ENVIRONMENTAL SOCIALIZATION
Quantitative Tests of the Childhood Play Hypothesis

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ABSTRACT: Two studies with adolescent youth ($N = 1,376$, $N = 450$) help clarify the relationship between childhood play experiences in wild environments and later environmental preferences in the life domains of work, leisure, and school. Respondents reporting having played in wild environments had more positive perceptions of natural environments, outdoor recreation activities, and future indoor/outdoor occupational environments. No significant differences were found for preferences for environmental sciences activities conducted in schools. Results suggest that childhood play in wildland environments is related to environmental competencies and preferences but not necessarily an intellectual interest in environmental sciences or environmentalism.

A growing body of cross-cultural research has attempted to identify socialization forces that contribute to a committed concern for natural environments. The results of these studies have consistently identified childhood play in natural environments as a key factor. Through using a different research method that is responsive to some of the limitations of the previously conducted research, this article examines whether childhood play

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experiences in natural environments have effects broader than merely stimulating environmentalism.

In 1980, Tanner published a study indicating that his sample of politically active professional conservationists attributed memorable experiences of playing outdoors as a commonly reported influence in choosing conservation-oriented careers. Numerous other studies in North America, England, Europe, and Africa have replicated this finding (Chawla, 1999; Palmer, 1993; Palmer & Suggate, 1996; Palmer, Suggate, Bajd, & Tsaliki, 1998; Sia, 1984; Sia, Hungerford, & Tomera, 1986). The topic has attracted enough attention among environmental educators that several critiques of the research exist (Chawla, 1998; Tanner, 1998a, 1998b). Most studies were conducted using open-ended questions, asking respondents to identify significant life experiences that stimulated their interest in conservation, environmentalism, or environmental education careers. Responses were subjected to content analysis, often without interrater reliabilities, and results were reported as descriptive statistics. All studies produced rankings with childhood play as the first or second most frequently listed influence. Several critiques of these studies suggest that a second generation of investigations is needed, accompanied by a theoretical explication of what is occurring during childhood play in wild environments that could influence later adult behavior.

Existing significant life experience studies have several limitations, some of which have been identified by Chawla (1998) in her critique. A major issue is the lack of comparison groups. Chawla suggested that it is possible that individuals uninvolved in environmentalism could also report memorable childhood play experiences in wild environments. This is a serious weakness because studies done with both children and adults asked to recall favorite childhood places indicate widespread preference for wild and interstitial play areas (Becker, 1976; Bjorklid, 1985; Chawla, 1992; Cooper-Marcus, 1978; Hart, 1983; Henninger, 1994; Moore, 1980; Moore & Young, 1978; Pellegrini, 1992; Raymund, 1995; Sebba, 1991). Most children with access to wild play areas report preferring these places. If it were not for several studies that provide evidence that some portion of the general population actively dislikes being in wild environments, one would conclude that preference for wild settings was ubiquitous and unlikely to distinguish environmental activists from any other group (Bixler, Carlisle, Hammitt, & Floyd, 1994; Bixler & Floyd, 1997, 1999; Ulrich, 1993).

As a response to the "lack of comparison groups" concern, Chawla suggested the need to study groups of individuals involved in environmentally neutral or destructive occupations and those lacking childhood play experiences in wild settings. Only one study was found that had addressed previous nature experiences and their relationship to environmental attitudes. This

research of an adult population used a single question measuring "past time spent in nature," although it did not specifically measure childhood play. The researchers found a small but significant relationship between past time spent in nature and "indignation about insufficient nature protection" (Kals, Schumacher, & Montada, 1999).

An additional issue raised by Chawla (1992, 1998) is the untested relationship between adult conservationists' childhood access to wild play environments and the values and attitudes of parents and peers who facilitate their access (see Kals et al., 1999). Any number of physical or social conditions that provide the opportunities for a child to play in wild settings may reflect values of parents or peers. The child may grow up in a rural sociophysical environment (Whitaker, 1983) or have parents with the interest and resources to buy a home surrounded by acres of land or near a natural resource–based park. Even if the parent is disinterested in the outdoors, a neighborhood friendship may result in access to outdoor play and places to explore. Based on Harris's (1998) sweeping reinterpretation of the parent-child socialization research literature, peer influences must not be ignored. Harris argued persuasively that peers are more influential than parents. Not only are the values of the parent or peers important in access to wild play areas, the interpretation of the child's experiences by parents and peers may also be a factor in how children interpret their adventures in natural areas (Chawla, 1992).

Even if additional studies use different methods and take into account the social as well as physical milieu of the child, the evidence supporting the relationships between childhood play and interest and concern for natural environments would still be tenuous. A formal theory of how play in wild settings contributes to environmental sensitivity is necessary. Not only is an explicit conceptual understanding of the effects of wildland play during childhood important at theoretical and empirical levels, it may also be helpful in the design of nonformal environmental education programs and play areas for children (Kirkby, 1988).

THE VALUE OF WILDLAND PLAY: A PRELIMINARY CONCEPTUALIZATION

Childhood play in wildland environments combines exploration and play (Gorlitz & Wohlwill, 1987; Hart, 1977; Sobel, 1996). Exploration helps children develop wayfinding skills and provides a sense of autonomy from adults, particularly parents (Acredola, 1982; R. Kaplan, 1976; Nerlove, Munroe, & Munroe, 1971; Passini, 1980; Webley, 1981). Exploratory behavior begins in early childhood with the toddler beginning to move incrementally farther away from the parent (Acredola, 1979, 1982). In middle childhood, parents establish a home range, an area where the child may

explore unsupervised, based on the parents' perceptions of the child's maturity and the perceived safety of the area. The home range may be limited to the property lines of the parents' home or may extend far into the community (Hart, 1978; Matthews, 1987a, 1987b; Webley, 1981). Children sometimes violate parental restriction on home range, further expanding it. This often occurs when children receive bicycles, allowing them to travel farther from home in less time (Moore & Young, 1978). If the home range is large enough, children will have daily opportunities to explore, without supervision, diverse areas. They will develop fundamental wayfinding skills, particularly if the environment being explored only provides subtle spatial cues (Cornell, Heth, & Broda, 1992 ; R. Kaplan, 1976). They may also develop positive attitudes toward the environments they explore because these are the places in which they are least inhibited due to absence of adult supervision (Deci, 1981; Sobel, 1993). The autonomy to explore is both a key motivation and reward because all other travel by the child through the molar physical environment involves being led somewhere by parent, older sibling, school bus driver, or other adult. An extensive literature on sex differences in home range and wayfinding abilities suggests that children who have highly restricted home ranges and who are accompanied everywhere by adults develop limited wayfinding competencies (Moore & Young, 1978) and miss developmentally important contact with a diversity of physical settings (Hart, 1977; Saegart & Hart, 1979).

Wildlands provide a rich developmental environment. Most empirical evidence for this comes from changes in the behavior of children after renovations of school yards in which asphalt was replaced with natural areas (Moore, 1997; Titman, 1994). Natural environments are dynamic, complex, and often disorderly in contrast to the rectilinear built environment. Protruding rocks and tree roots, fallen trees, low-hanging branches, streams without bridges, and many geologic variations provide exciting psychomotor challenges. The large number and variety of "loose parts" available in wildland environments along with the lack of close adult supervision provide greater potential for creative and constructive play than most built environments (Nicholson, 1971; Sobel, 1993).

Learning about the environment is partially a function of the unique and novel qualities of wild places. As aptly described by Rachel Carson (1956) in *The Sense of Wonder*, there are multitudes of plant, animal, geographic/geologic features, and physical phenomena as well as changes across time, season, and weather that stimulate curiosity. The natural environment changes across time, daily, seasonally, and with the weather. The novel qualities of natural environments motivate regular exploration and produce surprise and wonderment (Berlyne, 1966; Hunt, 1965; Watkins & Marsick, 1992).

One of the few empirical studies that indicate what children are learning during exploration and play comes from a comparison of the differing ability of two groups to understand biodiversity. Immigrant children who foraged for berries and mushrooms were better able to understand concepts related to biodiversity than their middle-class suburban counterparts (Chipeniuk, 1995). Incidental learning that occurred through encountering the large numbers of different insects, plants, and animals during exploring for berries may have made the concept of biodiversity both easier to comprehend and personally relevant.

In addition, evidence of learning from natural environments comes indirectly from studies contrasting environmental preferences of members of special interest groups with those of general population samples. These studies consistently show that most adults in the general population prefer green environments over built environments. However, only certain types of natural environments are preferred. These places are described as having a limited number of elements, smooth ground cover, and deep visual penetration (Schroeder, 1986; Ulrich, 1977, 1986, 1993). The generally less preferred wildland environments are complex, with many partially obscured elements and limited visual penetration. To the inexperienced person, these perceptual characteristics make these environments confusing, creating cognitive chaos (S. Kaplan & Kaplan, 1982). In contrast, adults whose careers and avocations center on outdoors prefer these environments often based on symbolic qualities related to their interests (Medina, 1983, and R. Kaplan & Herbert, 1987, as cited in R. Kaplan & Kaplan, 1989). Frequent experience with these environments decreases the perceived complexity and uncertainty while increasing environmental preference. Medina's (1983) study of environmental educators and R. Kaplan and Herbert's (1987) work with wildflower society members suggest that these groups know more about what is in these environments and value what they infer to be present. Learning to make sense of these disorderly and complex wildland environments is probably a function of a combination of implicit, incidental, and informal learning through repeated experiences. Research on implicit and incidental learning shows promise in clarifying how and why children benefit cognitively from wildland play (Necka, Machera, & Miklas, 1992; Rathus, Reber, Manza, & Kushner, 1994; Reber, 1989; Seger, 1994).

Childhood play also provides sociocultural rewards gained from developing competencies in wild environments. Humans are social creatures, learning from each other, negotiating the meaning of events, and seeking social approval (Bronfenbrenner, 1977). Children have access to wild areas partially as a function of parental approval and facilitation (Torell & Biel, 1985). Peer influences are also important and may be a significant positive influence

if the parents are disinterested in wildlands but do not outright forbid play in wildland areas (Bixler & Morris, 2000; Harris, 1998). Individual children strive to emulate whatever peer group to which they have access (Harris, 1998). When the child receives messages from significant others that an interest in the outdoors is acceptable and desirable, the child receives further social reinforcement for holding an interest in nature. In addition, the growing child becomes better able to function socially in recreational, vocational, and educational social worlds directly or indirectly related to the outdoors (Ditton, Loomis, & Choi, 1992).

The research literature provides explanations for why the sociophysical characteristics of natural environments should be appealing to children. Play and exploration in natural environments provide for novelty, challenge, control, self-determination, and positive social interactions. At least for some children, environmentalism probably begins to emerge as a function of a positive affective attachment to wild places that provided enjoyable experiences and a sense of competency. Even if childhood play in wild places is related to later adult environmental activism, it seems unlikely that the effects would be limited to activism. This study tests the relationship between frequency of childhood play in different physical environments and environmental preferences within the life domains of education, recreation, and work. Two data sets allow replication of a clustering method for identifying different play experiences and the testing of a wide variety of preferences and activity measures already established in the environmental psychology literature.

METHOD

Two studies were conducted with public school students, one in the southeastern United States and the other in Texas. Measures of the frequency of childhood play in different environments plus environmental perception and preference variables were part of these studies.

Study 1. Middle and high school students ($N = 1,337$) in Kentucky, North Carolina, and South Carolina completed a structured questionnaire during a regular school classroom period. The questionnaire consisted of scales using photographs and written questions covering frequency of childhood play in different environments, environmental preference, recreation activity preferences, fears concerning a wildland trip, and desires for modern comfort. The negative perceptions scales were listed last so as not to influence responses to the environment and activity preference scales. All questions were read aloud

to compensate for differences in reading levels. The sample was evenly balanced between urban, suburban, and rural schools with equal numbers of rural and urban minority students. The sample was 53% female, 49.5% White, 48.5% Black/African American, and 2% other.

Study 2. Middle school students ($N = 450$) in Texas completed a structured questionnaire using data collection methods identical to Study 1. A wider range of environmental preference and perception scales was used than in Study 1, including a Disgust Sensitivity Scale (DSS), Environmental Education Activity Preference Scale, and Occupational Environments Preference Scale (Bixler & Floyd, 1997). This study allowed both replication and extension of Study 1. The sample was 47% female, 50% White, 15% Black/African American, 28% Hispanic, and 7% other. The sample was predominantly suburban and rural students.

MEASURES OF FREQUENCY OF CHILDHOOD PLAY IN DIFFERENT ENVIRONMENTS

In both studies, respondents were presented with a list of play environments and asked to rate on a 5-point scale (0 = *never*, 4 = *very often*) how often they played in different common outdoor environments before the age of 10.

Hierarchical cluster analysis was used to create groups of respondents based on frequency of play in the different environments. The cluster analyses used squared Euclidean distances and Ward's method (Milligan & Cooper, 1985). Responses were not standardized because all items used the same response categories. Agglomeration schedules were used to identify the best cluster solution. In both studies, two items, "my yard" and "a friend's yard," did not significantly discriminate between clusters but were retained because they were necessary to identify persons who only reported play experiences in their own yards and their neighbors' yards. A yard play environment may have been limited to a small city or suburban lot or, for rural respondents, subsume more specific play environments such as woods, fields, or lakes. A rural backyard could be several hundred acres in size. Rural students should report playing in their yards along with playing in wild environments such as the woods.

Taken at face value, the frequency of play scales measure frequency of play. The scales undoubtedly measure a combination of frequency of play and positive orientation toward preferred play environments. Humans tend to remember participating in activities at a higher rate than in actuality if the activity was pleasurable. This is a well-documented aspect of the reconstructive aspect of memory (Bernard, Kilworth, Kronenfeld, & Sailer, 1984;

TABLE 1
Childhood Play Environment Clusters: Study 1—Southeastern Secondary School Sample

Amount Played	*Study Population Mean*	*Wildland Adventurers (n = 493)*	*Urban Adventurers (n = 360)*	*Yard Adventurers (n = 455)*
Around a pond or stream	2.01	2.70	2.39	0.97
In a farm field/pasture	2.10	2.53	2.18	1.57
In the woods	2.23	3.14	2.37	1.14
In an alley	0.94	0.45	2.48	0.26
In an empty lot	1.19	0.82	2.36	0.67
In a friend's yard	3.44	3.32	3.78	3.31
In my yard	3.65	3.32	3.80	3.87
In a playground	2.89	2.46	3.30	3.04

NOTE: Hierarchical cluster analysis based on Ward's method and squared Euclidean distance. Data based on a preference scale from 0 to 4, where 0 = *never played* and 4 = *almost always played* in these places.

Dawes, 1988; Thompson, Skowronski, Larsen, & Betz, 1996). Although this phenomenon would poise validity issues in experimental psychology, it is part and parcel of the recall and choice behavior of individuals: Pleasurable experiences tend to be repeated.

Both studies produced three cluster solutions labeled wildland adventurers (WA), urban adventurers (UA), and yard adventurers (YA) (see Tables 1 and 2). All three clusters were characterized by high mean scores for play in yards. The YA had high mean scores only for the yard environments. The WA cluster had high play scores for all environments except the urban settings. The UA had significantly higher mean scores for urban settings and moderate scores for wildland environments.

The WA and the YA clusters are all that are needed to test the study questions. The UA cluster was an unexpected result of the cluster analysis and is included both to illustrate the complexities of categorizing play environments and as stimulus for further research.

DEPENDENT VARIABLES

A range of dependent variables measured environmental preference and perceptions. One-way ANOVA tests of differences in the dependent variables were made across the three clusters. Scheffe's post hoc comparisons were made if the overall model was significant at alpha = .05 for three cluster solutions in Study 1 and Study 2.

TABLE 2
Childhood Play Environment Clusters: Study 2—Texas Middle School Sample

Amount Played	*Study Population Mean*	*Wildland Adventurers (n = 133)*	*Urban Adventurers (n = 144)*	*Yard Adventurers (n = 156)*
In the woods	1.88	2.58	2.08	1.09
Around a pond or lake	2.02	2.68	2.31	1.19
In an overgrown field	1.82	2.42	2.12	1.03
In a farm field/pasture	1.92	2.65	2.30	0.96
Around a stream or creek	1.98	2.69	2.28	1.10
In an alley	0.89	0.59	1.63	0.46
In a street	2.44	1.44	3.26	2.53
In a friend's yard	3.08	2.56	3.47	3.16
In my yard	3.50	2.92	3.76	3.76
In a playground	2.69	2.23	2.81	2.99

NOTE: Hierarchical cluster analysis based on Ward's method and squared Euclidean distance. Data based on a unipolar preference scale, where 0 = *never played* and 4 = *almost always played.*

Walking Path Preference Scales were used in both studies as measures of environmental preference. In Study 1, 10 photographic slides illustrated either wildland paths (narrow dirt paths with vegetative enclosure on both sides) or manicured park paths (wide paved paths with mowed lawn on one or both sides of the path, some trees, and park benches). Respondents were asked to rate how much they would like walking down each path on an afternoon after school. All 10 photos were shown to respondents and then rated during a second projection. The response scale was a 5-point bipolar scale where 1 = *dislike a lot*, 2 = *dislike a little*, 3 = *not sure*, 4 = *like a little*, and 5 = *like a lot*. Factor analysis (principal components with varimax rotation) reduced the scale to two factors labeled Wild Paths (Cronbach's alpha = .91) and Manicured Paths (Cronbach's alpha = .86).

In the Walking Path Preference Scale used in the second study, identical routines were used with an addition of five photographs of urban walkways composed of sidewalk scenes with a road visible. In these photos, the berms contained grass and trees. Factor analysis identified three factors composed of five photographic slides: Wildland Paths (Cronbach's alpha = .93), Manicured Paths (Cronbach's alpha = .88), and Urban Paths (Cronbach's alpha = .90).

A Desire for Modern Comforts Scale is loosely based on Helson's (1959) adaptation level theory. The scale measures comfort level with being in wild environments for extended periods of time. Respondents were given a hypothetical situation in which they would be participating in a historical reenactment, living without modern comforts for 2 weeks. On a 5-point scale,

respondents were asked how much they would miss each modern comfort. In Study 1, the items in the scale were sleeping indoors, bathtub or shower, electric lights, flush toilet, bed to sleep in, air conditioner, heater, and running water. Reliability for the scale was Cronbach's alpha = .90. In Study 2, four camping equipment items were added (tent, sleeping bag, insect repellent, and flashlight). Factor analysis produced two scales, Modern Comforts (Cronbach's alpha = .90) and Camping Comforts (Cronbach's alpha = .71).

In Study 1, a Wildland Fear Expectancy Scale measured environmental perception. Theoretical aspects of the scale and its construction can be found in Bixler, Floyd, and Hammitt (1995). Respondents rated each fear-evoking item twice, once on how much fear they thought they would experience when encountering each phenomenon and then their perceived expectation of encounter. For each stimulus, the product of each respondent's two answers was the score for that stimulus. Factor analysis was used to identify three subscales: Fear of Animals (Cronbach's alpha = .78), Fear of Becoming Lost (Cronbach's alpha = .74), and Fear of Weather Extremes (Cronbach's alpha = .65).

Recreation activity preferences were measured in both studies by asking respondents to indicate their preferences for participating in various recreation activities. Using a 5-point scale from 0 to 4, respondents indicated their preferences for each activity. In Study 2, an additional scale measured preference for future occupational environments. Respondents rated how much they would like working in different physical environments on a 5-point scale from 0 to 4.

In Study 2, preferences for environmental education activities were measured using a 10-item scale. The activities involved either observation or manipulation of biological phenomena and measured preferences for activities that would be assigned to students at school. The Cronbach's alpha for the Observational Activities Scale was .70, and the Cronbach's alpha for the Activities Requiring Manipulation Scale was .78.

Several additional perception scales were added in Study 2. Environmental perception was measured using a Concerns About a Forest Trip (CFT) Scale and the DSS. The CFT Scale involved the respondents in rating how worried they would be about different things happening if they were to take a daylong trip into a forest with a group of peers. The items were being caught in thunder and lightning, stepping on a snake, getting lost, getting a spider bite, being chased by a swarm of bees, getting separated from friends, seeing a snake, being caught in a wind storm, and not returning before dark. The composite score for the nine items was used for the statistical tests. The items were measured on a 5-point scale from 0 to 4, where 0 = *not worried* and 4 = *very worried*. The nine items in the CFT Scale had a Cronbach's alpha of .88.

Details of the DSS are described in Bixler and Floyd (1999). Respondents rated their reactions to different disgust-evoking natural phenomena. Factor analysis reduced the items in the scale to Strong Disgust Elicitors (Cronbach's alpha = .88) and Weak Disgust Elicitors (Cronbach's alpha = .88). Examples of Strong Disgust Elicitors were "touching a slug" and "stepping in animal droppings." Weak Disgust Elicitor items included "having to sit in wet grass" and "getting itchy from dust and sweat on my skin."

RESULTS

Comparisons of environmental perception and activity preferences between WA and YA provide clear support for a relationship between reported childhood play and exploration in wildland environments and later preferences for wildland-dependent activities. The UA cluster results suggest more complex relationships are at work.

In Study 1, preference for walking paths varied across the three clusters (see Table 3). For the wildland paths preference, the WA and UA reported a significantly higher preference than the YA. For manicured paths, UA had the highest mean preference and WA had the lowest mean preference.

Results for recreation activity preferences showed patterns that varied systematically with frequency of play in different environments (see Table 3). WA and UA had significantly higher mean preferences for all the outdoor and wildland activities than YA, including motorized activities and golf. A somewhat different pattern emerged with the social and generic activities popular with North American teenagers. WA had the lowest mean preferences for these activities. UA and YA were similar in preference for most activities, with YA only significantly higher on mean preference for visiting shopping malls. UA had the highest mean score for listening to music and the common urban park activity of flying kites.

Environmental perception of wildlands was measured with two negative affect variables (see Table 4). For the Desire for Modern Comforts Scale, the three clusters were significantly different. WA had the lowest mean scores, UA had moderately high mean scores, and YA mean scores were significantly higher than the other two clusters. A similar pattern was found with the three subscales of the Wildland Fear Expectancy Scale. WA had the lowest mean fear expectancy scores on the three subscales, and YA had the highest mean expectancy scores. For Fear of Weather, UA and YA were not significantly different.

TABLE 3

Differences in Environmental Preferences by Childhood Play Environment Clusters: Study 1—Southeastern Secondary School Sample

Variable	*Wildland Adventurers*	*Urban Adventurers*	*Yard Adventurers*	F	p
Preference for walking paths[a]					
Wildland paths	15.7_a	14.6_a	11.6_b	52.8	.000
Manicured park paths	19.4_a	21.1_b	20.2_c	17.5	.000
Preference for recreation activities/wildland[b]					
Bird watching with binoculars	0.77_a	0.74_a	0.55_b	7.3	.001
Hunting in woods or fields	1.45_a	1.47_a	1.10_b	43.5	.000
Bicycling just for fun	2.63_a	2.88_a	2.57_b	7.8	.000
Fishing in rivers or lakes	2.17_a	2.16_a	1.62_b	24.4	.000
Rock climbing with ropes	1.04_a	1.15_a	0.56_b	38.0	.000
Motor boating on lakes/rivers	2.01_a	1.94_a	1.31_b	38.5	.000
Canoeing	1.48_a	1.45_a	0.91_b	35.9	.000
Tent camping in parks/forests	1.95_a	1.80_a	1.16_b	47.7	.000
Motorcycling/four-wheeling on trails	1.95_a	1.95_a	1.34_b	28.4	.000
Preference for recreation activities/social[b]					
Talking with friends	3.42_a	3.56_b	3.57_b	6.0	.003
Dancing to music	2.37_a	2.76_b	2.87_b	17.0	.000
Playing a musical instrument	1.58_a	1.52_a	1.57_a	0.22	.802
Listening to music	3.59_a	3.74_b	3.61_a	5.0	.007
Watching TV	3.06_a	3.40_b	3.38_b	20.4	.000
Reading books or comics	2.39_a	2.27_a	2.35_a	0.93	.395
Kite flying in a park	$1.27_{a,b}$	1.41_a	1.13_b	6.8	.001
Visiting the shopping mall	3.00_a	3.24_b	3.42_c	21.2	.000
Bowling	1.74_a	1.91_a	1.76_a	2.2	.112
Golfing	0.84_a	0.87_a	0.65_b	6.0	.003

NOTE: Variables with different subscripts are significantly different from each other; variables with the same subscripts are not statistically different.

a. Based on a 5-point bipolar scale, where 1 = *dislike greatly* and 5 = *like greatly*; data are composite score of five items.

b. Based on a 5-point unipolar scale, where 0 = *do not like* and 4 = *one of my favorites*.

TABLE 4
Differences in Environmental Perceptions by Childhood Play Environment Clusters: Study 1—Southeastern Secondary School Sample

Variable	*Wildland Adventurers*	*Urban Adventurers*	*Yard Adventurers*	F	p
Desire for modern comforts[a]	19.6_a	22.0_b	23.7_c	36.8	.000
Wildland fear expectancy[b]					
Fear of animals	22.0_a	25.1_b	29.3_c	22.1	.000
Fear of becoming lost	12.4_a	14.6_b	16.6_c	17.5	.000
Fear of weather	10.5_a	12.3_b	12.4_b	5.7	.003

NOTE: Variables with different subscripts are significantly different from each other; variables with the same subscripts are not statistically different.
a. Composite score of nine items, each item on a unipolar scale, where 0 = *would not miss* and 4 = *cannot live without.*
b. Three subscales identified through factor analysis: Data are composite scores of three to six variables (see text).

In Study 2, analyses were replicated and extended. Results for the Preference for Walking Paths Scale were identical to Study 1 for the Wildland and Manicured Paths subscales (see Table 5). The Urban Walking Paths subscale was added in Study 2. The UA had the highest mean score for this scale, with WA and YA having mean scores that were not significantly different from each other but significantly lower than the UA mean.

Patterns across recreation activity preferences were similar to Study 1 (see Table 5). YA had the lowest mean preference scores for the outdoor and wildland activities. For social activities popular with teenagers, WA had the lowest mean activity preference scores, and UA and YA scores were not significantly different from each other but were significantly higher than WA scores.

A new scale, not used in Study 1, measured preferences for future occupational environments (see Table 6). WA had the highest mean preference for occupations in outdoor and wildland environments. No significant differences were found for city park as an occupational environment. Patterns were less clear with the indoor occupational environments. WA had the lowest numerical mean preference for these environments, but for two of the three environments, the means were not significantly different from YA.

In Study 2, respondents rated their preferences for environmental education activities (see Table 7). There were no significant differences between clusters on 7 of the 10 items. For these 3 items, UA had significantly lower mean preference scores. These 3 items described manipulation of invertebrates and soils. WA and YA were significantly different on only 1 item dealing with comparing soils.

Perceptions of environmental threats were measured with three variables (see Table 8). The Desire for Modern Comforts Scale used in Study 1 was replicated with the addition of a Camping Comforts subscale. The ANOVA tests indicated no significant differences between UA and YA on the two subscales, Modern Comforts and Camping Comforts. WA had the lowest mean desire for modern comfort scores on both subscales.

The CFT Scale measured fear expectancy with a response format simpler than that used in Study 1. Tests of the composite score indicated no significant differences between UA and YA. WA had the lowest mean CFT scores (see Table 7).

Disgust sensitivity was a measure of environmental perception used in Study 2 but not in Study 1 (see Table 8). Significance tests indicated differences between the three clusters on both subscales. WA had the lowest mean DSS scores, UA had moderate mean DSS scores, and YA had the highest mean DSS scores.

(text continues on p. 813)

TABLE 5
Differences in Environmental Preferences by Childhood Play Environment Clusters: Study 2—Texas Middle School Sample

Variable	*Wildland Adventurers*	*Urban Adventurers*	*Yard Adventurers*	F	p
Preference for walking paths[a]					
Wildland	20.6_{a}	18.0_{a}	15.7_{c}	18.7	.000
Manicured	19.7_{a}	$20.8_{a,b}$	21.0_{b}	3.5	.032
Urban	11.3_{a}	$13.1_{b,c}$	$12.9_{a,c}$	4.2	.015
Preference for recreation activities/wildland[b]					
Bird watching with binoculars	0.91_{a}	0.71_{a}	0.68_{b}	1.9	.150
Tent camping in parks/forest	2.75_{a}	2.26_{a}	2.03_{b}	10.1	.000
Rock climbing with ropes	1.62_{a}	1.61_{a}	1.24_{b}	3.8	.024
Fishing in lakes or rivers	3.14_{a}	2.64_{b}	2.10_{c}	23.7	.000
Backpacking in parks/forests	2.34_{a}	1.70_{b}	1.58_{b}	12.2	.000
Hunting in woods or fields	2.60_{a}	1.96_{b}	1.06_{c}	40.6	.000
Motorcycling on trails	1.95_{a}	1.82_{a}	0.96_{b}	24.3	.000
Canoeing on lakes or rivers	2.33_{a}	1.92_{a}	1.84_{b}	5.1	.000
Boating on lakes	3.02_{a}	2.52_{a}	2.10_{b}	16.8	.000
Hiking in woods	2.68_{a}	2.07_{b}	1.96_{b}	10.1	.000
Preference for recreation activities/social[b]					
Talking with friends	3.47_{a}	3.78_{b}	3.76_{b}	10.6	.000
Going to a shopping mall	2.74_{a}	3.58_{b}	3.41_{b}	24.3	.000
Dancing to music	2.36_{a}	2.79_{b}	2.92_{b}	7.1	.001
Listening to music	3.57_{a}	3.80_{b}	3.84_{b}	8.6	.000

NOTE: Variables with different subscripts are significantly different from each other; variables with the same subscripts are not statistically different.

a. Based on a 5-point bipolar scale, where 1 = *dislike greatly* and 5 = *like greatly.*

b. Based on a 5-point unipolar scale from 0 to 4.

TABLE 6
Differences in Preferences for Future Occupational Environments by Childhood Play Environment Clusters: Study 2—Texas Middle School Sample

Variable	*Wildland Adventurers*	*Urban Adventurers*	*Yard Adventurers*	F	p
Preference for occupational environments[a]					
Indoor					
Office building	2.96_a	3.75_b	3.94_b	26.8	.000
Factory	1.80_a	2.16_b	$2.03_{a,b}$	3.5	.031
Restaurant	2.74_a	3.15_b	$3.10_{a,b}$	4.3	.015
Outdoor					
City park	2.90_a	2.78_a	2.84_a	0.386	.680
Forest	3.95_a	3.24_b	2.97_b	18.9	.000
State park	3.65_a	3.26_b	$3.39_{a,b}$	3.4	.033
Farm	3.86_a	2.84_b	2.52_b	35.1	.000
Jungle	3.61_a	2.73_b	2.56_b	19.7	.000
River	3.98_a	3.23_b	3.03_b	18.9	.000
Desert	2.14_a	1.72_b	1.53_b	10.9	.000

NOTE: Variables with different subscripts are significantly different from each other; variables with the same subscripts are not statistically different.
a. Based on a 5-point unipolar scale, where 0 = *do not like* and 4 = *one of my favorites*.

TABLE 7
Differences in Preference for Hands-On and Observational Environmental Education Activities by Childhood Play Environment Clusters: Study 2—Texas Middle School Study

Activity	*Wildland Adventurers*	*Urban Adventurers*	*Yard Adventurers*	F	p
Activities requiring manipulation[a]					
Grow fungi and bacteria in the lab and study them under a microscope	2.80	2.81	2.94	0.476	.621
Collect soil samples from the bottom of swamps, lakes, and rivers and compare the soils and living things in the soils	3.00_{a}	$2.74_{a,b}$	2.56_{b}	3.66	.027
Collect dead fish along a river, cut them open, and examine their livers for diseases and tumors	2.42	2.35	2.06	2.37	.095
Collect leaves off the forest floor and find and identify all the insects, centipedes, and other creatures living among the dead leaves	2.58_{a}	2.23_{b}	2.54_{a}	3.67	.026
Collect water samples from a polluted lake and test for chemicals and sewage	2.62	2.73	2.74	0.29	.745
Catch 30 water bugs in a pond and identify them	2.33	2.20	2.30	0.44	.643
Collect different fruits, insects, slugs, and mushrooms and offer them to a box turtle to see what foods it likes	3.37_{a}	2.98_{b}	$3.48_{a,b}$	5.11	.006
Observational activities[a]					
Put out six types of seeds for birds and count what each type of bird eats to see if different birds like different seeds	3.12_{a}	3.05_{a}	3.39_{a}	3.08	.047
Place different colors of yarn outside and observe which colors the birds take away to their nests	3.43	3.43	3.70	2.28	.103
Make four 2-hour visits to a zoo to watch and take notes on the behavior of a zoo animal	3.80	3.50	3.75	2.39	.09

NOTE: Variables with different subscripts are significantly different from each other; variables with the same subscripts are not statistically different.
a. Based on a unipolar scale from 0 to 4, where 0 = *not disgusting* and 4 = *very disgusting*.

TABLE 8
Differences in Perception of Environmental Threats by Childhood Play Environment Clusters: Study 2—Texas Middle School Sample

Variable	*Wildland Adventurers*	*Urban Adventurers*	*Yard Adventurers*	F	p
Desire for modern comforts[a]					
Modern comforts	16.7_a	22.0_b	21.6_b	18.9	.000
Camping comforts	7.1_a	8.3_b	8.1_b	3.6	.028
Concerns about taking a forest day trip[b]	15.5_a	21.0_b	21.2_b	16.78	.000
Disgust sensitivity[c]					
Strong disgust elicitors	13.7_a	17.8_b	19.1_c	22.9	.000
Weak disgust elicitors	4.4_a	6.8_b	7.9_c	12.4	.000

NOTE: Variables with different subscripts are significantly different from each other; variables with the same subscripts are not statistically different.
a. Based on a 5-point bipolar scale, where 1 = *dislike greatly* and 5 = *like greatly*; data are composite score of several items.
b. Based on a 5-point unipolar scale, where 0 = *not concerned* and 4 = *extremely concerned*; data are composite score of nine items.
c. Based on a 5-point unipolar scale, where 0 = *not disgusting* and 4 = *extremely disgusting*; data are composite score of several items.

DISCUSSION AND CONCLUSION

The initial impetus for this analysis was findings by researchers that memorable childhood play experiences in wild environments helped shape later adult interest in environmental activism. Results from this analysis support the idea that childhood play influences later interest in wildlands, environmental preferences, outdoor recreation activities, and occupations in outdoor environments. Although environmental attitudes and activism were not directly measured, there is little indirect evidence among the results for a relationship between childhood play in wildlands and environmentalism. Because no direct measures were available, this research should only be viewed as nonconfirming rather than disconfirming the original Tanner (1980) hypothesis. However, the results do support differences in environmental preferences and competencies based on reported frequency of play in wildland environments during childhood.

Cluster solutions were conceptually similar between the two studies despite variations in the number and types of environments listed in the scales and differences in geographic location and ages of respondents. Use of cluster analysis to describe differences in childhood play environments is a simple yet effective method of measuring and classifying previous behavior and identifying empirical groups that have had varying degrees of experience in natural environments. Because the research question seeks to differentiate between experiences in discrete environments through describing past behavior, the static and categorical quality of cluster solutions is acceptable. If the study population includes respondents with a diversity of backgrounds, at least one of the clusters should be composed of individuals with few if any play experiences in wild environments. This cluster constitutes one of the comparison groups that Chawla (1998) argued was needed to verify findings about significant life experiences of environmentalists. More refined measurements of not only where play occurred but also how the environment was experienced during play may provide further insights into environmental socialization.

The unexpected UA cluster suggests greater complexity than the existing research conducted by environmental educators or its critics. UA reported the greatest number of experiences with urban environments along with moderate contact with natural environments. Further ethnographic research on the informal play of urban children may suggest that a more comprehensive Play Environments Scale may need to include "dumpster diving," exploring storm sewers, and other as yet unidentified enticing urban places. Another possibility is that this cluster is simply misnamed. The cluster may include children who have lived in and explored both rural and urban environments due to

having moved at least once. The group could also consist of people who live in urban areas but have had some experiences in wildland areas through camping with family and friends or attending traditional summer camps. Through moving or living in an urban areas, yet recreating in wildlands, the UA would have acquired some of the environmental preferences of both WA and YA. Their families (parents and siblings) may have contributed to their preferences for wild places, whereas their urban peers contributed to their preferences for social activities and modern comforts. This seems a reasonable conjecture because UA reported moderate to high environmental preferences for all types of environments. In addition, UA were similar to WA in their preferences for outdoor recreation activities but were more like YA in their preferences for social activities.

Clearly, play in wildland environments has a significant effect on environmental preferences and activities but not necessarily on environmentalism. WA had a greater interest, or at least willingness, to try motorized outdoor recreation activities than YA in both studies. They also had significantly higher scores for preference for golf, an environmentally suspect activity. But in Study 2, YA were just as likely to have the highest mean ratings as WA or UA for school activities that might help students understand ecology and environmental issues. Neither of these findings provides even indirect support for a relationship between childhood play and mainstream environmentalism.

Additional conceptual and empirical work needs to be conducted on the social worlds of children with differing play experiences. Deeply committed environmentalists, at least those focusing on land conservation, are probably a subpopulation of the WA group. Further research should explicitly acknowledge and measure the sociopolitical interaction between developing children, peers, and significant adults as they interpret their experiences in the wild places they play in and explore.

Additional environmental socialization studies need to be made of adults in different vocational, political, and recreational pursuits. In-depth investigations of the environmental socialization of environmentalists, developers, architects, landscape architects, foresters, fur trappers, animal rights activists, risk recreationists, amateur mycologists, birders, and amateur entomologists, among others, should provide additional understanding of environmental socialization and the development of environmental concerns. Field experiments in housing developments next to natural areas that compare the behavior of children who do and do not play in these areas with attitudes of their parents and peers would help in evaluating findings of this study that were based on self-report recall questions (see Falk, Martin, & Balling, 1978). From an applied standpoint, the findings support the benefits

of providing childhood play experiences in wild environments for anyone wishing to instill an interest in children in outdoor activities, including those that may not garner the approval of mainstream environmentalism.

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