



## Enhancing student wellbeing through nature-based social prescribing: A social return on investment evaluation

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### ABSTRACT

**Background:** Social prescribing (SP) is a non-clinical approach connecting citizens to community support to better manage their health and wellbeing. Wrexham University (WU) offers a Nature-based Social Prescribing (NBSP) pathway for students to connect with green spaces on campus to support their wellbeing. The aim of this study is to evaluate the health and wellbeing benefits of the NBSP pathway and the associated social value generated and the monetise the health outcomes from access and use of high standard greenspaces.

**Methods:** The evaluation applied a Social Return on Investment (SROI) mixed-method approach. Data collected outcomes measures by means of the Short Warwick Edinburgh Mental Wellbeing Scale, General Self-Efficacy Scale, and a 'Time spent in nature' question. SROI ratios were generated from two separate wellbeing valuation methods: the social value calculator and the mental health social value calculator along with contingent valuation (CV) questions.

**Results:** SROI value ratios suggest that for every GBP £1 invested in WU NBSP, generated between GBP £1.83 and £2.38 of social value. The results of the sensitivity analysis yielded a SROI ratio of £1:£1.45 and was generated following stricter thresholds for improvements in valuation criteria of high confidence and having access to a high standard greenspace. CV analysis indicates that 86 % of students value accessing and using the WU NBSP pathway and associated health benefits. On average students who have an average weekly income of GBP £125 are willing to pay GBP £7 per session to access quality greenspace and the associated health and wellbeing benefits of the WU NBSP pathway.

**Conclusion:** The WU NBSP pathway generated positive social values for students which is consistent with evidence with other NBSP SROI studies. Based on the growing body of evidence universities should consider prioritising investment in NBSP services on campuses. This investment could assist student mental health and wellbeing by linking them to local community assets at times that suit their academic timetables.

### 1. Background

Social prescribing (SP) is a way of connecting people, regardless of age or background, with local community and resources to better manage their health and wellbeing (Welsh Government, 2024). There are various models and definitions of SP within the four devolved nations in the UK (Kimberlee et al., 2022) and Wales has developed a cross-sectional model for SP that is integrated with existing community and statutory services (C. Wallace et al., 2021). This integrated model uses holistic and person-centred methods (Pringle and Jesurasa, 2022) to empower individuals to recognise their own needs and strengths, and to connect with their local communities for support with their health

and wellbeing (Social Prescribing in Wales, 2018).

The use of Nature-based Social Prescribing (NBSP) interventions has become increasingly prevalent within SP (Bragg and Leck, 2017; Howarth and Lister, 2019; Shanahan et al., 2019). The use of green and blue spaces by means of NBSP can offer significant health benefits (de Bell et al., 2024). NBSP is an umbrella term used to describe the referral of individuals to groups, interventions or services that support engagement with nature-based interventions based in natural or semi-natural 'green' and 'blue' environments, to improve their health and wellbeing (Newstead et al., 2023). NBSP include interventions such as green referral, and blue referral. NBSP activities that fall under the umbrella of 'green referral' (Newstead et al., 2023) include conservation activities,

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nature walks, gardening & therapeutic horticulture, and care farming (taking part in normal farming practices for health, socialisation, and education) (Husk et al., 2018; Makanjuola et al., 2023a, 2023b; Robinson et al., 2020). NBSP also include activities such as surfing, swimming, or kayaking (Gibbs et al., 2022; Juster-Horsfield and Bell, 2022; Wilkie et al., 2022) that fall under the umbrella of ‘blue referral’ (Alejandro et al., 2023). Evidence suggests that NBSP provides a means to engage different populations to benefit from social and community activities which enhance social cohesion (Gonzalez et al., 2010), reduce joint inflammation (Van den Bosch and Bird, 2018) and can result in significant positive mental and physical health benefits (Bakolis et al., 2018; White et al., 2019). The referral to such activities builds upon the earlier concepts of referral for exercise or diet-based interventions (Patel et al., 2011) as well as in the management of chronic conditions (Jones et al., 2020).

### 1.1. Nature-based social prescribing intervention

Students at WU are signposted to the NBSP service following a ‘What matters conversation’ with WU student support navigators, who signpost students to relevant sessions and on-campus green pathway activities. The ‘What matters conversation’ is a core component of the SP referral process in order to highlight what is important to the individual engaging with SP and in which areas support is required (Newstead et al., 2023). This is a co-produced plan between an individual and the SP link worker. Signposting is a key skill and component within SP where individuals are directed to assets to support their mental health and wellbeing (Makanjuola et al., 2023a, 2023b). Wrexham University’s NBSP service offers a number of different interventions, workshops and nature-based assets for staff and students to access which are free to attend. These include the following workshops and green assets:

- Science Discovery Away day
- Pet Therapy intervention
- Relaxation Room/Indian Head Massage workshop
- Candle Making workshop
- Careers advice away day
- Coffee Morning
- Yoga
- Aromatherapy Oils workshop
- Christmas Crafts workshop
- Nature-based work and study spaces
- Sensory Garden
- Outdoor Gym facilities

### 1.2. Nature-based social prescribing research study

In 2019, a two-year realist evaluation research project was undertaken by Wrexham Glyndwr University (WU), in partnership with the University of South Wales (USW), Coleg Cambria, along with third sector organisations. The project primarily aimed to understand the underpinning theory linked with SP of ‘what worked for whom and in what circumstances’, and to what extent the model of SP used in WU worked (Davies et al., 2022; C. Wallace et al., 2022; S. J.). A secondary aim of the project was to translate this learning for use across the higher and further-education sectors using a replicable model of social prescribing with transferrable principles, to enhance student wellbeing, to build resilience, and promote new ways of working that better supported student’s mental health and wellbeing. WU received funding from the Higher Education Funding Council of Wales (HEFCW) to build on this previous work (C. Wallace et al., 2022; S. Wallace et al., 2022) and to develop a Nature-based Social Prescribing (NBSP) intervention for their students.

The evaluation of the WU NBSP project seeks to build upon the findings from the previous report (C. Wallace et al., 2022) to identify student priorities and how universities nationally and internationally

can utilise nature-based local assets, both on campus and in the community, to improve the mental wellbeing and social connectedness among students and to evaluate WU nature-based referral pathway.

The aim of this study is to evaluate the health and wellbeing benefits of the WU NBSP pathway and the associated social value generated and the monetise the health outcomes from access and use of high standard greenspaces for WU students.

## 2. Methods

The research evaluation for the WU NBSP project applied a Social Return on Investment (SROI) methodology.

This evaluation was conducted between September 2023 and December 2023 as a part of a wider study which included a Realist Evaluation. A process for ethical approval was established for each component of the evaluation. Ethical approval was sought and secured primarily by the USW, Faculty of Life Sciences and Education low-risk ethics panel (Reference number: 230232LR August 2023). The study formed a study advisory group which consisted of members of the WU and USW Student Union, academic and student services staff in addition to members of the evaluation team. The advisory group role was to provide counsel on method, processes, challenges and enablers, as well as reflect on emerging findings.

For this evaluation, a mixed-method data collection approach was applied to collect data at pre and post intervention (Shorten and Smith, 2017). Qualitative data was collected post intervention via interviews. Quantitative data was collected via a one-time retrospective questionnaire. The questionnaire featured demographic questions, three outcome measures and questions pertaining to stated preference, attribution, and counterfactuals.

### 2.1. Social return on investment (SROI) methodology

The National Institute for Health and Care Excellence (NICE) advocates the utilisation of cost-benefit analysis (CBA) and cost-utility analysis (CUA) in assessing public health interventions (National Institute for Health and Care Excellence, 2013). Social CBA is encouraged in the His Majesty’s (HM) Treasury Green Book as a vital tool for evaluating the impact of interventions on public health and wellbeing (HM Treasury, 2022; New Economics Foundation, 2012). SROI emerges as a practical approach of Social CBA, employing quantitative methodology to assess pertinent costs and outcomes. SROI represents a stakeholder-informed, bottom-up approach to Social CBA (Edwards and Lawrence, 2021; Hamelmann et al., 2017; Maher and Buhmann, 2019). SROI methodology is outlined in the Cabinet Office Guide to Social Return on Investment (Nicholls et al., 2012).

SROI is an economic approach applied to evaluate and estimate the social value generated by a public health intervention. The social value refers to the social, environmental, and economic impacts generated from outcomes that do not have a current market value nor monetised valuation. SROI prioritises outcomes deemed relevant and significant by stakeholders, assigning monetary values to these outcomes, often lacking market prices (HM Treasury, 2022). Evidence linking the value of outcomes include increased mental wellbeing (Lynch et al., 2024), as well as the barriers and challenges of access and use of greenspaces (de Bell et al., 2024), and the wellbeing benefits of increased confidence experienced as a result of engaging in SP activity in nature (Makanjuola et al., 2023a, 2023b). The SROI evaluation uses wellbeing valuation to estimate the social value of the pre-determined outcomes, which is then compared to total costs to derive the SROI ratio.

Wellbeing valuation is a reliable and robust approach to determining the monetary worth of outcomes not freely traded in the open market. In this evaluation study wellbeing valuation was implemented using two primary social value calculators: the Social Value Calculator derived from the Social Value Bank (SVB), and the Mental Health Social Value Calculator derived from the Short Warwick Edinburgh Mental Wellbeing

Scale (SWEMWBS) (Trotter and Rallings Adams, 2017). This SROI evaluation also applied contingent valuation (CV), a stated preference technique based in neoclassical economic theory in order to measure the value that the WU students placed on accessing and using the NBSP pathway (Bayoumi, 2004). This approach examines choices and preferences and estimates the proxy values placed on access and use of a good or service and associated benefits and value estimates based on respondents Willingness to Pay (WTP) (Zainudin et al., 2016).

In this study, the outcomes of increased confidence from the General Self-efficacy Scale (GSES) scores, and access to high standard green-spaces were monetised by utilising the Social Value Calculator. The SVB value for improved confidence is estimated at GBP £12,623 per person per year, which is the value assigned to ‘High Confidence for an adult’. This is attributed to a 10 % change in the GSES baseline and follow-up responses. The SVB value for having access to high standard green-space is estimated at GBP £7301 per person per year and is attributed to any increase in time spent in nature.

The selection of these outcomes were co-produced by the research team at USW and WU NBSP staff based on evidence and recommendations from the previous study (S. Wallace et al., 2022). The SWEMWBS scores applied within the context of the Mental Health Social Value Calculator were utilised to monetise mental wellbeing. Given that the values in the Social Value Calculator incorporate mental wellbeing, the two calculators are treated separately with each generating its own SROI ratio (Table 1). The GSES and SWEMWBS are two independent questionnaires which were applied to capture data on increases in confidence and mental wellbeing as a result of the WU NBSP pathway. It is acknowledged that these questionnaires may gather similar data however in the social value calculation for which there are two values, data analysis ensured that no double counting was undertaken.

The aim of this SROI was to establish how inputs (e.g. costs) were converted into outputs (e.g. numbers of students), and subsequently into outcomes (e.g. improved mental wellbeing) to develop a Theory of Change and resulting impact. The social value generated by these outcomes was then estimated in a similar way to cost-benefit analysis, with a ratio comparing the cost per student with the social value generated per student. The SROI analysis was operationalised through the six stages outlined in the Guide to Social Return on Investment (Nicholls et al., 2012): identifying stakeholders, developing a Theory of Change, calculating inputs, evidencing and valuing outcomes, establishing impact, calculating the SROI ratio.

2.1.1. Identifying stakeholders

The primary stakeholders were the students who directly experienced the intervention and the service. Due to the scope of this study, data was not collected from other stakeholders who may have also benefited from such as family members of students, or instructors.

Eligibility in this study included students at Wrexham University

Table 1 Wellbeing valuation methods.

Outcome	Outcome measure	Wellbeing Valuation Method
Mental wellbeing	SWEMWBS score (7–35)	Mental Health Social Value Calculator v.1.0
Self-efficacy (improved confidence)	GSES score (10–40) Base case improvement threshold 10 % Sensitivity analysis improvement threshold 12.5 %	Social Value Calculator v.4.0
Having access to high standard greenspaces	Time spent in nature Base case improvement threshold 1 mins ≥ Sensitivity analysis threshold 60 mins ≥	Social Value Calculator v.4.0

(over 18 years old). All students were required to have an ability to speak Welsh or English and a mental capacity to reflect on their own wellbeing.

2.1.2. Developing a theory of change

A Theory of Change model was created to identify the expected changes experienced by students. Theory of Change models are often used in programme development and evaluation to illustrate the links between the inputs, outputs, outcomes, and impact (Fig. 1). Stakeholder engagement is vital to taking a co-design co-produced approach to understanding the inputs, outputs, outcomes to establish impact (Thomas et al., 2021). In order to develop the Theory of Change, students were consulted during ‘What matters conversations’ to determine how NBSP could be optimised for WU students. The results of these conversations informed the chosen outcomes relevant to this SROI evaluation.

2.1.3. Calculating inputs

To identify costs, researchers consulted with WU NBSP pathway staff. Total costs for WU NBSP pathway include staff costs, and non-staff and intervention costs (Table 2). All monetary terms including costs, and social values were calculated in Great British Pounds (GBP £) in the WU financial year 2023/24.

2.1.3.1. Staff costs. Staff costs included the cost of four posts that manage the SP service, two student support navigators (one full time post and one part time post), a full-time green health coordinator, a project administration support post and one full time student engagement assistant post. The costs of the student support navigators was based on 40 % of the salaried posts as staff managed several services at Wrexham University campus.

2.1.3.2. Non-staff and intervention costs. Non-Staff and Intervention costs include capital infrastructure, session costs, transport costs and overhead costs. Capital infrastructure refers to the outdoor SP assets which were installed on the WU campus, these include outdoor working pods for students and staff, a sensory garden and an outdoor gym.

The session costs refer to the green health and nature-based activities costs, one off instructor costs, session materials, and during and after session refreshments.

Transport costs include shuttles and coaches for off campus away interventions.

Overhead costs refer to office costs, utility costs (such as electricity and heating), and finance and HR costs.

2.1.4. Evidencing and valuing outcomes using the social value calculator

2.1.4.1. Deadweight, attribution and displacement. To avoid over-claiming, SROI methodology requires that deadweight, attribution and displacement are considered.

2.1.4.2. Deadweight. Deadweight reflects the possibility that a proportion of the outcomes could have happened anyway without the programme. In this study, the one-time questionnaire asked students: “How much of this change would have happened (if you had not participated the WU NBSP pathway)?” The results indicated that the average deadweight was 17 % for students.

2.1.4.3. Attribution. Attribution acknowledges that a proportion of the outcomes could be attributable to factors other than the programme. In this study, the one-time questionnaire asked students: “How much of this change was due to the WU NBSP pathway?” The results indicated an attribution percentage 47 % for students.

2.1.4.4. Displacement. Displacement considers whether students had to give up any other activities that could have contributed to their

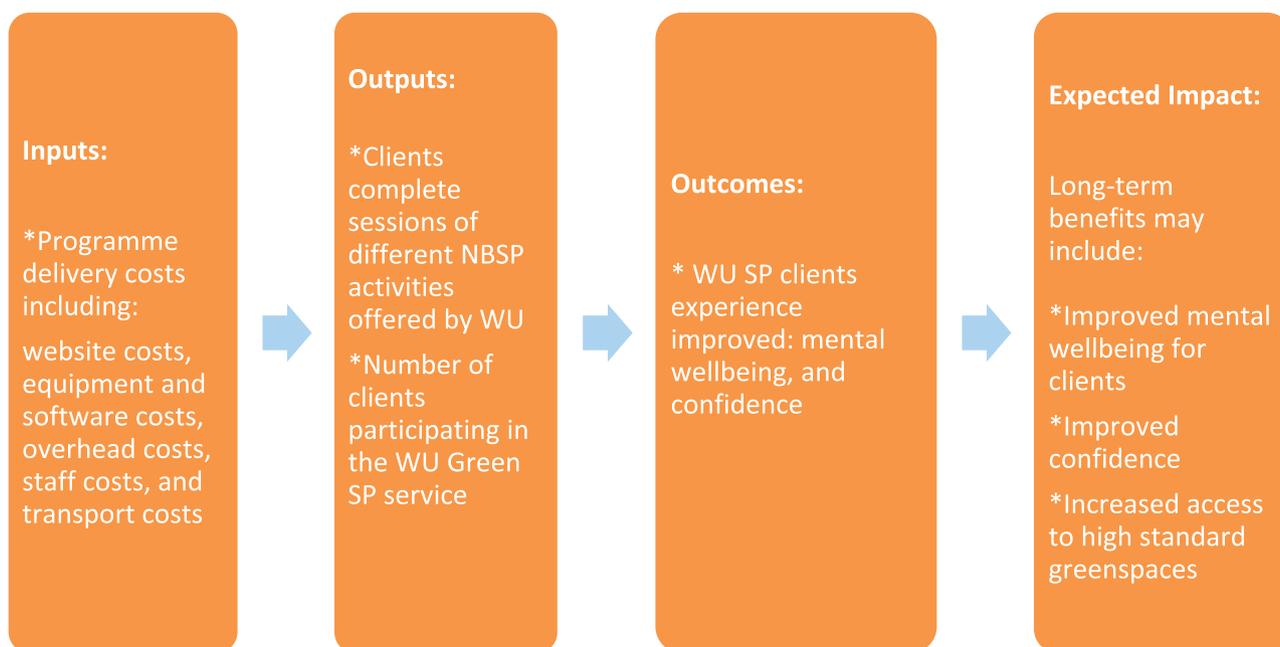


Fig. 1. Theory of change model.

**Table 2**  
Semester costs to run the NBSP service for students.

Description of cost	Semester 1 Expenditure
WU student support navigators (Full time equivalent (FTE) 1.0 and FTE 0.5)	£5903
WU green health coordinator (FTE 1.0)	£33,492
Project administrative support (FTE 1.0)	
WU student engagement assistant (FTE 1.0)	£19,671
<b>Total staff costs</b>	<b>£59,066</b>
WU Green health hub developments on campus (capital infrastructure)	£12,990
Green Health/Nature-based Intervention Activities (revenue)	£10,132
Transportation costs	£946
Translation	£1432
WU overheads	£24,239
<b>Total Non-Staff and intervention costs</b>	<b>£49,739</b>
<b>Total WU project cost</b>	<b>£108,804</b>
<b>Total cost per person per semester<sup>1</sup></b>	<b>£1196</b>

<sup>1</sup> Total cost per person based on 91 students per semester.

wellbeing. In this study, the one-time questionnaire asked students: “By participating in the WU NBSP pathway over the last several months, how much have you had to give up other activities that benefitted your health and wellbeing?” The results indicated a minimal displacement percentage of 24 % for students.

**2.1.5. Interviews**

As part of the mixed-method approach involved in conducting an SROI evaluation semi structured interviews were conducted with students (n = 6) to understand their experience of the NBSP pathway. Facilitated by a University of South Wales researcher, informed consent was obtained, and interviews were conducted between September and December 2023, audio-recorded and transcribed. The interviews took place online at a time and in an environment that suited the interviewee and lasted up to 30 min.

The semi-structured interviews corroborated the Theory of Change which was established to understand the inputs necessary to run the NBSP pathway, outputs, the expected outcome benefits and agreed expected impacts of participating in the NBSP pathway.

The data was analysed by applying narrative thematic analysis to group the findings under key themes of [improved] mental wellbeing, [increased] self-efficacy and having [increased] access to a high standard greenspace. Coding and theme development were conducted manually without the use of software such as NVivo. Data was primarily analysed in relation to the pre-specified outcomes from the Theory of Change: mental wellbeing, self-efficacy (confidence), and access to high-quality greenspaces. Interpretation was conducted independently by three authors who then conferred to reach consensus.

**2.1.6. Calculating the SROI ratio**

Using the social value calculator and mental health social value calculator, wellbeing valuation generates SROI ratios that compare the social value of relevant outcomes with the total costs (Eq. (1)).

**Eq. (1): Social Return on Investment Ratio calculation**

$$SROI\ ratio = \frac{\text{Social value of student outcomes}}{\text{Cost of delivering the NSBP programme}} \tag{1}$$

**3. Results from the social return on investment study**

This section highlights the results of the SROI study.

**3.1. Student demographics**

Students were on average 28 years old with, 79 % of students aged between 18 and 35 years of age. The majority of respondents were female (75 %) with 40 % of respondents in their foundation year of their education. A further 29 % of respondents were in their 1st year of their degree education, with 10 % were in their 2nd year of their degree while, 9 % were in their 3rd year of their degree with a final 12 % of respondents were completing their Master’s degree. Finally, 58 % of students in this evaluation cited stress as their primary reason for engaging with the NBSP pathway (Table 3). The CV WTP analysis indicate that WU students are on average WTP GBP £7 which equates to (6 %) of their disposable income per individual session to access and experience the associated health benefits from participating in the NBSP pathway.

To understand the financial trade off that the WU students would place on accessing and use of the NBSP pathway students were asked to

**Table 3**  
Overview of student demographics.

Characteristic	Category	Ratio (75 %)	Number of participants	Mean ± SD
Sex	Female	75	52	
	Male	24	17	
	Other	1	1	
Age (years)			69	28 ± 8.699588256
Ethnic Origin	White British	38	26	
	Indian	13	9	
	White Other	3	2	
	Asian Other	3	2	
	Arab	1	1	
	Prefer not to say	41	28	
Current year of study	Foundation	40	28	
	1st year	29	20	
	2nd year	10	7	
	3rd year	9	6	
Primary reason for attending	Masters	12	8	
	Stress	58	40	
Average Weekly household disposable income				£125 ± 139.0330966
Average WTP for individual SP interventions				£7 ± 8.860529272
Would participate in an alternative NSBP intervention	Yes	86	59	
	No	5	3	
	Did not respond	9	6	
Current financial situation	Have to be careful	55	38	
	Prefer not to say	20	14	
	Strain to get from week to week	15	10	
	Manage without much difficulty	10	7	
Rational for WTP amount	Indicates value of NBSP	38	26	
	Cannot afford more	32	22	
	Prefer not to say	16	11	
	Government should provide free	14	10	

indicate what was their available disposable income. On average WU students had a weekly disposable income of GBP £125. To gain insight on WU students' allocation of limited weekly spending and value of NBSP pathway (55 %) of the students indicated cited that they have to be careful with their money', a further 15 % stated that they 'find it a strain from week to week', with 10 % of students indicating that they are 'able to manage without difficulty'. To gain insight on the estimated valuations provided students were asked about the rationale for choice of WTP with 38 % of WU students stated that the monetised bids selected was the value that they place on access and use of the NBSP pathway. In addition, a further 32 % of students outlined that they could not afford to pay for NBSP if it was not provided through WU. Finally, 16 % of students did not provide any justification for the value estimates they provided, while a further 14 % considered the NBSP intervention should be available free of charge and should supported by government funding (Table 3).

### 3.2. Stated preferences

In this study CV methodology was integrated into the SROI post intervention questionnaire. The purpose for including CV questions to understand students' choices and preferences for engaging in NBSP pathway. To gain insight on the value and benefits that students' placed on access and use of NBSP pathway students completed a CV question asking about WTP by means of a payment card elicitation format.

The WTP estimates for this NBSP pathway were outlined by means of a payment card ladder with a range of 13 monetised bids which ranged from GBP £0.10 to GBP £50. Results from the CV questionnaire indicated that 86 % of students would be willing to pay to continue engaging in the NBSP pathway. To understanding the associated value and benefits connected with access and use of NBSP at WU students were asked to indicate their maximum WTP for engaging in the NBSP pathway whilst considering their current financial situation.

### 3.3. Outcomes using the social value calculator

Social Value Bank values were used to monetise the outcomes (Table 4) for changes in confidence and access to high standard greenspace.

#### 3.3.1. Total social value from the social value calculator v.4.0

When deadweight, attribution and displacement were considered, the total social value for students experiencing high confidence and having access to high standard greenspaces was GBP £77,782 and the total social value per student was GBP £2397 (Table 4).

### 3.4. Outcomes using the mental health social value calculator

68 % (n = 54) of 69 students surveyed, reported a positive improvement in their SWEMWBS scores. Using the Mental Health Social Value Calculator the results determined that the total social value using SWEMWBS was GBP £2183 per student.

### 3.5. Qualitative results from semi-structured interviews

Quotations from semi-structured interviews with individuals engaged with the NBSP pathway are presented in under the key themes: mental wellbeing, self-efficacy (confidence), and having access to high standard greenspaces. Analysis was conducted by means of thematic narrative analysis. While the analysis did not explore additional inductive sub-themes, it captured key mechanisms of action reported by participants, including respite from academic pressure, social interaction, and the emotional impact of engaging with well-maintained greenspaces. Barriers to participation were noted, including transport, scheduling constraints, and accessibility, although these were not the primary focus of the analysis. Unintended consequences were considered when mentioned by participants.

#### 3.5.1. Respite and stress reduction

Students reported that access to high quality greenspace was a respite from normal university activity which led to a reduction in anxiety along with a reduction in stress levels.

*"We're under a lot of pressure, when we're on campus. We're usually studying for periods of time ... actually being able to take yourself away for an hour and spend some time in a garden where you ... can smell the lavender, you know ... just having that time out to mentally unwind and get a bit of balance back..."*

*Interviewee 1*

*"It definitely takes the pressure off, doesn't it? It just relaxes your mind ... I think it reduces the anxiety. It helps you reset, doesn't it? ... and giving yourself some time and space ... if you're with other people, it's a chance*

**Table 4**

Gross and adjusted social values of NBSP outcomes, including deadweight, attribution, and displacement for base case.

Outcomes:	Indicators	Net Quantity	Financial value	Total social value for students	Deadweight (* 0.83)	Attribution (* 0.47)	Displacement (* 0.76)	Total adjusted social value	Total social value per student
<b>High Confidence</b>	GSES: one-time only retrospective questionnaire	15 /34 reported increase of 4 points or more	£12,623 per year for feeling high confidence	£189,345	£157,156	£73,863	£56,136	£56,136	£1651 (n = 34)
<b>Having access to a high standard greenspace</b>	Time spent in nature: one-time only retrospective questionnaire	16/29 reported any increase in time spent in nature	£7301 per year for access to high standard greenspace	£116,816	£96,957	£45,570	£34,633	£34,633	£1194 (n = 29)
<b>Total / Social Impact</b>				<b>£306,161</b>				<b>£77,782</b>	<b>£2845</b>

*to relax and talk, whether that's about what you're doing or what you're going to do, or what you need to do ... it's like a resetting process for me, certainly."*

*Interviewee 4*

**3.5.2. Social opportunity and confidence**

Students revealed the positive impact of deliberate time spent in nature has on mental wellbeing and that the informal nature of NBSP pathway encouraged a sense of community and also helped to mitigate against the effects of loneliness.

*"I can see first-hand the benefits of reducing isolation and building confidence by enabling people to access the outdoors."*

*Interviewee 3*

*"It's a social opportunity ... most people do enjoy working in groups with other people with similar interests ... people are building skills and knowledge ... building confidence I think ... it's those three main things really: skills, confidence and the socialisation"*

*Interviewee 5*

**3.5.3. Engaging with the physical environment**

The transformation of the physical environment emerged as a key component of participant's positive experiences, with many reporting an emotional response to being in a well maintained, aesthetically pleasing setting.

*"It definitely has changed like the physical environment ... and I think that is very positive for students...I would say that it has quite a significant impact on the physical space of the campus, and seeing as well that they are actually being used more by students is really positive"*

*Interviewee 2*

*"I didn't expect that to make you feel so nice....so even when you are just walking from one building to the other for a meeting, just being in a space that's cared for is really nice, it makes you feel quite fuzzy.... just looking at the space, not necessarily even using it has a positive impact."*

*Interviewee 6*

The qualitative data analysis suggests that access to nature and social engagement contribute positively to students' overall wellbeing. Equally these results indicate that the WU NBSP pathway demonstrates the multifaceted benefits of NBSP in a university setting.

**3.6. Calculating the base case SROI ratio**

When the base case total social value per student was compared with the total cost per student, the SROI base case ratios ranged from GBP

£1.83 to GBP £2.38 for every GBP £1 invested.

**3.6.1. Wellbeing valuation using the social value bank—sensitivity analysis**

Sensitivity analysis was conducted to generate a conservative case for the two SVB outcomes confidence and having access to high standard greenspaces. Sensitivity analysis allows for mitigation of study result uncertainty by exploring different real-world cases and scenarios (Taylor, 2009).

For the conservative case, social values were awarded only to those participants who experienced an increase of 12.5 % or more on the GSES questionnaire, and an increase of 60 mins or more of spending time outside (Table 5). These thresholds were chosen to ensure that only substantial and sustained improvements, rather than minor variations attributable to measurement error or short-term fluctuations, were counted towards the social value calculation.

When deadweight, attribution and displacement were considered for the conservative case, the total social value for students experiencing improved confidence and having access to a high standard greenspace was GBP £55,328 and the total social value per participant was GBP £1737 (Table 5).

When the total social value per participant was compared with the total cost per participant for the conservative case, the social value ratio was GBP £1.45: GBP £1 (Table 6).

The SROI study found that NBSP pathway generated positive SROI ratios ranging from GBP £1.45 to GBP £2.38 of social value for every GBP £1 invested. These ratios were generated by quantifying and monetising the agreed health related outcomes which were agreed through stakeholder engagement: mental wellbeing, confidence, and access to high standard greenspaces.

**4. Discussion**

This mixed-methods SROI study examining NBSP pathway sought to build upon the findings from the previous evidence (C. Wallace et al., 2022) and to identify student priorities and how universities can utilise nature-based local assets, both on campus and in the community, to improve the mental wellbeing and social connectedness among students and to evaluate WU nature-based referral pathway (de Bell et al., 2024; Makanjuola et al., 2023a, 2023b).

The SROI evaluation results indicated a positive SROI with ratios ranging from GBP £1.45 to GBP £2.38 for every GBP £1 invested in the WU NBSP pathway. Wellbeing valuation was applied to quantify and monetise three significant student outcomes: mental wellbeing, confidence, and access to high standard greenspaces. These SROI ratios are consistent with previous studies evaluating NBSP interventions (Carrick and Lindhof, 2011; Paths for all, 2013; Makanjuola et al., 2023a, 2023b). Students demonstrated that they value that they place on access and use of the NBSP pathway with CV method indicating that on average students are willing to pay GBP £7 for the health benefits associated with

**Table 5**  
Gross and adjusted social values of NBSP outcomes, including deadweight, attribution, and displacement for conservative case.

Outcomes:	Indicators	Net Quantity	Financial value	Total social value for students	Deadweight (* 0.83)	Attribution (* 0.47)	Displacement (* 0.76)	Total adjusted social value	Total social value per student
<b>High Confidence</b>	GSES: one-time only retrospective questionnaire	9/34 reported increase of 5 points or more	£12,623 per year for feeling high confidence	£113,607	£94,294	£44,318	£33,682	£33,682	£991 (n = 34)
<b>Having access to a high standard greenspace</b>	Time spent in nature: one-time only retrospective questionnaire	10/29 reported increase of 60 mins or more	£7301 per year for access to high standard greenspace	£73,010	£60,598	£28,481	£21,646	£21,646	£746 (n = 29)
<b>Total / Social Impact</b>				<b>£186,617</b>				<b>£55,328</b>	<b>£1737</b>

**Table 6**  
SROI ratios.

	SROI Ratio (Social Value Calculator —Conservative Case)	SROI Ratio (Social Value Calculator)	SROI Ratio (Mental Health Social Value Calculator)
Total social value per participant	£186,617	£77,782	£150,612
Total social value participant	£1737	£2845	£2183
Total cost per participant	£1196	£1196	£1196
<b>SROI ratio</b>	<b>£1.45: £1</b>	<b>£2.38: £1</b>	<b>£1.83: £1</b>

engaging in NBSP pathway. The value estimates suggest that despite many students citing that they are face weekly financial strain, great value is placed on the wellbeing benefits gained through engaging in the NBSP pathway.

The running costs of the WU NBSP programme were calculated based on 91 students per semester, although the service’s total capacity was unknown. It is likely that more WU students could engage with the NBSP pathway, and if this capacity were established, future evaluations could incorporate a sensitivity analysis based on the programme operating at full capacity.

Although students frequently reported an improvement in their mental wellbeing, confidence and their access to high standard greenspaces, inconsistent response rates suggest that the true social value generated from the NBSP pathway could be significantly higher. The staff of WU also avail of the NBSP pathway and they were not included in the SROI evaluation given that the ‘What matters conversations’ were conducted with the students exclusively. Thus, if staff had been included within the study evaluation, their perceived outcomes, values and benefits would have generated additional social value estimates providing a clear depiction of the social value generated by NBSP intervention. Student demographic data demonstrated that many students that engage in the service are international students, who by their own estimation experienced loneliness. Social isolation and loneliness can have last impact on health outcomes and that NBSP could improve health and wellbeing outcomes among this population (Haslam et al., 2024). Future research examining the benefits of NBSP should consider including the outcome of improved social interaction as a result of the NBSP interventions and also look at how the effects drop-off over time. This SROI evaluation was conducted during semester 1 of the WU academic year which fell during the autumn and winter seasons. It is possible that the Social Value generated could have been higher, given that engagement with the WU NBSP pathway was lower due students

avoiding colder weather conditions (Eisenberg and Okeke, 2009; Tucker and Gilliland, 2007; Wagner et al., 2019).

The concept of SP in Wales, represents a pivotal shift in healthcare paradigms, focusing on community-centred approaches to address health and wellbeing needs (Welsh Government, 2024). This approach acknowledges the importance of integrating community resources and support networks to enhance individual health outcomes. Notably, the Welsh model of SP emphasises holistic, person-centred methods, aligning with contemporary healthcare trends that prioritise individual empowerment and community engagement (Pringle and Jesurasa, 2022).

The evaluation of the NBSP pathway at WU employs a robust methodology, taking an SROI approach, to assess the social value generated as a result of the NBSP pathway (Nicholls et al., 2012). SROI provides a comprehensive framework for understanding how inputs translate into outcomes and estimating the social value generated per unit of investment. By incorporating key factors such as deadweight, attribution, and displacement, the SROI analysis offers a nuanced understanding of the intervention’s impact on student wellbeing (Carrick and Lindhof, 2011; Hartfiel et al., 2020; Jones et al., 2020; Makanjuola et al., 2022).

Overall, the integration of NBSP pathway within the educational setting represents a promising approach to enhancing student wellbeing and fostering resilience, increasing confidence and decreasing social isolation and loneliness. By leveraging the restorative power of nature and community support networks, institutions like WU can play a pivotal role in promoting holistic approaches to student health and wellbeing.

**4.1. Strengths**

To our knowledge this is the first SROI evaluation completed for a Higher Education Institution examining NBSP pathway. Previous studies have evaluated the SROI evaluation of outdoor walking interventions (Carrick and Lindhof, 2011; Makanjuola et al., 2023a, 2023b; Paths for all, 2013), but this was the first to use two different methods of wellbeing valuation (applying the Social Value Calculator and Mental Health Social Value Calculator) to estimate the social value for students that engage with NBSP and also apply the CV method to determine student stated preference and opportunity cost. This is an SROI with integrated CV methodology which captures choice and preferences, and associated value placed on the access and use of NBSP along with capture the value estimates for the health and wellbeing benefits associated with the NBSP pathway.

This is a more rigorous SROI as it combines both approaches and CV methodology is a stated preference technique which is well established and recognised within the field of economics.

The social value ratios calculated in this study were generated from

two separate value sets using the social value calculator and the mental health social value calculator. Both value sets are derived from wellbeing valuation, a consistent and robust method recommended in *HM Treasury's Green Book (2022)* for measuring social CBA. Equally, eliciting student stated preference and choice is consistent with Central (UK) Government guidance for the valuation of non-market goods and services. Students were asked to indicate their stated preference and opportunity cost of using the NBSP service and indicate their WTP for individual sessions which shows the value placed on access and engagement with the NBSP pathway. Furthermore, stated preference questions provided WU with key information that pertains to the student's financial situations including weekly disposable income, and rationale for WTP estimate. In addition, taking a co-designed coproduced approach by involving the students in the development of the Theory of Change model is another strength of this study as stakeholder engagement assures that the most relevant outcomes will be measured.

#### 4.2. Limitations

The WU staff also engage in this service however only student perspectives were taken into account therefore the NBSP pathway's total social value was not captured. It is possible that recall bias may have affected the accuracy of baseline scores in the 'one-time only questionnaire' completed by students, who may not have correctly recalled their baseline level of mental wellbeing and confidence and their time spent in nature. However, the questionnaires were completed immediately after the end of the first semester (three months long). The reliability of the results may have been hampered due to the lack of a control group. However, this limitation was mitigated by the 17 % deadweight percentage (the proportion of outcomes that would have taken place anyway without the programme) applied when using the Mental Health Social Value Calculator and self-reporting percentages for deadweight, attribution and displacement when using the Social Value Calculator. Second, a common issue is that researchers working with the same data may arrive at different SROI ratios (Fujiwara, 2015). Time spent in nature, for example, could be attributed in the SVB with other social values. Matching outcomes from study data with the most appropriate SVB value depends on the researcher's discretion. This can introduce potential researcher bias and the likelihood that estimates of social value can be upward-biased (Fujiwara, 2015). In order to measure confidence, "achieving personal goals was also considered. To measure the outcome of access to high standard greenspace, "feeling connected to the community" and "participation in recreational activity" were considered. However, in this study the SVB values selected most closely aligned with the measured outcomes and the population context (WU students engaging in NBSP activities).

#### 5. Conclusion

The Wrexham University Nature-based Social Prescribing pathway generated a positive social value ranging from GBP £1.45 to £2.38 for every GBP £1 invested. Results from the one-time questionnaire data indicated that many students improved in mental wellbeing (77 %), self-confidence (65 %) and experienced increased as a result of access to high standard greenspaces (79 %). The CV results indicate that on average students are willing to pay GBP £7 per individual NBSP session for the associated health and wellbeing benefits. Students had an average weekly disposable income of GBP £125, 6 % of which they were willing to spend per individual session of NBSP. However, over half (55 %) of the students have to be careful with money and also just under half (46 %) of students either cannot afford more or believe the government should provide a free subsidy for the service. In addition, the stakeholder engagement that informed the Theory of Change model, assures internal and external validity in the research findings. Furthermore, costs were generated for the winter semester at Wrexham University and staff were not included in the quantitative data collection therefore it is possible

that the true social value of the NBSP pathway was not captured. Future studies could compare the social values generated for the student population and staff at Wrexham University and also evaluate the pathway in the second or third semester when the weather is not inclement. Evaluating the WU NBSP in different semesters and also including the staff that engage in the pathway will allow for a more holistic view of the social value that the pathway generates.

#### Declaration of interests

We declare that we have no conflicts of interest.

#### Contributions

To follow journal acceptance.

#### Statements of ethical approval

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Faculty Ethics Committee of the University of South Wales (Reference number: 230232LR August 2023).

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This work was supported by the Higher Education Funding Council for Wales (HEFCW).

#### Data availability

The Social Value Bank (SVB) values used to calculate social return on investment in this study were accessed under licence from the Housing Associations' Charitable Trust (HACT). Access to these values is subject to the terms of the HACT SVB licence. Other data supporting the findings of this study are available from the corresponding author upon reasonable request. Full data underpinning the SWEMWBS scores and corresponding social values used in this study are available from the corresponding author upon request.

#### Statements of ethical approval

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Faculty Ethics Committee of the University of South Wales (Reference number: 230232LR August 2023).

#### CRediT authorship contribution statement

**Abraham Makanjuola:** Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Carolyn A. Wallace:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Mary Lynch:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

#### Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Carolyn Wallace reports financial support was provided by Higher Education Funding Council for Wales. Carolyn Wallace reports a relationship with Higher Education Funding Council for Wales that includes: funding grants. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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