Benefits of Group Walking in Forests for People with Significant Mental Ill-Health

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Abstract

This study investigated the effects of group walking in forests for people with significant mental ill-health including depression, bipolar and anxiety disorders based on a pilot program in Ireland. The program consisted of activities in a forest setting for approximately 2 hr duration weekly, for 13 weeks, which included roughly 10 min of gentle warming-up exercises, 1–1.5 hr of forest walks, followed by approximately 30 min of refreshments/socializing on the forest sites. Fifteen participants were assessed. The results indicated significant improvements in mood, measured by the Positive and Negative Affect Schedule, immediately after a walk. Semi-structured interviews with a sample of participants also revealed that the quiet and uncrowded forest environment was particularly beneficial to the participants with significant mental ill-health, as they can be conscious of other people around them. In addition, the sense of escaping from everyday life, the beauty of nature, and having something interesting to look at in the forest environments were important elements for improving their mood, encouraging communication, and motivating regular participation. Despite the difficulty of separating the effects of being in the forest from the social interaction benefits or physical exercise, it can tentatively be concluded that the "positive" environment that forests provide can act as a first step in encouraging those with significant mental ill-health to reengage with society. Key Words: Human-health benefits of forests—Depression—Mood change—Forest group walk—Restorative effects.

Background

The relationship between nature, human health, and well-being has been recognized since the early human civilizations in Persia, China, and Greece (Burford, 1969; Delumeau, 1995; Jost, 1994). During the 13th and 14th centuries in Europe, the large convent gardens in monasteries were believed to contribute to the spiritual and mental well-being of friars (Montford, 2004, cited in Ward Thompson, 2011). In the 19th century, mental health institutions began to be situated within the natural environment or by gardens (Wilson et al., 2008). Within the last 40 years, studies focusing on the links between human psychology and nature have developed, and a large amount of qualitative and quantitative research has been conducted, especially in developed countries. The accumulated results of this research suggest that green spaces such as urban parks, forests, the countryside, and even a picture in a room or landscapes from a window can reduce stress and anxiety and can improve mood, cognitive functions, and self-rated well-being (e.g., Berman et al., 2008; Hartig et al., 1991; Kaplan & Kaplan, 1989; Ulrich, 1983).

A number of theories have attempted to explain the link between human psychology and nature. These include the biophilia hypothesis, which theorizes that humans have an innate preference for nature because their body and mind have evolved through interaction with nature (Wilson, 1993). Similarly, Stress Recovery Theory (SRT) implies that humans display positive emotional and psychological responses to nature because such environments represent potential food sources and safe shelters (Ulrich, 1983; Ulrich et al., 1991). In contrast, Attention Restoration Theory (ART) focuses on human cognitive processes. It argues that mental restoration occurs

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when an individual is exposed to the environment and eliminates his or her use of "directed attention" by distancing himself or herself from routine activities or thoughts ("being away"); being attracted by objects without any effort ("fascination"); feeling connectedness to the world beyond what is immediately perceived ("extent"); and feeling support for his or her intended activities from the surrounding environment ("compatibility") (Kaplan, 1983; Kaplan & Kaplan, 1989; Kaplan & Talbot, 1983).

The benefits of green spaces, specifically for people who are enduring mental health problems, have been investigated by experimental and non-experimental research approaches. Berman et al. (2012) conducted a walking exercise for individuals with depression in natural and urban areas, and the results showed that patients' positive mood and memory capacity improved to a significantly greater extent after a nature walk compared to after an urban walk. In addition, the degree of the effect observed was nearly five times as large as that in another study with healthy individuals. Roe and Aspinall (2011) also found that individuals experiencing poor mental health showed greater improvements in affective and cognitive restoration after a rural walk compared with individuals with good mental health. Some other studies were based on the case studies of ecotherapy, which is a form of therapy that includes the use of nature in treatment (Hasbach, 2012). Gonzalez et al. (2010) assessed the effects of therapeutic horticulture on people enduring depression, and the results showed a statistically significant decline in depression measures and an increase in attention measures. The authors suggested that "being away" and "fascination" proposed by ART (Kaplan & Kaplan, 1989) were the main factors that explained the beneficial effects. Wilson et al. (2010) investigated the effects of participating in nature programs for people enduring mental ill-health and suggested such programs not only improved the participants' mental well-being but also provided social networks and a stepping stone to further community engagement.

The social costs of enduring mental health problems are high, because they include not only medical costs but also the costs from lost employment and reduced productivity (Sheridan et al., 2012). In Ireland, more than 13,000 adults use inpatient services each year, and €711 million was allocated to the provision of mental health services in 2012 (Health Service Executive, 2012). There is a growing recognition of the importance of the social needs of people with ongoing mental health problems, and this has promoted the reorientation of the Irish psychiatric service. Support is now needed from different sectors at a community level, beyond the formal mental health care system. In this context, a group forest walk program called "Woodland for Health" was initiated in Ireland as a pilot program for the treatment of people with mental ill-health.

Aim of the Study

This study aims to investigate the effects of a group forest walk program, the "Woodland for Health" for the treatment of people with significant mental ill-health including depression, bipolar and anxiety disorders. The specific objectives of this study were to

- Investigate the short-term self-rated psychological effects of participating in group forest walks;
- Investigate the effects on the symptoms of mental disorder after engaging in a weekly group forest walk program;
- Understand the perceived effects on participants of weekly group walking in forests, and identify the particular elements related to forests that are responsible for the effects.

Methods

Program and participants

The "Woodland for Health" program. A pilot program, "Woodland for Health," was launched in March 2012 by the Irish Forestry Board (Coillte) in collaboration with the HSE/Wicklow Mental Health Services (WMHS) and the Wicklow Mental Health Association with financial support from Mental Health Ireland. It aims to improve the quality of life for individuals experiencing enduring mental ill-health in the Wicklow area of Ireland. The program consisted of activities in a forest setting for approximately 2 hr duration weekly, for 13 weeks, which included roughly 10 min engaging in gentle warming-up exercises, 1–1.5 hr of forest walks, followed by approximately 30 min of refreshments/socializing in the forest sites. The participants gathered at a meeting point in Wicklow every week and were taken to the forest sites by two community buses arranged by Coillte and WMHS. The travel duration from the meeting point to the forest sites was usually less than 30 min. Every walk was led by an experienced staff member of Coillte and/or a clinical staff member from WMHS, and the participants freely conversed with other participants during the walks. The program was based on the pilot program "Branching Out" in Scotland, which involves activities in green areas for people with mental ill-health (Wilson, 2009). By March 2014, the "Woodland for Health" program had been run on four occasions.

This study was carried out on the fourth round of the program, which commenced in January 2014 and lasted for 13 weeks. During the program the participants visited a number of forest sites (Table 1).

The program participants. The program participants were recruited by the clinical staff and the doctors from WMHS during their

Table 1. Description of the Locations Where Walks Took Place During the Program

LOCATION	DESCRIPTION
Avondale Forest Park	A mixed-species forest covered by native tree species. Within the park, there are several forest walks, a river walk, and an old estate house.
Ballygannon Wood	The second-largest oak plantation forest in Ireland, which is a part of nature reserve. The trails go through oak stands with few conifer plantations.
Deputy's Pass	A mixed forest covered by a wide variety of native and non-native tree species. There is a 4 km way-marked loop trail as well as a car park and a picnic site within the site.
Roddenagh Wood, Annacurragh	A mixed conifer and broadleaved forest located adjacent to the village of Annacurragh. The trails are relatively flat.
Devil's Glen	A conifer plantation with a small number of broadleaf stands. A part of the trail is steep, climbing about 150 m from bottom to top.
Carrick Mountain	A plantation forest covered by a mixture of conifers and broadleaves, managed using continuous-cover forestry principles. There is a network of forest roads for walkers.
Kilmacurragh Botanic Garden	A botanic garden with a great variety of native and exotic trees planted over the centuries. There are walking trails within the garden as well as a pond and plantation areas.
Glendalough	A part of a national park situated in a valley containing lakes, which has been a heritage site dating from the 5th century. Along the walking trail, there are broadleaf and conifer plantations.

inpatient treatment in Newcastle Hospital in Wicklow. Individuals who met the following two criteria were invited to participate:

- Recovering from significant mental ill-health including any combination of depression, bipolar, anxiety disorder and still taking medication;
- Physically capable of taking part in the walking program per the judgment of the clinical staff.

Among those invited, 15 people (3 male, 12 female) agreed to participate in this program, which ran from 23 January 2014 to 17 April 2014 (i.e., 13 weeks). The age range of the participants was 32–72 years with a mean age of 47 years. The diagnoses of the 15 participants are shown in Table 2.

"Woodland for Health" was a voluntary social program, and no one participated every week. Six people participated for seven weeks,

Table 2. Diagnoses of the Participants

DIAGNOSES	NUMBER OF PARTICIPANTS
Depression	10
Bipolar	4
Anxiety disorder	6
Other	3
DUAL DIAGNOSES	NUMBER OF PARTICIPANTS
Depression with anxiety disorder	5
Depression with other	3

and nine participated for eight weeks. The numbers of the participants in each walk are shown in Table 3.

The research received ethics approval from the ethics committee of Newcastle Hospital, and all participants completed an informed consent form.

Research design

Measurement 1: Assessing the immediate psychological effects of the walk. Method used. The immediate psychological effects on the participants from taking part in the forest walks were assessed using the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988). PANAS involves the investigation of changes in positive mood, that is, Positive Affect (PA), as well as changes in negative mood, that is, Negative Affect (NA). Watson et al. (1988) outline that the factors of PA and NA are not completely opposite to each other; rather, they emerged as distinctive dimensions. High PA is a state of "high energy, full concentration, and pleasurable engagement," and low PA is a state of "sadness and lethargy." High NA is characterized by "subjective distress and unpleasable engagement that subsumes a variety of aversive mood status, including anger, contempt, disgust, guilt, fear, and nervousness," and low NA is a state of "calmness and serenity" (Watson et al., 1988, p. 1063). This method has also been used in other studies related to the psychological effects of nature experiences (e.g., Berman et al., 2012).

Data collection. The PANAS test was conducted twice, once halfway through the program (week 8) and once at the end of the program (week 13), on both occasions in Avondale Forest Park. The test, which was undertaken by one of the nonclinical researchers, was not conducted at the start of the program, as it was considered important for the participants to get used to that person prior to commencing the

Table 3. Number of Participants and Location Where Walks Took Place During the Program

	DATE	NUMBER OF PARTICIPANTS	LOCATION
1	23 Jan	Participants (15), Clinical staff (1), Drivers (2), Volunteer (1), Researcher (1)	Ballygannon Wood
2	31 Jan	Participants (12), Clinical staff (1), Coillte (1), Drivers (2), Researcher (1)	Deputy's Pass
3	6 Feb	Participants (12), Clinical staff (1), Coillte (1), Driver (1), Researcher (1)	Devil's Glen
4	13 Feb	Participants (10), Clinical staff (1), Coillte (1), Drivers (2), Researcher (1)	Avondale Forest Park
5	20 Feb	Participants (7), Clinical staffs (2), Driver (1), Volunteer (1), Researcher (1)	Glendalough
6	27 Feb	Participants (14), Clinical staffs (2), Coillte (1), Drivers (2), Volunteer (1), Researcher (1)	Roddenagh Wood, Annacurragh
7	6 Mar	Participants (11), Clinical staff (1), Coillte (1), Drivers (2), Volunteer (1), Researcher (1)	Carrick Mountain
8	13 Mar	Participants (12), Clinical staffs (2), Coillte (1), Drivers (2), Researcher (1)	Avondale Forest Park
9	20 Mar	Participants (10), Clinical staff (1), Drivers (2), Researcher (1)	Glendalough
10	27 Mar	Participants (15), Clinical staff (1), Coillte (1), Driver (1), Researcher (1)	Deputy's Pass
11	3 Apr	Participants (14), Clinical staff (1), Coillte (1), Drivers (2), Volunteer (1), Researcher (1)	Roddenagh Wood, Annacurragh
12	10 Apr	Participants (17), Clinical staff (1), Coillte (1), Driver (1), Volunteer (1), Researcher (1)	Kilmacurragh Botanic Garden
13	17 Apr	Participants (14), Clinical staff (1), Driver (1), Researcher (1)	Avondale Forest Park

assessments. Only two sets of data were recorded, as participants were still recovering from mental-ill health, and additional intrusion was unwarranted. Additionally, we wished to avoid the well-known rehearsal effects of frequently repeated psychometric tests.

To conduct the test, the participants were asked to complete a 1-page worksheet on the bus to the site or when they arrived at the site, and they completed it again immediately after the walks. The PANAS worksheet consisted of 20 words that describe different feelings and emotions: 10 words measure PA, and the other 10 words measure NA. Each word was scored on a 6-point scale ranging from 1 (*not at all*) to 6 (*extremely*) to indicate the extent to which the participant was experiencing the particular feeling "right now" (i.e., when she or he was completing the worksheet). The sum of the PA words and the sum of the NA words are referred to as the PA scale and NA scale, respectively, and the changes in PA scales and NA scales after the walks were measured separately as is the norm (Watson et al., 1988).

Statistical analysis. Using SPSS version 20 (IBM Corp., 2011), a 2×2 repeated measures within subjects ANOVA was applied separately to the PA scales and the NA scales; with session (week 8 and week 13) and time (prewalk and postwalk) as the two factors.

Measurement 2: Assessing changes in symptoms of mental disorder over the course of the program. Method used. The Hamilton Depression Rating Scale (HDRS) (Hamilton, 1960) is one of the most widely used methods to detect the efficacy of treatments for symptoms of mental disorder. A 21-item version (HDRS21) was used in this assessment, which includes items related to mood, feelings of guilt, suicide ideation, insomnia, agitation, retardation, anxiety, weight loss, and somatic symptoms. Each participant was assessed during semi-structured clinical interviews conducted by a medical professional in WMHS. There were 21 questions, and the first 17 were scored. The remaining questions provide additional clinical information. Each item was scored on a 2- to 5-point scale depending on the item. The sum of the scores indicates the severity of depressive symptoms: 0–7 is Normal, 8–13 is Mild, 14–18 is Moderate, 19–22 is Severe, and over 23 is Very Severe.

The Beck Depression Inventory (BDI) (Beck et al., 1961) is also one of the most commonly used methods to assess the severity of depression (Richter et al., 1998). It contains 21 items related to affective, behavioral, and cognitive symptoms such as hopelessness and irritability, guilt, feelings of being punished, and fatigue, weight loss, and lack of interest in sex (Beck et al., 1961). It is a multiple-choice self-reported inventory, and the participants responded to statements using a 4-point scale. The level of depression is evaluated using the total score (Table 4).

Data collection. The Hamilton Depression Rating Scale (HDRS) and the Beck Depression Inventory (BDI) were recorded for 15 program

Table 4. Evaluation of Beck Depression Inventory

TOTAL SCORE	LEVELS OF DEPRESSION
0–10	These ups and downs are considered normal
11–16	Mild mood disturbance
17–20	Borderline clinical depression
21–30	Moderate depression
31–40	Severe depression
Over 40	Extreme depression

(Source: Beck et al., 1961)

participants before and after the program in Newcastle Hospital. Additional data on the changes in the participants' symptoms, drug dosage, and/or the number of hospital visits arising from the walks were also collected.

Analysis. Due to data confidentiality issues, the individual measures of HDRS and BDI for each patient were not available to all the authors; only the average for each measure was released. It was not therefore possible to undertake a statistical analysis of the HDRS and BDI data, and in the results section that follows only the overall percentage changes in the HDRS score and BDI scores of 15 participants after the program are presented.

Interviews. Participants. All participants were asked if they would be willing to be interviewed; eight individuals declined. As such, interviews were held with seven participants of the program (three males, four females; age range 32–72 years) and a clinical staff member who participated in the walks. The latter was interviewed to get the insight and views of a medical professional. This clinical staff member was not involved in setting up the program, and she is not one of the coauthors; therefore she did not have a primary vested interest. However, it is acknowledged that a potential for bias in her views about how participants behaved during the program remains.

Data collection. Interviews were held in Newcastle Hospital one week after the final walk of the program. Semi-structured interviews were conducted by one of the authors with support from the clinical staff member. Following discussions with the clinical staff member, it was determined that an interview length of approximately 20 min would be appropriate, as it was believed that a longer interview may have resulted in undue stress for the participants. An interview guide was used to aid the interviewer, but the discourse essentially was a co-construction between the interviewer and the interviewee. The topics covered during the interview included the effects experienced during the participant's favorite/least favorite walks, longer-term impacts of participating in the program, and the impacts of walking in forest settings. The clinical staff member was asked to outline how the program started, how the participants were recruited, what medication the participants were taking, and their perception of the effects of walking in forest settings.

Analysis. Each interview was transcribed, and the scripts were analyzed using thematic analysis. The process is based on the qualitative research guide by Matthews and Ross (2010). The themes that emerged from this analytical process are presented in the results section.

Results

Immediate psychological effects

The changes in the PA and NA of the participants during various stages of the program were assessed separately. The statistical analysis of the PA scales showed that the effect of session was significant ($p < 0.001$), with the PA scale significantly higher postwalk compared with prewalk; however, over the 5-week time interval no significant improvement was noted (Table 5). No significant interaction between session and time was found.

A similar trend was noted with the NA scales; the effect of session was significant ($p < 0.05$), with the NA scale significantly lower (i.e., improved), on average, postwalk compared to prewalk (Table 6). The effect of time was not significant; neither was a significant interaction between time and session noted.

Changes in symptoms of mental disorder after the program

Hamilton Depression Rating Scale (HDRS). The average total HDRS score of 15 participants before the program was 11.84, and that after the program was 5.98. The overall percentage change in total HDRS

Table 5. Positive Affect (PA) Scale Changes Mid-Program and End-of-Program

		NUMBER	MEAN	*SD*
Week 8	Before	14	33.6	12.1
	After	14	39.2	12.1
Week 13	Before	13	35.4	12.5
	After	13	40.2	9.0

PA scale can range from 10 to 50, with higher scores representing higher levels of Positive Affect. Mean for individuals without mental ill-health = 29.7 (*SD* = 7.9) (Watson et al., 1988).

Table 6. Negative Affect (NA) Scale Changes Mid-Program and End-of-Program

		NUMBER	MEAN	*SD*
Week 8	Before	14	21.1	9.7
	After	14	16.7	6.7
Week 13	Before	13	21.9	9.7
	After	13	17.7	10.7

NA scale can range from 10 to 50, with lower scores representing lower levels of Negative Affect. Mean for individuals without mental ill-health = 14.8 (*SD* = 5.4) (Watson et al., 1988).

of 54.3% indicates that the symptoms of mental disorders of the participants improved substantially after the 13-week program. The changes in individual items are shown in Fig. 1. Items related to Depressed Mood, Suicide, Insomnia, Work and Activities exhibited the greatest improvements.

Beck Depression Inventory (BDI). The average total BDI score for 15 participants improved from 22.86 to 14.93 after the program, resulting in an overall percentage improvement of 36.8%. The changes in individual items are shown in Fig. 2. Items such as Sadness, Appetite, Guilt, and Interest showed the largest improvements.

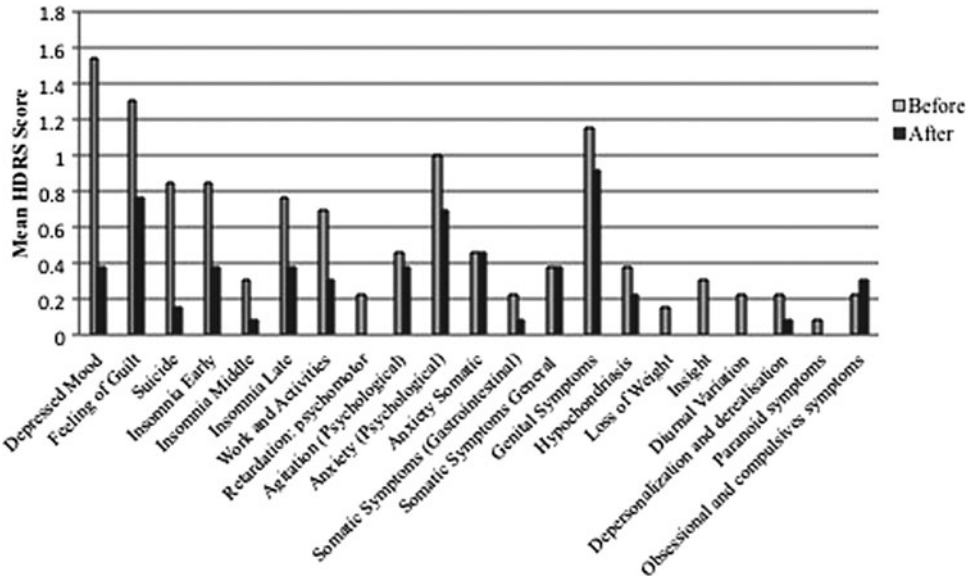

Fig. 1. Hamilton Depression Rating Scale (HDRS) score changes after the 13-week session.

Additional data. According to the medical data, three participants decreased their medical drug dosage, three participants decreased their hospital visits, and one participant went back to work during the program.

Results from interviews

The interviews with seven participants of the "Woodland for Health" program and with a clinical staff member were conducted to understand the perceived effects of the weekly group walking in forests for people who are recovering from mental-ill health and the elements that are responsible for the effects. The results from thematic analysis showed that the elements that are responsible for the effects could be divided into two main themes; "Forest elements" and "Social aspects." Within Forest elements, there are five subthemes: "Quietness and fewer people," "Different from everyday life," "Beauty and interesting," "Nicer place for walking," and "Negative experience." Within the Social aspects, four subthemes were identified: "Getting out," "Looking forward," "Changing routine," and "Creating/strengthening social relationships." The results are presented below, and where appropriate, direct quotes from those interviewed are given.

Forest elements. "Quietness and fewer people." The forest elements that were constantly mentioned both by the participants and the clinical staff member were quietness and fewer people. These elements provided the participants with a sense of peace and had a calming effect.

> Peace, I love the peace … I think it is the peacefulness of the … just being out in nature is very healing. I think it's the calmness, quietness, lack of noise, just the beauty of the birds, you know the wind, just the natural elements, I think. (Participant 7)
>
> It has a calming effect because there is nobody else other than you. (Participant 1)

The clinical staff member pointed out that the elements of quietness and fewer people are particularly important to people who are experiencing mental ill-health, because they are more self-conscious and sometimes not comfortable surrounded by other people. In the forest settings, the participants were

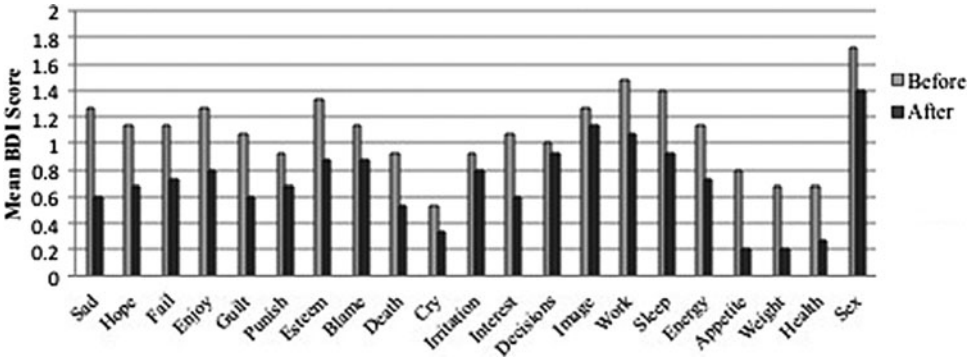

Fig. 2. Beck Depression Inventory (BDI) score changes after the 13-week session.

more relaxed and willing to interact with each other, whereas in public they might stop talking to each other.

> I think that the woodland walks, you see they are quiet, they are secluded, so that the participants can have a chance to interact with each other without you know people butting in or people coming around, walking toward them or something like that. It's quiet, they can afford to do that you see … We used to go to the café after the walk … in the cafés we were all separated. And it did not work. (Clinical staff member)

"Different from everyday life." Forest environments also provide a sense of escape and freedom by taking people away from everyday life. "Well, it's [walking in forest is] prettier. I suppose you feel like you get out of town, you know, if you go for somewhere" (Participant 5). The clinical staff member pointed out that this encouraged participants to have open discussions. "I found the benefit of the forest was it took them away from where they were living. It took them out, so they were a lot more open to discussions, discuss things as well" (Clinical staff member).

Some of the participants also walk on the roads around Wicklow town voluntarily with the clinical staff member in the evening time. One of the participants mentioned that walking on the road does not have the same effect and that it was rather boring because it is nothing different from what she sees every day.

> I am in the road every day. So nothing changes. My least favourite would be the road walk that we did during the winter. It is because it was winter and dark, we kept to the routes in lights. There was nothing there. More boring. (Participant 2)

The clinical staff member pointed out that people would be more interested in where they go in the case of forest walks, whereas they would be more focused on getting some exercise in the case of urban walks.

"Beauty and interesting." The words "beauty" and "interesting" were used many times by some of the participants when they described their favorite walks. This was especially true for those whose favorite walk was a botanic garden, which had varieties of tree species and where the participants had a guided tour that explained different tree and flower species in the garden. Some of the participants indicated that the elements of beauty brought some positive psychological effects.

> You are looking at something beautiful. It changes your whole mind, you know. (Participant 1)
>
> I like different trees … I prefer the trees really. Well I like the variety really. (Participant 4)
>
> They are all beautiful. Each thing is so beautiful, I am still stunned by the beauty … Inspiration for poetry … The trees are beautiful. The trees are always beautiful. (Participant 7)

The clinical staff member also pointed out that something interesting made people more enthusiastic.

> I think that the more interesting the place is, the more enthusiastic the group is. So if I told them we were going for a walk somewhere they haven't been before, they would be all talking about it. Whereas when we would go back to the same place, it wouldn't be as interesting to them. And maybe that keeps them going … Yes. Interest, yes. Because it's different you see, different. (Clinical staff member)

In contrast, some participants did not value "Beauty and interesting" elements of forests as much. For those people, getting enough exercise was more important.

"Nicer place for walking." Some of the participants mentioned that grass or forest paths are easier to walk on than city pavements.

> It's easier walking. And a forest to me is nicer. It has a nicer atmosphere, nicer rhythm than pounding the pavement. (Participant 2)
>
> I prefer walking on grass for my feet. When you walk on cement you can get your feet blistered. (Participant 5)

"Negative experience." A few participants mentioned negative experiences they had in forests prior to participating in the program.

One of the participants felt cold and somewhat uncomfortable when he was walking in a forest park where some parts of the land were covered by tall and dense conifer plantations. Other participants mentioned that the forest environment can be dark especially under dense plantation sites.

> I like forests. But I must say I used to walk regularly and I always find it is a little bit dark, you know, when you are under the forest … I prefer not dense. I have found it a bit closed, it is handy in the rain, but even if it is only a day, it is dark. (Participant 5)

Some forests have bad reputations such as having gangs hanging out there, and one of the participants had actually encountered them. In addition, one of the participants mentioned the sense of isolation she felt when she was walking in a forest on her own. None of the participants mentioned that they had those negative experiences during the program, where they enjoyed socializing with other participants even if they were walking in the same dense conifer plantations.

Social aspects. Some of the answers were not directly related to the elements of the forests but rather to the social aspects of the walks.

"Getting out." One of the biggest impacts that the program had on the everyday lives of those interviewed was the opportunity it gave them to get outdoors.

> I think really it is just getting out and talking with them anyway. I felt better, naturally, get out in the air, walk a bit, talk a bit … More and more, yes. I could go out. Sometimes I stay in the house two or three days, and I am like you have to go, you have to get out, and that all stems from the walking group … in the beginning, that was the only time in a week I was outside of the door. (Participant 1)
>
> I sometimes lack the "get up and go" factor in the morning … It's something to get up and go and be there on time. It just gets you going. I mean the discipline of having to go is good in my case anyway. (Participant 7)

"Looking forward." Participating in the program also gave those involved something to look forward to: "[In the early stage] I was low enough level. There wasn't much perhaps looking up for me at that time. I went through the walks, I was really looking forward to getting to go" (Participant 6).

"Changing routine." Some of the participants indicated that they had started to walk in different places in their own time. One outlined how engaging in walking helped to sleep and gave her a healthy appetite.

> I really am now hooked on walking. Even I walk maybe 30–40 minutes in a day, especially in this lovely weather, you have no excuse. I do find it helps my sleeping. I am not tossing around and turning, which is great. (Participant 7)

"Creating/strengthening social relationships." Almost all respondents indicated that creating social relationships with other participants was one of the most valuable outcomes of the program.

> Into the group, and you realise that you are blessed. You realise that what you consider to be difficulties that you have. You know that it is not as bad after all … We all have individual difficulties whatever it is, but being with the group, you become aware that you are blessed. You can focus on the positive. You are not your own. Because I think part of the feeling of any kind of distress or any kind of psychological distress, I think you are focusing on the isolation. (Participant 7)

The effects of belonging and being part of a group improved the participants' mental health status. They built on the relationships to the extent that they felt comfortable whatever the mental status they were in.

> I was getting better as the weeks went on, and I was not so anxious and I enjoyed it. The feeling of belonging to something and I just liked it. (Participant 1)
>
> [My favourite part of the programme was] the social side of the walk. It's kind of the support without actually being structural support … Actually you can do it no matter how you feel. (Participant 2)

The sense of developing ties with the group members was also emphasized: "If those guys want me to go, I will keep coming … I would go anywhere with the group" (Participant 3).

The importance of creating social relationships was also emphasized by the clinical staff member.

> People who live lonely, isolated lives, don't talk to people from one day to the next. They felt the group was, you know, an outlet. An outlet for them to be in social contact with them, to be able to talk to them, to get a little bit of support from each other, if they happened to have had a bad day or whatever, and for contact after the group … Some people think with mental illness they are alone, but they are not. We have all suffered from depression some part of our life. OK it mightn't really require treatments, we all have dips, and maybe that's what they need to see you see, that they are not alone, that they can live with this, and move on with their life. And make a good quality of life with this. (Clinical staff member)

The clinical staff member concluded that the effects were recognized by the doctors and they would continue the program, which would include the additional social group activities.

Discussion

Short-term psychological effects

Significant improvements in PA and NA were detected in the participants after the group forest walks. This finding agrees with that of Berman et al. (2012), who found that individuals with major depressive disorders experienced improved moods immediately after nature walks. Berman et al. (2012) also found that the positive affects increased to a greater extent after nature walks when compared to urban walks, but there was no significant effect of location on negative affects. Others have similarly found individuals experienced greater mood improvements by walking in natural environments compared to urban settings (e.g., Berman et al., 2008; Hartig et al., 1999, 2003), laboratories (Plante et al., 2006) or indoor environments (Peacock et al., 2007). As this study was based only on the "Woodland for Health" program, whether the same respondents would experience similar changes in mood by walking in a different environment could not be assessed. This represented one of the limitations of the study as discussed in the following section.

Effects on the symptoms of mental disorder

Improvements in the average HDRS and BDI scores of the participants were noted after the 13 weeks of periodic forest walks. Although the statistical significance of this result could not be tested, it is important to note that such improvements in such a short period of time would usually require one-to-one intensive treatment with a consultant one or two times a week. The clinical staff member from WMHS indicated that the lower rate of improvement in BDI compared to that of HDRS might be due to it being a self-reported assessment and that people with depression may have a tendency to rate their depression status lower than people without this condition.

With the effects of changing some of the participants' drug usage, their frequency of hospital visits, and their life status, it can be suggested that the program could provide an adjunctive mode of treatment for significant mental ill-health, which could lead to savings in the national health budget. However, it should be pointed out that these positive impacts cannot be attributed solely to the exposure to the forest but rather are a combination of effects arising from increased social interaction and regular exercise. As pointed out in the previous studies (e.g., Berman et al., 2012), these effects are difficult to separate and could be considered as cumulative effects.

Participants' perceived benefits of forest and the group walking program

The results from the interview analysis attempted to highlight the elements of forests which were particularly beneficial to people who are enduring mental ill-health. They also reinforced existing theories, and some similarities were found with previous studies. Some of the participants stated that the quietness of the forests and their uncrowded nature provided them with peace, calmness, and relaxation. The clinical staff member also recognized that participants were more willing to interact with each other when they were in a forest environment where they were not conscious of other people around them. Priest (2007) similarly found that participants of a nature walking group particularly noted "feeling safe" and welcomed being "far away … from the crowdedness of town" (p. 44). Jordan and Marshall (2010) also noted that one of the benefits of therapy conducted in outdoor settings is that it tends to encourage participants to take ownership of their process. By being in control of the situation, the participants are more relaxed and comfortable interacting with others.

Some participants stated that their favorite aspect of the forest environments was that they provide an experience that is different from everyday life. This aspect is similar to the sense of "being away" proposed in ART (Kaplan & Kaplan, 1989). Priest (2007) also noted that getting away from unnatural environments "enabled people simply to breathe" (p. 46), while Gonzalez et al. (2010) found that engaging in therapeutic horticulture provided the "psychological distance from daily tasks" (p. 2004). Hence it seems that forest environments provide not only physical distance but also psychological distance from the participants' daily life. Priest (2007) argued that "being away" and "connecting with places, such as the landscape, natural environment or the out-side world" had an important healing effect for people labeled mentally ill (p. 50). Other researchers noted that natural environments allow patients a great sense of individuality beyond their mental health issues (Adams et al., 2014) and allow them to connect with the outside wider world beyond an inpatient unit or home where they might be isolated (Berger, 2006). In this sense, it can be argued that nature can be a "co-therapist" for healing mental ill-health (Jordan, 2014).

Another element found to be beneficial by the participants was the beauty and the interest-provoking nature of forests, which fits with the "fascination" element of ART. This finding also mirrors Wilson's (1993) theory that humans' early relationships with the natural world have a profound influence on the development of a grounded sense of identity that includes the mind, body, and spirit. He suggested that humans are naturally attracted to the beauty of the flowers and the variety of trees, and these contribute to the improvement of their mood and provide a sense of well-being.

The "Woodland for Health" program gave the participants a reason for getting out of their house, provided something to look forward to, and resulted in them changing their routine. Some other studies have outlined that the provision of daily structure and routine was particularly beneficial to people enduring mental ill-health because it "brings structure to chaos" (Wright et al., 2012, p. 637) and gives distraction that may weaken depressive symptoms (Gonzalez et al., 2010).

Creating and strengthening social relationships was identified by both the participants and the clinical staff member as one of the biggest benefits of the program. Similar results were found by Priest (2007) in her work on a nature walking program where she showed that being part of a group had a positive impact on those suffering from mental ill-health. Wilson et al. (2010) also noted in their study that nature group walking programs can be a stepping stone for people who have suffered from mental ill-health to further engagement with a wider social environment. The clinical staff member pointed out that realizing that they are not alone and that the others may have similar experiences has powerful healing effects for people who are suffering from significant mental ill-health. The participants also seemed to gain confidence not only by creating friendships but also by helping others. Kaplan and Kaplan (2002) pointed out that such "meaningful action" is particularly important for individuals' well-being as "humans are highly social animals" (p. 247). The power of social aspects should not be underestimated in the future treatment of mental ill-health along with the use of the outdoors and nature.

It has been proven in previous studies that engaging in exercise has a positive effect on mental health (e.g., Mead et al., 2009; North et al., 1990). This study identified that the program has changed the participants' exercise regime and some participants had started to walk in different places in their own time. A knock-on effect for some of improved sleep patterns and improved appetite was identified.

Limitations of the study and further recommendations

The small sample size could be considered a limitation of the study. However, Roe and Aspinall (2011) suggested that an evidence-based study with small sample number "need not be a barrier, providing replication in methodology and comparable results can be achieved" (p. 113). The study would have benefited from the inclusion of a comparison group of individuals with mental ill-health who did not take part in the "Woodland for Health" program with which to compare the change in depression and emotional well-being over time. It would also be worth investigating whether individuals with mental ill-health would experience a similar improvement if their social interaction took place in different settings. This would help isolate the particular role of the forest environment. Furthermore, more regular mood tests should be conducted; however, these should be done in such a way as to avoid the well-known rehearsal effects associated with them. Finally, the improvement in the symptoms of mental disorders in the program participants needs to be observed over a longer period in a longitudinal study.

Conclusions

This study has added to our understanding of the benefits of group forest walking to people who are enduring mental ill-health. Despite the difficulty in isolating the benefits of walking in forests in particular, an attempt was made to explore the elements of forest environments and the social aspects that were perceived to benefit the participants. It is suggested that "group forest walks" as a form of therapy could be an effective adjunctive intervention for people who are experiencing enduring mental ill-health. Further structured quantitative research is required to support this initial conclusion.

Finally, the program has the potential to be replicated nationwide, which could provide economic benefits for the health service, which could assist in the reduction in the costs associated with medications, clinical appointments, and residential care in hospitals as well as welfare support.

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