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Key features for forest bathing development: A Q-methodology study applied in Italy

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Abstract: Forest bathing is gaining attention for its health and well-being benefits, leading to growing interest among academics, policymakers, and practitioners. While most studies have focused on its physiological and psychological effects, less is known about how different stakeholders perceive the characteristics that make forest bathing effective and meaningful. This study explored expert and non-expert perspectives on forest bathing in Italy through the Q-methodology, aiming to identify shared and divergent views on key aspects such as site features, accessibility, and perceived benefits. The results highlighted four distinct viewpoints: a scientific-health-oriented perspective emphasising medical efficacy (mainly experts); a preference for more naturalness and ecological integrity (mainly non-experts); a possible socio-economic opportunity (mainly non-experts); and a preference for a more managed forest environment with supporting structures (mainly experts). Despite differences, consensus emerged on several points, including the cultural and physical relevance of forest bathing and the importance of inclusive accessibility while preserving low-impact environments. The findings highlighted the potential of Q-methodology to capture the plurality of stakeholder voices, offering a basis for more inclusive planning and policy development in the context of nature-based well-being initiatives.

Keywords: experts; non-experts; opinions and points of view; Shinrin-yoku; survey

Since the early 1980s, forest bathing – also known as 'Shinrin-yoku' (森林浴) – has emerged as a health and well-being practice based on engaging all senses with the forest surroundings, being mindful, walking slowly, and breathing deeply (Li et al. 2012). The concept of forest bathing was introduced by the Japanese Ministry of Agriculture, Forestry and Fisheries in 1982 to encourage urban people to visit forests to improve their well-being and relaxation (Farkic et al. 2021). Subsequently, this practice interested the scientific community, which began to investigate its physical and mental effects (Li et al. 2010), and gradually spread worldwide (Paletto et al. 2024a).

In the 2000s, some studies conducted mainly in Japan showed the physiological and physical effects

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of forest bathing on participants. Li et al. (2008) found that the benefits of forest bathing related to human natural killer (NK) cells activity were influenced by the components of the air (phytoncide) and the forest environment itself. In a subsequent study, Li et al. (2010) observed that cell activity and immunoglobulin levels increase, while systolic blood pressure and noradrenaline and cortisol levels decrease after forest bathing activity. Other studies have confirmed benefits from sessions of two to three hours, such as improved cardiovascular function and alleviation of respiratory diseases (Park et al. 2008). In a study conducted in Canada, Fu et al. (2022) quantified the physiological effects of a guided interactive nature activity ('nature break'), assessing the autonomic nervous system responses of participants using wearable sensors. From a psychological point of view, Morita et al. (2007) evaluated the effect of forest bathing on reducing the risk of psychosocial stress-related diseases using different mood and anxiety scales, while Morita et al. (2011) highlighted the positive effects on sleep quality. Other authors have focused on the mental health benefits of this activity on specific target participants such as young women (Song et al. 2019), teenagers aged between 16–18 years (Keller et al. 2024), and elderly people (Yu et al. 2017). A recent literature review has comprehensively summarised the physical and mental effects of forest bathing on participants (Antonelli et al. 2023).

After these initial studies, forest bathing has been investigated from other perspectives. From an economic perspective, Visintin et al. (2024) investigated forest bathers' attitudes and estimated visitor flows and the benefits associated with forest bathing activity in Italy, while Paletto et al. (2024b) estimated the economic impact of forest bathing activities on the local economy in an Italian case study. In a study conducted in the Philippines, Uyan (2020) quantified the participants' willingness to pay for forest bathing activities. Other studies have focused on site and stand characteristics to optimise the benefits of forest bathing participant uses. Kil et al. (2021) investigated forest bathers' demographic and visit characteristics, recreation experience preferences and well-being outcomes based on forest bathers' levels of place attachment in a case study in South Korea. Takayama et al. (2017) explored the influence of slight thinning in a managed coniferous forest in Japan on the psychological restorative effect of the forest bathers, emphasising that the decrease in stems density due to the thinning does not have a direct influence on the mood index and emotions of the participants (Takayama et al. 2017). Saito et al. (2019) investigated how restoration from a stress stimulus is affected by forest management, distinguishing between managed and unmanaged forests. Those authors have shown that managed forests may have greater beneficial effects than unmanaged forests for restoration from physiological stress. Doimo et al. (2020) focused on the importance of available information to support forest managers and planners in the development of forest bathing activities through a literature review.

Starting from these considerations, the aim of this study is to investigate experts' and non-experts' opinions on key features for forest bathing development in Italy. To this end, Q-methodology – a research technique designed to obtain a diverse range of perspectives or viewpoints on a topic – was adopted to better understand how experts and non-experts perceive the importance of different aspects related to the forest bathing practice in Italy. The research questions are: (R_1) Does educational background and personal experience shape differing perceptions and priorities regarding forest bathing? (R_2) Is there a convergence of opinions on the key aspects of the forest bathing practice?

MATERIAL AND METHODS

Q-methodology is an analytical tool designed to produce robust results with small samples of respondents (defined as P-sample) without the intention of extrapolating the results to a larger population. Q-methodology has the advantage of investigating a topic extensively through the selection of different respondents and a sample of statements (Q-sample) containing the widest spectrum of opinions (Raadgever et al. 2008).

In this study, the Q-methodology was implemented following these steps: (*i*) generation of the concourse of statements about the investigated topic (Q-statements); (*ii*) development of the sample of statements (Q-sample); (*iii*) respondents (P-sample) allocate cards with statements along nine response categories (Q-sorting); (*iv*) statistical analysis and interpretation of results.

The research team, based on the literature and supported by three experts, prepared the initial concourse of 63 statements concerning forest bath-

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Table 1. Q-sample of the statements used in the study

No.	Statements	Category
1	Small streams or lakes can be distracting during the activity.	SI
2	Old-growth forests with monumental trees are an ideal site.	ST
3	Deadwood on the ground is an indicator of greater naturalness and does not hinder activity.	SI
4	The type of forest does not have a significant impact on the experience.	ST
5	Uneven-aged forests with trees of different diameters and heights are ideal sites.	ST
6	Shrub layer is aesthetically pleasing and encourages forest bathing activities.	ST
7	Biogenic volatile organic compounds emitted by trees have a role in the functionality of the ecosystem but not in human health.	EF
8	Forest bathing should be medically prescribed to people with depressive tendencies.	EF
9	Structures (barefooting and tree hugging trails) are not necessary.	SI
10	Mature even-aged forests, with 70–80-year-old trees, are more effective for well-being than young forests.	ST
11	Areas with steep slopes (> 10%) offer a more intense and varied nature immersion experience.	SI
12	Accessibility can compromise the experience, increasing the number of visitors and disturbing the serenity of the place.	SI
13	Flat or moderately sloped (< 10%) sites are required.	SI
14	High-altitude areas (above 1 000 m a.s.l.) offer a better and more immersive experience.	SI
15	There is not enough scientific evidence for the benefits of forest bathing to be able to prescribe it medically.	EF
16	Facilities (barefooting and tree hugging trails) are an added value in a forest bathing activity site.	SI
17	Conifer forests are ideal sites.	ST
18	Young even-aged forests, with 30–40-year-old trees, are ideal sites.	ST
19	Forest bathing has positive effects on the immune response, thanks to an increase in the activity in the production of natural killer (NK) cells.	EF
20	Sites must be close to forest paths, but away from roads that could disturb the activity.	SI
21	Forest bathing has positive effects on people suffering from depression.	EF
22	Shrub layer is an obstacle to activity.	ST
23	It is a traditional Japanese practice that can also be seen as an opportunity in our culture.	SO
24	Deadwood on the ground and rocks hinder activity.	SI
25	Sites must be located near areas that are easily accessible even by people with disabilities.	SO
26	This activity should be medically prescribed to people suffering from respiratory disorders (dyspnea/ shortness of breath).	EF
27	It has positive physical effects, such as reducing prefrontal brain activity, heart rate and blood pressure.	EF
28	Small streams and lakes promote relaxation activities.	SI
29	Positive physical effects of forest bathing are due to the little anthropised environment (forest) where the activity takes place.	EF
30	Forest bathing is a passing fad linked to marketing.	SO
31	Deciduous forests are ideal sites.	ST
32	The organisation of forest bathing activities has a relevant impact on the local economy.	SO
33	Spending time in nature improves people's mood and psychological well-being, regardless of the activity they are doing.	EF
34	Forest bathing should be regulated by national or regional legislation.	SO

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Table 1. To be continued

No.	Statements	Category
35	Disturbances such as urban noise or the presence of other visitors do not compromise the immersive experience.	SO
36	Dense forests are oppressive and claustrophobic, limiting the feeling of freedom and connection with nature.	ST
37	Deciduous-conifer mixed forests are ideal sites.	ST
38	It is effective in reducing anxiety, stress and burnout phenomena.	EF
39	Organising forest bathing activities can create new job opportunities.	SO
40	Forest bathing activities are associated with improvements in participants' mood.	EF
41	Dense forests are best suited for forest bathing activities.	ST
42	Forest bathing could enhance the economy of internal and mountain areas that are being abandoned.	SO
43	Forest bathing can interfere with other economic activities in the area.	SO
44	A forest does not need to be certified to have this experience.	SO
45	Biogenic volatile organic compounds emitted by trees have a positive effect on human health.	EF
46	A certified guide leading the activity does not add value to the activity itself.	SO
47	This activity should be done only with a certified guide to get the maximum benefit.	SO
48	Sites should be certified and listed in a national or regional database.	SO
49	Forest bathing could be an economic resource for eco-tourism, without compromising the ecology of natural areas.	SO

EF – physical and psychological effects; SI – site characteristics; SO – socio-economic impacts; ST – stand characteristics

ing activities in Italy, both positive and negative statements as suggested in the literature (Urquhart et al. 2019). The statements were subdivided into four categories of themes: (*i*) stand features of forest bathing trails; (*ii*) site features of forest bathing trails; (*iii*) physical and psychological effects of forest bathing activities on human health; (*iv*) socio-economic impacts and relations with other productive activities.

Afterwards, 49 of the initial 63 statements were selected to have a balanced number of statements for each category, summarised as follows: 12 statements each for both physical-psychological effects, site and stand features, and 13 about socio-economic impacts. Then, the 49 statements were randomly numbered, creating the final Q-set as shown in Table 1.

In the third step, participants, including selected experts (academics/researchers, professional guides) and non-experts (forest bathers, managers/promoters), allocated cards with statements along nine response categories (from –4 strongly disagree to +4 strongly agree). Participants completed the Q-sort exercise by sorting the statements in a forced-choice structure using the free online Q-methodology platform Q-TIP developed by the University of Wisconsin (Nost et al. 2019). In this study, an online data collection was adopted because this administration system offers many practical advantages (e.g. capturing greater diversity in social perspectives and facilitating the interpretation), as emphasised by Meehan et al. (2022). To complete the Q-sort, participants could indicate any additional observations and comments on both the statements and the methodology.

In the fourth step, the Q-sorts were analysed using the KADE (KenQ Analysis Desktop Edition; Banasick 2019), a desktop application for the analysis of Q-methodology data. A correlation matrix was computed using Pearson correlations to assess the relationships among individual Q-sorts, while the Principal Component Analysis (PCA) was used to identify patterns or clusters among participants, represented by a smaller set of underlying dimensions (commonly referred to as 'factors'). Then, a Varimax rotation – an orthogonal rotation method introduced by Kaiser (1958) – was applied to the extracted components to enhance interpretability. This method maximises the variance explained by each factor (i.e. the eigenvalue), allowing for clearer factor loadings and the emergence of more distinct participant viewpoints (Watts, Stenner 2005). During the

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'factor loading' step, the participants were assigned to factors through auto-flagging using a significance threshold of $P < 0.05$. Each participant was automatically flagged for the factor on which they had the highest loading, thus identifying those who best represent each viewpoint.

RESULTS

A total of 24 respondents participated in the study, divided as follows: 11 experts (7 academics/researchers and 4 professional guides) and 13 non-experts (5 forest bathers and 8 managers/promoters).

In Table 2, the results of the PCA are shown. Using KADE, a maximum of eight factors could be extracted, accounting for a cumulative variance of 78%. Factor selection was guided by the eigenvalue criterion, which indicates how many variables a given factor explains. Only factors with eigenvalues greater than 1 should be retained for interpretation (Watts, Stenner 2005). Based on this criterion, only Factors 1, 2, 3, and 4 were retained for further analysis; these four factors collectively explain 65% of the total variance, a value considered more than acceptable in social science research (Rahma et al. 2020).

The correlation matrix among the four extracted factors is shown in Table 3. Although Varimax rotation was used – a method that theoretically assumes uncorrelated factors – moderate correlations were still observed between some components, indicating partial conceptual overlap among certain viewpoints.

Factor 1 and Factor 2 showed the highest correlation ($r = 0.6577$), suggesting that these two factors share some common underlying structure or interpretive similarity. Factor 1 also shows a moderate correlation with Factor 4 ($r = 0.5648$), indicating that these viewpoints may not be entirely distinct. Factor 3 appears to be the most distinct, with the lowest correlations with the other factors (from $r = 0.3035$ to $r = 0.4409$). These moderate correlations do not invalidate the orthogonal rotation but rather reflect the complexity of subjective perspectives, which may overlap in practice even if they are statistically treated as independent.

Key characteristics of the four factors extracted through Q-methodology are shown in Table 4.

Table 2. Results of Principal Component Analysis (PCA)

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Eigenvalues	10.3386	2.232	1.7948	1.4148	0.9541	0.8363	0.8319	0.7671
Explained variance (%)	43	9	7	6	4	3	3	3
Cumulative explained variance (%)	43	52	59	65	69	72	75	78

Table 3. Correlations between factor scores

Factor	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1	–	–	–
Factor 2	0.6577	1	–	–
Factor 3	0.4409	0.4088	1	–
Factor 4	0.5648	0.4373	0.3035	1

Table 4. Factor characteristics in terms of number of defining variables, average relative coefficient, composite reliability, and standard error of factor Z-scores

Characteristic	Factor 1	Factor 2	Factor 3	Factor 4
No. of defining variables	9	8	3	4
Average relative coefficient	0.8	0.8	0.8	0.8
Composite reliability	0.973	0.97	0.923	0.941
SE of factor Z-scores	0.164	0.173	0.277	0.243

SE – standard error

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Factor 1 and Factor 2 are the most robustly defined (number of defining variables), with 9 and 8 defining Q-sorts, respectively, suggesting strong representation among participants. Factors 3 and 4 are defined by fewer participants (3 and 4, respectively), indicating more specific or less common viewpoints.

All factors showed an average relative coefficient of 0.8, suggesting solid internal coherence for each viewpoint, and a high composite reliability, ranging from 0.923 (Factor 3) to 0.973 (Factor 1). Values above 0.9 indicate excellent reliability, confirming that each factor consistently represents the participants' viewpoints.

The standard error (SE) of factor Z-scores is lowest for Factor 1 and Factor 2, and higher for Factor 3 and Factor 4. This is expected given the lower number of defining Q-sorts for Factors 3 and 4, which results in greater uncertainty in estimating their factor scores.

Overall, these values support the validity and reliability of the factor structure, particularly for Factors 1 and 2.

The output analysis includes a table of distinguishing statements ($P < 0.01$), which are key in interpreting the meaning of each factor (see Table 5). These statements show which opinions are most unique to each group of participants (factors), based on their Z-scores. The Z-score represents a weighted average of how closely aligned each statement is with the Q-sorts that define a factor. It reflects the degree of agreement or disagreement with the statement (St.) within each viewpoint (Zabala, Pascual 2016).

Table 6 shows the 10 'consensus statements', those with similar Z-scores across all four factors. These shared beliefs include the recognition of the positive physiological effects of forest bathing (St. 27), its cultural significance (St. 23), and the importance of locating forest bathing areas near forest trails yet sufficiently distant from roads to avoid external disturbances (St. 20). Additionally, there is a collective rejection of the idea that such disturbances are irrelevant (St. 35), as well as disagreement with the notion that biogenic volatile organic compounds (BVOCs) released by trees have no impact on human health (St. 7).

Participant distribution across the four factors is shown in Table 7. Experts primarily define Factors 1 and 4, while Factor 2 is dominated by non-experts, especially forest bathers. Factor 3 includes a mixed profile with a prevalence of non-experts (but on a sample of 3 people), suggesting some cross-group convergence.

Table 5. Distinguish statements for each factor, along with the significance threshold, Z-score, Q-sort value, and number of statement

Threshold	Z-score	Q-sort value	Statement No.
Factor 1			
$P < 0.0005$	1.72	4	19
$P < 0.005$	0.57	1	39
$P < 0.01$	0.17	0	48
$P < 0.005$	0.11	0	10
$P < 0.0005$	−0.25	−1	29
$P < 0.01$	−1.77	−3	30
$P < 0.0001$	−1.81	−3	15
Factor 2			
$P < 0.0001$	1.64	4	3
$P < 0.0001$	1.56	3	12
$P < 0.005$	0.93	2	5
$P < 0.001$	0.85	1	6
$P < 0.005$	−0.06	0	11
$P < 0.01$	−0.45	−1	4
$P < 0.005$	−1.07	−2	36
$P < 0.005$	−1.65	−4	24
Factor 3			
$P < 0.0001$	2.08	4	42
$P < 0.0005$	1.77	4	39
$P < 0.0005$	1.36	3	44
$P < 0.005$	1.08	2	48
$P < 0.005$	0.84	2	49
$P < 0.005$	−0.45	−1	1
$P < 0.01$	−0.82	−2	3
$P < 0.0001$	−0.92	−2	21
$P < 0.0005$	−1.1	−3	26
Factor 4			
$P < 0.001$	1.54	3	37
$P < 0.0005$	1.2	3	10
$P < 0.0001$	1.19	3	24
$P < 0.001$	−0.21	−1	40
$P < 0.001$	−0.7	−1	45
$P < 0.0005$	−0.77	−2	9
$P < 0.0005$	−1.45	−3	6

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Table 6. Consensus statement described by Z-score and rank for each factor

Statement No.	F1 Z-score	F1 rank	F2 Z-score	F2 rank	F3 Z-score	F3 rank	F4 Z-score	F4 rank
7	–2.21	49	–1.62	47	–2.22	49	–2.38	49
14	–0.21	30	–0.36	30	–0.02	24	–0.56	33
18	–0.08	27	–0.47	32	–0.41	32	–0.18	29
20	1.24	7	1.47	5	0.93	10	1.03	10
23	1.05	8	0.61	17	0.69	13	0.72	14
25	0.74	12	0.76	15	0.31	19	0.63	15
27	1.43	5	1.21	7	1.77	3	1.05	9
31	–0.07	26	–0.52	33	–0.13	26	–0.42	32
32	–0.25	32	–0.86	40	–0.28	29	–0.07	38
35	–1.28	43	–1.59	46	–1.95	48	–1.29	44

Table 7. Characterisation of each factor according to the categories of participants (experts *vs*. non-experts)

Factor	Experts		Non-experts	
	academics/researchers	professional guides	managers/promoters	forest bathers
1	4	3	2	–
2	–	–	2	6
3	1	–	–	2
4	2	1	1	–

DISCUSSION

Perspectives and views on forest bathing

The Q-methodology revealed four distinct yet partly overlapping viewpoints, represented by the four factors retained by the PCA. Each factor describes a way of thinking or a focus on forest bathing, influenced by both professional background and experiential knowledge (R_1).

The moderate correlations observed between some of the factors (particularly between Factor 1 and Factor 2) suggest conceptual proximity, even though Varimax rotation assumes orthogonality. This nuance highlights a common feature of social science research: the coexistence of statistically distinct, yet practically intertwined, perspectives (Watts, Stenner 2005).

Factor 1: Scientific and health-oriented perspective. Defined mainly by experts, this viewpoint strongly emphasises the positive health effects of forest bathing, particularly its impact on the immune system. Supporters of this perspective believe that spending time in forests can enhance immune response by increasing the activity and production of NK cells. They claim that there is sufficient scientific evidence to consider forest bathing as a practice that could be medically prescribed for its health benefits.

Importantly, they do not see forest bathing as a temporary trend or a product of marketing hype. On the contrary, they believe in its long-term potential, recognising that organising forest bathing activities could create new job opportunities and contribute to broader societal well-being.

This factor's prominence (highest composite reliability: 0.973) suggests it is the most robust and widely shared among expert respondents.

Factor 2: More naturalness and ecological integrity. This perspective values forest environments that preserve a relatively high degree of naturalness and ecological integrity, seeing them as ideal for forest bathing experiences. Key features include the presence of deadwood on the ground, which is interpreted not as a hindrance but as a sign of ecological health. The shrub layer and dense forest structures are appreciated for their aesthetic appeal and their ability to enhance immersion and connection with nature, rather than being perceived as obstacles.

The presence of uneven-aged trees and stand diversity within the stand is regarded as beneficial, providing a more authentic and enriching natu-

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ral setting for restorative experiences. Moreover, there is a critical view of excessive accessibility, which is seen as a threat to the serenity and contemplative quality of forest bathing.

In summary, Factor 2 highlights a biophilic appreciation for wildness and diversity and a desire to protect the quiet and immersive qualities of forest environments from human disturbance.

The predominance of non-experts (especially forest bathers) in this group highlights how lived experience models preferences for a more natural environment, which diverges from preferences commonly reported in the literature.

Factor 3: A Socio-economic opportunity. This perspective views forest bathing primarily as a tool for regional economic development; it emphasises the economic potential of organising forest bathing activities to create new job opportunities and to serve as a sustainable form of eco-tourism that can stimulate local economies without compromising ecological integrity.

Regarding regulation, this view maintains a pragmatic stance: while it acknowledges the value of official certification and site listings, it also recognises that meaningful forest bathing experiences can occur without formal certification, suggesting flexibility in implementation.

However, this factor is sceptical about the medicalisation of forest bathing. It questions the scientific evidence supporting its therapeutic effects, especially in the treatment of depression or respiratory conditions, and so does not support its prescription as a medical treatment.

Its relatively small representation (only three respondents) may indicate a more niche, but strategically relevant, stakeholder voice – particularly among promoters and territorial managers (non-experts).

Factor 4: Managed forests with supporting infrastructures. This perspective favours more managed forest settings for forest bathing, emphasising clarity, accessibility, and structure over wilderness. Mixed forests and mature, even-aged tree stands (70–80 years old) are seen as the most suitable environments, offering a sense of stability and visual coherence that supports well-being. Conversely, natural clutter – e.g. deadwood, rocks, and even a dense shrub layer – is perceived as an obstacle, potentially limiting movement, safety, and comfort during forest bathing activities. This factor expresses a clear preference for more managed forests, aligning with the literature (Gobster et al. 2023).

Additionally, this point of view supports the presence of dedicated infrastructure – e.g. barefooting paths and tree hugging trails – and regards these infrastructures as valuable additions. These infrastructures are viewed as essential for facilitating the experience and making it more accessible and engaging.

In essence, this factor reflects a structured and guided approach to forest bathing, valuing controlled natural settings over raw wilderness.

Despite the differences among various factors, ten consensus statements highlight a cross-stakeholder agreement (R_2), offering a shared foundation for developing planning related to forest bathing. All groups generally recognise the cultural roots and value of the practice (St. 23) and agree on its physiological benefits (St. 27), disagreeing with the notion that BVOCs have no health effects (St. 7). For these reasons, they also support ensuring accessibility to forest bathing sites, including for people with disabilities (St. 25), but keeping in mind that disturbances such as noise and the presence of other visitors could negatively affect the immersive experience (St. 35).

After validating a shared base trend for which some benefits attributable to forest bathing activity are recognised, the need/challenge of identifying sites that are moderately accessible emerges, also in order to allow access to this practice to people with certain types of disability, but away from urban areas and anthropogenic disturbances – need already emerged also from some studies in the literature (Gobster et al. 2023, Rivieccio et al. 2024) – paying special attention to the visitor flows to avoid excessive crowding.

Methodological reflections: Strengths and limitations of Q-methodology

Q-methodology proved to be a valuable mixed-method approach – both qualitative and quantitative – for capturing subjective viewpoints and uncovering patterns of agreement and divergence within a diverse participant group. One of its key strengths lies in its ability to identify shared perspectives across different groups, while still preserving the uniqueness of each viewpoint as an individual voice (Bashatah 2016).

Brown (2006) further emphasised that Q-methodology not only amplifies and clarifies preferences that may have been unintentionally marginalised but also brings to light the individuals who hold these views.

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In this study, the methodology allowed for a comparison between expert and non-expert opinions, helping to highlight potential differences in perspectives and priorities among various stakeholder categories. Importantly, it brought forward the preferences of forest bathers ('marginalised participants'), voices that are often overlooked once more dominant or 'ideal' characteristics (e.g. health benefits) come to the forefront.

This study also demonstrated high internal consistency, with composite reliability values exceeding 0.9 across all factors. Furthermore, the emergence of consensus statements made it possible to identify shared needs and opinions across the different perspectives revealed, offering a basis for common understanding and potential policy development.

A limitation of the methodology is the small sample size – 24 participants in our case – which aligns with other studies based on Q-methodology and does not allow the generalisability of the results. However, the aim of Q-methodology is not to determine how many people hold a particular viewpoint but rather to explore the range and nature of those viewpoints (Bashatah 2016).

Factors 3 and 4 in our study were defined by fewer participants (three and four, respectively), which increases the level of uncertainty, particularly in terms of categorising them as experts or non-experts, as reflected by higher standard errors. While increasing the sample size could help in this regard, the issue is not inherent to the methodology itself but rather to the in-depth analysis concerning participant profiles.

Another limitation is the impossibility of capturing all potential perspectives on a topic either *a priori* or *a posteriori*, as noted by Leiding et al. (2022). This carries the risk of excluding certain priorities or ways of thinking from the analysis.

Lastly, the forced-ranking nature of Q-sorting – while central to the method – can sometimes oversimplify complex opinions or limit the participants' ability to fully express nuanced views. This difficulty was also explicitly mentioned by some participants during the study.

CONCLUSION

This study provides valuable insight into the multifaceted perceptions of forest bathing among both experts and non-experts in Italy. The main strength was to explore stakeholders' opinions on forest bathing using a mixed-method approach. Through this methodology, four distinct yet interrelated viewpoints were identified, each highlighting different priorities, ranging from scientific and health-oriented considerations to aesthetic preferences, biophilic values, and socio-economic opportunities. The coexistence of these perspectives underscores the complexity of forest bathing as a practice that bridges scientific evidence, experiential engagement, cultural dimensions, and local development. However, a core of shared beliefs emerged, particularly concerning the physiological benefits of forest bathing, its cultural relevance, and the importance of inclusive accessibility. These points of agreement lay the groundwork for a common framework to guide site management and policy initiatives, particularly in balancing accessibility with the preservation of immersive, low-impact natural environments.

The study also demonstrated the utility of Q-methodology in elevating less dominant but meaningful voices, thus contributing to a more democratic and inclusive understanding of the practice. While limitations regarding sample size and generalisability exist, they do not detract from the depth and richness of the findings, which are meant to explore the spectrum of views and preferences rather than quantify their prevalence.

Future research could benefit from expanding the participant pool to include additional stakeholders from other countries, further exploring how forest bathing practices might adapt to different regional contexts and cultural interpretations.

Finally, forest bathing in Italy emerges as a practice with strong potential for integration into broader public health, tourism, and environmental agendas – provided that planning efforts are inclusive, ecologically sensitive, and attuned to the plurality of values expressed by diverse stakeholder groups.

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