

# Increased Exposure to Nature Reduces Elementary Students' Anxiety

Sage Winter Rian\* and Kenneth M. Coll

Department of Counseling and Educational Psychology,  
University of Nevada, Reno, Reno, Nevada, USA.

\*Current affiliation: Department of Counseling Psychology,  
University of Denver, Denver, Colorado, USA.

## Abstract

*This study investigated the effect of nature-based guidance lessons on anxiety and connection to nature among elementary students using a pretest post-test with control group experimental design. Nature-based interventions have been an effective treatment for anxiety among adults, but there is less literature conducted with children, and no other studies thus far have examined interventions as implemented by a school counselor through guidance lessons. An elementary school was recruited through convenience sampling and included four third grade classes, representing the entire grade level at the school, which were randomly assigned to control and experimental conditions. Participants were given anxiety and connection to nature assessments 1 week before and after the 6-week intervention. Data were analyzed using a two-way mixed analysis of variance for each assessment, and t-tests were done to establish group equivalence at baseline. Results indicated that anxiety was significantly reduced among the experimental group, and that there was a significant increase in connection to nature among both groups. Based on these findings, this study presents a cost-effective intervention that reduces student anxiety and is easily incorporated into an existing guidance curriculum.*

Key Words: Nature and health—Anxiety—Guidance lessons—School counselor.

## Introduction

The idea that humans have an intrinsic relationship with the earth is not new, it has been documented in various fields throughout history (Davis & Atkins, 2004). Not only are human health and planetary health interdependent, but there are also many health benefits associated with being in nature across physical, mental, and emotional domains (Davis & Atkins, 2004; Frumkin et al., 2017; Howell, Dopko, Passmore, & Buro, 2011). There are also academic benefits associated with time spent in nature, specifically, children who have frequent contact with nature are able to concentrate more easily and tend to be more self-disciplined, resulting in better academic achievement (Bird, 2007). This may be because nature significantly impacts children's attentional capabilities by reducing inattentiveness and off task classroom behaviors and also helps them regulate their emotions, which improves their overall classroom and learning experience (Lee, Oh, Jang, & Lee, 2018).

In a comprehensive analysis of the existing literature on the nature–health relationship, Frumkin et al. (2017) found that the health benefits of nature include (but are not limited to) reduced stress, depression, anxiety, aggression, attention-deficit/hyperactivity disorder symptoms, diabetes, obesity, mortality, and improved sleep, happiness, prosocial behavior, connectedness, child development (cognitive and motor), immune function, eyesight, and other domains of general health. With so many health benefits spanning a variety of subjects, Frumkin et al. (2017) have also called for an interdisciplinary research agenda, which includes the epidemiology of health benefits. This research study addresses Frumkin et al.'s (2017) proposed research priority “how is nature contact associated with specific health outcomes of public health importance, such as cardiovascular disease, cancer, depression, anxiety, well-being, and happiness?” (p. 8) by examining the relationship between exposure to nature and anxiety.

No studies to date have investigated nature-based interventions as implemented by the school counselor through guidance lessons. Nature-based learning in the elementary schools is becoming more popular when teaching science lessons but has yet to be meaningfully incorporated into non-Science, Technology, Engineering, and Mathematics (STEM) subject lessons (Camasso & Jagannathan, 2018). Although children benefit from virtual experiences with nature such as through photos, videos, and other artificial means, Mayer, Frantz, Bruehlman-Senecal, and Dolliver (2009) found a significant difference between participants who experienced virtual nature and those who made physical contact with nature, showing that real contact was more impactful on psychological domains. Therefore, it is important to bring children physically outside of the school to foster a meaningful relationship and experience with nature, rather than simply incorporating natural elements (such as bringing in leaves or rocks for a project) into the classroom.

Unfortunately, people are spending so much less time in nature over the past few decades that Louv (2005) coined the term Nature Deficit Disorder after observing the negative effects that lack of natural interactions has on children, including cognitive, emotional, and physical impairments. Similarly, Greenleaf, Bryant, and Pollock (2014) refer to this as the “disease of indoor living” (p. 163) because spending so much time inside is linked to many negative outcomes among physical, mental, cognitive, and emotional domains. Conversely, spending time in nature has been shown to improve social relationships, anxiety, depression, stress, and other mood disorders in both children and adults (Greenleaf et al., 2014; Howell et al., 2011).

Children today are facing significantly higher rates of mental and emotional disorders, with anxiety affecting 6–18% of all elementary school children in the United States, and only about half of them are receiving any intervention (Brown, 2013; Swank, Cheung, Prikhidko, & Su, 2017). Anxiety specifically has detrimental effects on children’s developing bodies and brains, including weakened immune system and bones, increased risk of cancer, poor academic outcomes, and increased risk of substance abuse later in life (Kang, 2017). Failing to identify mental health needs of children and provide services may ultimately lead to costly psychiatric treatment and/or involvement in the juvenile justice system (Swank et al., 2017).

Children with emotional disorders in elementary schools are also more likely to experience other negative long-term outcomes including low academic achievement, school suspensions, delinquency, developmental issues, substance abuse, difficulties with relationships, and an increased risk of suffering from mental health disorders as adults (Grills-Taquechel, Fletcher, Vaughn, Denton, & Taylor, 2013; Kösters et al., 2017; Sanchez et al., 2018; Swank et al., 2017). Nature-based interventions at the ele-

mentary school level may be an invaluable tool for school counselors because Tudor (2013) found that many of these issues can be treated effectively by developing a positive connection to nature. In addition, Maller (2009) found that children are naturally more drawn to nature in late childhood, or about 5–12 years old, which makes elementary school an ideal place to implement these nature-based interventions.

Lovelock, Walters, Jellum, and Thompson-Carr (2016) reported that one of the biggest barriers to child and adolescent participation in nature-based activities is parental constraints on when and where children can play due to perceptions of safety and fears. Children have the most opportunities for contact with nature during school, which is where they spend most of their day (Barton, Sandercock, Pretty, & Wood, 2015). Furthermore, the responsibility of providing children opportunities to interact with nature is typically put on schools because many children in cities do not have regular access to nature at home (Maller, 2009). Bird (2007) recommends that the government and schools should encourage students to spend more time in nature, such as through outdoor lessons where students can access green space and vegetation.

One way to provide more opportunities to connect with nature at schools is by incorporating outdoor activities that strengthen the relationship between nature and children, while also providing learning experiences (Louv, 2005). Nature-based education programs and lessons have distinct advantages over traditional indoor classes because of the many opportunities to explore, move around physically, and enhanced emotional and cognitive functioning (Carter, 2016). Open natural spaces, such as the fields on school grounds, are preferable as they provide more opportunities for children to use their imaginations than other outdoor spaces, such as playgrounds (Barton et al., 2015). Playgrounds and other man-made structures can hinder the positive effects of being in nature because nature, in and of itself, is healing (Sackett, 2010).

School counselors at the elementary level are in a unique position because the comprehensive counseling curriculum is delivered to all students in the school (ASCA, 2012), whereas most teachers only interact with specific classes or grade levels. Therefore, school counselors have the ability to reach all students in a school system through classroom guidance. Core components of the counseling curriculum include promoting student academic, emotional, and cognitive development, and working as an advocate to address achievement gaps, barriers to success, and social justice issues (ASCA, 2012). Moving classroom guidance outside supplements the material being taught through the added benefits of being in nature. Carter (2016) asserted that nature is an “incredible resource” (p. 10) to teach students about caring and foster social-emotional development, which is aligned with the ASCA (2012) standards.

Access to nature is also a social justice issue because students from lower socioeconomic status (SES) backgrounds spend less time in nature due to urban living, fear, safety, a shift toward indoor recreation, and more time spent on electronic devices (Bratman et al., 2019; Bürgi et al., 2016; Maller, 2009). These areas also tend to have less access to green and blue spaces, and living in proximity to these spaces has been associated with psychological well-being (Bratman et al., 2019). Furthermore, even children from higher SES families spent more time inside being sedentary when living in a low SES neighborhood (Bürgi et al., 2016). Compounded with the findings that students from low SES backgrounds are also at higher risk for developing stress disorders, such as anxiety, school counselors have the opportunity to act as social justice advocates for these students by bringing their lessons outside (Kim et al., 2015). Therefore, conducting guidance lessons in nature meets social-emotional academic requirements, promotes student health and development, addresses equity regarding access to nature, and may improve academic performance and classroom behaviors (Bird, 2007; Greenleaf et al., 2014; Lee et al., 2018).

**Purpose of the Study**

The purpose of this study was to identify the effects of nature-based guidance lessons by analyzing elementary school students' levels of anxiety and connection to nature before and after implementation of the lessons. The research question guiding this study was "what are the effects of nature-based guidance lessons on elementary school students' levels of anxiety and connection to nature, as measured by Beck's Anxiety Inventory for Youth and the Connection to Nature Index?" This study has the potential to add valuable quantitative findings in the growing field of nature and health. An increase in knowledge about these effects will assist school counselors, principals, and research professionals by potentially expanding the range of interventions available to them, and may help shape school policies regarding time spent outside.

**Methods**

This study assessed the potential benefits of participation in nature-based guidance lessons among third grade elementary school students using a pretest post-test control group design. It was hypothesized that the students participating

in nature-based guidance lessons would experience less anxiety and a stronger connection to nature at the conclusion of the study.

*Participants and sampling*

The sample was selected out of convenience; a school counselor with whom the primary researcher had an existing relationship with was selected for the study. The school also had access to a green field where the guidance lessons could take place, a key necessity. Four third grade classes participated, which comprised the entire grade level ( $n=70$ ) of the school. Initially there were 61 participants, but one student in the control group unenrolled during the 1st week of the study, for a final total of 60 participants (large effect,  $f=0.4$ ), or 85.7% of the third grade. Two students enrolled during the study, but they were excluded so as not to confound the results due to partial participation.

The school was located in a primarily Hispanic low-income neighborhood of a major city in the northwest region of the United States. Demographic information on race and ethnicity, gender, and age (Table 1) was collected for all participants. The students primarily identified as Hispanic or (non-White) Latinx (71.6%,  $n=43$ ), about one-quarter (23.3%,  $n=14$ ) as White, four students (6.6%) as

**Table 1. Student Demographic Data**

| DEMOGRAPHIC                         | EXPERIMENTAL (N= 34) | CONTROL (N= 26) | TOTAL SAMPLE (N= 60) |
|-------------------------------------|----------------------|-----------------|----------------------|
| Race or ethnicity, % (n)            |                      |                 |                      |
| Hispanic or Latinx                  | 73.5 (25)            | 69.2 (18)       | 71.6 (43)            |
| White                               | 20.6 (7)             | 26.9 (7)        | 23.3 (14)            |
| American Indian or Alaska Native    | 8.8 (3)              | 3.8 (1)         | 6.6 (4)              |
| Black or African American           | 2.9 (1)              | 3.8 (1)         | 3.3 (2)              |
| Native Hawaiian or Pacific Islander | 0 (0)                | 3.8 (1)         | 1.7 (1)              |
| Asian                               | 0 (0)                | 3.8 (1)         | 1.7 (1)              |
| Biological gender, % (n)            |                      |                 |                      |
| Male                                | 52.9 (18)            | 65.4 (17)       | 58.3 (35)            |
| Female                              | 47.1 (16)            | 34.6 (9)        | 41.6 (25)            |
| Age in years, % (n)                 |                      |                 |                      |
| 8                                   | 44.1 (15)            | 50 (13)         | 46.7 (28)            |
| 9                                   | 52.9 (18)            | 46.2 (12)       | 50 (30)              |
| 10                                  | 2.9 (1)              | 3.8 (1)         | 3.3 (2)              |

American Indian or Alaska Native, two students (3.28%) as Black or African American, one student (1.7%) as Native Hawaiian or Pacific Islander, and one student (1.7%) as Asian, with a total of five students (8.3%) identifying as more than one race. The gender break down was 58.3% ( $n = 35$ ) male and 41.6% ( $n = 25$ ) female. The majority of the students were 8 (46.7%,  $n = 28$ ) or 9 (50%,  $n = 30$ ) years old, and two students (3.3%) were 10 years old. The groups were equivalent among all demographic information except for gender; the control condition had significantly more male than female students.

### Procedures

First, Institutional Review Board approval was obtained to employ all data collection methods used and tests administered. The school counselor and principal of the target school were contacted to discuss the acceptability of the proposed study. After both had agreed to it, the researcher and the school counselor determined the guidance lessons to be conducted, which was a feelings unit from the Promoting Alternative THinking Strategies (PATHS<sup>®</sup>) curriculum being implemented at the school. These guidance lessons are prevention focused, aligned with the ASCA (2012) Mindsets and Behaviors, and emphasize emotion regulation and awareness (Chi-Ming, Greenberg, & Kusché, 2004). The lessons were exactly the same for students in both conditions, with the only difference being experimental classes received outdoor instruction.

The entire PATHS third grade curriculum is composed of 42 total lessons across nine units, but only 6 lessons from unit 3 were included in the study. Unit 3 includes a total of eight lessons, but two were excluded on the basis of feasibility. Lesson 6 “The PATHS<sup>®</sup> Feelings Dictionary” was excluded because it required the students to write three paragraphs, which was misaligned with the students’ actual capabilities, according to their teachers. Lesson 7 “My Own Feelings Story” was also excluded because it relied on the answers and information from lesson 6. The lessons were conducted in order on the following topics: Introduction to Feelings (one), Recognizing and Controlling Anger (two), Calm or Relaxed and Tense (three), Guilty (four), Jealous (five), and Feelings Intensity (eight). In addition, these lessons were implemented once per week, instead of the PATHS recommendation of twice per week, due to the practicality of implementation.

Families were notified of the study 4 weeks in advance. Active permission slips were sent home to be signed and returned by all parents or guardians. Guardians of students who had not returned permission slips after 1 week were contacted through telephone by the primary researcher to explain the study and request the slip be returned, which increased the return rate. Verbal student assent was also

collected before the pretest. Any student who was not able to participate in the study joined another third grade class for the duration of the lesson: as all classes were scheduled for an elective at this time. All assessments were conducted indoors in the primary classroom for both groups. The students were tested on measures of anxiety and connection to nature both 1 week before and 1 week after the intervention, making the total length of the study 8 weeks. Students in the control condition received guidance lessons as they usually would, with the exception of a different counselor delivering the lesson.

Each class was randomly assigned to experimental or control conditions using a coin flip. The students in the experimental condition first discussed what the rules were before going outside, which were to stay with the group and to listen when someone else was speaking. The students and the primary researcher sat in a circle in the middle of the grassy field for lessons, which were scheduled for a time when no one else was outside. Since guidance lessons are part of the student curriculum, it was important for everyone to sit close enough to hear. Once the guidance lesson was over, students lined up in the same manner they do when they come in from recess and then returned to their classroom.

Data were collected at two points in time, 1 week immediately before the intervention and 1 week after. The primary research administered the tests, and the classroom teacher and school counselor were also present to help manage the students. The pre- and post-tests were done by classroom (one class at a time) at the same time the guidance lessons had been scheduled for. The Beck Anxiety Inventory for Youth (BAI-Y) was used to measure anxiety and the Connection to Nature Index (CNI) was used to measure connection to nature (Beck, Beck, & Jolly, 2005; Cheng & Monroe, 2012). In addition, a demographic questionnaire asking student age, gender, and race/ethnicity was given to students before the pretest. The students were allowed to ask clarifying questions, such as the definition of a word, but were not given specific examples, nor were they permitted to speak to each other during assessment administration.

### Measures

The BAI-Y measures fear, worry, and physical symptoms of anxiety, and is intended to be a general measure of childhood anxiety (Bose-Deakins & Floyd, 2004). The BAI-Y is a prolonged state measure, meaning that it should not make a significant difference whether the student is just having an anxious day or not, because the instrument assesses how they feel in general, with special attention paid to the past 2 weeks (Bose-Deakins & Floyd, 2004). The measure was standardized using a sample of 800 children between ages 7 and 14 years, from all over the nation (Steer, Kumar, Beck, & Beck,

2001). The BAI-Y has high internal consistency, construct validity, and test-retest reliability coefficients, exceeding the minimum of 0.8 (Bose-Deakins & Floyd, 2004; Steer et al., 2001). In addition, the BAI-Y was correlated with scores from another known valid instrument, the Revised Children's Manifest Anxiety Scale, and was significant at the 0.01 level, indicating strong convergent validity. The BAI-Y is written at a second grade reading level, scored on a 0- to 4-point scale (0: never through 3: always), and takes roughly 10 min to complete (Steer et al., 2001). Based on the research, the BAI-Y is an effective tool for use with children in both group and individual settings that can be conducted fairly quickly, making it ideal for a classroom setting (Bose-Deakins & Floyd, 2004).

The CNI consists of 18 items rated on a 5-point scale and measures four separate constructs: enjoyment of nature, empathy for creatures, sense of oneness, and sense of responsibility (Cheng & Monroe, 2012). The index was piloted among a representative sample of 1432 students in fourth grade, in conjunction with student interviews to determine the appropriateness of the vocabulary used (Cheng & Monroe, 2012). Although initially intended for children in fourth and fifth grade, Bragg, Wood, Barton, & Pretty (2013) found that the CNI was also acceptable for use with third and sixth graders, and can be administered in a group setting. The CNI is a reliable measure ( $\alpha=0.87$ ) and is valid based on the positive correlations ( $p<0.01$ ) between scores on the index and variables empirically supported to measure affinity toward nature (Cheng & Monroe, 2012).

#### Data analysis

This study used two *t*-tests and two mixed analysis of variances (ANOVAs) to analyze the results. The *t*-tests were used to determine group similarity at baseline for both measures. A two-way mixed ANOVA was conducted to analyze the results for each measure, the CNI and the BAI-Y, to compare scores between groups and to analyze within-group differences from the start to conclusion of the study. The between-groups variable was treatment condition, the within-groups variable was time (change from pre- to post-test), and the dependent variables were anxiety and connection to nature.

## Results

Two independent *t*-tests were conducted to assess whether or not the groups were equivalent at baseline and found no significant differences between groups on either measure (BAI-Y  $t=0.886$ ,  $p=0.38$ , and CNI  $t=1.613$ ,  $p=0.112$ ), demonstrating equivalence. In addition, the assumptions of sphericity, normality, and homogeneity were met, indicating that the ANOVAs could be run without transformed data.

#### Anxiety

There was no significant effect from pre- to post-test on the BAI-Y within groups, indicating the intervention alone did not lessen anxiety [ $F(1,58)=2.856$ ,  $p=0.096$ ,  $\eta_p^2=0.047$ ]. However, there was a significant interaction between treatment condition and time [ $F(1,58)=14.772$ ,  $p<0.001$ ,  $\eta_p^2=0.203$ ]. Students in the experimental group had significantly lower scores on the post-test ( $M=44.62$ ,  $SD=7.766$ ) than those in the control group ( $M=53.62$ ,  $SD=11.933$ ). The control group actually scored at higher levels of anxiety post-test, increasing by an average of 1.93 points. In addition, there was a significant main effect of condition on the BAI-Y [ $F(1,58)=5.788$ ,  $p=0.019$ ,  $\eta_p^2=0.091$ ]. This indicates that treatment condition had a significant effect on anxiety; those in the experimental group decreased on their anxiety scores at post-test by an average of 4.94 points.

#### Connection to nature

There was a significant effect from pre- to post-test on the CNI within groups. The intervention increased connection to nature among both groups [ $F(1,58)=4.48$ ,  $p=0.039$ ,  $\eta_p^2=0.072$ ]. However, there was no significant interaction between treatment condition and time [ $F(1,58)=0.052$ ,  $p=0.821$ ,  $\eta_p^2=0.001$ ]. Students in both groups scored higher on connection to nature on the post-test, with the experimental group scoring slightly higher ( $M=4.307$ ,  $SD=0.466$ ) than the control group ( $M=4.123$ ,  $SD=0.572$ ). The experimental group also had a higher score at pretest ( $M=4.164$ ,  $SD=0.556$ ) than the control group ( $M=3.945$ ,  $SD=0.469$ ). In addition, the change in scores from pre- to post-test was similar for both groups, with the control group scoring 0.178 points higher and the experimental group scoring 0.143 points higher. There was no significant main effect of condition on the CNI [ $F(1,58)=3.276$ ,  $p=0.075$ ,  $\eta_p^2=0.053$ ], indicating that connection to nature was similar for both groups.

## Discussion

This study addressed the issue of the lack of quantitatively driven research in the area of human health and nature, as noted by Burls and Caan (2005). Nature-based studies conducted in elementary school settings are largely focused on science curriculum, and there is a lack of research integrating nature into the schools outside of STEM subjects (Camasso & Jagannathan, 2018). Furthermore, researchers have found that students from low SES backgrounds are at a higher risk for developing stress-related disorders, such as anxiety, and have significantly fewer protective factors (Hawkes & Furst, 1971; Kim et al., 2015).

The students who participated in nature-based guidance lessons experienced a decrease in anxiety, suggesting the intervention was effective. The control group actually experienced an increase in anxiety, which is worth mentioning even though it was not statistically significant. Although there are many possible explanations, it seems likely that students would experience an increase in anxiety at the end of the school year due to standardized testing and other performance requirements to move into the next grade. It is also possible that the lack of time spent outdoors contributed to the increase in anxiety, especially for students with poor coping skills. Regardless of the underlying reason, it is important to note that spending one extra class period outdoors per week significantly reduced anxiety among third graders during a time when anxiety was peaking for other students. These results are important because anxiety has detrimental effects on children's developing bodies and brains, including weakened immune system and bones, poor academic outcomes, and increased risk of cancer and substance abuse later in life (Kang, 2017). Finding ways to prevent and decrease anxiety in elementary age children can impact them immediately and in the long term, which highlights the importance of reaching many students at once; only a few students receive individual counseling at school, but all students receive guidance lessons.

Students in both groups had a stronger connection to nature at the conclusion of the study, despite the control group not getting any additional time outside. It was hypothesized that the experimental group would have a stronger connection to nature at the conclusion of the study, but no significant difference between groups was found. It is possible that students were spending more time outdoors as the study progressed, because it started in February (average temperature of 52°F) and ended in May (average temperature of 74°F). Furthermore, spring sports such as soccer begin in April, so students who participate in those sports would have been spending more time outdoors regardless of participation in this study. It seems that even without the introduction of an intentional plan to expose students to nature more frequently, many students can still experience an increase in connection to nature through other means. However, these results suggest that a strong connection to nature alone is not enough to reduce anxiety or mediate stress; it needs to be accompanied with frequent contact with nature (Buchan, 2017).

### *Implications for school counselors*

Students have the most opportunities to interact with nature at school, where they spend most of their day and are safely supervised while outdoors (Barton et al., 2015). It logically follows that schools would provide such opportunities, given the importance of spending

time in nature on healthy development across emotional, social, and physical domains (Carter, 2016; Greenleaf et al., 2014; Louv, 2005). However, although the majority of school principals reported belief in the importance of spending time outdoors, elimination of recess remains the most common punishment for elementary school aged students (RWJF, 2010). The introduction of a nature-based guidance program would not interfere with such punishments and could help ensure that students still have an opportunity to go outside, even if their recess or physical education has been eliminated. Counselors have an ethical responsibility to provide preventative, secondary, and tertiary services to their students aimed at reducing symptoms and developing coping skills (ASCA, 2012). The implementation of a nature-based guidance program is one way counselors can address this need and work to close the achievement gap, especially in Title I and lower SES schools, where students are more susceptible to anxiety disorders (Kim et al., 2015).

### *Future research*

Although a reduction in anxiety was observed in the experimental group of this study, more research is needed to better understand how well these reductions are maintained. Qualitative data would have provided useful insights as to why students in the control group experienced an increase in anxiety and an increase in connection to nature, despite not receiving additional time outside, highlighting the need for mixed-methods research in this area. A study that takes place for the duration of the full school year is also recommended, so the entire guidance curriculum can be implemented, and the effect of different seasons can be accounted for. In addition, other variables should be accounted for, such as high stakes testing periods, seasonal changes, and whether or not the students are participating in outdoor sports or activities.

Research investigating the effects of a nature-based guidance program for students in rural communities would also provide valuable insights. Many people who live in rural areas spend the majority of their days outdoors, primarily to work (on farms, fields, and so forth), yet experience high levels of anxiety. However, Thompson, Sugg, and Runkle (2018) found that adolescents in rural communities were both the least likely to seek help and had the highest suicide rates. These data illuminate a discrepancy: people in rural communities are not showing signs of improved mental health compared with other geographic populations, despite spending significantly more time outdoors. This may speak of the quality of time spent outdoors; it is clear that being outside alone is not enough to access the healing potential of the natural environment in a meaningful way.

## Limitations

One specific school was chosen purposefully for this study based on expressed interest and the availability of open green space, which limited the generalizability of the findings. Furthermore, the physical space provided by the school was much richer than the outdoor spaces of many neighboring schools. However, students may have experienced fear or phobias about being in nature. In an effort to control for these potential concerns, students were given the opportunity to ask questions and have them addressed as a class by the researcher. It is also possible that a negative bias was introduced to the control group because of jealousy about the experimental group getting to go outside. To control for this potential bias, students were taken outside using a side exit, to minimize the chance that they would pass other classrooms on their way out, and students were not able to see the classes while they were outside. The researcher conducted all of the testing and guidance lessons, which may have inadvertently altered student behavior based on group expectations. The design also presented some limitations, namely instrument reactivity and regression to the mean.

## Conclusion

The results of this study indicate that a nature-based guidance program was effective at reducing anxiety among third grade students. At the elementary level, school counselors have the opportunity to focus on prevention by proactively engaging students with the natural environment, before they begin to experience the negative effects from lack of time spent outside, such as those detailed by Louv (2005). Although other school counseling programs address the issue of anxiety, moving outside has the distinct advantage of reducing children's risk of developing stress-related disorders, which includes anxiety (Bird, 2007). Furthermore, frequent contact with nature is a protective factor against stress and negative states, and effectively moderates life stress in elementary school aged children (Mayer et al., 2009; Wells & Evans, 2003). This study presents a cost-effective solution to address students' lack of opportunities to engage with the natural world, especially with underserved student populations.

## Authors' Contributions

S.W.R., corresponding author, developed the main idea for the study and K.M.C. guided the design and analysis of the study. S.W.R. drafted the study and K.M.C. revised it critically for important intellectual content. Both S.W.R. and K.M.C. approved of the final version of the article to be published and agree to be accountable for

all aspects of the study in ensuring that questions related to the accuracy or integrity of any part of the study are appropriately investigated and resolved.

## Author Disclosure Statement

No competing financial interests exist.

## Funding Information

No funding was received for this article.

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Address correspondence to:  
 Sage Winter Rian  
 Department of Counseling Psychology  
 University of Denver  
 1999 E. Evans Ave.  
 Denver, CO 80208-1700  
 USA

E-mail: sage.rian@du.edu

Received: December 9, 2020  
 Accepted: February 1, 2021