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## Development and Validation of the *Attitudes toward Outdoor Play Scales for Children*

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### Abstract

The natural world has long been associated with health and described as a therapeutic landscape, and a growing body of research demonstrates the benefits of interacting with nature for mental and physical health. However, concern is growing that children have lost connection to the natural world and spend less time outdoors, despite the known health benefits of doing so. It is likely that healthy behaviors related to engagement with nature are mediated by beliefs about the value and safety of play in nature. While the literature abounds with qualitative examinations of children's attitudes toward outdoor play, there exist few instruments to quantitatively measure these attitudes. Informed by health behavior change theories, we describe the development and validation of the Attitudes toward Outdoor Play (ATOP) scales. As part of a community-academic partnership project called More Than a Pretty Place, the development of the ATOP scales unfolded in stages: (1) item generation based on a comprehensive literature review and consensus among the project team, (2) interviews with environmental educators, (3) initial pilot testing, (4) scale refinement, (5) administration during 2012 and 2013 to a sample of school children ages 9–13 ( $n=362$ ) in Milwaukee, WI, USA, and (6) quantitative psychometric evaluation. Two distinct scales emerged: ATOP-benefits ( $\alpha=.79$ ) and ATOP-fears ( $\alpha=.79$ ). Validity analyses found that both scales correlated as expected with measures of engagement in outdoor play, parental support for outdoor play, and sedentary behaviors. The ATOP scales are reliable and valid instruments for measuring attitudes toward outdoor play that may mediate children's outdoor activity in natural settings. The ATOP scales could be a useful for evaluating the effects of programming, such as environmental education programming, on improving children's attitudes toward the benefits of nature and reducing their fears, and may predict more distal outcomes including engagement in outdoor activity.

## Keywords

United States; nature; children; outdoor play; attitudes; measurement; community engagement

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## Introduction

A significant body of work now demonstrates the benefits of interacting with nature for mental and physical health, particularly through pathways linking natural green space to higher levels of social cohesion and sense of community (Kim and Kaplan, 2004; Maas, et al., 2009; Maas, et al., 2009; Pretty, et al., 1994; Pretty, et al., 1994; Prezza, et al., 2001; Prezza, et al., 2001), increased levels of physical activity and reduced obesity (Bell, et al., 2008; Bell, et al., 2008; Maas, et al., 2008; Mitchell and Popham, 2008; Mitchell and Popham, 2008; Nielsen and Hansen, 2007; Nielsen and Hansen, 2007), stress reduction (De Vries, et al., 2003; De Vries, et al., 2003; Mitchell & Popham, 2008; Nielsen & Hansen, 2007; Nielsen & Hansen, 2007; Van den Berg, Agnes E, et al., 2010; Van den Berg, Agnes E, et al., 2010; Ward Thompson, et al., 2012; Ward Thompson, et al., 2012), and reduction of mental fatigue through attention restoration (Berman, et al., 2008; Berman, et al., 2008; Berman, et al., 2012; Berman, et al., 2012; Faber Taylor & Kuo, 2009; Hartig, et al., 1991; Hartig, et al., 1991; Hartig, et al., 2003; Hartig, et al., 2003; Kaplan, 1995; Kaplan, 1995). A systematic review of 25 studies relating time outdoors to health benefits found that exposure to natural environments consistently reduced negative emotions (e.g., anger, fatigue, and sadness), while having a positive impact on energy levels and attention (Bowler, et al., 2010).

Children who interact with the natural environment benefit physically, particularly in motor skill development (Fjørtoft, 2001). Unstructured play in outdoor environments among children may lead to benefits beyond physical health, including improved problem-solving skills, social relationships, and emotional well-being (Burdette & Whitaker, 2005). However, concern is growing that children have lost the connection to the natural world and spend less time outdoors, despite known health benefits of doing so (Klesges, et al., 1990; Klesges, et al., 1990; Louv, 2008). Racial and ethnic minority children in urban environments are at a disadvantage in terms of access to natural areas for play (Lindsey, et al., 2001). In addition to lack of access, studies have shown that parental concerns about safety contribute to lower exposure to natural environments in urban children (Kalish, et al., 2010; Kalish, et al., 2010; McFarland, et al., 2011; Valentine & McKendrick, 1997; Valentine & McKendrick, 1997), and aspects of the built environment, including transportation infrastructure, are also negatively associated with children's participation in physical activity (Davison & Lawson, 2006).

As the benefits of outdoor activity become more apparent and concern rises that children are becoming disconnected from those benefits, identifying and overcoming barriers to children's outdoor play in nature, particularly in urban environments, becomes critical. Prominent health behavior theories would suggest that one target for intervention to ultimately increase children's engagement in outdoor play is the set of health beliefs and attitudes children hold that may influence that behavior (Glanz, et al., 2008).

Informed by theories of health behavior, including the Theory of Reasoned Action, the Health Belief Model, and the Theory of Planned Behavior (Glanz, et al., 2008), the authors developed a conceptual model to theorize the process by which attitudes toward outdoor play in natural environments may ultimately lead to improved physical and mental health (Figure 1). In this model, “attitude” refers to the evaluative belief of an individual (Fishbein & Raven, 1962), long hypothesized to be associated with behavior (Glanz, et al., 2008; Glanz, et al., 2008; Liska, 1984). Although specific definitions of “attitude” vary among social scientists, generally, there is agreement that it refers to a propensity to react in a positive or negative way to external stimuli—here, the stimulus is outdoor play in natural environments. The model acknowledges the importance of factors external to the child in influencing attitudes toward and engagement in outdoor play in nature, considering the importance of influential people (e.g. parents, caregivers, teachers, mentors), as well as the environment within which attitudes are formed and behavioral patterns emerge (e.g. access to TV, access to natural areas). In addition, the model captures the likelihood that while attitudes toward outdoor play in nature may influence engagement in outdoor play, it is also likely that engagement in outdoor play influences the development and reshaping of attitudes.

We enhance the model through consideration of the notion of therapeutic landscapes. Gesler’s concept of therapeutic landscapes encompasses notions of places associated with treatment, healing, and health promotion (Gesler, 1992). The natural world has long been associated with health and described as a therapeutic landscape (Gesler, 1992; Gesler, 1992; Völker & Kistemann, 2011). In addition to studies that have demonstrated direct restorative benefits of exposure to nature (Cimprich & Ronis, 2003; Cimprich & Ronis, 2003; Faber Taylor & Kuo, 2009), explanations for and understandings of these restorative qualities have been provided by theoretical contributions (Kaplan, 1995; Wilson, 1984; Wilson, 1984), as well as through numerous research endeavors where research participants have relayed their experiences with nature as those generating feelings of healing, restoration, happiness and health (Abraham, et al., 2010; Abraham, et al., 2010; Völker & Kistemann, 2011; Völker & Kistemann, 2011; Völker & Kistemann, 2012; Völker & Kistemann, 2012; White, et al., 2010). Here, we consider how children may envision natural environments as health-promoting landscapes (Gesler, 1992), or, conversely, as landscapes of fear (Yi-Fu, 1979). In light of a growing body of work describing the value of unstructured play in nature, we also consider attitudes toward unstructured, creative play, which is particularly relevant given the abundance of “loose parts” available in natural spaces to encourage this type of play (Fjørtoft & Sageie, 2000; Fjørtoft & Sageie, 2000; Louv, 2008; Nicholson, 1972; Nicholson, 1972).

While the literature abounds with qualitative inquiry into explore children’s attitudes toward outdoor play (Burns, et al., 2007; Goldenberg, et al., 2010; Goldenberg, et al., 2010; Veitch, et al., 2007; Veitch, et al., 2007), quantitative measurements are only recently being constructed and validated (Larson, et al., 2011), and studies have confirmed that this is an area of interest for research (Veitch, et al., 2006). This article describes the development and validation of measures – the Attitudes Toward Outdoor Play (ATOP) scales – to quantitatively assess attitudes toward outdoor play to enhance the ability to assess attitudinal changes that may predict or result from engagement in outdoor play.

## Methods

### Context

The development of the ATOP scales took place as part of a larger community-academic partnership study called More Than a Pretty Place. Two local nonprofit organizations and researchers at two local academic institutions contributed to the study. The project was overseen by the Institutional Review Board of one of the local academic institutions. The main goal of the study was to measure the impact of environmental education programs on urban children's well-being. To achieve this goal, researchers needed to measure attitudes toward outdoor play as a hypothesized proximal outcome between small doses of outdoor educational experiences, outdoor play, and health outcomes. The study was approved by the Institutional Review Board at the Medical College of Wisconsin.

### Intent

The goal of this research was to develop an Attitudes toward Outdoor Play (ATOP) scale designed to measure the key components of the construct situated in healthy behavior theory, and informed by ongoing work in health and medical geography, environmental psychology, and related disciplines. Key constructs were identified as (1) belief in the benefits of outdoor play in nature (2) fears related to playing outdoors (barriers), and (3) orientation toward unstructured play. The intent was to calculate a total scale score from the above three subscales to measure key aspects of children's attitudes toward outdoor play in nature.

### Defining “nature” and “outdoor play”

“Outdoor play in nature” needs to be defined for the current study. Because of our particular interest in free play in unstructured environments, the scale targets play in “natural areas,” broadly defined as areas with open spaces predominately consisting of grass and trees. This definition excludes areas dominated by playground or recreational equipment where use is prescribed, but may include areas with large sections of both (e.g., a municipal park may include an unmanicured field, as well as a defined use area such as a tennis court). After considerable discussion, authors concluded that respondents would be shown pictures of unstructured natural environments that would be described as “nature” or “natural areas.” Pictures were shown to children prior to taking the survey to increase the likelihood that participants would have a similar construct in mind when answering questions to follow. The scale did not specify outdoor play activities. The project team conceived of outdoor play as a broad range of activities, including but not limited to riding a bicycle, walking, hiking, water play, playing games with friends, climbing trees, and exploring.

### Scale Development Procedure

The development of the ATOP scale unfolded in stages: (1) item generation, (2) interviews, (3) initial pilot testing in small groups, and (4) scale refinement. After this process, data were collected for quantitative psychometric evaluation.

**Item Generation**—Based on the definitions and identification of components described above, the authors engaged in a literature review to identify concepts, sentences, and key

words related to the construct. Through a thorough search of the literature related to children's experiences with outdoor play, authors identified journal articles, existing related scales, several reports, and one book for close review. Studies represented in these documents ranged from scale validation to qualitative focus groups with youth about outdoor activity preferences to studies on the psychological benefits of nature. Richard Louv's seminal book, *Last Child in the Woods*, was also reviewed, with particular attention given to Part II: Why the Young (and the Rest of Us) Need Nature (Louv, 2008).

A major theme in the literature relates to the benefits of playing in nature, and therefore a subscale measuring the level of agreement that outdoor play has positive effects was created for inclusion in the ATOP scale. Several of the statements were gleaned from open-ended questions posed to youth in qualitative studies, suggesting that youth are aware of positive effects (Burns, et al., 2007; Goldenberg, et al., 2010; Goldenberg, et al., 2010). Five statements about the positive benefits of outdoor play were included initially: (1) Playing outside in nature helps me think more clearly, (2) Playing outside in nature makes me healthier, (3) When I'm angry, playing outside in nature calms me down, (4) I learn new things when I play outside in nature, and (5) When I'm stressed, playing outside in nature helps me to relax.

A key component of our definition of outdoor play is that natural environments are unstructured. As Louv stated, play environments that are not prescribed encourage creativity and exploration (Louv, 2008). Much of the literature about the decline of natural play areas, particularly in urban areas, bemoans the loss of a sense of freedom associated with open spaces. A five-item subscale measures children's orientation toward unstructured play using common themes from the literature. For example, a variant of "I feel free when I am outside" was found in several articles (Burns, et al., 2007; Eastep, et al., 2011; Eastep, et al., 2011; Lester & Maudsley, 2007; Lester & Maudsley, 2007; Thompson, et al., 2008; Thompson, et al., 2008). Statements in this subscale included: (1) I like parks better when they have benches and paths, (2) I feel free when I play outside in nature, (3) I like to make up games when I'm outside in nature, (4) I like to explore new places outside in nature, and (5) I like playgrounds better when they have trees and grass.

Barriers are a key concept in the Health Belief Model, and the literature pointed to several potential barriers to outdoor play. Five statements were included in the original draft of the ATOP scale to form a "barrier" subscale, including feelings of fear related to animals and other people, as well as concerns about getting lost or hurt. Source literature included qualitative studies with youth (Burns, et al., 2007; Burns, et al., 2007; Goldenberg, et al., 2010) and other existing scales (Bingley & Milligan, 2004; Eastep, et al., 2011; Eastep, et al., 2011; Faber Taylor & Kuo, 2009; Faber Taylor & Kuo, 2009; Thompson, et al., 2008; Thompson, et al., 2008). Initial statements were: (1) I am afraid of getting lost outside in nature, (2) I don't like playing outside in nature because there are strangers, (3) I am afraid of wild animals or insects outside in nature, (4) I am afraid of getting hurt if I play outside in nature, and (5) I don't like playing outside in nature because there are people who are doing drugs.

**Interviews**—In the summer of 2012, the first version of the ATOP scale was introduced to three environmental educators in Milwaukee, WI, USA with at least one year of experience working with children in the target age group (mean experience = 4.3 years). All educators had contact with children over multiple visits and could contribute information about observed changes. The intent of interviewing educators and having them review the instrument was to (1) continue generating potential items for the scale and (2) gather preliminary information about the appropriateness of language used in the scale for the targeted age group.

In guided interviews, educators were asked about their experiences in delivering programs in natural environments to children ages 9–11. An interview protocol was created to ensure that data was collected in a consistent manner. After a brief description of what is meant by “natural area” or “green space” (discussed above), educators were asked about (1) what kinds of things children are afraid of when outdoors, as evidenced verbally or behaviorally, (2) the language children use to describe their experiences outdoors, (3) how children’s language about and behavior in natural environments change over time, and (4) what they believe the benefits of outdoor play to be. These questions were asked prior to having educators review the instrument, in order to mitigate contamination. Educators were then presented with the draft instrument, and feedback was solicited.

Responses generally confirmed the draft items. Educators most commonly mentioned fear of animals and insects. In terms of the benefits, educators replied that over time, children relax more in natural environments, seem calmer, and enjoy exploring nature without hesitation. Children express this through showing enthusiasm about going outside and through verbally relaying how excited they are. Although no new items were generated, the fact that educators independently corroborated many of the ATOP scale items suggests preliminary evidence for content validity.

Educators were also asked to respond to the first draft of the ATOP scale in terms of whether the overall construct is covered through the subscales, whether items are consistent with subscale definitions, and whether the language is appropriate for the target age group. Educators responded that the subscales and items covered the construct and no items were inconsistent. Educators did have some suggestions for the ATOP scale. Three of the “benefits of nature” subscale items were identified as having potentially problematic language for the age group. Specifically, “Playing outside in nature makes me healthier” was identified as potentially problematic.

**Pilot Test**—The initial pilot test was conducted in summer of 2012 with participants in a summer day camp program emphasizing outdoor activities and environmental education. This pilot test occurred simultaneously with the educator interviews and also took place in Milwaukee, WI, USA. A paper-and-pencil version of the survey instrument was piloted with a group of children (N=10). The ages of the students ranged from 10 to 12 (M=11.5), and there were equal numbers of males (N=5) and females (N=5). Most identified themselves as “White” (N=9), with one survey that was missing racial identification. The ATOP scale was one of multiple scales included in the survey administered, and came after children had responded to questions regarding basic demographic information, viewed images of natural



areas (Figure 2 is one of three images shown to participants) and were asked about access to nearby natural areas, parental support of outdoor play, and access to TV and video games at home.

The purpose of the initial pilot test was to identify any problematic subscales or items from the target study population prior to full implementation in a set of urban elementary schools. Participants were asked to circle words and phrases they had any difficulty understanding and identify any questions they felt did not have an appropriate response. Additionally, because the construct and language are somewhat abstract for the age group, the project team utilized the small group interviews to obtain valuable information about how children talk about nature and playing outside.

Useful information was gleaned from the initial pilot test. The ATOP scale was administered as one of a battery of scales, as previously mentioned, and perhaps the most important finding was that only 6 of the 10 children completed the survey. Due to this, revisions to the instrument, including the ATOP scale, occurred in the context of a strong preference for eliminating items.

Immediately after the survey was administered, participants were divided into two groups for exploratory focus groups. Survey participants were asked to identify words, phrases, and questions that were difficult to understand. Participants had questions about a few items on the ATOP scale. They thought “When I’m angry, playing outside in nature calms me down” and “When I’m stressed, playing outside in nature helps me to relax” were redundant. Some wanted a “Don’t care/doesn’t matter” choice for “I like parks better when they have benches and paths.” Finally, a few were uncomfortable with answering, “I don’t like playing outside in nature because there are people who are doing drugs.” These items received particular scrutiny in revision discussions.

In addition to identifying problematic items, survey participants were asked exploratory questions to gather information about how they use language to describe outdoor play and nature. While constructing the ATOP scale, a considerable portion of discussions involved how to describe the unstructured play areas that are the target of our study. The consensus decision was “natural area.” When asked what they think of when they hear “nature,” they responded with “trees,” “dirt,” “animals,” “anything green,” “bugs,” “leaves,” “sticks,” “wood,” “flowers,” “grass,” and “flower fragrance.” When asked what they think of when they hear “natural area,” responses included “parks,” “grass or fields,” and “a kind of restricted area.” These responses are congruent with the construct “outdoor play” previously discussed.

**Revisions**—Based on the interviews and initial pilot, the ATOP scale was revised. All but one subscale (fear of nature) was revised to change wording and/or drop items. Two items in the benefits of nature subscale were revised. “When I’m stressed, going outside helps me to relax” was very similar to the statement, “When I’m angry, playing outside in nature calms me down.” The “relax” statement was dropped in this subscale and the “calm” statement was retained. “I feel free when I play outside in nature” was revised to “I feel like I have freedom when I play outside in nature” in order to more accurately reflect intent. Two items

were dropped from the preference for unstructured play, including “I like parks better when they have benches and paths,” which was identified as problematic in our initial pilot test. Its corollary, “I like playgrounds better when they have trees and grass” was also dropped.

## Scale Implementation

**Participants**—The revised ATOP scale was implemented via iPads to 362 youth ages 9–13 (mean=11) in school settings between October 2012 through January 2013 in Milwaukee, WI, USA. Just over half of participants (51%) identified themselves as male (N=183). In contrast to the pilot youth demographics, most identified themselves as Hispanic or Latino (N=301).

**Subscales**—The ATOP scale was one of several scales included in the survey, and the ATOP scale consisted of three subscales. Four items related to respondents’ perceived benefits of playing outside in natural environments. Three items were designed to capture the extent to which students enjoy unstructured play. Five common fears related to playing outdoors comprised a barrier subscale. For all ATOP items, students were asked to indicate whether they “strongly disagree,” “disagree,” “agree,” or “strongly agree” with the subscale statements. Items included in the final instrument are listed in Table 1. These items were preceded by the following statement: “*The next questions ask you about your experiences and feelings about playing in nature. How much do you agree with each statement?*”

**Statistical analysis**—Descriptive statistics were calculated for the scale items. Relationships among variables were investigated using polychoric correlations that estimate correlations between underlying normally distributed latent variables, as the items represent a categorization of an underlying continuous variable (Holgado-Tello, et al., 2010). Factor analysis, using oblique rotation to allow correlation between factors, was used to examine the factor structure of the items within the proposed scale. Hierarchical factor analysis was used to determine whether items measured one underlying construct. Correlations between factor based scores and average scores were examined to determine the best methodology for scoring. Reliability was examined using the ordinal alpha statistic based on polychoric correlations (Zumbo, et al., 2007). In addition, for each item researchers calculated the Cronbach’s alpha if the item were removed, item-scale correlation, and proportion of respondents skipping the item. Validity analyses examined the association between each scale and measures of outdoor activity, sedentary activity, and parental support for outdoor play. Analyses were performed during 2013 and 2014 using R 2.15.2 with the psych 1.3.2 package for item scoring and reliability analyses (R Development Core Team, 2012).

## Results

### Descriptive statistics

Table 1 presents the frequency of responses for each item. Children responded strongly that nature had positive value for them. They largely believed (75–93%) in the benefits of outdoor play in nature, noting that it helps them to think more clearly, it makes them healthier, it calms them down when they are angry, and that they learn new things when they play outside in nature. Students also agreed (85–92%) with statements describing their



fondness for creative, unstructured play in nature, agreeing that they feel like they have freedom when they play outside in nature, and that they enjoy making up games and exploring new places in nature. Students expressed some fears about playing in nature, but the majority disagreed (54–76%) with statements about fearing getting lost, getting hurt, encountering strangers, people with drugs, wild animals or insects. Interestingly, the biggest fear they expressed was not of anything inherent to nature, but instead was a fear of encountering people with drugs.

### Psychometric Analyses

Figure 3 illustrates the correlation structure of the items in the revised ATOP scale as administered. Two clusters distinctly emerge from the correlation plot. The first cluster captures the fears of nature (getting lost, strangers, animals and bugs, getting hurt, people with drugs). The second cluster illustrates the positive correlation among items intended to capture the benefits of nature (think clearly, healthier, calm down, learn things), including benefits associated with unstructured play (freedom, make up games, explore new places). There is no clear distinction between perceived benefits of nature and benefits associated with unstructured play. The highest correlations were observed between fear of animals and bugs and strangers ( $r=.51$ ), fear of people with drugs and strangers ( $r=.50$ ), fear of animals and bugs and getting hurt ( $r=.46$ ), freedom and learning new things ( $r=.46$ ), freedom and making up games ( $r=.46$ ), fear of strangers and getting lost ( $r=.46$ ), fear of getting hurt and getting lost ( $r=.45$ ), and fear of people with drugs and getting hurt ( $r=.44$ ). Interestingly, getting lost (a fear) is positively correlated with making up games and learning new things (benefits), and there are no strong negative correlations between any measures of fear and benefit.

Factor analyses revealed two underlying factors (eigen values – Factor 1: 2.83), Factor 2: 1.89). As illustrated in Figure 5, the factors were weakly negatively correlated ( $r = -0.2$ ), and a multilevel factor analysis demonstrated that the two factors did not measure one underlying construct.

Because the factors did not measure a general, underlying construct, the instrument was divided into two scales: ATOP-benefits and ATOP-fears. Items originally intended as “unstructured play” were included in the ATOP-benefits scale based on the factor analysis results. Figure 5 illustrates the contribution of each item to the overall factor. For the ATOP-benefits scale, the feeling of freedom and the ability to learn new things when playing outside in nature were the most important items (0.7), followed by calm down when angry and make up games when playing outside in nature (0.6). Exploring new places, being healthier, and thinking clearly had the lowest loadings (0.5). For the ATOP-fears scale, fears of strangers, getting hurt, and getting lost were the strongest items (0.7), while fears of animals/bugs and people with drugs loaded slightly lower (0.6).

Average scores performed well when compared with factor-based scores for both scales. Average scores are recommended when using the ATOP scales, as they perform well and are easy to score and interpret.

Reliability analyses are presented in Table 2. Both the ATOP-benefits scale and the ATOP-fears scale have a reliability of  $\alpha=.79$ , indicating that both scales demonstrate acceptable levels of reliability. For the ATOP-benefits scale, feelings of freedom when playing outdoors had the highest item-scale correlation (0.75) and would have the biggest impact on the scale's reliability if dropped. For ATOP-fears, fear of strangers has the highest item-scale correlation (0.79) and would result in the biggest impact on the scales reliability if dropped. No items were affected by large proportions of missing values.

Validity of the ATOP scales was examined through testing associations between the ATOP scales and related variables and constructs (Table 3). The ATOP benefits scale was significantly and positively associated with several outdoor play activities, including walking/hiking, climbing trees, exploring and observing. In addition, it was negatively correlated with indoor, sedentary activities, including watching TV and playing video games. The mean ATOP benefits score was significantly higher among children who reported that their parents support their outdoor play in nature. In contrast, the ATOP-fears scale was significantly, negatively associated with outdoor play activities, including riding a bike, climbing trees, exploring and observing. Interestingly, it was also negatively correlated with playing video games, although this association was only marginally significant. ATOP-fears scores were higher among children who reported that their parents did not support their outdoor play in nature, but this association did not reach statistical significance.

## Discussion

Two reliable and valid scales emerge from this work – the Attitudes Toward Outdoor Play-benefits scale ( $\alpha=.79$ ) and the Attitudes Toward Outdoor Play-fears scale ( $\alpha=.79$ ). The ATOP-benefits scale includes notions of outdoor play in nature as beneficial to health, as well as notions of the benefits of unstructured, creative play often associated with play in natural spaces. The ATOP-fears scale includes five statements that summarize fears of outdoor play in nature, including one item (strangers, people with drugs) that indicates children's fears of the use of natural spaces by individuals they do not know and who may be engaging in deviant behaviors.

The original intent of this work was to develop a scale to measure the construct of attitudes toward outdoor play in nature among children. However, psychometric analyses indicate that items selected to measure subscales within this instrument as originally conceived do not appear to measure a single underlying construct; instead, two distinct constructs emerged – attitudes toward the benefits of outdoor play in nature (aligned with the notion of therapeutic landscapes) and fears of outdoor play in nature (aligned with the notion of landscapes of fear). Of particular interest, these constructs – originally conceived by the project team as oppositional – are not strongly negatively correlated. Instead, it appears that children's perceptions of benefit and fear are part of a more complex understanding of landscapes as opportunities for outdoor play. This finding is meaningful and intuitive, particularly given the recognition that fears of nature cannot be understood as entirely negative emotions, and are not necessarily obstacles to recognizing the benefits of nature play, as those fears can serve important purposes (Louv, 2008) – namely, self-preservation and caution.

This work is subject to several important limitations. First, the scales were validated in an urban, school setting in the United States among a population of primarily Hispanic/Latino youth (ages 9–13). It is not known whether the scales are appropriate for administration in other settings or with different populations. Further work should examine the performance of these scales in different settings to further assess reliability and validity, and to provide a basis for comparison among different populations. Here, we examined the correlation between the ATOP scales and related measures developed by the project team in a cross-sectional correlation analysis. Future work should examine the relationship between ATOP scores and additional measures of engagement in outdoor play, including within the context of study designs that allow for the examination of causal relationships and using methods non-reliant on self-report (accelerometers, direct observation). Future work is also needed to dissect constructs such as “nature” and “outdoor play” in order to investigate how, and to what degree of variability, these constructs are imagined by individuals.

In conclusion, the ATOP scales are reliable and valid instruments for measuring attitudes toward outdoor play that may mediate children’s outdoor activity in natural settings. The ATOP scales could be useful tools for evaluating the effects of programming, such as environmental education programming, on improving children’s attitudes toward the benefits of nature and reducing their fears, and may predict more distal outcomes including engagement in outdoor activity. Perhaps the most interesting finding of this research is the lack of a strong negative correlation between ATOP benefits and ATOP fears items. Future work, informed by the literature on therapeutic landscapes and associated work (Gesler, 1992; Gesler, 1992; Tuan, 1975; Yi-Fu, 1979; Yi-Fu, 1979) should interrogate this relationship, exploring the complexity of children’s understandings of the nature of landscapes in relation to their engagement in outdoor play.

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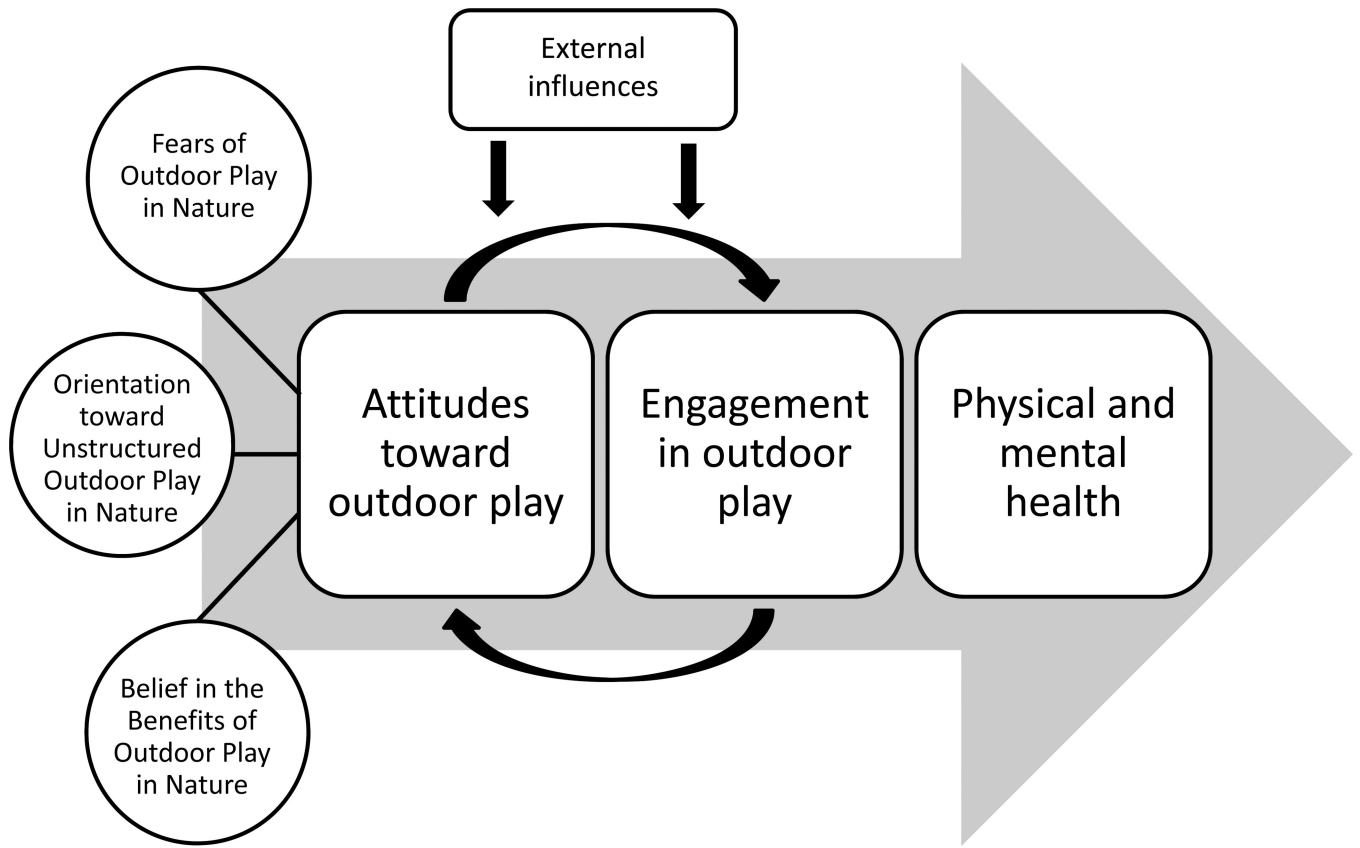
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**Figure 1.**  
Conceptual Model

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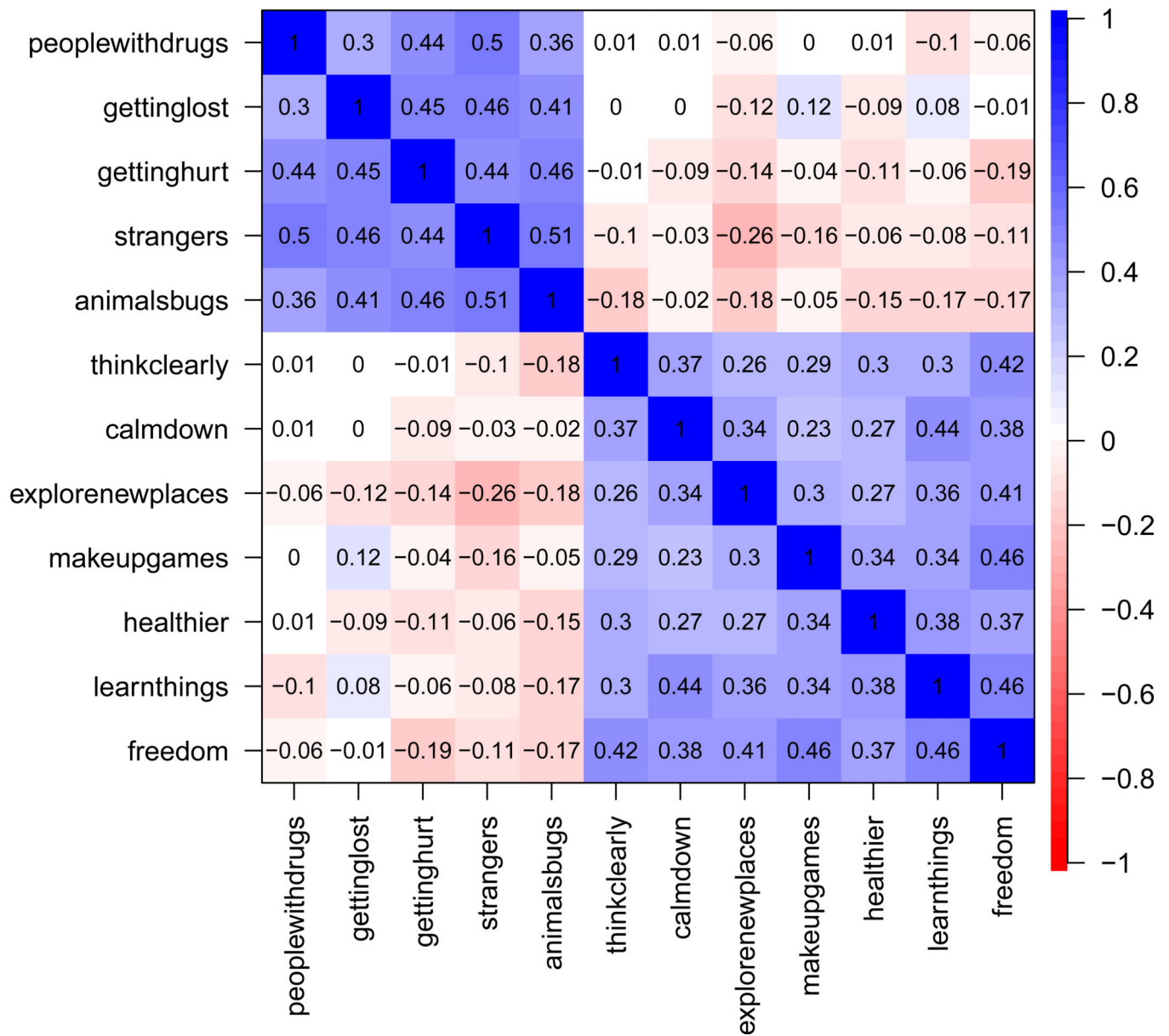
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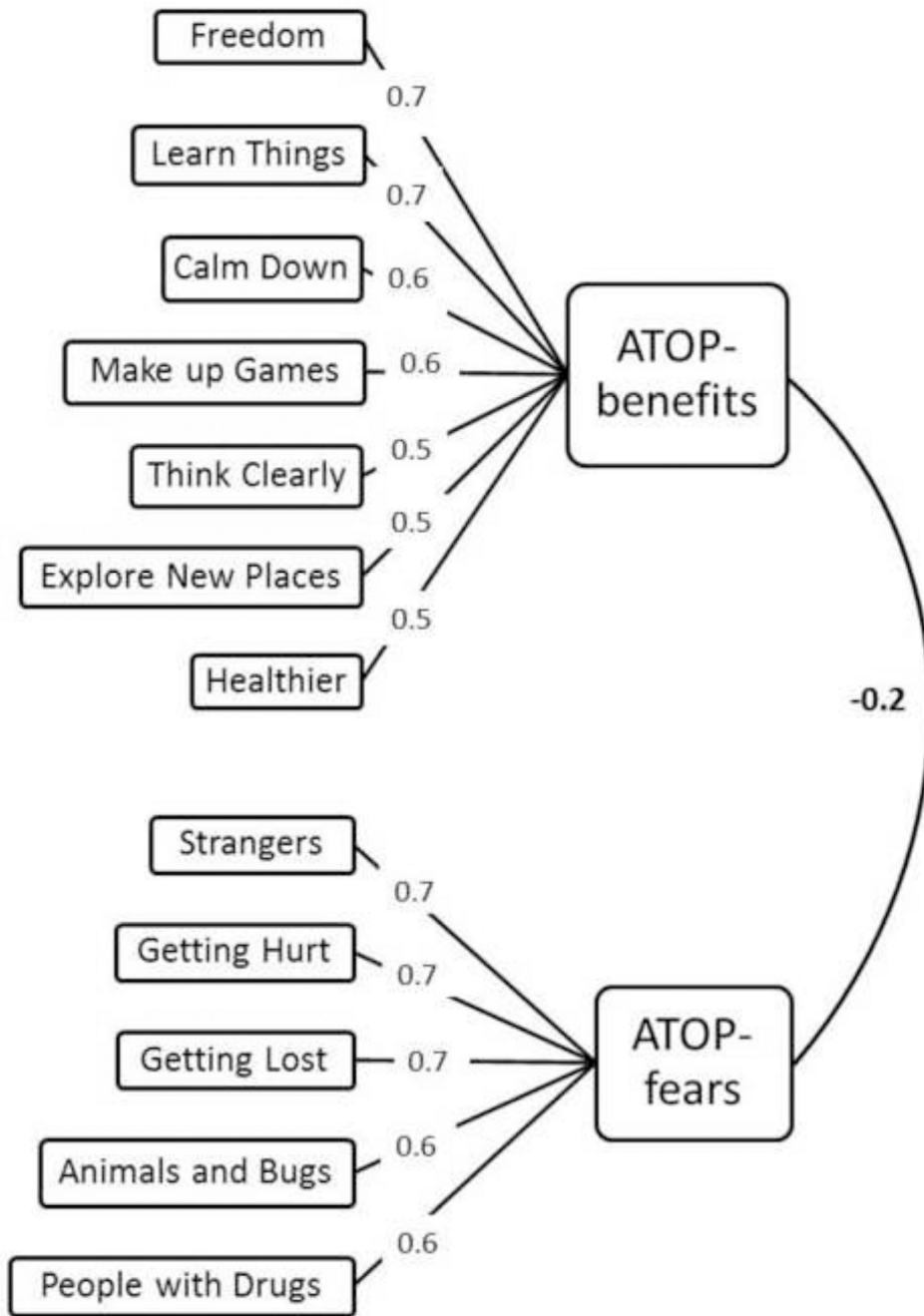
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**Figure 2.**  
Example of “Natural Area” Photo Shown to Participants



**Figure 3.**  
Correlation Structure



**Figure 4.**  
Factor Structure

**Table 1**

Descriptive statistics for Attitudes toward Outdoor Play scale items

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
Playing outside in nature helps me think more clearly.	18 (5%)	35 (10%)	210 (58%)	99 (27%)
Playing outside in nature makes me healthier.	6 (2%)	16 (4%)	170 (47%)	167 (46%)
When I'm angry, playing outside in nature calms me down.	21 (6%)	67 (19%)	166 (46%)	105 (29%)
I learn new things when I play outside in nature.	14 (4%)	58 (16%)	210 (58%)	79 (22%)
I feel like I have freedom when I play outside in nature.	11 (3%)	17 (5%)	158 (44%)	174 (48%)
I like to make up games when I'm outside in nature.	13 (4%)	40 (11%)	193 (54%)	114 (31%)
I like to explore new places outside in nature.	11 (3%)	36 (10%)	170 (47%)	143 (40%)
I am afraid of getting lost outside in nature.	91 (25%)	125 (35%)	97 (27%)	44 (12%)
I don't like playing outside in nature because there are strangers.	93 (26%)	153 (43%)	85 (23%)	25 (7%)
I am afraid of wild animals or insects outside in nature.	83 (23%)	151 (42%)	99 (27%)	26 (7%)
I am afraid of getting hurt if I play outside in nature.	108 (30%)	166 (46%)	67 (19%)	19 (5%)
I don't like playing outside in nature because there are people with drugs.	73 (20%)	122 (34%)	111 (31%)	51 (14%)

**Table 2**

## Reliability Analyses

<b>ATOP-Benefits</b>	<b>Alpha if dropped</b>	<b>Item-Scale correlation</b>	<b>Percent missing</b>
Think clearly	0.77	0.63	0.00
Healthier	0.77	0.63	0.83
Calm down	0.76	0.65	0.83
Learn new things	0.75	0.70	0.28
Freedom	0.74	0.75	0.55
Make up games	0.77	0.64	0.55
Explore new Places	0.77	0.63	0.55
<b>TOTAL SCORE</b>	<b>0.79</b>	<b>n/a</b>	<b>2.49</b>
<b>ATOP-Fears</b>	<b>Alpha if dropped</b>	<b>Item-Scale correlation</b>	<b>Percent missing</b>
Getting lost	0.77	0.71	1.38
Strangers	0.73	0.79	1.66
Animals and bugs	0.75	0.74	0.83
Getting hurt	0.75	0.76	0.55
People with drugs	0.77	0.70	1.38
<b>TOTAL SCORE</b>	<b>0.79</b>	<b>n/a</b>	<b>3.59</b>

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**Table 3**

## Validity Analyses

	<b>ATOP-Benefits</b>	<b>ATOP-Fears</b>
<b>Ride a bike</b>	r = 0.07, p-value = 0.18	r = -0.21, p-value < 0.001
<b>Walk or hike</b>	r = 0.22, p-value < 0.001	r = -0.09, p-value = 0.08
<b>Play games with friends</b>	r = 0.13, p-value = 0.02	r = -0.15, p-value = 0.004
<b>Climb trees</b>	r = 0.15, p-value = 0.01	r = -0.30, p-value < 0.001
<b>Explore</b>	r = 0.37, p-value < 0.001	r = -0.19, p-value < 0.001
<b>Observe</b>	r = 0.33, p-value < 0.001	r = -0.15, p-value = 0.004
<b>Watch TV</b>	r = -0.23, p-value < 0.001	r = 0.08, p-value = 0.12
<b>Play Video Games</b>	r = -0.20, p-value < 0.001	r = -0.09, p-value = 0.09
<b>Parental Support</b>		
Yes	mean = 3.22 [3.17, 3.27]	mean = 2.15 [2.08, 2.22]
No	mean = 2.95 [2.80, 3.09]	mean = 2.40 [2.21, 2.58]
	p-value < 0.001	p-value = 0.01