

The Psychological Relationship of Humans and Trees

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Abstract

Trees are critical to human, environmental, and societal well-being sometimes in subtle ways⁷. The physical value of trees is indisputable (e.g., sources of building materials and the transformation of carbon dioxide). However, the psychological and communal benefits of trees are also important, albeit less apparent. For example, research suggests trees play an important role in promoting healthy communities². Trees provide communities with shared, structured symbols that ground people by producing a constant feeling of place and comfort for the people that are around them the most². The relationship between experience with and memory for trees is another novel area of research yet to be studied in depth. This study has been designed to examine the human psychological relationship with trees, focusing on how memories and relevant attitudes may be impacted by individual experience with trees. The specific dimensions of the human psychological relationship with trees that were investigated in this study included: experience with planting and climbing trees; visual and other sensory preferences of trees; how people value of trees; how trees may relate to communal and personal identity; whether trees are associated with autobiographical memories; and whether relationship with trees is associated with nature-connectedness. The results show that 78.5% of the participants recalled a favorable memory of trees from childhood and 74.7% of the participants were able to describe engaging in an activity with a tree when asked to recall a tree memory. Results also reveal a positive association between experience with trees and the degree to which trees are perceived to provide community value. The full results are discussed in terms of the ways that trees positively influence psychological and social well-being in the participants' lives.

1. Introduction

Trees are known to be helpful to humans, the environment, and society as a whole⁷. When someone thinks of trees, they may think about the process of photosynthesis, where trees provide humans with oxygen and absorb the carbon dioxide humans produce. Another person may think of trees and consider all of the useful properties of trees, such as their use in construction, the production of paper, and providing humans with food via fruit and sap. In another view, trees can be useful for landscaping purposes, including making an area more aesthetically pleasing and supporting delicate ecosystems that rely on trees⁹. Still, some questions about the importance of trees remain unanswered: How do humans psychologically and emotionally connect to trees? Do episodic memories play a role in forming and assigning values to trees? What types of sensory input from trees determines how a person decides which trees are the most preferable? Generally, research suggests that there are many factors that play a role in the human relationship with trees and includes community, personal, and cultural factors.

The term "biophilia," translated "love of life," is used to describe the human connection with nature. Human love of and identification with nature may be broken down into several distinct identities, such as community identity (how communities collectively relate to the natural environment), personal identity, religious identity, and spiritual identity. The community aspect of human nature identity relates to the human communal relationship with, in particular for

this study, trees. Research has suggested that trees play an important role in promoting healthy communities². Trees act as social elements by providing a community with shared, structured symbols that ground people through producing a constant feeling of place and comfort for the people that are around them the most². Tree planting events are useful in building and maintaining community, as this requires the coordinated and cooperative help of all within the local community to achieve. Community requires interaction, communication, trust, reflection of the values of the local population, cooperation, and attention to all areas of local life² (Elmendorf, 2008). Trees nourish and support the growth of communities through providing communities with common symbols, values, and consistency that everyone in the community can rely on for guidance and when seeking out their own individual identities.

Individual, personal identities, in the context of the present study, may be influenced by patterns of sensory signals (such as sights, sounds, smells, tastes) that are associated with specific geographic regions. In terms of trees, sensory perception is crucial to the way humans categorize and decide which type of tree is the most preferable³. Gerstenberg (2015) emphasizes the importance of crown size to trunk ratio and the crown density of trees to be two of the most important factors for humans when deciding which trees are the most visually preferable. Other sensations, such as smell or sound may impact one's perception and preference of certain trees over others. For example, the scent of a pine tree might be highly preferable to someone that has a fond memory that is associated with pine trees. Another example of sensory influences of trees would be the sound of the wind blowing through the leaves of a tree, making a rustling sound. Indirectly, trees could attract birds, leading to the presence of noise of bird song, in which many find relaxing and/or uplifting. Generally, it is reasonable to believe that sensory experience with trees influences an individual's relationship with trees and their beliefs about the value of trees.

As mentioned above, certain sensory aspects associated with trees may influence one's perception of trees due to, perhaps, a fond memory one may have of a particular tree or trees. Specifically, episodic and/or autobiographical memories may be related to the way one relates to and perceives trees. Episodic memories refer to specific events experienced from one's personal past, and may be associated with tree preference and perception due to the personal connections that can be made to trees when experiencing or recalling a pleasant moment in life that involved trees, in any way. Research on episodic memory suggests that emotion and motivation influence one's ability to recall episodic memories, particularly if the emotion is pleasant and the motivation of recalling a memory is within a positive environment⁸. However, the relationship between memory and trees, and/or nature in general, is a novel area of research, and the present researcher's search of the literature found no directly relevant information on the topic.

The purpose of this study is to examine the human psychological relationship with trees, including but not limited to tree memory. Other dimensions of the human psychological relationship with trees to be investigated in this study are as follows: experience with trees, visual and other sensory preferences of trees, personal values of trees, trees in relation to identity, including community and personal, how trees may be associated with childhood and/or long-term memories, and how relationship with trees relates to nature-connectedness. Participants' overall tree experience will be used to determine if it predicts values assigned to trees, memories of trees, tree type preferences, and connectedness to nature. In addition to the tree experience score, participants will also be scored using the nature-connectedness scale developed by F. Stephan Mayer and Cynthia McPherson Frantz⁵. In other words, this study seeks to obtain data that address the extent to which one's values, identity, memory, and sensory preferences of trees are associated with the psychological relationship one has with trees.

2. Methods

2.1 Participants

Participants were recruited from the psychology research participant pool. The participants consist of students attending UNC Asheville with a major or minor in psychology or are enrolled in a psychology course that requires PAL credits. There were no exclusion criteria other than participants must be 18 years old or older. The sample was n=79. The questionnaire did not collect demographic information of the participants.

2.2 Materials

The only materials used in this study consisted of the online survey. Please see Appendix A included after the references for a copy of the survey.

2.3 Procedure

In order to answer this research question, an online survey was used. After students were notified, via an informed consent statement, they were asked to consent and then provided access to the survey. The procedure involved securing participant consent prior to completing the survey, providing the questions to the participants, and offering a debriefing after the survey is completed that provides contact information for participants who wish to learn about how they can access study results once they are available.

3. Results

A nonsignificant trend ($n = 79$) was found such that as the number of trees climbed in lifetime reaches 4 or more, nature relatedness scores increase: $F(3, 76) = 2.24, p < .09, \eta^2 = .08$; 1-3 trees climbed: $M = 46.67$, 4-7 trees climbed: $M = 52.16$; 8 or more trees climbed: $M = 52.75$. Therefore, the number of trees climbed was positively correlated with nature relatedness scores. An analysis of variance ($n = 79$) showed that those who climbed 8 or more trees in their lifetime value trees ($M = 4.17$) as supporters of the community significantly more than those who climbed 0 trees ($M = 2.67$): $F(3, 76) = 2.97, p < .04, \eta^2 = .10$.

The mean scores of values of trees were calculated and ranked from most important to least important: 1.life supporting ($M = 4.81$) 2.aesthetically pleasing ($M = 4.37$) 3.supporter of communities ($M = 3.94$) 4.producer of materials ($M = 3.84$) and 5.companions ($M = 2.77$). Please see Table.1 for a visual of this information.

Seventy-nine participants wrote responses to the question, “Please briefly describe a memory you have of a specific tree. If relevant, please briefly describe how this memory shapes your self identity (i.e., how you perceive yourself).” A content analysis, relying on a simplified version of Grounded Theory (the creation of categories occurred during multiple readings of responses)¹⁰ was performed to identify themes in participants’ responses and response frequencies are summarized in Figure 1.

Coding of qualitative data collected of memories of a specific tree indicated that 59 of the 79 (74.7%) participants mentioned engaging in an activity in the presence of trees, 62 of the 79 (78.5%) participants mentioned a memory that occurred during childhood, 2 of the 79 (2.5%) participants mentioned spirituality, 32 of the 79 (40.5%) participants mentioned close relationships, 15 of the 79 (19%) participants mentioned sensory details, 4 of the 79 (5.1%) participants mentioned community, 7 of the 79 (8.9%) mentioned a tree that is a historic landmark, and 30 of the 79 (40%) participants mentioned identity formation as a result of a specific tree. Please see Figure 2 for a visual of this information.

Table.1 Visual of this Information

	N	Mean	Std. Deviation
On a scale from 1 to 5, how much do you value trees?	67	4.39	.852
Life-supporting	67	4.81	.584
Aesthetically pleasing	67	4.42	.838
Supporter of communities	67	3.97	1.029
Producer of materials	67	3.84	1.009
Companionship	67	2.72	1.277

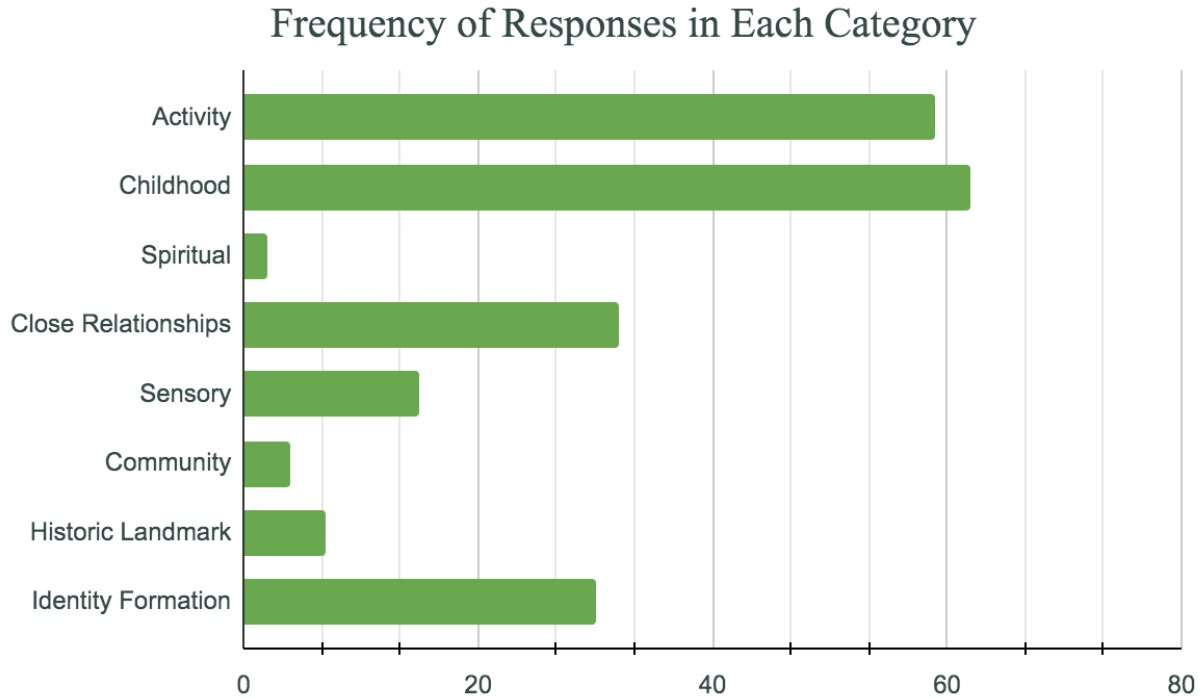


Figure 1. Frequency of Responses Across Categories

3.1 Illustrative quotes

Participants were asked to recall a memory of a specific tree or trees that had significance to them and/or their identity development. Below are some relevant quotes in relation to the results of the present study:

“...My grandparents were both greatly in love with nature, and they carried that affection over to me during my upbringing. My grandfather was walking with me through a forest of pine trees that created a beautiful overgrowth of needles that we were able to walk under. He told me about how he had planted this entire forest with the help of my mother and her two sisters, his daughters, and how we as humans have a responsibility to love and nurture the growth of the planet we live on...”

“The one memory involving a specific tree that stands out to me the most would be an experience I had while I was under the influence of a perception altering substance. I was laying underneath a tree with the sun shining through the individual leaves and it looked like a painting. It probably sounds insignificant now that I ponder that experience, but it allowed me to look at nature in a totally different way and the beauty of trees in every aspect.”

“I remember marveling at the smoothness and beauty of a magnificent magnolia tree in an historic cemetery outside Atlanta, Georgia. I was just in awe and had to have my picture taken with the tree.”

“I used to visit a tree in my backyard. I would talk to God, or myself, or whatever was listening. I used to visit it a lot, but now I only go when life hits hard and I need something stable. I’m not religious anymore but I guess this memory makes me feel like I’m innately religious or spiritual no matter how I fight it.”

“I spent most of my free time in our mango tree in my backyard growing up. It was an amazing climbing tree. Nobody could see me up there, but I had a great view. When the mangos were ready, it was my job to pick them and bring them down. We shared them with our neighbors, as they shared their fruit with us. I was proud to have something to offer.”

“My childhood home sits on top of a mountain in Western NC. Growing up, I had a favorite tree to climb because the branches were thick and arranged almost like a spiral staircase. I pushed myself to see how high in the tree I could get. The higher I was, the more in touch with nature I felt. I have always felt more aligned and in tune with nature, as a child I wanted to be able to live in the wild or in the ocean. My favorite places are where I’m as far and separated from society as possible. I think the location I grew up in fostered my love for the natural world.”

4. Discussion

The results suggest that the number of trees climbed is modestly, positively related to the nature relatedness score of the participants. The greater number of trees climbed, the higher the nature relatedness score. In addition, the results show that those who planted 8 or more trees value trees as a supporter of the community significantly more than those who planted 1 to 3 trees. The reported values of trees from most to least important were as follows: life supporting, aesthetically pleasing, supporter of communities, producer of materials, and companions. Of the 79 responses collected regarding the participants' memories of trees, 59 (74.7%) mentioned engaging in an activity in the presence of trees, 62 (78.5%) mentioned childhood, 2 (2.5%) mentioned spirituality, 32 (40.5%) mentioned close relationships, 15 (19%) mentioned sensory details, 4 (5.1%) mentioned community, 7 (8.9%) mentioned a tree that is a historic landmark, and 30 (40%) mentioned identity formation as a result of a specific tree.

Speculatively, the positive relationship between trees climbed and greater nature relatedness may be a result of the fact that climbing trees is a highly engaging behavior that requires precise use of visual input, tactile discrimination (assessing firmness of hand-holds), and physical exertion in a way that is both consuming and rewarding. Such direct, intense, physical engagement with an impressive and alluring manifestation of the natural world, arguably, leads one to feel highly connected to nature. The finding that those who planted many trees value trees in a communal way more than those who planted far fewer trees is similarly intriguing and is consistent with previous research², cited above, showing that trees play an important role in promoting community health. It is not unlikely that planting trees, like climbing trees, requires not only intense physical exertion but likely also is part of shared, communal labor. Whether one plants trees as part of a class or club or family or some other social group, it is plausible that the likely social nature of tree planting is associated with communal actions and feelings: "...My grandparents were both greatly in love with nature, and they carried that affection over to me during my upbringing. My grandfather was walking with me through a forest of pine trees that created a beautiful overgrowth of needles that we were able to walk under. He told me about how he had planted this entire forest with the help of my mother and her two sisters, his daughters, and how we as humans have a responsibility to love and nurture the growth of the planet we live on..."

The ways in which trees are valued are also intriguing. The beauty of trees were valued greater than the utility of trees (as sources of usable material, e.g. paper, building structure, and so on). Perhaps the readily apparent beauty of trees is more cognitively available than thoughts about their utility, or maybe the difference reflects that most individuals are willing to sacrifice some comfort for natural beauty. One participant wrote "The one memory involving a specific tree that stands out to me the most would be an experience I had while I was under the influence of a perception altering substance. I was laying underneath a tree with the sun shining through the individual leaves and it looked like a painting. It probably sounds insignificant now that I ponder that experience, but it allowed me to look at nature in a totally different way and the beauty of trees in every aspect." Future research could be designed to drill down into this intriguing result.

Looking at the qualitative data, participants provided intriguing responses when asked to think of a significant memory of a tree. One participant stated "I remember marveling at the smoothness and beauty of a magnificent magnolia tree in an historic cemetery outside Atlanta, Georgia. I was just in awe and had to have my picture taken with the tree." This statement suggests that trees provide positive sensory experiences to some. Another participant wrote "I used to visit a tree in my backyard. I would talk to God, or myself, or whatever was listening. I used to visit it a lot, but now I only go when life hits hard and I need something stable. I'm not religious anymore but I guess this memory makes me feel like I'm innately religious or spiritual no matter how I fight it." This statement suggests that, to some, trees represent a spiritual and/or religious symbol.

Some participants clearly articulated ways in which trees provide a resource for physical engagement and relate to community values: "I spent most of my free time in our mango tree in my backyard growing up. It was an amazing climbing tree. Nobody could see me up there, but I had a great view. When the mangos were ready, it was my job to pick them and bring them down. We shared them with our neighbors, as they shared their fruit with us. I was proud to have something to offer." This indicates that trees may have a value of community tied to them for those in close proximity to others that share the same tree or trees. Additionally, trees may impact how we form our identities: "My childhood home sits on top of a mountain in Western NC. Growing up, I had a favorite tree to climb because the branches were thick and arranged almost like a spiral staircase. I pushed myself to see how high in the tree I could get. The higher I was, the more in touch with nature I felt. I have always felt more aligned and in tune with nature, as a child I wanted to be able to live in the wild or in the ocean. My favorite places are where I'm as far and separated from society as possible. I think the location I grew up in fostered my love for the natural world."

The limitations of this study include relying on self-reports and being limited in terms of participants, as participants were only recruited through the UNC Asheville research module for psychology students. The quantitative data included 67 of the total 79 participants, but the data from the additional 12 participants would not have been likely to impact the outcome of the quantitative data analyses. The sample size was sufficient in terms of obtaining reliable data, but the diversity of participants regarding age, race, gender, and ethnicity was likely low, thereby limiting the study's generalizability.

This research provides a broad understanding of how humans may connect and interact with trees. Future research on this topic could focus on more specific categories explored in this study, such as community or identity. The majority of participants reported that significant memories of trees were formed during childhood, suggesting that childhood plays a role in forming perceptions of trees and relationships with them. Research exploring the area of childhood would likely produce interesting findings. Clinically, this research could provide useful information regarding the importance of trees in the lives of clients. Mental health professionals would benefit from considering the nature-connectedness displayed by clients. Professionals designing their treatment plans or intervention programs could consider the emotional and mental well-being clients may experience by being in nature and/or in the presence of trees.

In summary, the present study found that physical engagement with trees is modestly associated with nature connection. In addition, the present study found that planting trees is associated with valuing trees for their communal value. Future research might be designed to build more specifically on these findings, perhaps by recruiting participants who have a lot of experience with trees in order to better understand the role that trees may play in mental health.

5. References

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6. Appendix A:

1. In your life, please estimate the total number of trees you have planted.
 - a. 0
 - b. 1 - 3
 - c. 4 - 7
 - d. 8+
2. In your life, please estimate the total number of trees you have climbed.
 - a. 0
 - b. 1 - 3
 - c. 4 - 7
 - d. 8+
3. Please estimate how often you go to visit or spend time near a specific, favored tree or trees
 - a. Never
 - b. Once a year
 - c. Twice a year
 - d. Once a month
 - e. Once a week
 - f. Every day
4. Please estimate, in general, your knowledge of trees.
 - a. No knowledge
 - b. A small amount of knowledge
 - c. A moderate amount of knowledge
 - d. I know a great deal about trees
5. On a scale from 1 to 5, how much do you value trees, (1 = not at all to 5 = very much)?
6. Rate the following aspects of trees based on how important they are to you (1 = not at all to 5 = very much):
 - a. Life-supporting: 1 2 3 4 5
 - b. Aesthetically pleasing 1 2 3 4 5
 - c. Producer of materials (construction, paper, etc.) 1 2 3 4 5
 - d. Supporter of communities 1 2 3 4 5
 - e. Companionship 1 2 3 4 5
7. Recall a memory from your childhood that involved a tree or multiple trees; how fond is that memory to you? (1 - 5) How much does memory influence your view on trees? (1 - 5)
8. Please briefly describe a memory you have of a specific tree. If relevant, please briefly describe how this memory shapes your self identity (i.e., how you see yourself).
9. Rank in order of importance the sensory aspects of trees that influence your preference of trees:
 - a. Visual (physical appearance)
 - b. Auditory (sound)
 - c. Olfactory (smell)
 - d. Tactile (touch/feel)
10. Which group trees do you find most appealing?



11. Which tree do you find most appealing?



12. What do you feel most when you are near a tree or surrounded by trees?

- a. Calm
- b. Energized
- c. Focused
- d. Connected to nature
- e. Inspired
- f. Nothing in particular
- g. Other, please specify

13. Which of the following ways do you believe is most important in terms of how trees impact your local community?

- a. As a landmark (historic)
- b. As a landmark (geographic)
- c. As a reliable/consistent structure (a stable meeting place/constant in the background)
- d. Create comfortable spaces (e.g., provides shade and community character)

- e. Makes the community environment visually appealing
- f. Other, please specify

[Nature connectedness scale]

Use the following scale to number each of the items in the list:

1 - strongly disagree, 2 - disagree, 3 - neutral, 4 - agree, 5 - strongly agree

1. I often feel a sense of oneness with the natural world around me
2. I think of the natural world as a community to which I belong
3. I recognize and appreciate the intelligence of other living organisms
4. I often feel disconnected from nature
5. When I think of my life, I imagine myself to be a larger cyclical process of living
6. I often feel a kinship with animals and plants
7. I feel as though I belong to the Earth as equally as it belongs to me
8. I have a deep understanding of how my actions affect the natural world
9. I often feel part of the web of life
10. I feel that all inhabitants of Earth, human and nonhuman, share a common "life force"
11. Like a tree can be part of a forest, I feel embedded within the broader natural world
12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature
13. I often feel like I am only a small part of the natural world around me, and I am no more important than the grass on the ground or the birds in the trees
14. My personal welfare is independent of the welfare of the natural world