

Green walking groups: a mixed-methods review of the mental health outcomes for adults with mental health problems

Tom Swinson ¹, Jennifer Wenborn ^{2,3}, Paul Sugarhood ⁴

- 1 East Hertfordshire and Broxbourne Adult Disability Team, Hertfordshire County Council, UK
- 2 Division of Psychiatry, University College London, UK
- 3 Research & Development Department, North East London NHS Foundation Trust, UK
- 4 School of Health and Social Care, Department of Allied Health Sciences, London South Bank University, UK

Corresponding Author: Tom Swinson, East Hertfordshire and Broxbourne Adult Disability Team, Hertfordshire County Council, Farnham / Robertson House, Six hills Way, Stevenage, Herts SG1 2st, UK

Email: thomas.swinson@hertfordshire.gov.uk

Abstract

Introduction

Evidence suggests that group walking in natural environments is more beneficial to the general population's mental health than walking indoors, in urban environments, and alone. Such 'green walking groups' have been suggested as an occupational therapy intervention, that could be suitable for adults with mental health problems. However, there have been no reviews of the mental health outcomes of participating in green walking groups for this population.

Method

A mixed-methods literature review was conducted. A range of databases was systematically searched electronically. Papers that met pre-defined inclusion criteria were selected, critically appraised, and qualitative and quantitative data were extracted. Thematic analysis was used to identify key qualitative outcomes.

Findings

Six papers were included and eight mental health outcomes identified. The evidence suggests participants can experience connections with other people, connections with nature, and a sense of freedom. There is some limited evidence to support improvements to mood, self-esteem, reflection on life tasks, and symptoms of depression, with mixed evidence for experiencing a sense of achievement.

Conclusion

This review can be used to build the evidence base for the link between occupation and mental health, and inform the clinical decision-making of occupational therapists, who are well-placed to design and implement green walking groups.

Keywords Physical activity, environment, mental health, occupational therapy

Introduction

Mental health problems are one of the leading causes of disability worldwide (Vos et al., 2015). Consequently, improving mental health is of vital importance.

Positive mental health, or mental well-being, can exist simultaneously to psychiatric diagnoses (Weich et al., 2011). Such mental well-being includes both positive subjective feelings and functioning well psychologically (Aked et al., 2008) and includes: feeling good about oneself, functioning well independently, having positive relationships, dealing with challenges and taking opportunities, feeling connected to communities and surroundings, having control and freedom, and a sense of purpose and value (Mental Health Foundation, 2016). As well as pursuing the minimisation of psychiatric diagnostic symptoms, promoting mental well-being for those with mental health problems is also important in mental health service delivery.

Participating in physical activity can improve mental health, as stated for example, in the National Institute for Health and Care Excellence (NICE) guidance for depression (NICE, 2016). Walking has advantages due to its accessibility in daily life, ease of undertaking, minimal monetary cost, and low adverse risk (Robertson et al., 2012). Initiatives to promote walking include the Walking for Health (WfH) programme (WfH, 2013), which involves group walking in natural environments ('green walking groups'). Evidence from primarily non-clinical populations suggests that walking in nature, and in groups, is more beneficial to mental health than walking indoors, in urban environments, and alone (Bowler et al., 2010; Marselle et al., 2014).

As a meaningful leisure occupation, green walking groups for a non-clinical population are associated with various mental health benefits, including; social connectedness, enjoyment, feelings of escape and relaxation, a sense of achievement and a connection to nature (Wensley and Slade, 2012). Consequently, such groups could be a valuable occupational therapy intervention. Enabling participation in meaningful activity to promote mental health is a recognised role of occupational therapists working with service users with mental health problems (College of Occupational Therapists [COT], 2010). However, to the authors' knowledge, the evidence for mental health outcomes for adults with mental health problems participating in green walking groups has not been reviewed. In light of the need for evidence on the links between occupation, health and wellbeing (COT, 2007), and for the delivery of evidence-based practice (Creek, 2003), this review sought to answer the following question:

Participation in green walking groups: What are the mental health outcomes for adults with mental health problems?

Method

Systematic literature searches were conducted in February 2019 using the databases CINAHL Complete, Academic Search Complete, GreenFILE, MEDLINE, SocINDEX, PsycARTICLES, and PsycINFO. Further articles were found through examining citations in resulting papers.

A systematic search strategy was devised by Author 1 and Author 3 (see Appendix 1). This included key terms on variants of 'mental health problems', 'physical exercise' and 'nature'.

The following inclusion criteria were applied:

- Adult participants (18+)
- Participants with mental health problems as identified by the study authors
- Participants involved in a walking group taking place in outdoor natural environments, ranging from urban parks to open countryside (Barton and Pretty, 2010)
- Data on the mental health outcomes of participating in green walking groups available for extraction. Outcomes could range from psychiatric diagnostic symptoms to aspects of mental well-being
- Articles published in peer-reviewed journals to increase scientific rigour (Bowling, 2014)
- Articles published in the English language to ensure comprehension for the reviewer
- Any time period

Exclusion criteria were:

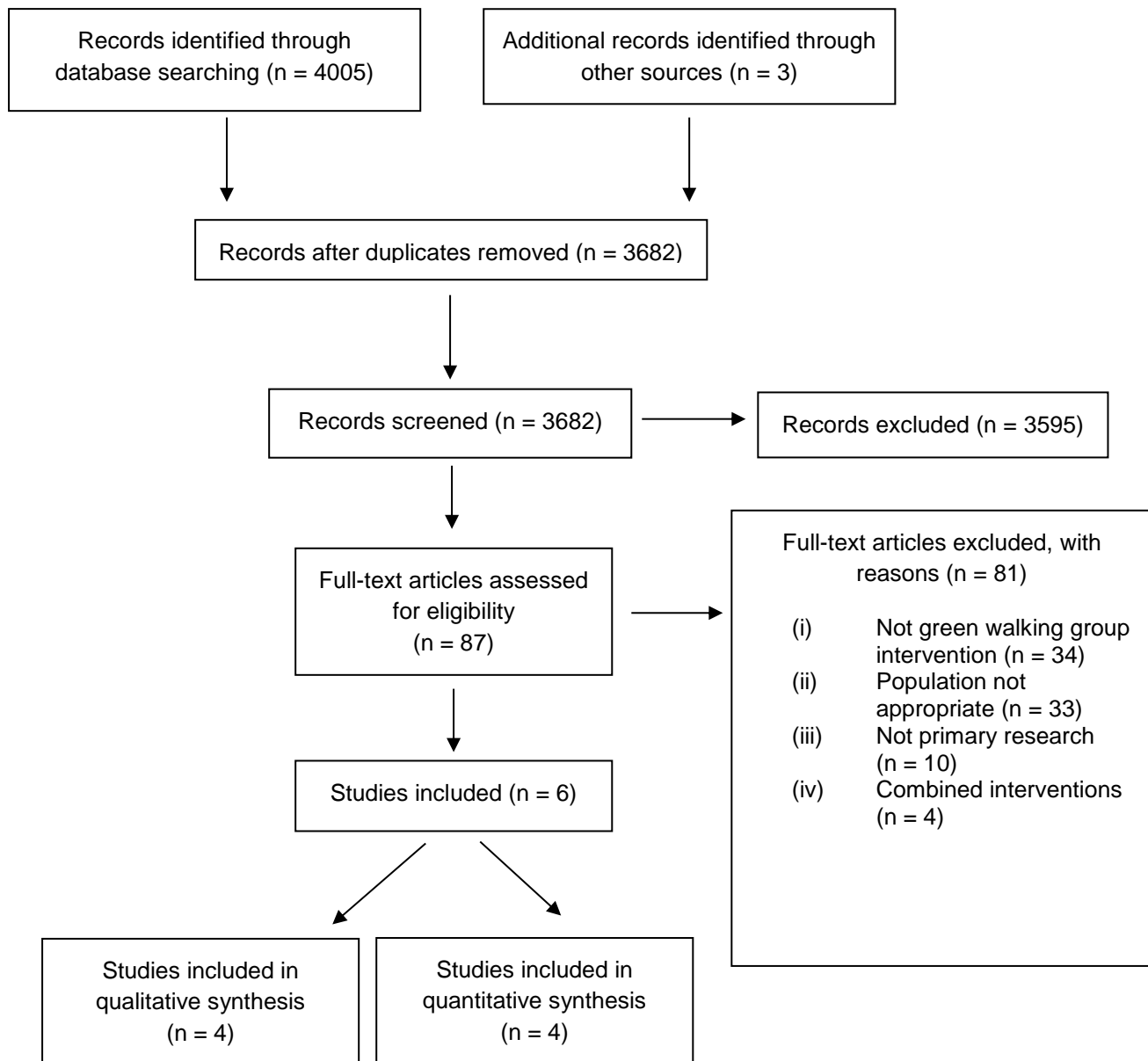
- Data attributable to combined interventions (e.g. green walking in groups in combination with counselling) which could not be subdivided into the effects of the interventions separately
- Walking required specialist equipment (e.g. Nordic walking)
- It was unclear whether the walking took place in natural environments
- Participants also took part in other types of walking as part of the study (e.g. lone, indoor, urban), and green group walking was not analysed as a separate condition

See Figure 1 for the full search process. Titles and abstracts from the search results were examined by Author 1 and irrelevant articles excluded. In circumstances where title and abstract did not provide sufficient information to include or exclude an article, the full-text was examined by Author 1. For included articles, full text screening was conducted by Author 1. For articles still included after full-text screening Author 1 and Author 2 then extracted data from these articles independently. Author 1 and Author 2 then met to discuss the data extraction, any variance and agreed on themes for the review. Author 3 was involved as necessary for discussion regarding data and themes extracted. All three authors were involved in the critical appraisal of papers. Critical appraisal did not influence a paper's inclusion; rather, it supported the evaluation of key strengths and limitations, and the identification of overall quality. Authors 1 and 2 scored the papers independently before meeting with Author 3 to resolve discrepancies and agree on a final score for each paper.

For quantitative studies, a modified 28-point Downs and Black checklist (1998) was used, which assessed: quality of reporting, external validity, internal validity, and power. Question 27 was modified to provide a simpler appraisal of a study's power; a point was given if a power calculation had been conducted to determine the required sample size. Overall quality descriptors were given on the number of met criteria (or percentage equivalent if particular criteria were not applicable), as based on work by O'Connor et al. (2015): 'Poor' (<14 points), 'Fair' (14-18 points), 'Good' (19-23 points), 'Excellent' (24-28 points). For qualitative work, a 30-point checklist by Cesario et al. (2001) was used, which covered: descriptive vividness, methodological congruence, analytical preciseness, theoretical connectedness and heuristic relevance. Scores of less than 50% of the criteria met were rated as being of the

lowest quality (Q3 or 'Poor'). Scores of 50% to 74% were the next highest quality (Q2 or 'Fair'). Scores of 75%-100% were the highest quality (Q1 or 'Good'). For mixed-methods studies, both the Downs and Black (1998) checklist and the Cesario et al. (2001) checklist were utilised for the quantitative and qualitative elements respectively.

Figure 1. PRISMA flow diagram



Findings

Six papers fitting the criteria were included for review. Table 1 provides a summary of the papers included. Two used purely quantitative methods (Barton et al., 2012; Roe and Aspinall, 2011), two used purely qualitative methods (Crone, 2007; Priest, 2007), one used mixed methods (Iwata et al., 2016) and another was primarily quantitative, but with a small qualitative element (Legrand and Mille, 2009). Thus, this is a mixed-methods review (Unsworth, 2017), with qualitative and quantitative data synthesised separately. In extracting qualitative data, Aveyard's (2014) approach to thematic analysis for reviews was used to identify four key outcomes; *Connecting with other people, Connecting with nature, Freedom, and Achievement*. A further four key outcomes were reported in the quantitative studies: *Mood, Self-esteem, Reflection on life tasks and Symptoms of depression*.

Table 1. A summary of the details of the included studies

Authors	Location of study	n	Participants	Method/methodology	Main findings	Review outcome categories	Key strengths and limitations	Quality
Barton et al. (2012)	UK (England); country parks, countryside, nature reserves	24 (12M:12F, <i>m</i> = 43.4yrs +/- 12.2yrs)	No formal diagnoses provided. MIND group members with problems identified by authors using DSM-IV-TR, related to substance use, psychosis, mood, anxiety	<i>Quantitative:</i> quasi-experimental, pre-post test, active control groups, not randomised. Outcome measures: Rosenberg Self-Esteem Scale and shortened 30-item Profile of Mood States (POMS) questionnaire	Mood: green walking group improved mood. Improvement maintained at 6 week follow-up. Self-Esteem: green walking group improved self-esteem. Improvements maintained 6 weeks later.	Mood Self-esteem	<i>Strengths:</i> used reliable and valid measures. Active control groups to establish relative effects <i>Limitations:</i> small sample size. Different demographics and attendance between groups. No randomisation to groups or any indication of researcher blinding for outcome measures.	FAIR
Crone (2007)	UK (England); woods, lakes, coastlines	4 (2M:2F, no age provided but inclusion criteria stated between 18-65)	Service users with mental health problems referred from either secondary mental health services, primary care or other agencies. No specific problems reported	<i>Qualitative:</i> interviews. Inductive and constant comparative analysis	Participants reported enjoyment, opportunity to meet and be with people, knowledge and appreciation of plants, purposeful activity	Connecting with other people Connecting with nature Freedom Achievement	<i>Strengths:</i> detailed information that highlights perceptions of service users. Credibility promoted through researcher familiarity with service users and walking group <i>Limitations:</i> short interview duration, with limited dataset. Themes pre-determined by researcher. Limited discussion of researcher's background and perspectives	FAIR
Iwata et al. (2016)	Ireland; various (e.g. forest, botanical gardens, lakes)	15 (3M:12F, age range; 32-72yrs, <i>m</i> = 47yrs)	Receiving inpatient treatment, with problems of any combination of: bipolar disorder, depression, anxiety. 'Other' also noted	<i>Mixed methods.</i> (1) <i>Quantitative:</i> quasi-experimental; one group pre-post test. Outcome measures: Positive and Negative Affect Schedule (PANAS), Hamilton Depression Rating Scale (HDRS), Beck Depression Inventory (BDI) (2) <i>Qualitative:</i> semi-structured interviews with service users (<i>n</i> = 7) and a clinical staff member. Thematic analysis	Positive affect improved pre-post walk. Negative affect decreased pre-post walk. These effects still occurred 5 weeks later. However, no significant improvement over a 5-week period. Trend of decrease in depressive symptoms, but not analysed statistically	Connecting with other people Connecting with nature Freedom Mood Symptoms of depression	<i>Strengths:</i> mixed-methods approach enabled both analysis of data from a valid and reliable measure, and some detailed information from service user perspectives <i>Limitations:</i> small sample size. No comparison groups. No inferential statistical analysis for HDRS/BDI. Half declined interviews. Brief interviews (average 20 minutes)	Quantitative: POOR Qualitative: FAIR

Legrand and Mille (2009)	France; 'fitness loop' in natural area park	12 (12F; <i>m</i> = 66.8yrs, +/- 2.5yrs)	Subsyndromal depression; mild depressive symptoms as per Geriatric Depression Scale (GDS) score: 10-19) (Yesavage, 1988)	<i>Quantitative</i> : experimental. Pilot randomised trial; pre-post test, active control group, randomised. Outcome measure: GDS. Also had small qualitative element: interviews – emphasis on what was enjoyed. Content analysis and arranged into themes.	Over 4 weeks, symptoms of depression in older women fell significantly and was maintained for a month afterwards. Women taking part in more regular, shorter walks had a significantly greater reduction in depressive symptoms versus women who took part in one long walk a week Interviews revealed new social networks, sharing common background, stress-free participation	Symptoms of depression Connecting with other people Freedom	<i>Strengths</i> : valid and reliable depression scale used. Use of active comparison groups to establish relative effects and randomisation to groups <i>Limitations</i> : small sample size. Method of randomisation not stated. No researcher blinding indicated for outcome measures. Very little detail of information gained from interviews. Limited details provided of the qualitative data collection and analysis	Quantitative: FAIR Qualitative: Not enough content for quality score
Priest (2007)	UK (rural town); surrounding countryside	12 (11M: 3F; age range 26-47yrs)	Mental health day service participants. Problems included: hearing voices, trauma, alcohol use, distressing living conditions	<i>Qualitative</i> : participant observation, interviews and group discussion. Ethnography. Data analysed using grounded theory approach	'Healing Balm Effect' model, with 7 categories; closer to what is more natural, feeling safe, being part, striving, getting away, being me, finding meaning	Connecting with other people Connecting with nature Freedom Achievement	<i>Strengths</i> : Thick description of findings. Use of group discussions to triangulate data. Strong ethnographic elements, interviewing individuals whilst walking <i>Limitations</i> : Lack of discussion or reflection of researcher's background, assumptions, guiding theoretical lens. Limited information on what group walks entailed	GOOD
Roe and Aspinall (2010)	UK (Scotland); woods and open countryside.	40 (22M: 18F, <i>m</i> = 44yrs. (Study 1; rural walking only) 13 (8M:5F, <i>m</i> = 35yrs, (Study 2; rural and urban walking)	Those with 'poor' mental health recruited from specialist mental health service providers. Diagnoses confidential and not reported. Aim was to recruit those with depression or stress	<i>Quantitative</i> . quasi-experimental, pre-post test, (Study 1); pre-post test, repeated measures (Study 2). Outcome measures: shortened version of Mood Adjective Checklist, Personal Project Scale, Rosenberg Self Esteem scale – shortened version	Study 1: improvements to mood (energy, hedonic tone, stress). No effect on self-esteem. Reflection on life tasks; higher enjoyment, more self-efficacy, less stress, more challenge, no effect on control Study 2: Fewer variables were studied. Improvements to mood (hedonic tone, stress). No effect on self-esteem. Reflection on life tasks: no effect on efficacy or challenge.	Mood Self-Esteem Reflection on life tasks	<i>Strengths</i> : Looked at separate pre-post effects of both urban and green walking groups for those with poor mental health (within-subjects). Thus, comparisons could be observed (albeit without inferential statistical analyses on this comparison) <i>Limitations</i> : Small sample size. Questionable psychometrics for outcome measures used (noted shortened scales have acceptable internal reliability, but little information on validity. Personal project scale created from existing measure through personal communication).	FAIR

Connecting with other people

Four studies highlighted connecting with other people. Participants reported that the groups provided opportunities to make social connections through being with others (Crone, 2007; Priest, 2007), creating relationships (Iwata et al., 2016) and developing a new social network (Legrand and Mille, 2009). Participants also experienced a sense of togetherness. Priest (2007) described that most participants found unity in the walking group through shared experiences of distress within an accepting social environment. Legrand and Mille (2009) noted that meeting others with a similar background was a positive experience, however there was no detail as to what these similarities were. Crone (2007) outlined that being with others and being able to share experiences was unifying, while Iwata et al. (2016) found that groups provided a sense of belonging.

Connecting with nature

Three studies emphasised connecting with nature (Crone, 2007; Iwata et al., 2016; Priest, 2007). All three found that participants enjoyed the beauty of the natural environment, and Crone, (2007) and Iwata et al., (2016) also emphasised participants' interest in nature, particularly about plants. However, the data indicated this was due to educational components included as part of the walks, and this interest may not have occurred otherwise. In Iwata et al.'s (2016) study, a staff member identified that forest walks generated interest for service users about where they were going, whereas when urban walks were undertaken, there was more of a focus on getting enough exercise. Interestingly, even for the natural walks, for some participants getting enough exercise was still more important than beauty and interest.

Priest (2007) highlighted that participants felt a closeness to the natural environment, which some experienced as being a closeness to God, an element echoed by one participant in Crone (2007). Priest (2007) was the only researcher to interview participants during the walks, which may reflect the reporting of more intense experiences with the natural environment. Legrand and Mille (2009) did not highlight a connection with nature, possibly due to the use of a “fitness loop” (p.72) of the same trail of less than a mile. Accordingly, there may have been an emphasis on the exercise of walking, as opposed to exploration and immersion in the natural environment as part of the walking process.

Freedom

Participants felt a sense of freedom from the everyday environments, lives and difficulties they experienced ordinarily. Priest’s (2007) work is the most detailed of the studies, and provides the widest range of experiences of participants. Priest (2007) noted that participants could escape from unnatural physical environments to a place where they could experience freedom and “breathe” (p.49), allowing respite from other people, struggles, and difficult and mundane aspects of their lives and identities. Less powerful and worrisome thoughts were experienced and people’s minds were clearer, more refreshed and calm. Crone (2007) noted that participants enjoyed being able to leave their normal place of residence for a more natural and sociable environment, where they felt “refreshed” (p.176). Iwata et al. (2016) outlined that participants valued getting outdoors, where they experienced a freedom from the normality of their lives, a quieter and less populated environment and peace and calm. Legrand and Mille (2009) did not report an experience of freedom associated with a different environment, perhaps due to the somewhat limited context within

which walking occurred. However, they did identify experiences of “stress-free participation” (p.74).

Achievement

Two studies noted the concept of achievement. Priest (2007) noted that the effortful process of walking resulted in a sense of achievement, and was often associated with achieving a significant event e.g. reaching the top of a hill. Similarly, Crone (2007) found that participants undertook activity they felt was purposeful, and through the associated effort felt a sense of achievement. Such purposes included to exercise, see others, keep busy, or walk up a hill, the latter being similar to Priest’s (2007) findings. These studies suggest that effort and challenge associated with purposeful walks, including mastery of the natural environment and increased physical and/or social activity, resulted in a sense of achievement. Neither Iwata et al. (2016) nor Legrand and Mille (2009) reported achievement outcomes.

Mood

Three studies (Barton et al., 2012; Iwata et al., 2016; Roe and Aspinall, 2011) found that participants’ mood improved pre-post-session, albeit using different outcome measures. Barton et al. (2012) used the Profile of Mood States (POMS), Iwata et al. (2016) the Positive and Negative Affect Schedule (PANAS), and Roe and Aspinall (2011) a shortened version of the Mood Adjective Checklist (MAC).

Barton et al. (2012) compared green walking groups to existing social activity and swimming groups. All three groups significantly improved participants’ overall mood, with swimming groups providing the greatest change and social activities the least. The study reported that beneficial effects to mood were still observed post-session six weeks later. Iwata et al. (2016) did not use any control groups, and similarly

found mood improvements pre-post-session five weeks later. However, mood did not significantly improve over this five-week period. In Study 1 (green walking only), Roe and Aspinall (2011) found significant improvements to mood (hedonic tone, stress, energy). In Study 2 (green and urban walking), those with poor mental health experienced significant benefits to mood (hedonic tone, stress) in both green and urban walking conditions. However, no analyses were reported which specifically compared poor mental health group participants' mood in urban and green walking group conditions. Roe and Aspinall (2011) did not assess a longer-term impact of the walks.

Self-Esteem

Both Barton et al. (2012) and Roe and Aspinall (2011) assessed participants' self-esteem. Barton et al. (2012) used the valid and reliable Rosenberg Self-Esteem Scale, whilst Roe and Aspinall (2011) used a shortened version of this measure. Barton et al. (2012) found that self-esteem significantly improved pre-post-session in green walking and swimming groups, but not the social activities group. Green walking groups improved self-esteem significantly more than the social activities group. Moreover, significant improvements to self-esteem through participation in green walking or swimming groups were still observed post-session 6 weeks later. Conversely, in Study 1, Roe and Aspinall (2011) found no significant improvement to self-esteem in the poor mental health group after green walking participation. In Study 2, although self-esteem is outlined as being measured, no results were reported.

Reflection on Life Tasks

Roe and Aspinall (2011) also studied participants' perceptions of their life tasks using a personal project scale. Participants were asked to list their personal projects, or life

tasks, and explore what they thought about them in relation to their goals. In Study 1, participants perceived significantly higher enjoyment, higher efficacy and less stress. There was no impact on perceived control, and negative effects occurred through higher perceived challenge. In Study 2, with fewer variables studied, participants pre-post green walking experienced no significant differences in perceived efficacy or challenge. Urban walking produced significant improvements to perceived efficacy, but no significant effect to perceived challenge. No analyses were reported which statistically compared effects of the two walking environments for those with poor mental health.

Symptoms of Depression

Iwata et al. (2016) and Legrand and Mille (2009) both assessed symptoms of depression. Using the Geriatric Depression Scale, Legrand and Mille (2009) found that symptoms of depression in older women fell significantly over four weeks, and this was maintained for a month afterwards. Women taking part in more regular, shorter walks had a significantly greater reduction in depressive symptoms than women who took part in one long walk a week. Iwata et al. (2016) used the Beck Depression Inventory and Hamilton Depression Rating Scale, and found a large trend of improvement in depressive symptoms after 13 weeks, although no analysis was conducted to assess statistical significance.

Discussion and Implications

This mixed-methods review has identified a small body of evidence that contributes to increased understanding about the potential mental health outcomes of participation in green walking groups among adults with mental health problems. A caveat of the findings is that they represent the results of only six papers. Yet, as this

review employed a systematic search strategy, it is likely that there are few other papers which could have been included.

Studies reported quantitative data that indicated improved mood, reduced depressive symptoms and some benefits to reflecting on life tasks, with mixed results on self-esteem. However, there were a number of limitations to these studies, including small sample sizes, a lack of appropriate control groups (and subsequent analyses), limited randomisation to groups, and no indication of researcher blinding for outcome measures. Therefore, evidence for the link between the occupation of green walking groups and mental health for these outcomes is currently limited for people with mental health problems. Further research, using larger samples randomised to active control groups or treatment as usual (e.g. a randomised controlled trial), should be undertaken in order to provide more rigorous evidence on the outcomes to inform occupational therapy intervention.

Qualitatively-derived outcomes were similar to Wensley and Slade's (2012) findings, with most studies reporting opportunities to socialise and belong, connect with nature (in particular through the enjoyment of natural beauty), and experience a sense of freedom from other environments, lives and thoughts. A sense of achievement was also noted in half of the studies with qualitative outcomes.

Discrepancies in outcomes such as *Achievement* highlight that further research is required to assess what factors may affect this experience. In some studies, it may not have been reported due to a lack of detail (e.g. Legrand and Mille, 2009).

Alternatively, there may have been differences in participant characteristics, or the nature of the intervention, which may have meant that individuals ascribed different meanings to participation.

Whilst most of the qualitative studies in this review might not fully meet common criteria for transferability, for example through limited thick description (Lincoln and Guba, 1985), the similarity of outcomes strengthens the case for considering application of the findings of this review to other contexts (Morse, 1999). The convergence of the outcomes in the high quality study by Priest (2007) adds credibility to the more limited findings of Crone (2007), Iwata et al. (2016) and Legrand and Mille (2009).

For future work, in-depth idiographic individual accounts, as opposed to reporting of broad themes, would help build a fuller and more nuanced picture of the complex interplays involved in participation in diverse groups, lived experiences and reported outcomes. Research designed to elicit such detailed understanding could use the themes developed in this review as sensitising concepts. Furthermore, most of the existing qualitative studies collected data at one time point. Given that people's views and experiences alter over time, longitudinal research would build upon both the qualitative and quantitative findings of this review.

These findings can be used by occupational therapists to inform therapeutic interventions for people with mental health problems aimed at enabling well-being through meaningful *doing* (Wilcock, 2006). When conducting activity analysis, occupational therapists can use this review evidence to inform their clinical reasoning when analysing green walking groups for their therapeutic potential (Creek, 2003). Such activity analysis, in addition to other core skills including group work and environmental analysis and adaptation (Creek, 2003), means that occupational therapists are well-placed to design and run green walking groups for individuals with mental health problems to enable meaningful participation, and promote mental health. Through green walking groups, service users could be

supported to build relationships with others and experience a sense of belonging, find a connection to and an interest in the natural world, and a freedom from everyday environments, lives and difficulties.

However, it is important to highlight a number of considerations. The groups included in this review largely occurred in rural natural spaces. It is not possible to ascertain whether such meaningful mental health outcomes would occur in urban green spaces. Some services may not have access to rural natural spaces through geography or cost, and would need to consider how to deliver effective green walking groups in urban green spaces for those with mental health problems. Urban green spaces might result in experiences of connecting with others, but lend themselves less strongly to a connection to nature or freedom. Furthermore, as postulated from appraising Legrand and Mille's (2009) findings, such benefits may not occur even in rural spaces when the intervention design is less conducive to exploring the natural environment. If such designs are necessary, or walks take place in urban green spaces, incorporating an educational component on nature during the walk could be an additional aspect to promote a connection to nature.

Conclusion

This review has highlighted potential mental health outcomes for adults with mental health problems who participate in green walking groups. There is evidence that participants may experience connections to other people, connections to nature and a sense of freedom. There is some limited evidence to support improvements to mood, self-esteem, reflection on life tasks, and symptoms of depression, with mixed evidence for experiencing a sense of achievement.

The findings can be used to build the evidence base, including the link between occupation and mental health (COT, 2007). They can also inform the clinical decision-making of occupational therapists when utilising core skills of using activity as a therapeutic tool, group work and environmental analysis and adaptation (Creek, 2003). As such, occupational therapists are well-placed to be involved in the design and implementation of green walking groups. Future work should involve the undertaking of larger and higher quality qualitative and quantitative studies to further contribute to the evidence-base, and investigate factors which may affect mental health outcomes.

Key findings:

- Participants may experience connections to other people, connections to nature and a sense of freedom
- There is limited evidence of the benefits of green walking groups to mood, self-esteem, life task reflection, depressive symptoms, and sense of achievement

What the study has added:

This review has evaluated potential mental health outcomes for people with mental health problems who participate in green walking groups, adding to the evidence on the link between occupation and mental health.

Research ethics:

Ethical approval was not required for this paper as its purpose was to review existing evidence from studies already conducted.

Consent

Consent was not applicable to this paper.

Declaration of conflicting interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and /or publication of this article.

Funding

The authors received no formal funding for the research, authorship, and/or publication of this article.

Contributorship

Tom Swinson conceived the topic of focus for the review. Tom Swinson and Paul Sugarhood created the search strategy, searched the literature, and included or excluded articles. All authors were involved in data extraction, theme generation, and critical appraisal and quality scoring of papers. Tom Swinson wrote the first draft of the manuscript. All authors reviewed and revised the manuscript and approved the final version.

ORCID IDs

Tom Swinson <https://orcid.org/0000-0003-2314-9193>

Jennifer Wenborn <https://orcid.org/0000-0001-7311-8972>

Paul Sugarhood <https://orcid.org/0000-0002-8286-9804>

References

Aked J, Marks N, Cordon C, and Thompson, S. (2008). *Five ways to wellbeing: The evidence*. London: NEF.

Aveyard H (2014) *Doing a Literature Review in Health and Social Care: A Practical Guide*, 3rd ed. Berkshire: Open University Press.

Barton J, Griffin M and Pretty J (2012) Exercise-, nature-, and socially interactive-based initiatives improve mood and self-esteem in the clinical population. *Perspectives in Public Health* 132(2): 89-95.

Barton J and Pretty J (2010) What is the best dose of nature and green exercise for improving mental health? *Environmental Science and Technology* 44(10): 3947-3955.

Bowler D, Buyung-Ali L, Knight T and Pullin A (2010) A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*. DOI: 10.1186/1471-2458-10-456.

Bowling, A. (2014) *Research methods in health: Investigating health and health services*. 4th ed. Maidenhead: Open University Press.

Cesario S, Morin K and Santa –Donato A (2001) Evaluating the level of evidence of qualitative research. *Journal of Obstetric, Gynecologic & Neonatal Nursing* 31(6): 708-714.

College of Occupational Therapists (2007) *Building the evidence base for occupational therapy: Priorities for research*. London: College of Occupational Therapists.

College of Occupational Therapists (2010) *Recovering ordinary lives: The strategy for occupational therapy in mental health services 2007-2017: a vision for the next ten years*. London: College of Occupational Therapists.

Creek J (2003) *Occupational therapy defined as a complex intervention*. London: College of Occupational Therapists

Crone D (2007) Walking back to health: A qualitative investigation into service users' experiences of a walking project. *Issues in Mental Health Nursing* 28(2): 167-183.

Downs SH and Black N (1998) The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology & Community Health* 52(6): 377-384.

Iwata Y, Dhubháin Á, Brophy J, Roddy, D, Burke C and Murphy B (2016) Benefits of group walking in forests for people with significant mental ill-health, *Ecopsychology* 8(1): 16-26.

Legrand F and Mille C (2009) The effects of 60 minutes of supervised weekly walking (in a single vs. 3-5 session format) on depressive symptoms among older women: Findings from a pilot randomized trial. *Mental Health and Physical Activity* 2(2): 71-75.

Lincoln, Y. and Guba, E. (1985) *Naturalistic inquiry*. Beverly Hills: Sage.

Marselle M, Irvine K and Warber S (2014) Examining group walks in nature and multiple aspects of well-being: a large-scale study. *Ecopsychology* 6(3): 134-147.

Mental Health Foundation (2016) *Look after your mental health using exercise*. Available from: <https://www.mentalhealth.org.uk/publications/how-to-using-exercise> [Accessed on 25th May 2017]

Moher D, Liberati A, Tetzlaff J, et al. (2009) Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine* 6(7): e1000097.

Morse JM (1999) Qualitative generalisability. *Qualitative Health Research* 9(1): 5-6.

NICE (2016) *Depression in adults: recognition and management*. Available from: <https://www.nice.org.uk/guidance/cg90> [Accessed 27th May 2017].

O'Connor SR, Tully MA, Ryan B, Bradley JM, Baxter G and McDonough SM (2015) Failure of a numerical quality assessment scale to identify potential risk of bias in a systematic review: a comparison study. *BMC Research Notes*. DOI 10.1186/s13104-015-1181-1

Priest P (2007) The healing balm effect: Using a walking group to feel better. *Journal of Health Psychology* 12(1): 36-52.

Robertson R, Robertson A, Jepson R and Maxwell M (2012) Walking for depression or depressive symptoms; a systematic review and meta-analysis. *Mental Health and Physical Activity* 5(1): 66-75.

Roe J and Aspinall P (2011) The restorative benefits of walking in urban and rural settings in adults with good and poor mental health. *Health and Place* 17(1): 103-113.

Unsworth C (2017) review papers: Getting the best occupational therapy evidence into practice. *British Journal of Occupational Therapy* 80(3): 143-144.

Vos T, Barber R, Bell B, Bertozzi-Villa A, Biryukov S, Bollinger I et al. (2015) Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: a systematic

analysis for the Global Burden of Disease Study 2013. *The Lancet* 386 (9995): 743-800.

Walking for Health (2013) *Walking works. Making the case to encourage greater uptake of walking as a physical activity and recognise the value and benefits of Walking for Health*. London: The Ramblers and Macmillan Cancer Support.

Weich S, Brugha T, King M, McManus S, Bebbington P, Jenkins R, Cooper C, McBride O and Brown S (2011) Mental well-being and mental illness: Findings from the adult psychiatric morbidity survey for England 2007. *The British Journal of Psychiatry* 199(1): 23-28.

Wensley R and Slade A (2012) Walking as a meaningful leisure occupation: the implications for occupational therapy. *British Journal of Occupational Therapy* 75(2): 85-92.

Wilcock A (2006) *An occupational perspective of health*. 2nd ed. Thorofare, NJ: Slack.

Appendix 1

1. "mental health problems" (19464)
2. "mental health difficulties" (1227)
3. "mental illness" (114492)
4. "mental disorder" (106858)
5. "psychiatric disorder" (32552)
6. anxi* (296762)
7. depress*(534080)
8. psychosis (154329)
9. psychoses (124477)
10. psychotic (81176)
11. schizo*(154365)
12. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (966224)
13. walk*(186917)
14. exercis*(295837)
15. "physical activit*" (113132)
16. "physical fit*" (36185)
17. 11 or 12 or 14 (529332)
18. 10 AND 15 (37157)
19. Natur* (1977047)
20. Countryside (18282)
21. Environment (1452301)
22. Green (388329)
23. "Green space" (1696)
24. Greenspace (423)
25. Outdoor* (44871)
26. Outside (155102)
27. 17 or 18 or 19 or 20 or 22 or 23 or 24 (3602065)
- 28. 18 and 27 (4005)**