Growing Minds: The Development of an Instrument to Measure Parental Attitude Toward Nature and Their Child's Outdoor Recreation

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SUMMARY. The purpose of this study was to develop an instrument to measure parental attitude toward nature (PAN) and parental attitude toward their child's outdoor recreation (PACOR) to allow researchers to better understand the factors influencing children's outdoor recreation and suggest programs for changing the recent decline in outdoor activity in children. The construction of this instrument followed the Dillman method of constructing survey instruments to improve response rates and to ensure higher quality results. Two scales were developed in three phases. In the first phase, an initial set of instrument questions were developed by adapting questions from previous research. The accumulated questions were then pilot tested and revised based on feedback and reliability. Each inventory was then tested following Dillman's four stages of survey pretest procedures: stage 1—review by knowledgeable colleagues and analysts, stage 2—interviews to evaluate understanding of instructions and questions, stage 3—pilot testing, and stage 4—a final check. The final Cronbach's alpha reliability analyses of the PAN scale and the PACOR scale indicated high levels of internal consistency. The number of questions was reduced following the results of an "alpha if item deleted" tool within SPSS statistical analysis software to improve internal consistency and to reduce load on participants.

Theories from psychology and sociology frame our understanding of behavior. Social learning theory (Bandura, 1965, 1973, 1974; Bandura et al., 1961, 1963) suggests that children learn how to act and behave by modeling the behaviors they observe. Primary socialization theory (Oetting and Donnermeyer, 1998) states that, "In Western society the primary socialization sources through the critical adolescent period are usually the family, the school, and peer clusters." Parental attitudes have a strong influence on children, and parents may even be the most important influence on children's attitude development (Brown, 1990; Collins et al., 2000; Hutchinson and Baldwin, 2005). For example, children's attitudes about

exercise and physical activity have been found to be similar to their parents' attitudes about exercise (Dowell, 1973; Godin and Shephard, 1984; Trost et al., 2003). Researchers also believe that positively changing parents' knowledge, attitudes, and beliefs regarding physical activity and eating would be a significant factor in preventing childhood obesity (Dietz and Gortmaker, 2001). Furthermore, parents have strong influences on their children's physical activity levels, as research has found activity levels in children increase at the parents' encouragement (Klesges et al., 1984, 1986; McKenzie et al., 1991).

So much attention recently has been focused on the fact that children are spending so little time outdoors that it has been termed "nature-deficit disorder" (Louv, 2008). According to Louv, this term "describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses" and can be detected at multiple levels of society including the individual and community.

Although parents are aware of the multitude of benefits derived from outdoor play, research reported the amount of time children spent in outdoor play was directly related to concerns for their children being exposed to traffic, strangers, injuries, and other outdoor hazards (Cahill, 1990; Carver et al., 2008; Louv, 2008; McNeish and Roberts, 1995; Rivkin, 2000; Valentine and McKendrick, 1997). Louv (2008) also extensively documented legal concerns regarding liability for injuries that may occur during outdoor play. Valentine and McKendrick (1997) reported that in a study on the opinions of parents with children ages 8 to 11 years, parental concerns about the safety of their children were the most important indicator of children's access to independent outdoor play, and that parents were equally concerned about the risks for both girls and boys. Reports from a qualitative study of 78 mothers supported Valentine and McKendrick's (1997) findings stating that 94% of parents were concerned about safety and reported that this was a major influence on where they allowed their children to play (Veitch et al., 2005). The most notable safety concerns mentioned were stranger dangers, teenagers and gangs, and road traffic (Veitch et al., 2005). Two important factors found in an investigation of the factors parents consider when looking for a play area for their children were safety and lighting of the area (Sallis et al., 1997). Furthermore, McNeish and Roberts (1995) reported that 60% of parents were very worried about their children when they played outdoors, and that 85% felt that the safety of children when playing outdoors had declined since the parents were children. Parental concerns about violence and traffic conditions were additional reasons for restricting their children's outdoor time (Gielen et al., 2004). Safety concerns severely limit children's opportunities for outdoor, physical play (Veitch et al., 2005).

Measuring any psychological or sociological construct requires careful research design. An issue particularly with survey research is that "carelessly and incompetently constructed questionnaires have ... been administered and distributed too often" (Collins, 2003). Social research is often criticized due to poorly designed instruments and the poor quality of data received

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from such instruments. It is necessary to carefully design questionnaires to improve the level of accuracy of the data collected and to reduce source error (Collins, 2003). Without careful design, "surveys can fail to achieve their objectives" and report inaccurate information (Dillman, 2007).

The purpose of this study was to develop two scales for an instrument to measure PAN and PACOR. Such an instrument would allow researchers to better understand the factors influencing children's outdoor recreation and suggest programs for changing the recent decline in outdoor activity in children.

Materials and methods

The assessment tools designed in this study were composed to ask parents about their attitudes toward nature and outdoor settings and their attitudes about their young children spending time in outdoor recreation.

DEVELOPMENT OF THE TEST INSTRUMENTS. The development of the test instruments occurred in three phases. Initially, test instruments measuring other aspects of parental attitude were collected and sample questions from each instrument were selected and adapted to fit this topic of study. The instrumentation questions were developed using Dillman's (2007) tailored design method which is "a set of procedures for conducting successful self-administered surveys that produce both high quality information and high response rates." Dillman's method (Dillman et al., 2009) included using the principles of social exchange theory to produce a detailed formula for specific wording of statements, the order of presenting items in a questionnaire, the visual format of the questionnaire, and for pretesting instruments. Dillman's method, when used in its entirety, consistently produces higher response rates (upward of 70% response rate) simply from expending greater effort to develop a more focused and better designed questionnaire and survey technique (Dillman et al., 2009).

Individual items were drawn from previous studies asking parents to rate their attitudes regarding nature, the environment, and various aspects of their children's recreational time (Ennis, 2003; McMillan, 2003; Murphy, 1984; Piotrowski, 2007; Skelly, 1997; Timperio et al., 2004; Weir et al., 2006). Statements from these surveys were adapted

and reworded following Dillman's method (Dillman et al., 2009) to pertain specifically to nature and outdoor recreation.

STAGE 1—REVIEW BY KNOWLEDGEABLE COLLEAGUES AND ANALYSTS. After the items were initially selected and adapted to fit the areas of nature and outdoor recreation, the questionnaire was reviewed by colleagues as described by Stage 1 of pretesting in Dillman's method (Dillman et al., 2009) to ensure that each question could be answered by potential respondents and that respondent answers would be useful and accurate.

During this stage of pretesting, content validity was also reviewed to assure the instrument questions measured the intended attitudes (Gall et al., 2006). Expert judges in environmental attitudes and outdoor recreation were consulted to review the instrument and modify questions deemed outside the scope of the intended measure.

STAGE 2—INTERVIEWS TO EVALUATE UNDERSTANDING OF INSTRUCTIONS AND QUESTIONS. After the initial items were pretested by experts, the questionnaire was evaluated according to Dillman's second stage of testing. In this stage, the survey was pretested by individuals similar to those whom the instrument was designed to evaluate while in the presence of an interviewer. This stage was designed to identify problems with the questionnaire's instructions or specific questions within the survey. This stage of testing also evaluated the degree to which each item on the survey could be accurately answered by every respondent.

STAGE 3—PILOT TESTING. Following Stage 3 of Dillman's pretesting procedures, the questionnaire was pilot tested. The pilot test data were collected using an online survey. A link to the survey was posted on an informational website for gardeners between Mar. and Aug. 2009. An e-mail was also sent out to people who were known to be interested in gardening and nature activities and were parents or guardians of children between the ages of 6 to 13 years old to complete the pilot test survey. This age group was selected according to the theoretical framework of Erikson's psychosocial development theory (Erikson, 1959). This age group includes primary school-aged children who are beginning to be independent and participate in more complex activities such

as independent outdoor play (Erikson, 1959). The self-selected pilot test participants accessed the survey from a link on the gardening website and then agreed to privacy and consent information and acknowledged that participation in the study was voluntary. Participants were then allowed access to the questionnaire. After completing the questionnaire, respondents were given the option to include their mailing address so that the incentive of a wildflower seed packet could be sent. Personal information was removed from responses before the data being analyzed to ensure confidentiality. Responses were collected from 140 participants and used for pilot testing from parents and guardians of children ages 6 to 13 years old.

PARENTAL ATTITUDE INSTRUMENTATION. Two measures of parental attitude were developed and used in this study. The PAN instrument was developed and included 21 questions pertaining to attitudes parents have toward nature, and the PACOR scale included 29 statements relating to their attitude toward their children spending time outdoors. These questions were adapted from other studies about attitudes toward nature and their children's activities (Ennis, 2003; McMillan, 2003; Murphy, 1984; Piotrowski, 2007; Timperio et al., 2004; Weir et al., 2006). Parents responded to statements on both scales on a six-point Likert-type scale (Likert, 1967). Possible responses included "strongly agree" (which scored 6 points), "somewhat agree" (5 points), "slightly agree" (4 points), "slightly disagree" (3 points), "somewhat disagree" (2 points), and "strongly disagree" (1 point). Negatively worded statements were reverse coded such that the more positive response scored the higher points to allow for proper data analysis. Nonresponses to any question received no points for that question. The PAN scale had a possible range of 21 through 126 with a higher score indicating a more positive view toward nature. The PACOR scale had a possible range of 29 through 174 with higher scores indicating more positive views toward their child's outdoor recreation.

RELIABILITY OF PILOT TEST INSTRUMENTS. Reliability of a scale means that when taken several times, a test or instrument would have consistent results (Gay and Airasian, 2003). If a test

is more reliable, then there is a better chance that the scores obtained from the test would be the same if it was readministered to the same people again; if it was less reliable then the scores would be different (Gay and Airasian, 2003). Reliability scores typically range from 0.0 to 1.0. The closer the reliability score is to 1.0, the less error that is present within the instrument and the more likely that the differences observed measured permanent characteristics (Gall et al., 2006). To determine how all of the items of an instrument relate to each other and to the overall instrument and thus estimate the internal consistency of an instrument, a Cronbach's alpha is used (Gay and Airasian, 2003). A Cronbach's alpha reliability analysis must be conducted for each concept measured within a questionnaire rather than the questionnaire as a whole (in this study, e.g., the PAN and the PACOR are analyzed for reliability separately). Using individual questions for data analysis is not considered reliable (Gliem and Gliem, 2003). Nunnally (1978) recommended that basic research inventories have a reliability coefficient >0.7 .

Responses on the pilot test were automatically downloaded into an Excel spreadsheet (Microsoft, Redmond, WA) and then transferred and analyzed using SPSS (version 15.0; SPSS, Chicago, IL). A Cronbach's alpha reliability analysis of the initial PAN inventory yielded a high reliability ($\alpha = 0.87$). The reliability analysis of the PACOR also yielded a high reliability of ($\alpha = 0.87$) (Gall et al., 2006; Hammond et al., 2011).

An additional reliability analysis was conducted to determine which instrument items were weakest and in need of removal. An "alpha if item deleted" analysis tool within SPSS was conducted to obtain a higher Cronbach's alpha reliability coefficient for each of the two instruments. The item indicated with the highest subsequent "alpha if item deleted" was removed from the questionnaire and then the analysis was re-run until the highest possible reliability coefficient was obtained such that no item if removed would result in a higher Cronbach's alpha.

Item analysis indicated that removing six items from the PAN scale would improve the estimated reliability to $\alpha = 0.88$. These items were

removed from the final instrument to slightly improve the reliability and to reduce the load on participants. Although the estimated alpha was not drastically changed by removal of the items, reducing load on participants is a critical concern and should be considered throughout the survey procedure (Dillman et al., 2009). The PAN scale on the final instrument had 15 items. Item analysis on the PACOR scale indicated that removing one item would improve the reliability to $\alpha = 0.90$. This scale on the final instrument contained 28 items.

STAGE 4—A FINAL CHECK. The Dillman method (Dillman et al., 2009) also recommended a fourth stage of pretesting before ending any instrument. During this stage, a final check was conducted by asking people unfamiliar with the study or survey instrument to review and complete the questionnaire as readers who had worked on a prior revision lose their ability to detect obvious errors. In this stage, instructions and navigational guides were clarified to ensure complete understanding by the future participants.

Results and discussion

The final test instruments (Tables 1 and 2) were administered to parents and guardians of children ages 3 to 5 years old. This age group was selected to expand the reliability range of applicability of this instrument to younger children and the group already

used to evaluate reliability and validity to all children with some level of mobility and ability to participate in outdoor activities through, but not including, teenagers. The sample for this stage of the survey design consisted of a total of 73 responses. This stage of the survey was administered via paper and pencil surveys to ensure consistency between internet and traditional survey methods with regard to the two inventories designed in this study.

RELIABILITY STATISTICS FOR THE FINAL TEST INSTRUMENT. A Cronbach's alpha coefficient determined the final reliability for each inventory. The PAN scale had a Cronbach's alpha of 0.85. The PACOR had a Cronbach's alpha of 0.89.

Conclusions

The final PAN and PACOR scales need further evaluation with larger sample sizes and broader age ranges to ensure reliability and validity for the final product across all adolescent age ranges. Factor analysis can be used to identify themes within PAN and PACOR and to identify any dimensions within PAN and PACOR that may measure different characteristics than those targeted for this study.

Survey research requires careful construction of instruments to ensure valid and reliable results. The Dillman method provides a method to develop objective evaluation and to reduce research error (Dillman et al., 2009).

Table 1. Final statements included on the parental attitude toward nature (PAN) scale in the study of the development of an instrument to measure PAN and parental attitude toward their child's outdoor recreation.

	Statement
1	I really enjoy nature. ^z
2	I enjoy watching the sky on summer nights. ^z
3	I enjoy pictures of birds and animals. ^z
4	I like sitting beside a quiet pond. ^z
5	Walking in the woods is a waste of time. ^y
6	I wish I knew more about nature. ^z
7	People should spend more time outside. ^z
8	I like TV programs about nature. ^z
9	I would like to vacation in a cabin in the woods. ^z
10	I feel good when I am close to nature. ^z
11	I like the sound that a stream makes. ^z
12	I like walking through the leaves in the fall. ^z
13	Spending time outdoors is an enjoyable alternative to watching TV. ^z
14	Family vacations are a good opportunity to spend time outdoors. ^z
15	I enjoy eating meals outdoors. ^z

^zAnswered on a six-point Likert scale and assigned numerical values: "strongly disagree" = 1, "somewhat disagree" = 2, "slightly disagree" = 3, "slightly agree" = 4, "somewhat agree" = 5, "strongly agree" = 6.

^yNumerical values assigned to responses for this question were reverse coded: "strongly disagree" = 6, "somewhat disagree" = 5, "slightly disagree" = 4, "slightly agree" = 3, "somewhat agree" = 2, "slightly agree" = 1.

Table 2. Final statements included on parental attitudes toward their child's outdoor recreation (PACOR) scale in the study of the development of an instrument to measure parental attitude toward nature and PACOR.

	Statement
1	Playing outside encourages too much aggressive behavior. ^z
2	All playgrounds should contain natural element. ^y
3	Playing outside would be good for my child's health. ^y
4	There is too much crime for my child to play outside. ^z
5	I think my child should go on nature hikes. ^y
6	Playing outside is a wasteful way for children to spend their free time. ^z
7	My neighborhood is safe enough for children to play outside. ^y
8	I would let my child walk in the rain even if they got wet. ^y
9	My child gets too dirty when playing outside. ^z
10	I am afraid my child may be harmed by strangers outside. ^z
11	Spending time outdoors is a meaningful family activity. ^y
12	I worry that my child will be hurt by gangs if he/she plays outside. ^z
13	My child's learning can be stimulated by outdoor play. ^y
14	Playing outside hurts my child's school grades. ^z
15	Playing outdoors is a good way to improve hand-eye coordination. ^y
16	Other children in my neighborhood are safe for my child to play around. ^y
17	Children who play outdoors gain confidence. ^y
18	I allow my child to have a wide range of recreational outdoor activities from which to choose. ^y
19	I feel that outdoor play interferes too much with my child's homework time. ^z
20	My child is easier to manage after spending time outside. ^y
21	I am afraid my child may be abducted outdoors. ^z
22	I let my child make mud pies. ^y
23	Taking part in outdoor recreation improves my child's communication skills. ^y
24	Outdoor activities over stimulate my child. ^z
25	Taking part in outdoor activities helps to build up my child's level of independence. ^y
26	I would let my child play in a sand box. ^y
27	Outdoor activities are a good way for my child to make friends. ^y
28	Participating in outdoor play is a good way for my child to get exercise. ^y

^zAnswered on a six-point Likert scale and assigned numerical values that were reverse coded: "strongly disagree" = 6, "somewhat disagree" = 5, "slightly disagree" = 4, "slightly agree" = 3, "somewhat agree" = 2, "slightly agree" = 1.

^yNumerical values assigned to responses for this question were: "strongly disagree" = 1, "somewhat disagree" = 2, "slightly disagree" = 3, "slightly agree" = 4, "somewhat agree" = 5, "strongly agree" = 6.

Careful design strengthens social science research and improves the generalizability of results.

Furthermore, children and the benefits of their being outdoors is becoming an increasingly popular subject of research and concern among parents with a recent research-based popular national bestseller dedicated to this area (Louv, 2008). As true experimental research with human population being greatly limited by ethical considerations, it is important to develop valid and reliable survey research to investigate the variables of interest. Using the methods established by Dillman et al. (2009), researchers can expect to obtain improved response rates and higher quality results. The PAN and PACOR can be used by research to investigate the relationship between these variables and other aspects of life such as time spent in various activities and health.

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