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Assessing the Relationships Among Children's Experiences in Nature, Executive Functioning, and Well-being: An Exploratory Study

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Background

- Nature has been linked to executive functioning (although the research is limited to children with ADHD¹) and well-being in children.
- Research has found that proximity to green space is associated with long-term outcomes including:
 - improvements in executive functioning in adulthood²
 - lower incidence of depressive symptoms in adulthood³
 - buffered life stressors⁴
- Time that children are spending in nature is decreasing, while mental health disorders continue to escalate⁵.
- Despite the established relationships among cognitive functioning and nature, little is known about associations between everyday experiences in nature and **stable** patterns of executive functioning and well-being.

Research Questions

Study 1:

Are there correlations among children's everyday experiences in nature and their executive functioning and well-being outcomes?

What elements of children's nature experiences are associated with positive outcomes?

Study 2:

How can children's experiences in nature be measured in a way that is robust, reliable, and valid?

Participants

- Study 1:** N = 92 (8-12 years old, $M=9.90$)
- Recruited through CDL database and online flyers
- Study 2:** N = 9 (8-11 years old, $M = 9.89$)
- Subset of study 1 participants from CT

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Study 1 Methods and Results

Procedure

Study 1 was an online survey (Qualtrics) broken up into two parts. The first part of the survey was completed by a caregiver and the second part was completed by the child. The survey included measures of executive functioning, well-being, and nature experiences (see table below).

At the end of the survey, participants were given the option to also participate in an additional executive functioning task (Flanker).

Parent Measures – Part 1	Child Measures – Part 2
<ul style="list-style-type: none"> Behavioral Rating Inventory of Executive Functioning (BRIEF) Strengths and Difficulties Questionnaire (SDQ) 	<ul style="list-style-type: none"> Self-Reported Well-being (SRWB) Nature Connection Index (NCI) Nature Relatedness Scale (NR-6) Connection to Nature Index (NCI) Flanker Task ($N = 19$)

Results

Correlations among all measures

Measure	BRIEF	SDQ	Flanker	SRWB	NCI	NR-6	CNI
BRIEF							
SDQ	.865**						
Flanker	.026	.054					
SRWB	.469**	.526**	.131				
NCI	.153	.128	.373	.500**			
NR-6	-.010	-.020	.295	.374**	.789**		
CNI	.093	.106	.305	.456**	.780**	.805**	

Note: ** $p < .01$, two tailed

Note: For Flanker Task $N = 19$

- Child-reported well-being was positively correlated with all three nature measures.
- All three nature measures were positively correlated with each other.
- There were no correlations between executive functioning and nature outcomes.
- We observed sex differences in caregiver reports of child executive functioning (BRIEF) and in all three nature measures.

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Study 2 Methods and Results

Procedure

Study 2 was a pilot of experience sampling methodology (ESM) and GPS mobility data. Participants first met with the lead researcher on a private zoom session to go over Study 2, complete consent forms, and download the GPS software.

Participants were instructed to use the GPS software that was compatible with their device (MyTracks or GuruMaps) for 9 days.

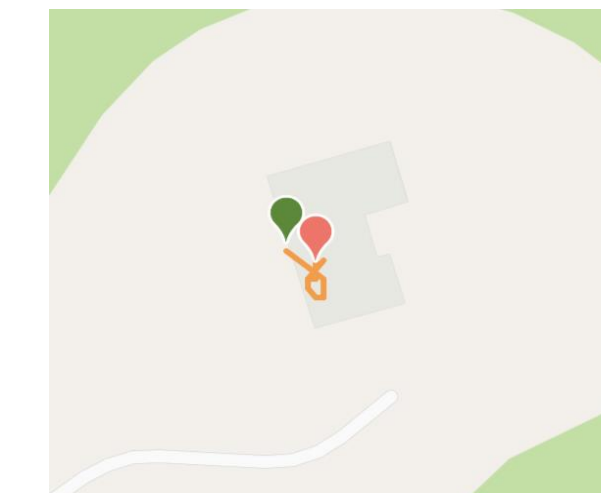
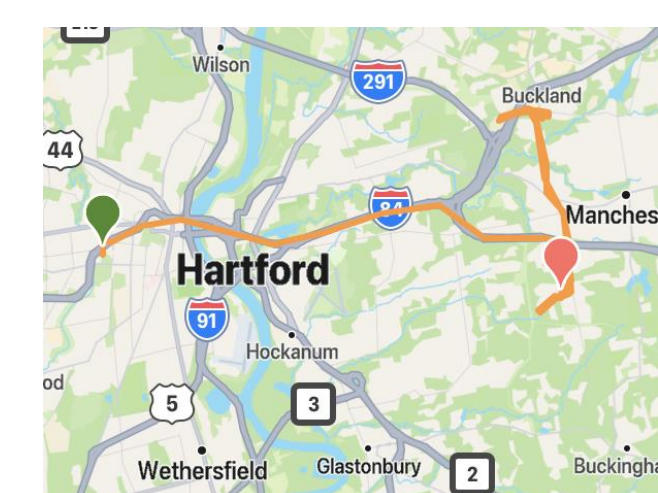
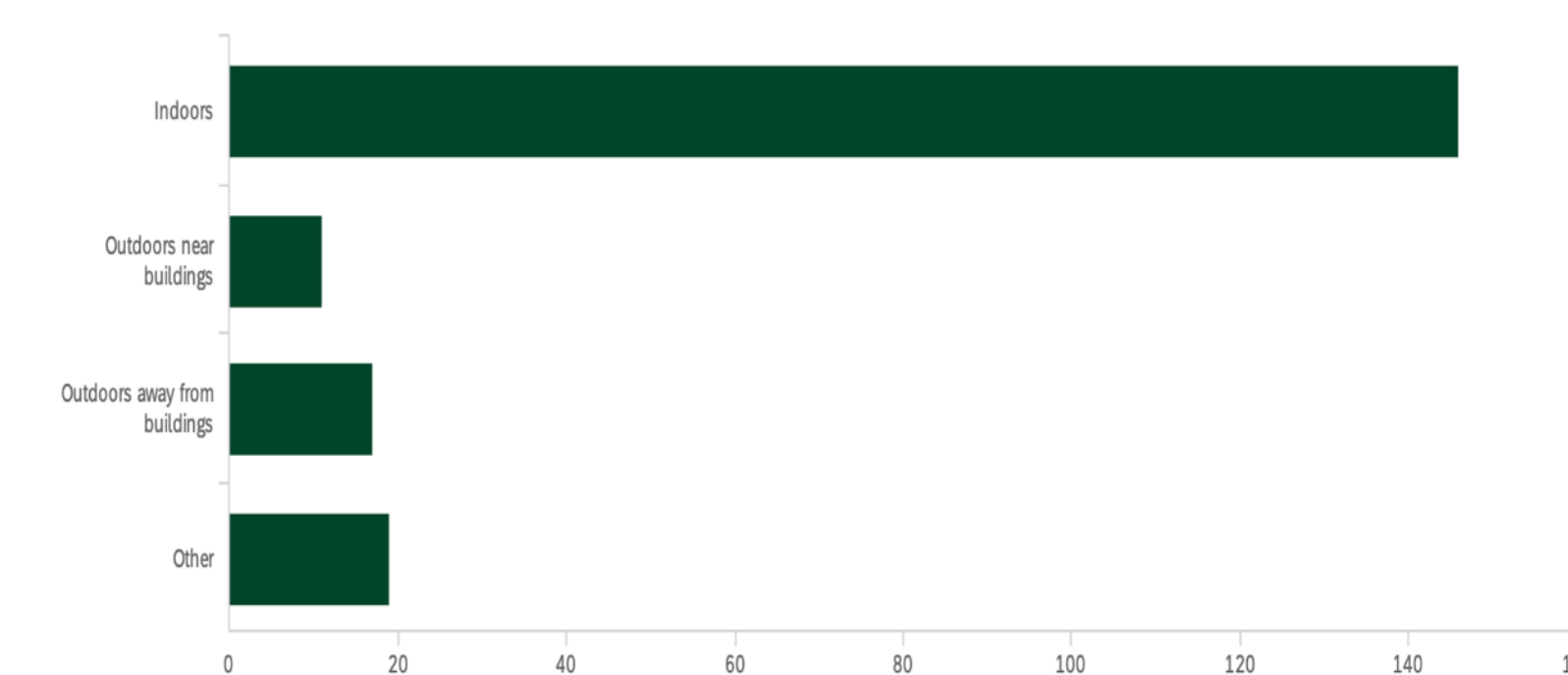
Over the course of 9 days, participants also completed short surveys (3 times a day) about their mood, location, and activities.

Results

ESM Responses

ID	Total Responses	Response Rate
1	26	96.30%
2	24	88.90%
3	18	66.70%
4	25	92.60%
5	10	37.30%
6	22	81.50%
7	22	81.50%
8	19	70.40%
9	22	81.50%

Where are you right now?



Discussion and Future Directions

Study 1

- There is a unique relationship between children's general states of well-being and their connection to nature. This may be a true positive association, or the nature measures may capture general affective states.
- Existing nature measures are capturing similar aspects of children's nature experiences. Upon inspection, the items in the nature measures focus largely on children's feelings and attitudes about nature.
- We found no evidence that children's executive functioning is associated with their experiences in nature. This may be a true null finding, and nature may have no effect on EF. Alternatively, the nature measures may fail to capture dimensions of nature that are associated with EF.

Study 2

- ESM and GPS mobility tracking are viable methodologies. These measures can be used for more robust tests of the associations between nature, EF, and well-being.
- The response rates for ESM were high, suggesting children are able to effectively, easily, and consistently complete ESM.
- GPS data confirmed the trend in the literature that children are spending much of their time indoors.

Future Directions

- Future research should develop comprehensive inventories of nature measures to include feelings about nature **as well as** how children conceptualize the physical and psychosocial benefits of nature.
- Considering the lack of correlations between executive functioning and nature experiences, future research should aim to differentiate the effects of continuous and more stable experiences in nature vs. acute exposure to nature.
- Future research using these diverse methods can explore which elements of children's nature experiences may be contributing to positive outcomes, which can help clarify the mechanisms that explain these associations.

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