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Recreational tree-climbing programs in a rural Japanese community forest: Social impacts and “fun factors”

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Abstract

We examined whether recreational tree climbing (TC) activities would have positive social impacts and rejuvenate an outdoor activity center and surrounding community forest in central Japan. Our case study comprised 3800 adults and children participating in TC activities at the Jyokoji Outdoor Activity Center (JOAC) in Seto, Japan. We focused on 1393 adult participants whom we considered to be the decision makers regarding family recreation, and we explored both the social impacts of TC and various factors that contributed to and distracted from the overall experience. Qualitative and quantitative data indicated that elements such as age, gender, tree preferences, tree appreciation, tree education, and technical instruction influenced the enjoyment of recreational TC and the positive effects on tree climbers. Overall, the climbing program had positive social impacts for the community forest and contributed to local conservation initiatives. Our case study suggests that other areas can benefit from incorporating TC programs into community forest planning to complement aesthetic, ecological, and restoration benefits and provide a new venue for recreation and conservation awareness.

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Introduction

Tree climbing (TC) is often thought of nostalgically as a childhood activity. Many adults can look back and reflect on the adventure, challenge, and freedom they felt while up in the treetops. Over the last 20 years, TC has gradually become a socially accepted activity for adults as well (Jenkins, 2005). In 1983, Peter Jenkins established Tree Climbers International (TCI), an organization dedicated to recreational TC for adults and children. Through the efforts of TCI and other TC schools worldwide, the popularity of TC has grown

dramatically (Smithsonian, 2002), to the extent that new businesses have been formed to help individuals and groups climb and even camp in trees (New York Times, 2005).

In April 2000, a non-profit organization called Tree Climbing Japan (TCJ), based in Seto, Japan, began offering recreational TC for disabled persons and families. TCJ was the first TC school in Japan and primarily focused on the therapeutic and rehabilitative aspects of climbing trees. Since then, TCJ has grown rapidly and has gained national recognition for their fun and environmentally and socially conscious TC programs. Between 2000 and 2007, over 37,000 people of various ages and abilities participated in TCJ TC activities across Japan.

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Considerable empirical and theoretical research in the field of environmental psychology has shown that nature and outdoor activities have restorative and therapeutic benefits. According to [Bonnes and Carrus \(2004, p. 801\)](#), “environmental psychology is the study of the relationships between people and the socio-physical features of the built and natural environment, in order to enhance human well being and to improve the people–environment relationship.” An integral component within the field of environmental psychology is the theory of “restorative environments and restorative activities”. [Hartig \(2004\)](#), in discussing restorative environments and the significance of natural–urban distinctions, stresses that the “conditions common in urban areas can impose heavy demands on people and that restoration is the process of renewing, recovering, or reestablishing physical, psychological, and social resources or capabilities diminished in ongoing efforts to meet adaptive demands” ([Hartig, 2004, p. 274](#)). Numerous scientific studies have found direct correlations between natural surroundings and restorative and stress-reduction effects (e.g., [Ulrich, 1981, 1983, 1984; Ulrich et al., 1991; Hartig et al., 1991, 2001, 2003](#)). Research on exercise in outdoor environments has also shown that running in outdoor green spaces reduces anxiety, depression, and anger more than running in an urban environment ([Bodin and Hartig, 2003](#)). [Hartig et al. \(2003\)](#) compared the positive effects of walking in a nature reserve to those obtained by walking in an urban environment and found greater positive effects from the former. A separate study by [Gathright et al. \(2006\)](#) compared the physiological and psychological effects of climbing a live tree in a forest with those of climbing a concrete tower of the same height in the same forest. Physiological and psychological tests were conducted on the climbers before, during, and after each climb. Physical test results indicated that climbers were more physically relaxed, and psychological results indicated greater vitality, reduced tension, confusion, and fatigue while TC compared to tower climbing ([Gathright et al., 2006](#)).

Attention restoration theory (ART) defines four environmental components that account for this restorative value: getting away, fascination, extent, and compatibility ([Kaplan and Kaplan, 1989; Kaplan, 1995](#)). Getting away refers to a change in scenery. Recreational TC takes this concept to another dimension because climbers experience the treetops and have direct body contact with trees. Therefore, we examined whether TC has positive and restorative benefits not only for people, but also for a community forest.

The government of Seto approached TCJ in February 2001 for advice on creating fun and popular outdoor activities that would enhance environmental appreciation and greater participation in a wider range of outdoor activities, thus having a positive social effect on

the Jyokoji Outdoor Activity Center (JOAC) and surrounding area. The desire to create a fun program that would encourage greater participation in outdoor education and activities at the JOAC can be likened to [Jackson’s \(1986\)](#) suggestion that continued involvement in experiencing and learning about nature will increase and strengthen existing attitudes, views, knowledge, and behavior of participants in pro-environmental activities. We refer to this as the “social impact and fun factors.”

After safety concerns, positive social impacts and fun TC activities were the highest priority for Seto officials. “Fun” in the broad sense of happiness, joy, and personal well-being was viewed as a powerful motivator for environmentally responsible behavior and participation in conservation and forest rejuvenation. We hypothesized that fun, healthy, and interesting TC activities would increase the popularity of a community forest to facilitate environmental awareness. This, in turn, would lead to more environmentally responsible behavior and conservation, and thereby have a positive social impact.

We examined whether enjoyable recreational outdoor education programs have a positive social impact by focusing on a particular TC program at the JOAC community forest. This case study spanned 5 years from 2001 to 2006 and examined the positive “social impact and fun factors” of recreational TC activities at the JOAC.

Methods

Research site

Seto City (population 130,000) in Aichi Prefecture, Japan, established the JOAC in 1984 so that children and families could “experience nature and forests and conduct group activities in a green and natural environment to better enhance their learning about nature, group cooperation, friendship, and respect for the local environment” ([Seto City Information Guide, 2001, p. 11](#)). The JOAC is located in a rural community forest (called a *satoyama* in Japanese) within the administrative limits of Seto. Seto and its satoyama have long had a symbiotic relationship. The city’s famed pottery enterprises using firewood kilns and local clay have existed for approximately 1300 years, and agriculture has been practiced in the satoyama area for over a millennium ([Seto City Information Guide, 2001, p. 13](#)).

In Japan, “hometown landscapes” or “rural areas” are more commonly referred to as satoyama. The term satoyama is difficult to translate directly. Although often called Japanese coppice woodlands or rural community forests, for most Japanese, the term satoyama evokes not just a forest area, but both a

concept and a landscape. According to the book *Satoyama: The Traditional Rural Landscape in Japan*, “satoyama conjures up images of the idyllic rural landscape of fields and woodlands” (Takeuchi et al., 2003, pp. 9–10). Takeuchi et al. (2003) further describe satoyama as secondary woodlands and grasslands adjacent to human settlements and suggest that environmentally conscious individuals use satoyama to symbolize nature that requires management. The abandonment of satoyama landscapes decreases the forests’ protective function of controlling soil erosion, leading to an inevitable loss of beautiful traditional landscapes (Nakajima, 1996). To preserve, rejuvenate, and restore satoyama, citizen participation in conservation efforts is critical (Okada, 1999).

The JOAC was established in a satoyama. Although the JOAC mission and facilities complied with the national government’s environmental policies, an unexpectedly low number of visitors made the JOAC difficult to justify financially. The lack of visitors and costs made it impossible to maintain year-round activities.

To attract more visitors, the municipal government sought collaboration with an organization that could help rectify this situation. At the same time, Seto also wanted the JOAC to better complement national environmental initiatives by providing a platform for greater “environmental spirit” and “fun.” “Environmental spirit” is a catchphrase in Japan suggesting a pro-environment feeling resulting in environmentally responsible behavior. This term gained popularity in the media and in government and was later defined in a 2003 government white paper in a chapter called “Life-Enriching Environmental Spirit” (MEXT, 2003).

Research methods

In 2001, TCJ was tasked with researching community needs in relation to the JOAC. To define participant preferences and needs before beginning TC programs congruent with Seto government guidelines, TCJ staff interviewed the head of Seto’s educational department regarding the low number of JOAC visitors. Seventy-two additional interviews were also conducted over a 3-week period to better understand program preferences, needs, and the concerns of parents, teachers, and educators in Seto. Interviews were taped and transcribed, with textual analysis used to identify main words, phrases, and the most common concerns. These results were then incorporated into the design phase of the TC Program.

During the main phase of the study between April 2001 and April 2004, over 3800 people, including adults and children, participated in TCJ Half-Day Tree Climbing programs at JOAC. For the purpose of this

study, we focused on adults as the decision makers in regard to family activities.

Konara trees (*Quercus serrata* Murray) were used exclusively in the climbing phase. The trees and climbing area remained constant throughout the study, with no noticeable size changes in the trees during the research period. The trees were 60–0 years old with crown widths of 9–1 m and heights of 21–3 m. Trunks varied from 70 to 90 cm in diameter. The first substantial branches were typically 5–6 m above the ground, and climbers were considered to have reached the top of the climb at 9–2 m in height. All TC activities were conducted on days with fair weather and followed the same half-day TC program protocol. There were only minor staffing changes during the study period.

Written questionnaires concerning the TC experience and focusing on the fun factors, social impacts, desire to participate in future JOAC programs, and increased interest in nature and conservation were collected randomly throughout the 3-year study period from 384 adults after TC activities. Some questions were answered on a five-point scale, whereas others were designed for keyword and textual analysis. The questionnaire took approximately 10–15 min to complete.

The data were cross-correlated, and further analysis was done using bivariate correlation coefficients, Chi-square correlation for *P* values, and residual analysis of cross-tabulation.

We then directly interviewed the leaders of 19 citizens’ groups that had incorporated TC into their activities at the JOAC or who had joined the TCJ half-day TC events and later used the JOAC for their activities. Interviews were conducted by the main author following an established guideline that included 10 main questions. These questions concerned the program’s positive and negative points and allowed for free discussion about how TC activities meshed with the groups’ existing programs.

JOAC staff members were instructed to keep visitor records and to note any citizens’ groups that had used the JOAC for TC activities and subsequently returned to JOAC because they had enjoyed the TC process. As of November 2005, there were 49 of these groups reported, although there may have been more that were not counted.

Results

Participation

In total, 3800 people participated in this study, of which 1393 were adults and 2407 were children between the ages of 6 and 16. Of the adults, 43.4% were male and 56.6% were female. Adults in their 30s and 40s

comprised the majority of participants (36.4% and 28.5%, respectively; Fig. 1). The next largest age groups were those in their 20s (18.9%) and older teenagers (9.0%). Mature tree climbers in their 50s and 60s totaled 5.8%. The most numerous TC group was females in their 30s and 40s.

Insurance records for each participant showed that Seto residents comprised only 11.4% of the total participants; 52.1% of the participants traveled from within 50 km, 27.8% traveled 50–100 km, and 7.2% traveled more than 100 km.

Questionnaire results

Many of the bivariate correlation coefficients were significant (Table 1). Statistically significant correlations were found between “age” and “experience,” “age” and “participation,” “age” and “tree appreciation,” “age” and “scary,” “gender” and “participation,” “fun” and “scary,” “fun” and “want to repeat TC,” and “tree appreciation” and “want to repeat TC” ($P < 0.01$). Statistically significant correlations were also found between “age” and “want to repeat TC,” “tree appreciation” and “want to repeat TC,” “experience” and “scary,” and “experience” and “want to repeat TC” ($P < 0.05$). These results indicate that “age” was a significant correlate with most other variables but only

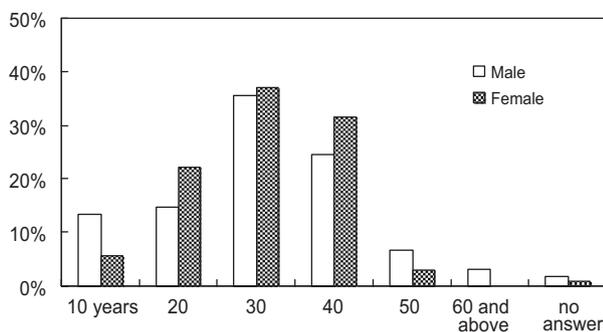


Fig. 1. Age and gender distribution for adult tree-climbing participants.

to a small extent. The largest correlation was between whether participants had fun and their likelihood of repeating TC.

As can be seen in Fig. 2, participants in their teens, 20s, and 50s or above were most likely to come to TC activities with a friend, whereas those in their 30s and 40s were most likely to come as a family. Participants in their 50s and above were more likely to come with a friend rather than family, but more likely to come alone than any other age group. Group participants were most often participants in their teens, but otherwise, there was no statistical difference in ages. Although there was no statistically significant finding related to gender and participation, males in their 20s and 30s were more likely to come alone or in groups compared to females in the same age groups.

Concerning the TC activity, the majority of participants stated that they had an extremely favorable impression of TC: 77.1% reported that TC was “very fun”, 22.6% answered “fun,” and none answered “not fun at all.”

Participants gave a large range of responses regarding what part of the TC program they liked best, and we did not find any statistically significant trends or correlations in these responses. However, from our direct observation of the program, we found several interesting trends (Fig. 3). The act of TC itself was the most enjoyable, particularly among men. The second most enjoyable activity also seemed to have a slight gender preference. Females tended slightly more than men to enjoy the treetop and reported that they achieved a sense of accomplishment from reaching the top. Males were more likely to climb as many trees as possible in the given time, and were more likely to focus on climbing to the highest point possible, whereas females tended to spend more time relaxing in the tree canopy.

To determine what factors detracted from the fun of TC, we gathered data from keywords and divided these into male and female groupings. It was not possible to perform statistical analysis on these results due to the wide variation in keyword responses. We did classify the many responses and found a marked gender difference

Table 1. Tree-climbing program (TC) correlation coefficients among variables for adult participants

Cross study	Experience	Age	Gender	Participation	Tree appreciation?	TC fun?	TC scary?	TC repeat
Experience	–							
Age	0.1668**	–						
Gender	0.0817	–0.174	–					
Participation	–0.0762	–0.1899**	0.1487**	–				
Tree appreciation?	–0.0735	–0.1818**	0.0472	0.0487	–			
TC fun?	–0.0851	0.0271	0.0350	–0.0983	0.1224*	–		
TC scary?	–0.1227*	–0.1830**	0.0666	0.0642	0.0601	0.2026**	–	
Want to repeat TC?	–0.1376*	–0.1260*	–0.0382	0.0870	0.1986**	0.3516**	0.0876	–

Statistical significance by the uncorrelated *t*-test: * $P < 0.01$, ** $P < 0.05$.

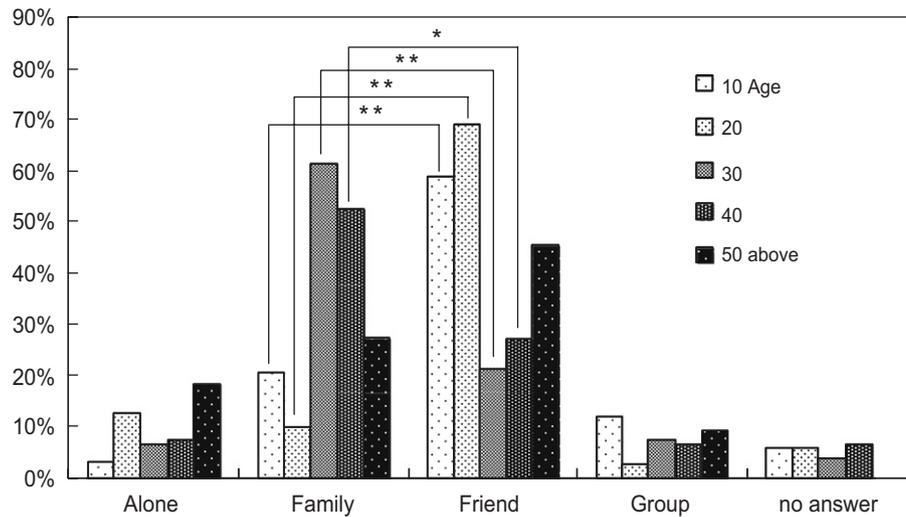


Fig. 2. Bivariate correlations between gender, age, and type of participation grouping chosen by adults for the tree-climbing activity. Statistical significance was determined by residual analysis of cross-tabulation; ** $P < 0.01$, * $P < 0.05$.

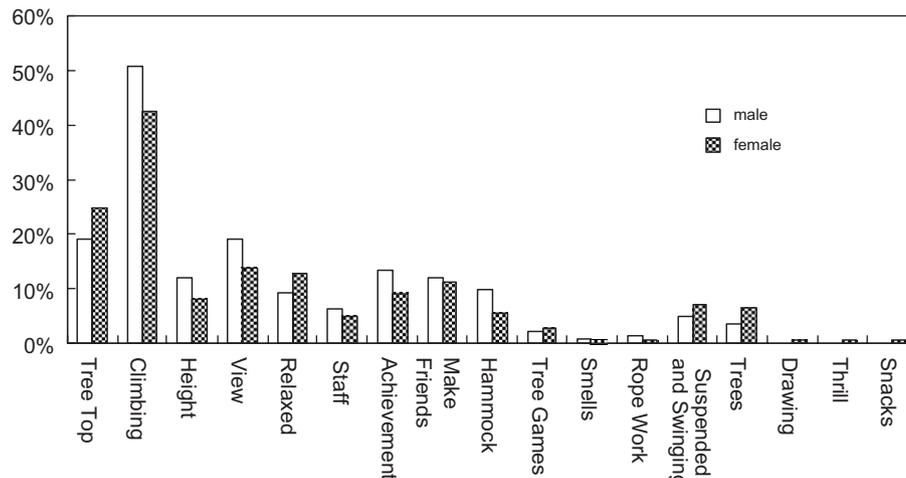


Fig. 3. Distribution of responses to the question “What was the most fun part of tree climbing?” from a gender perspective.

when addressing TC dissatisfaction. When asked what was not fun about TC, males were more dissatisfied if they did not reach the treetop (male 22%, female 11.1%) or were not able to climb into the treetop hammock (male 12.2%, female 0%). The greatest reason for dissatisfaction among female climbers related to their level of physical fitness, with some feeling that they were overweight or not strong enough (male 11.1%, female 38.9%). No males cited pain caused by the harness or inadequate climbing time, whereas females indicated both of these.

When asked if TC was scary, the majority of adults found TC “not scary at all” (male 68.1%, female 59.6%). Females were more likely than males to find it “a little scary” (male 21.5%, females 31.5%). However, of those who thought TC was “very scary,” 3.7% were male and 2.3% female.

To further investigate the fear factors in TC, we asked what factor contributed to TC being scary for those who answered that it was “a little scary” or “very scary”. The Chi-square test did not reveal any significant P -values, but our residual analysis did indicate significant residual differences between male and female responses (Fig. 4).

When asked about the scariest aspect of TC in free written responses, height was the number one factor. In comparison to males, more female climbers found being suspended by a rope high above the ground to be scary. None of the male climbers reported that the actual climbing activity was scary, whereas 12.0% of females felt that this was the scariest part of the process. Males were also slightly more likely to describe rope and equipment concerns such as knot slippage or anchor point security. Males were more concerned about technical problems and had less confidence in the

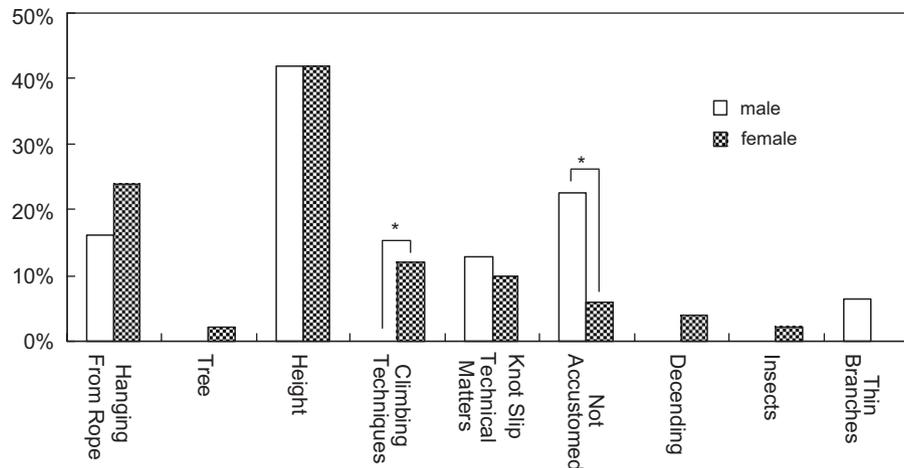


Fig. 4. Distribution of gender responses to the question “Was tree climbing scary?” Statistical significance was determined by residual analysis of cross-tabulation; * $P < 0.05$.

strength and function of the TC equipment. Women clearly perceived their lack of understanding about climbing techniques, equipment, and usage as most frightening. Interestingly, there did not appear to be a gender difference regarding height fears. Males were far more likely to consider the tree branch thickness as scary; this may reflect males being generally heavier than females and therefore having more concern about branch strength. Overall, these findings strongly suggest that gender-based fear factors should be considered in future TC programs.

When asked if they would like to tree-climb again, the majority of men and women answered that they would “definitely” like to climb again (male 74.8%, female 73.2%), but men were almost twice as likely to be “unsure” (male 14.1%, female 4.7%). Women were slightly more likely to want to invite friends the next time they climb trees (male 14.1%, female 18.8%).

Further participation in JOAC outdoor activities was not only a specific goal of the Seto City Government, but was of particular importance to this study as one of the indications that TC activities have a positive social impact by increasing participation in JOAC outdoor activities. For the analysis of the free-response question “would you like to participate in other JOAC activities and if so, what activities?” we grouped answers according to the frequency of activities appearing in the responses. The major groups were nature observation activities, camping, night hiking, nature education games, crafts, and other. Residual analysis of these results indicated that male and female preference concerning camping at the JOAC was significantly different, but those for the other activities were not. Only slight gender preference was indicated in the rest of the results concerning future activities at the JOAC. Both men and women rated camping highly while also indicating a statistically significant gender difference

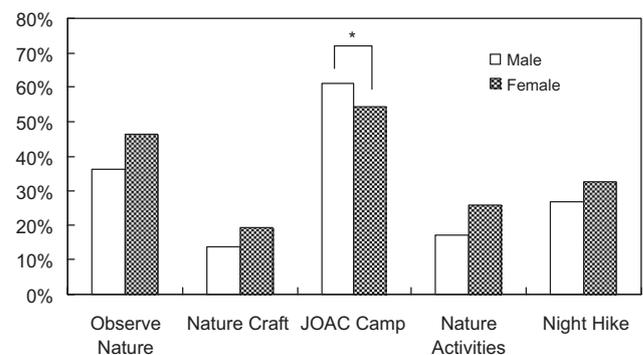


Fig. 5. Distribution of responses to the question “What would you like to do other than tree climbing on your next visit to the JOAC?” from a gender perspective. Statistical significance was determined by residual analysis of cross-tabulation; * $P < 0.05$.

(Fig. 5). Nature observation was higher for females than males. Night hiking was surprisingly popular among males and females. Nature-related games and activities were preferred by females, and more women wanted to create crafts and other products from natural materials. Males were significantly more likely to nominate camping at the JOAC, but no other activities differed significantly.

Further analysis of age preferences showed that age had a greater effect than gender on activity preference. Younger adults had less interest in environmental education, but more interest in night hiking compared to older adults, whereas middle-aged persons were more likely to want to camp and observe nature (Fig. 6).

We and the JOAC were also particularly interested in how participants learned of the JOAC TC activities and what factors would increase the awareness and popularity of the JOAC. When asked how they learned of the half-day TC program, participants listed media outlets, but

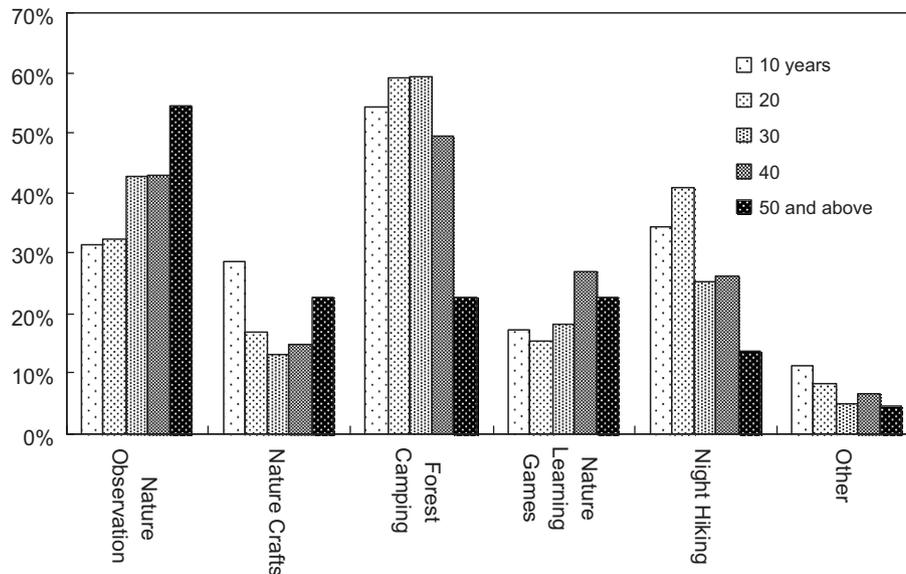


Fig. 6. Distribution of responses by age group to the question "What would you like to do other than tree climbing?"

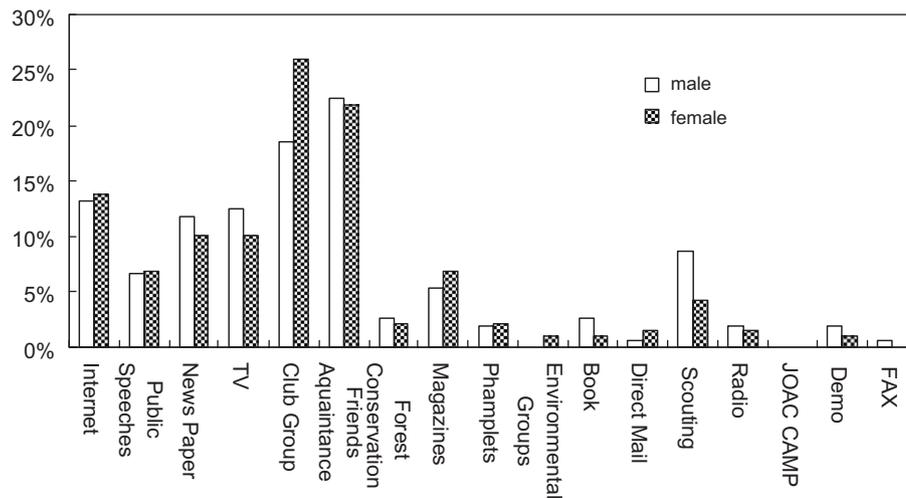


Fig. 7. Distribution of gender responses to the question "How did you learn about today's tree climbing?"

word of mouth and invitations from friends and acquaintances ranked higher. Women were slightly more likely to have learned of the program in magazines than were men, who were more likely to have heard about the program on television. Females were slightly more likely to have learned about TC from a newspaper, whereas slightly more men had read about the TC program on the Internet. The highest percentage of men and women learned of the program from associates from work or other groups (26.6%) and personal friends (Fig. 7).

Visitor participation results

Visitor records show that the number of visitors increased from 11,982 in 2001 to 19,650 in 2005,

suggesting that recreational TC activities had a significant positive effect in increasing annual visitor participation. During this period, the JOAC did not engage in any special publicity or campaign to increase visitation and continued to advertise on the Internet and in Seto City brochures as in previous years. However, the JOAC did receive publicity related to the TC activities. The 2001–2005 TC activities were documented in at least eleven national magazines, six outdoor guides, 14 local/regional TV programs, three national TV shows, and 13 newspaper articles.

The year 2001 is not included in the figures because the JOAC was only open seasonally at that time and offered no winter activities. Due to the increase in visitor numbers and the flexibility of TC as a winter activity, in 2002, the Seto government decided to open the JOAC to

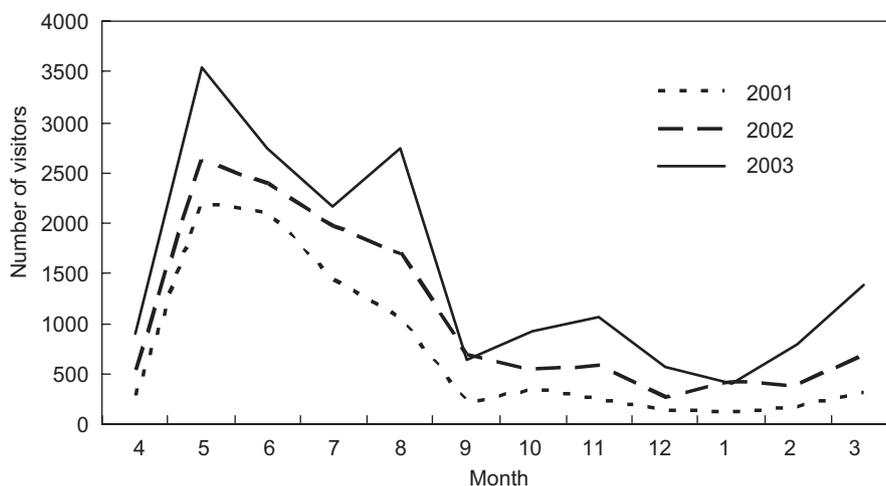


Fig. 8. Annual year-end number of visitors to the JOAC from the commencement of tree-climbing programs in 2001 until 2003 when additional activities were included in the JOAC outdoor programs.

the public year-round and provide winter activities. Although camping and other activities were available, TC proved to be the only draw for visitors in winter 2002. Other activities began to increase in 2003 as various groups used the facilities over the winter. Further, even though activities peaked in the summer months, the amount of activity has also increased in November; this increase includes day camping, one of the original activities provided by the JOAC (Fig. 8).

It is impossible to determine the extent to which publicity affected visitor numbers, but attendance records from 2001 to 2003 show an obvious increase in JOAC visitors. Visitor insurance records also indicate that more than half of the visitors resided more than 50 km from the JOAC, outside Seto City limits.

Citizens' group interviews results

Apart from TCJ, visitor records also showed an increase in other private TC clubs holding half-day programs at the JOAC. An estimated 800 people attended these TC activities between 2003 and 2006. Interviews with the leaders of 12 groups indicated that over 1100 people visited the JOAC directly as a result of the groups' activities. All of these groups have incorporated TC activities into their programs. We estimate that since 2002, approximately 50 other new citizens' groups have used or are using the JOAC for activities that relate directly or indirectly to TC.

To obtain accurate and pertinent information, we interviewed the leaders of the 12 groups that directly incorporated TC activities into their programs. When asked about the facilities and forest area, group leaders unanimously expressed satisfaction and were particularly positive about the TC area. Maintenance by TCJ

arborists has ensured that the site has healthy trees; this work has opened up the forest by selective thinning, has raised the canopy, and has made the forest much more "airy and light." Group leaders' comments included the following positive observations: "the trees look more stately and proud," "the forest is more inviting for non-TC activities as well," and "the forest instills a sense of calm and good feelings in children."

The leaders reported that their groups had not considered using the JOAC prior to attending the TCJ half-day TC experience. After that experience, the leaders and members wanted to undertake additional outdoor activities and familiarize themselves with the forests of the Owari Hills. Three groups incorporated TC activities into socially conscious programs such as a TC and outdoor activities program for victims of domestic violence, bullying, and neglect. TC was chosen because it was "a simple and relaxing activity that was non-competitive and stimulated children to learn more about nature and themselves." TC was also considered "a fun and attractive way to encourage children, who might otherwise have no desire to contact or interact with nature, to experience the forest." The double-rope climbing techniques also allow children of diverse physical strengths and abilities to participate, making TC attractive to programs designed to build confidence and feelings of self-worth in children with depression and other emotional issues.

Discussion

The TC program and publicity surrounding it improved the popularity of an outdoor activity center located in Seto City and close to one of Japan's largest

cities, Nagoya. What then are the psychological, social, and environmental benefits of these results? Psychological restoration in nature can be seen as positive motivation for ecological behavior (Hartig et al., 2001). Our subjects not only found TC enjoyable, they also expressed interest in other activities provided by the Outdoor Activity Center's natural setting, whereas prior to TC, they had no particular desire to participate in activities at the JOAC.

We had expected gender differences to emerge, as in some past studies (Gathright et al., 2006). However, to our surprise, age was a clearer predictor of what kind of outdoor activities seemed most enjoyable to subjects after their TC experience. Interestingly, we did find that males in their 20s and 30s were more likely to come alone or in groups compared to females in the same age groups. In comparison, a study undertaken in Singapore (Kong et al., 1997) indicated that women were more likely to visit natural areas with their families, whereas men were more apt to visit alone. Again, even though women were more likely to participate with their families, age was a far greater factor than gender for participation grouping.

Staff observations showed that men were more likely to request to climb additional trees and desired to climb multiple trees, whereas women tended to request to spend more time in the tree of their first climb. Although not asked directly in the study, participants reported less stress and greater mental clarity after TC. We did not directly address these issues, but made notes and found that these responses appear to agree with the findings of Uehara (2003), who showed that people were less stressed and performed better on self-counseling tests when in a satoyama setting compared to an urban environment.

When examining what factors detracted from the fun of TC, it appears that male dissatisfaction stemmed more from competitive issues such as not climbing the tallest tree, whereas females were dissatisfied with their own abilities. Concerning perceptions of fun and satisfaction with the TC program, gender differences were noticeable. None of the male participants complained about gear comfort, whereas females noted this as one of their major concerns. Special gear adapted for women's comfort may increase women's enjoyment of TC, as may modified TC techniques designed to compensate for limited physical strength or stamina (e.g., by reducing rope friction over branches or adding pulleys to assist climbers). Male achievement dissatisfaction could also be addressed by considering the height and difficulty of the TC activities and the allotted time for performing these activities. In addition, both male and female dissatisfaction may be allayed with a more detailed explanation of the climbing process to keep expectations in line with reality. Future TC programs designed to reduce these negative elements would likely

increase the fun factors and participant satisfaction. Overall, there were some gender-related preferences regarding the TC program; other research has also suggested that although gender is important, life-experiences and socialization factors have greater effects on pro-environmentalism (Dietz et al., 2002).

The TC program was designed to be fun, to encourage tree participants to try new outdoor activities at the JOAC, and to enhance the participants' "environmental spirit" and environmental consciousness. Identification of the factors that both contributed to the fun element of the TC and detracted from the program suggests that there are a number of factors within the present TC program that should be addressed to further increase the positive experience of TC.

Program elements that should be considered in future TC programs include age factors, gender preferences, and more detailed explanations of the TC process and equipment. Additionally, specially designed gear for female participants, skill- and ability-appropriate TC heights, and gender-related time allotments for TC activities should be considered.

Along with program design, the role of instructors should be addressed. Instructor satisfaction ranked very high among men (81.6%) and women (87.3%). "High" satisfaction was indicated by 16% of men and 11.7% of women. No participants answered "not very high", "dissatisfied" or "very dissatisfied."

Although instructors rated very highly, participants did note some areas for further improvement. Males felt that instructors should provide more environmental information while leading participants to the TC site (male 50%, female 7.7%). Some females felt that the program was too rushed (23.1%), whereas some males wanted more detailed technical instruction (male 25%, female 15.4%). Other suggestions for improvement varied too widely to be grouped. Females wanted more detailed information about how and why the equipment and techniques were safe, whereas males wanted to know how they could climb smoother and faster. Even though each participant was aware of how much time was allotted for TC, male participants were more likely to be dissatisfied if they did not have a clear idea of the time schedule in relation to their various achievements (climbing each tree, time in the hammock) and would have preferred a timekeeper so they could pace themselves to reach the top and spend time in the hammock. Men were more likely to be dissatisfied if they did not know the schedule or were not informed of how much time they had for the entire TC experience (male 25.0%, female 0.0%). Women tended to enjoy the climbing experience and were not as achievement orientated as males. Possible solutions would be to have an instructor give time updates and to provide both achievement-oriented courses and self-paced, experience-oriented courses. Greater effort to include nature

education and tree appreciation before TC would also increase satisfaction among men.

One of the direct goals was to connect satoyama conservation activities to a fun TC program. In the winter of 2003/2004, TCJ and the JOAC held satoyama rejuvenation events in which families and individuals helped with clearing deadwood, removing dense underbrush and non-native plants, fixing trails and walkways, aerating tree roots, and spreading composted leaves over areas of high human traffic. Approximately 1000 invitations were sent to study participants; of these, 93 (9.3%) people joined in the satoyama conservation activities despite sleet and snow on the scheduled day. Of these, 84 people (90.3%) had never previously attended or participated in satoyama conservation or had any previous desire to do so. These participants reported that the TC activities were responsible for their new conservation interest and increased “environmental spirit”.

The Satoyama Conservation Collaboration Project, in which TC participants were invited back to take part in rejuvenation activities in the forest, clearly shows the link between positive experiences in nature and environmentally friendly behavior. This result, which corresponds with findings by [Hartig et al. \(2001\)](#), shows that restorative psychological benefits received are a motivating factor in ecological behavior.

Conclusions

In many ways, today’s society has led to poorer public health both physically and emotionally. Stress and sedentary lifestyles are taking their toll on urban populations. However, recreational activities in urban and rural forests have numerous health and well-being benefits. Social benefits can be derived from TC, and most participants find recreational TC activities fun and enjoyable.

The fun of TC was related to a number of factors included in the TC program in this case study (e.g., tree preference, location, time, group dynamics, tree-related games, and cheerful, gregarious instructors). Before the study, we hypothesized that fun TC activities could positively affect the JOAC and individual health and well-being, as well as bring about positive societal impacts. The results support this hypothesis overall, although we also identified some factors that detracted from the fun experience; these included fear, lack of detailed technical instruction and environmental education, gear comfort, and physically demanding climbing techniques. Further, we found that both age and gender should be considered when creating future TC programs.

Whereas we focused on adults as the decision makers with regard to family activities, it must be noted that

many adults did participate with their children. For this reason, it can be argued that TC is beneficial to both individuals and society, and also the family unit.

Although fun is difficult to define, we can safely assume that fun in itself is a benefit to individuals, families, and children. Young people in Japan are increasingly subjected to greater social stress, family problems, and peer pressure. According to [MEXT \(2001\)](#) these effects are manifested in increased juvenile delinquency and other social problems. TC activities give families the chance to disengage from social pressures while providing an opportunity for healthy, enjoyable exercise. It is important to note that as a direct result of participation in TC programs at the JOAC, three citizens’ groups incorporated TC activities in programs that directly addressed social problems such as bullying, domestic violence, and child neglect, indicating the direct and positive societal impacts derived from TC activities.

It is also difficult to measure the depth or degree of the positive “environmental spirit” gained by participants through their TC experiences. Empirical and theoretical research indicates that experiences in nature emotionally motivate people to protect nature. Further, past and present life experiences with nature will result in an affinity to and an interest in nature ([Karls et al., 1999](#)). The positive responses to the TC program suggest that these fun activities contributed to a greater sense of “environmental spirit” among participants.

Seto and the JOAC also benefited from the recreational TC activities. The JOAC enjoyed a substantial increase in visitors, greater publicity, increased use by citizens’ groups, and direct participation in satoyama conservation activities. We did not investigate the financial benefits to the JOAC. However, with the year-round popularity of TC activities, the JOAC now keeps its facilities open all year instead of only seasonally. The popularity of TC has created a new source of income for the JOAC since the establishment in 2003 of the tree rental system, whereby TC clubs and groups can rent the TC area. From restorative, conservation, and societal perspectives, our results indicate that fun, enjoyable TC activities did produce positive social impacts for TC participants and rejuvenation of the JOAC and the surrounding community forest.

Future research

Our results also suggest ways to further enhance the TC program. Investigating the question of whether outdoor education really works, [Neill and Richards \(1998\)](#) compared the effects of outdoor education among 12,000 participants; their results provide some clues that could be applicable for future TC programs.

Specifically, they identified three factors that could contribute to more effective outdoor programs: (1) program design and facilitation, (2) longer programs, and (3) outdoor education programs with adults. They also found a larger “effect size” (amount of change in self-reported ratings at two points in time) in adventure therapy approaches; this supports the idea of tailoring programs to individual needs and applying therapeutic psychological principles.

Although we focused on the Seto–Owari area of Japan, the results can be applied to other areas and other types of projects. Specifically, the results can be used to design future rural–urban forests and green spaces that will provide aesthetic and restorative benefits and projects that incorporate TC activities into urban planning and urban forest activities. Such activities could bring about added social benefits for community governments and rural–urban forests and green spaces both inside and outside of Japan.

To our knowledge, this is the first case study to examine the “social impacts and fun factors” of TC activities in Japan or elsewhere. We would like to encourage further studies outside of Japan, as well as comparisons of TC programs, to explore the social and personal benefits of TC activities in urban and rural forests.

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