hopefully benefit children long-term in maintaining attention in school and experiencing greater levels of mental wellbeing.

Will I be compensated for participating in this study?

Yes, you will receive a \$25 Amazon gift card for filling out the survey and participating in the interview.

What are my costs to participate in the study?

There is no cost to participate in the study.

How will my confidentiality be protected?

When the investigator reviews the transcript, any names or personally identifying information will be removed. The typed transcripts will be in a password-protected Word file only accessible to primary and co-investigator through Box.

Every effort will be made to limit the use and disclosure of personal information, including research study records, to people who have a need to review this information. We cannot promise complete secrecy. Your records may be reviewed by authorized University personnel or other individuals who will be bound by the same provisions of confidentiality. We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

What will happen to the information collected about me after the study is over?

Your name and other information that can directly identify you will be deleted from the research data collected as part of the project.

We will not share your research data with other investigators.

Who should I contact if I have questions regarding the study or concerns regarding my rights as a study participant?

You can contact Dr. Gina Alexander at g.alexander@tcu.edu and 817-257-6763 with any questions that you have about the study.

Dr. Dru Riddle, Chair, TCU Institutional Review Board, (817) 257-6811, d.riddle@tcu.edu; or
Dr. Floyd Wormley, Associate Provost of Research, research@tcu.edu

By selecting "Yes" below and electronically signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. A copy also will be kept with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I agree to participate in this study. Yes _____ No _____

Signature _____

Date _____

Printed Participant Name _____

Consent to be audio/video recorded

I agree to be audio/video recorded. Yes _____ No _____

Signature

Date

(If you do not consent to be audio/video recorded but still want to participate in the research project, you may participate solely through the chat feature with your real name or a pseudonym.)

Consent to be Contacted for Participation in Future Research

I give the researchers permission to keep my contact information and to contact me for future projects. Yes _____ No _____

Signature

Date

APPENDIX C: DEMOGRAPHIC SURVEY

Please complete the following information (highlight one)

- Which grade do you teach?
 - Pre-K
 - Kindergarten
 - 1st grade
 - 2nd grade
 - 3rd grade
 - 4th grade
 - 5th grade
 - other

- Gender:
 - Male
 - Female
 - Other
 - Prefer to not answer

- Race
 - White/Caucasian
 - African American
 - Asian American
 - Native American
 - Hispanic
 - Pacific Islander
 - Other
 - Prefer not to answer

- Area studied in College/Graduate Studies
 - Education
 - Business
 - Communication
 - Fine Arts
 - Nursing/Health Sciences
 - Sciences and Engineering
 - Other
 - Prefer not to answer

- Please type in the number of years you have been a teacher: _____

- Please type in the number of years you have been a teacher at Morningside Elementary School: _____

- Do you utilize the school garden with your students?
 - Yes, currently
 - Yes, in the past only
 - No, but I would be open to the idea
 - No, and I do not plan on it

- Do you garden at your home?
 - Yes, it is a big part of my life.
 - Yes, occasionally
 - Yes, I have in the past
 - No, but I would like to in the future
 - No, this is not something I am interested in

- How interested are you in earning professional development focused on gardens and garden-based learning?
 - Very interested
 - Somewhat interested
 - Neutral
 - Not interested
 - Strongly opposed

Nature Relatedness Scale-6 (NR-6): Please rate the extent to which you agree with the following statements, using the scale from 1 to 5:

- My ideal vacation spot would be a remote, wilderness area.
 - 1: Disagree strongly
 - 2: Disagree a little
 - 3: Neither agree nor disagree
 - 4: Agree a little
 - 5: Agree Strongly

- I always think about how my actions affect the environment.
 - 1: Disagree strongly
 - 2: Disagree a little
 - 3: Neither agree nor disagree
 - 4: Agree a little
 - 5: Agree Strongly

- My connection to nature and the environment is a part of my spirituality.

- 1: Disagree strongly
 - 2: Disagree a little
 - 3: Neither agree nor disagree
 - 4: Agree a little
 - 5: Agree Strongly
- I take notice of wildlife wherever I am.
 - 1: Disagree strongly
 - 2: Disagree a little
 - 3: Neither agree nor disagree
 - 4: Agree a little
 - 5: Agree Strongly
- My relationship to nature is an important part of who I am.
 - 1: Disagree strongly
 - 2: Disagree a little
 - 3: Neither agree nor disagree
 - 4: Agree a little
 - 5: Agree Strongly
- I feel very connected to all living things and the earth
 - 1: Disagree strongly
 - 2: Disagree a little
 - 3: Neither agree nor disagree
 - 4: Agree a little
 - 5: Agree Strongly

APPENDIX D: INTERVIEW QUESTIONS

1. What is your overall impression of the current state of the school garden?
2. What do you believe are the benefits of spending time in the garden for these children?
3. Do you see any disadvantages to them spending time during school in the garden?
4. How do you think the garden affects the students' mental health and wellbeing?
5. How do you perceive that children focus after playing and working in the garden? How do you sense that they feel?
6. What other behaviors or changes (if any) do you perceive after garden time?
7. What do you think are the main obstacles the garden faces that is preventing it from being utilized as much as it can be?
8. Do you have any ideas/recommendations regarding garden sustainability?
9. What are some new strategies or ideas that you would recommend for promoting garden-based learning at Morningside?
10. Do you have any recommendations for other teachers we could possibly interview?