NICE National Institute for Health and Care Excellence

Guideline

Transition between inpatient mental health settings and community and care home settings

Economics, economic modeling, appendix 3

Title: Cost-effectiveness analysis of peer-delivered self-management programme vs treatment as usual

Review questions

Review Question 4: What is the effectiveness of interventions and approaches designed to improve discharge from inpatient mental health settings?

Review Question 5: What is the effectiveness of interventions and approaches designed to reduce or prevent readmissions to inpatient mental health settings?

This report was produced by the Personal Social Services Research Unit at the London School of Economics and Political Science. PSSRU (LSE) is an independent research unit and is contracted as a partner of the NICE Collaborating Centre for Social Care (NCCSC) to carry out the economic reviews of evidence and analyses.

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Contents

1 Introduction

This report presents the economic work undertaken for the guideline, "Transition between inpatient mental health settings and community and care home settings."

The economic work is comprised of two main components. The first is the critical appraisal and review of existing cost-effectiveness literature, interpreting the results to make recommendations for the English context. These can be found in Appendix C1 and C2 and these are not the focus of this report.

This report addresses the second component, to undertake new economic modelling. New analyses are useful where there is no suitable cost-effectiveness evidence available.

The rationale to focus on this particular intervention is covered in a separate document in Appendix C.3.1.

2 Aims

This report presents a cost-effectiveness analysis for individuals with severe mental illness undergoing discharge from hospital.

The intervention is a manual-based recovery and self-management programme in group sessions of 4 to 13 individuals between 2 to 2.5 hours per week for a duration of 8 to 12 weeks. Two peer workers provided psychoeducation, social support, information about the disease and taught strategies to overcome disease-specific problems in weekly sessions. A third peer worker is available for back-up. The intervention does not involve any evidence-based psychotherapeutic treatment. It is predominantly support-based. The intervention is delivered in the community. This is in addition to 'treatment as usual'.

This intervention is compared to 'treatment as usual'.

3 Background

The analysis is based on a meta-analysis of three high-quality studies (Fuhr et al. 2014), of which two are US studies (Cook et al. 2012a, 2012b) and one is from the Netherlands (van Gestel-Timmermans et al. 2012). We selected the Fuhr et al. (2014) review rather than the other two reviews identified (Lloyd-Evans et al. 2014; Pitt et al. 2013) because it synthesised the evidence more narrowly, which made it feasible to conduct an economic evaluation.

Each study in the meta-analysis delivers a variation of self-management. The respective programmes are: 'Recovery is up to you', 'Wellness recovery

action planning (WRAP)', and 'Building recovery of individual dreams and goals through education and support (BRIDGES)'.[1]

Study samples were similar for mean age (40 years old) and gender (between 55 and 68% female) and percentage married or cohabiting (between 10 and 17%). Samples were different when looking at the percentage living in their own home (the two US samples had a lower percentage, 48 and 67% respectively; compared to 75-83% in the Netherlands sample). They were also different in the percentage employed (55% in Netherlands and 9 to 15% in the two US studies). Further detail is located in the appendix.

3.1 Why the analysis is important

The Guideline Committee was consulted and it was agreed to focus on this particular intervention. The main reasons were an interest in recovery-oriented interventions and those involving peer workers.

3.1.1 Holistic approach

The Guideline Committee highlighted that psychiatric services should support individuals more holistically instead of approaches that focus mainly on medical symptoms. It is thought that peer workers and recovery-oriented interventions promote personal development, empowerment, hope, autonomy, optimism (including therapeutic optimism), self-esteem, life satisfaction, connection with others, social support and social relationships.[2] Recovery-oriented interventions promote wellbeing, which can be achieved even in the presence of persisting symptoms.

3.1.2 Benefits for peer workers

Peer workers themselves may benefit from providing services, although we did not find systematic reviews in this area. There is anecdotal and pre/post-test study evidence of benefits, including peer workers feeling empowered in their own recovery journey, higher levels of confidence and self-esteem, feeling more valued and less stigmatised, and having a more positive sense of identity (Repper and Carter 2011; Salzer and Shear 2002; Trachtenberg et al. 2013 citing Mowbray et al. 1998).

3.1.3 Results from the meta-analysis

The results from the meta-analysis indicate that there were statistically significant but small improvements in quality of life[3] (2 studies) and hope (3 studies) and no differences in clinical outcomes as measured by psychiatric symptoms (1 study). Results were sustained at 6 months; which is between 3 and 4 months after the intervention ended.

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[1] Respectively, these are programmes evaluated in: van Gestel-Timmermans et al. (2012), Cook et al. (2012a, 2012b).

[2] van Gestel Timmermans et al. (2012), citing Jacobson et al. (2001), Corrigan et al. (2004), Lloyd et al. (2010), Resnick et al. (2005), Topor et al. (2011), Hendryx et al. (2008), Schon et al. 2009.

[3] Quality of life was not measured using the NICE-preferred measurement tool (the EQ-5D).

3.1.4 Triangulating findings from other searches of the literature

Through a non-systematic search of the literature we identified 1 similar intervention conducted in the UK, although it was a single cohort pre-post test design. The focus was a peer-led group-based self-management intervention for people with severe mental disorders. This intervention was delivered over a similar duration to the interventions in the US and Netherlands studies (12 weeks) but with much longer follow-up (12 months) (Iemmi et al. 2015 and Chylarova et al. 2015). This intervention provides more services than the interventions in the meta-analysis. In the UK study, groups could continue to meet for at least 6 months after the 12-week course ended, at their own discretion. Results were promising but the completion rate was very low and results reflect 30% of the original sample.[4] Findings for study completers show statistically significant improvements only for health-promoting lifestyle activities (at 12 months) and a non-significant trend at 6 months.[5] Wellbeing appeared to be improved at 6 and 12 months but was not statistically significant.[6] Individuals had lower health and social care costs from baseline to 6 months, but cost savings were only statistically significant when comparing from baseline to 12 months ($p \leq 0.01$; Iemmi 2015, p20). Lower costs were driven by small cumulative changes: over the 12-month period there was a statistically significant reduction in inpatient days (-3, sd = 9.4, $p \leq 0.05$) and outpatient sessions (-1.3, sd=4.4, $p \leq 0.01$). Criminal justice services and productivity gains from reduced absenteeism from work and increased hours worked per week were not statistically different. However, without a randomised comparison group, interpreting the results is difficult.

3.1.5 Summary

There are small positive effects from three high quality RCTs and one lower quality UK pre/post study design (with low completion rates). There may also be small reductions in health and social care costs based on the UK study evidence. Follow-up periods of studies in the meta-analysis were short and results are not sustained beyond 6 months.

Taken together, there seem to be positive short-term effects but there are significant limitations in the evidence base. There are very few studies. There is an absence of research on individuals' use of health and social care services, employment and productivity, use of housing and criminal justice services. There is also an absence of research on the impact on peer workers on either costs or outcomes, or the impact on informal carers.

4 Methods

4.1 Cost-effectiveness analysis

A cost-effectiveness analysis was conducted. The cost-effectiveness of an intervention is then determined by examining the incremental cost ($C_I - C_C$) divided by the incremental effect ($E_I - E_C$), where C_I and C_C represent the cost

[4] Those who completed the study were more likely to have been in paid employment and had experienced mania in the past year (Chylarova et al. 2015, p8).
[5] As measured by the Health Promoting Lifestyle Profile II (HPLP II).
[6] Wellbeing as measured by the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS).

of the intervention and control groups, respectively, and E_I and E_C represent the outcomes of the intervention and control groups, respectively. A higher ICER means that it costs more to achieve a unit improvement in the outcome measure.

Economic evaluation aims to help decision-makers allocate resources to interventions that provide the best value for money. A threshold that indicates what might be an acceptable amount of additional expenditure in order to obtain 1 extra unit of effect does has not been established to guide social care economic evaluation. One reason is because there is no agreement yet on what might constitute a generic outcome measure equivalent to the QALY used in healthcare evaluations. However, there are helpful developments.. For example, the Adult Social Care Outcomes Toolkit, ASCOT, measures outcomes considered important in social care, including, feeling safe, feeling in control over daily life and activities, feeling comfortable and clean, satisfaction with opportunities to socialise, feeling sufficiently occupied and maintaining a sense of dignity.

In spite of the limitations outlined above, a cost-effectiveness analysis is still potentially useful in order to compare between interventions for which there are similar outcome measures.

The economic analysis is conducted using a Monte Carlo simulation in MS Excel for Mac 2011, Version 14.3.8. Further detail about the Monte Carlo simulation is in Section 5 with the results.

4.2 Costing approach

Our costing approach uses a full-cost approach in line with accepted practice (Curtis 2014). The full-cost approach reflects the long-run average costs.[7] All unit costs in the analysis reflect national UK estimates.

All costs reflect 2013/14 prices. Where costs are obtained from older studies these were inflated to 2013/14 using the health and social care community price and pay index (Curtis 2014).

All of the unit costs used in the analysis are reported in Table 3.

4.3 Data inputs and estimating differences in costs and outcomes

1. Perspective of the analysis

The analysis is conducted from the perspective of the NHS and personal social services for both costs and outcomes. Outcomes are measured in terms of quality of life and hope, although the studies did not measure quality of life using a measure that allows a generic outcome such as the QALY to be calculated (such as the EQ-5D recommended by NICE in healthcare

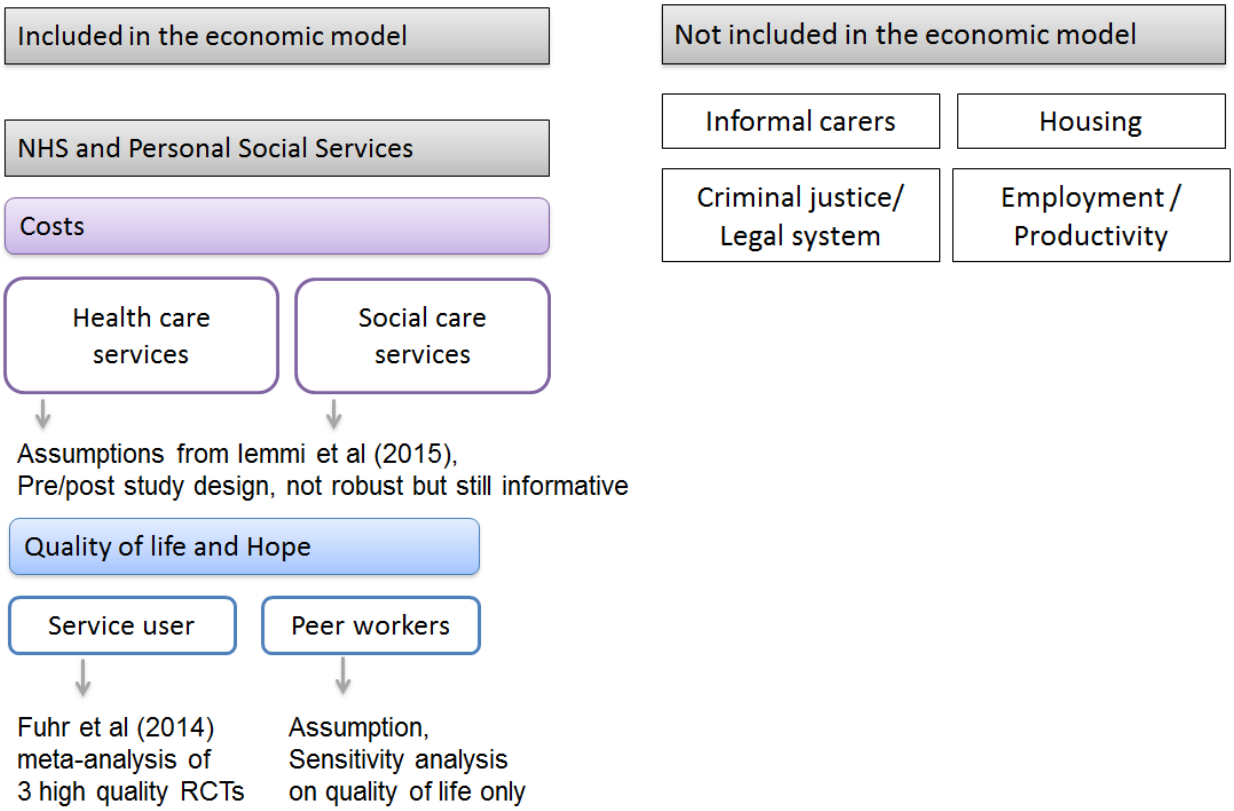
[7] Estimating long-run average costs considers salary, on-costs due to national insurance and pension contributions, qualifications, direct and indirect capital costs and any other indirect time costs (for instance, traveling time).

evaluations), and therefore a cost-utility analysis is not possible. Therefore, we conduct a cost-effectiveness analysis. We also undertook a sensitivity analysis that considers the impact on peer workers' quality of life. We do not consider the potential impact on informal carers as there was insufficient information.

The analysis is summarised in Figure 1. All of the parameters used in the analysis are also given in Table 3.

All analyses are conducted over both 6-month and 12-month periods. In the discussion section (6) we consider how the intervention may have influenced individuals' productivity, use of housing, criminal justice and legal services, and how it may have impacted informal carers.

Figure 1 Costs and outcomes in the economic model



2. Intervention effect on costs and outcomes

Regarding the intervention's effect on costs, none of the studies in the meta-analysis conducted an economic evaluation. Therefore, there was no direct information on resource use. In our economic model, information about resource use is based on assumptions from additional literature (details provided in subsequent sections).

Regarding the intervention's effect on outcomes, the meta-analysis synthesised outcomes for quality of life (2 studies), hope (3 studies) and clinical outcomes (1 study). The results were sustained at 6 months, which is

between 3–4 months after the end of the intervention.[8] The peer-delivered intervention resulted in small but statistically significant improvements in quality of life[9] and hope.[10] There were no differences in clinical outcomes.[11] See Table 1.

Table 1 Results from the meta-analysis (Fuhr et al. 2014), 6-month time horizon

Domain	**Quality of life**	**Hope**	**Clinical outcomes (psychiatric symptoms)**
Results	Small improvement	Small improvement	No difference
Effect size (SMD)	0.24 95% CI (0.08–0.40)	0.24 95% CI (0.02–0.46)	0.08 95% CI (-0.11–0.26)
Statistical significance	p=0.003	p=0.03	p=0.41
Heterogeneity	I^2=0%	I^2=65%	N/A
Sample size	n=639	n=967	n=448
Number of RCTs	2 RCTs	3 RCTs	1 RCT
Sources	Cook 2012a van Gestel-Timmermans 2012	Cook 2012a Cook 2012b van Gestel-Timmermans 2012	Cook 2012a

Note: Less heterogeneity is when I^2 is closer to 0%.

3. Resource use

Health and social care service use

We used additional literature to find evidence on the potential impacts on use of health and social care services, and then made assumptions (see below) about suitability of that evidence for our analyses. As described earlier (Section 3.1.4), only 1 UK study was identified that was sufficiently similar to the studies in the meta-analysis (Iemmi et al. 2015). It has serious limitations because it has a single cohort pre/post study design (i.e. no randomised comparison group).

[8] It is important to note that none of the individual studies discussed whether improvements in outcomes were meaningful important differences.
[9] Quality of life was measured using the Recovery Assessment Scale in 2 studies (Cook et al. 2012a, 2012b) and the Manchester Short Assessment of Quality of Life in the third study (van Gestel Timmermans et al. 2012).
[10] Hope was measured using the State Hope Scale in one study (Cook et al. 2012b) and the Herth Hope Index in the other study (van Gestel Timmermans et al. 2012).
[11] Clinical outcomes measured psychiatric symptoms using the Brief Symptom Inventory for anxiety and depression (Cook et al. 2012a).

Even with its limitations, it still provides useful information on the use of health and social care services. The UK study found lower health and social care costs from baseline to 6 months, but this difference was not statistically significant; there were greater cost reductions from baseline to 12 months, and this difference was statistically significant, as noted earlier. Over the 6- and 12-month follow-up period, mean reductions in health and social care costs per person were, respectively, -£281 (SD=5,242) and -£1,574 (SD=4,241) (inflated from 2011/12 to 2013/14 prices).

While it is possible the intervention reduced service use, it is not possible to rule out the possibility of regression to the mean or any other influential factors without a control group. The implication is that the reductions may not be due to the intervention. However, it could be the case that, if we had a comparison group, we might have seen them use more services.

Given the limitations, we resort to a scenario analysis to take into account all of the possibilities (above). Our analysis considers three scenarios, assuming what could happen if there had been a control group. The first is the assumption that observed cost reductions at 6 and 12 months are a 'true' reflection of the intervention. The second assumption is that cost reductions would be smaller – we assume 50% smaller. The third assumption is that there would be no differences.

Table 2 Assumptions about health and social care cost differences over 6- and 12-month periods (2013/14 prices).

Assumption		**6 months**	**12 months**
Scenario 1	Very optimistic	-£281 (SD=5,242)	-£1,574 (SD=4,241)
Scenario 2	Optimistic	-£140 (SD=5,242)	-£787 (SD=4,241)
Scenario 3	Conservative	£0	£0

4. Intervention costs

The total cost of the intervention is estimated to be between £509 and £1,636 per person for the 12 weeks of group sessions. In our analysis, we use the upper end of the cost estimates (£1,636).

The costs of the intervention were estimated using the descriptions provided in the studies (Fuhr et al. 2014). The interventions are slightly varied but we costed the intervention using a conservative approach. From the 3 studies, the duration of the intervention was between 2 and 2.5 hours and ran once a week between 8 and 12 weeks. Two peers delivered the intervention. Group size ranged from 4 to 13 individuals.

Our costing approach uses a full-cost, bottom-up approach. We assume a mean of 6 individuals per group session with 2 peer support workers per group delivering a 2.5-hour session for 12 weeks. We also assume an additional 2 hours of work per session per peer worker related to preparing the session and post-session activities.

When a full costing approach is considered, we include oncosts, overheads due to staff and non-staff costs, capital costs (building) and training. Assumptions regarding full cost approach is based a family support worker due to absence of information specific to peer-delivered interventions (Curtis 2014, p212). Values used in the full cost approach are located in Table 3.

We also included training costs. Training costs varied. Two of 3 studies reported on training and in the other (Cook et al. 2012a) no information was provided. In 1 study, peers attended a 5-day course (Cook et al. 2012b) and in the other, peers received 'on-the-job training and learned by experience while working with experienced course instructors' (van Gestel-Timmermans et al 2012, p55). We assumed that, for the less-intensive training, costs were 1% of direct salary costs and in the more-intensive training; costs were 10% of direct salary costs. Further detail is in Table 3.

5. Sensitivity analysis: impact on peer support worker

The studies in the meta-analysis did not provide direct evidence on the impact on peer support workers. We use evidence from the wider literature to make assumptions about the potential impact. We were only able to identify qualitative studies. This means that our analysis is less precise than if we had access to larger-sample quantitative evidence, but we are confident in the qualitative evidence showing positive effects.

We assume that peer support workers have higher quality of life as a result of delivering the programme. To make our results conservative, we assume that the peer workers have half the gains of the service users, a mean increase of 0.12 units in quality of life with an assumed 95% confidence interval of 0.02 to 0.23.[12] We assume the effects are also sustained over the 6-month period, which is between 2–3 months after the delivery of the intervention. One rationale for assuming half but not all the gains is on the basis of diminishing marginal returns – peer support workers are further along their recovery journey. Another rationale in taking a conservative approach is that it is unclear what alternative activities peer support workers might be doing and what impact that would have on their quality of life.

[12] We assume that the upper 95% confidence interval is half (from 0.46 to 0.23) but keep the same lower 95% confidence interval (0.02). This keeps the results conservative.

Table 3 Parameters used in the model

TREATMENT EFFECT			
Input parameter	**Value**	**Probabilistic distribution**	**Notes and sources of data**
Quality of life	SMD=0.24 95% CI (0.08–0.40) p=0.003 I^2=0% n=639	**Beta distribution** Distribution based on mean and standard deviation. (α=6.33, β=25.75)	– Meta-analysis from Fuhr et al. (2014) – Quality of life results based on 2 studies (Cook et al. 2012a; van Gestel-Timmermans et al 2012). – Hope results based on 3 studies (Cook et al. 2012a 2012b; van Gestel-Timmermans et al. 2012). – Clinical symptom results based on 1 study (Cook et al. 2012a). – Authors find that results are not sustained beyond a 6-month period (p1699).
Hope	SMD=0.24 95% CI (0.02–0.46) p=0.03 I^2= 65% n=967	**Beta distribution** Distribution based on mean and standard deviation. (α=3.23, β=12.68)	
Impact on peer support worker	SMD=0.12 95% CI (0.0–0.23)	**Beta distribution** Distribution based on mean and standard deviation. (α=4.30, β=34.28)	– Assumption. See main text.

RESOURCE USE			
Input parameter	**Value**	**Probabilistic distribution**	**Notes and sources of data**
Intervention costs per person (Assuming group size of 6)	Lower end=£509 Upper end=£1,636	No distribution.	Intervention costs are based on the 3 studies used in the meta-analysis (Fuhr et al. 2014). The interventions are slightly varied. Our cost estimates are based on the most conservative scenarios. Intervention duration lasted between 2 to 2.5 hours and ran once a week between 8 and 12 weeks. Two peers delivered in the intervention and in two studies there was a third peer available for back-up. Group size ranged from 4 to 13 individuals. Costing uses a full-cost, bottom-up approach. All estimates use a mean of 6 individuals per group session with 2 peer support workers per group delivering a 2.5-hour session for 12 weeks it also assumes an additional 2 hours of work per session related to preparing the session and post-session activities. When a full costing approach is considered, we include oncosts, overheads due to staff and

			non-staff costs, capital costs (building), and training. Assumptions regarding full cost approach is based a family support worker due to absence of information specific to peer-delivered interventions (Curtis 2014, p212). Salary We estimated the salary costs assuming that peer workers would be equivalent to a 'support, time and recovery (STR) worker'. The NHS Agenda for Change pay scale is Band 3. In the analysis we use the middle estimate. Middle of the range is £17,972 per year at point 9. Oncosts £3,594 National insurance contribution, 20%. Direct overheads £8,727 per year Related to providing the intervention, 29% of direct salary cost. Indirect overheads £4,814 per year General management and support services, 16% of direct salary cost. Capital costs £2,452 per year Building and maintenance. Total costs (excluding training) £37,559 / year=£24 per hour (Assuming hours are based on family support worker: 1,552 hours/year). Training costs (to deliver the intervention) Two of 3 studies in the meta-analysis reported on training peers and in the other (Cook et al. 2012a) no information was provided. In one study, peers attended a 5-day course (Cook et al. 2012b) and in the other, peers received 'on-the-job training and learned by experience while working with experienced course instructors' (van Gestel-Timmermans et al. 2012, p55). Less-intensive (5-days): £376 (assume 1% of direct salary costs) More-intensive ('on the job'): £3,756 (assume 10% of direct salary costs) Intervention cost: 2.5 hours per week, 12 weeks, assuming for every 1 hour spent with group there is additional 2

			hours of preparation and related admin (in total, 48 hours per peer worker). Cost per peer worker=48 hours x £24/hour= £1,152 Training costs=£376 or £3,756 <u>Costs of the 2 peer workers</u> Low cost estimate: £1,528x2 peer workers=£3,056 High cost estimate: £4,908x2 peer workers=£9,816 **<u>Cost per participant</u>** **Low cost per person (assuming group size of 6)=£509** **High cost per person (assuming group size of 6)=£1,636**
Inflation rate from 2011/12 to 2013/14	Hospital and community health services 1.03% PSS annual percentage increase for adult services, all sectors 1.02%	No distribution.	From 2011/12 to 2013/14 (pay and prices) Health and social care service costs were presented together in Iemmi et al. (2015), so it was not possible to assign specific inflation rates for health versus social care services. However, it does not impact the results as the difference between health and social care inflation rates are very small (1.03% vs 1.02%). We have used the healthcare inflation rate to inflate the total health and social care costs from 2011/12 to reflect 2013/14 prices so as to make our results conservative. We calculated inflation rates using the pay and prices index from the Unit Costs Handbook (Curtis 2014, p263, 265). <u>Hospital & community health services (HCHS) index</u> Year Pay and prices 2011/12 282.5 2012/13 287.3 2013/14 290.5 <u>Inflation rate</u>=290.5/282.5=1.03% <u>The PSS annual percentage increases for adult services, all sectors</u> Year Pay and prices 2011/12 0.100 100 2012/13 1.700 101.7 2013/14 0.500 102.21

			Inflation rate=102.21/100=1.02%
Assumptions about differences in health and social care costs	Very optimistic: 6m=-£281 12m=-£1,574 Optimistic: 6m=-£140 12m=-£787 Conservative (6 and 12m): £0	**Gamma distribution** Very optimistic 12 months (α=0.14, β=584.47) 6 months (α=0.0029, β=15.03) Optimistic 12 months (α=0.03, β=145.93) 6 months (α=0.0007, β=3.73)	Iemmi et al. (2015) • Prices inflated from 2011/2012 to 2013/14. • Reported values (2011/12), - £1,531 (SD=4,124) lower for the sample for the 12-month period (statistically significant) and -£273 (SD=5, 098) lower at 6 months (not statistically significant). • Inflated (2013/14): -£1,574 for 12 months and -£787 for 6 months. Assumptions about very optimistic to conservative scenarios: • See full text for details (Section 4.3).0

5 Results

1. Background

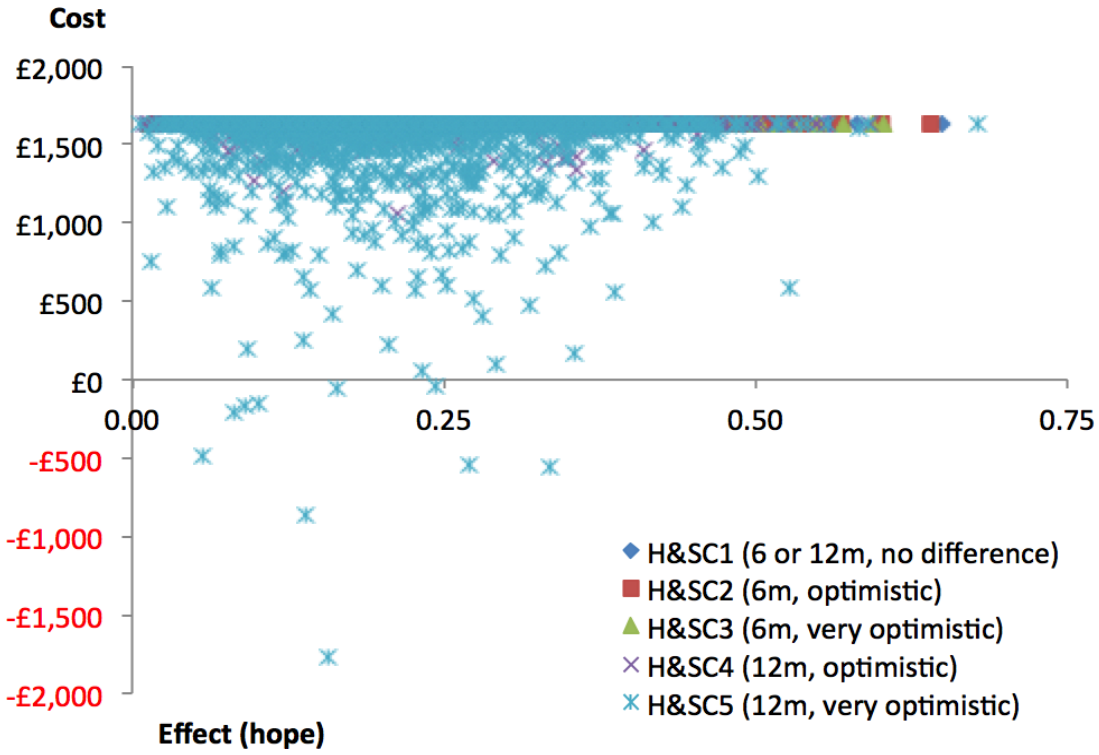
Monte Carlo simulations were used to determine the intervention's cost-effectiveness. Monte Carlo simulations are useful when there is uncertainty about the true value of the parameters used in the analysis.

To perform a Monte Carlo simulation, one must know or assume a probabilistic distribution of a particular parameter. In other words, there is a range of values that a parameter can take. In our analysis we had two types of parameter: outcomes and costs. For example, changes in individuals' level of hope or quality of life are both parameters. The mean and standard deviation change in hope and quality of life were reported. In a probabilistic distribution, each value that falls within the standard deviation is associated with a probability of it occurring. The collection of values and its associated probabilities is referred to as the 'probability distribution'. In the case of hope and quality of life, we have assumed that the probabilistic distribution is 'normal' and use a beta distribution. For costs, we have assumed a gamma distribution, which accounts for the common occurrence that service-related costs data in mental health studies are usually skewed.

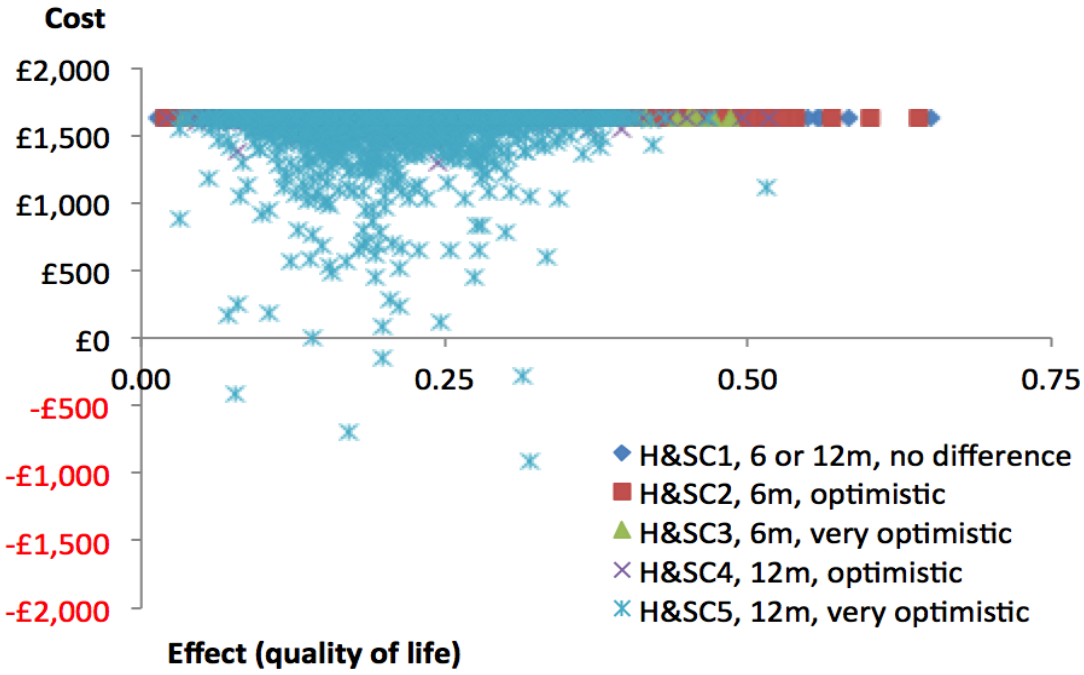
A Monte Carlo simulation performs the cost-effectiveness analysis a large number of times, and each time it selects a value at random from that probabilistic distribution. In our analysis, Monte Carlo simulations were carried out 2000 times for each scenario.

This type of analysis captures uncertainty in a way that helps us make a decision about whether the intervention is cost-effective or not. The results are presented in two complementary forms. The first result is shown in a scatterplot, illustrating the mean costs and QALYs 2000 times (**Figure 3 - Monte Carlo simulation, scatterplot, costs and effects**

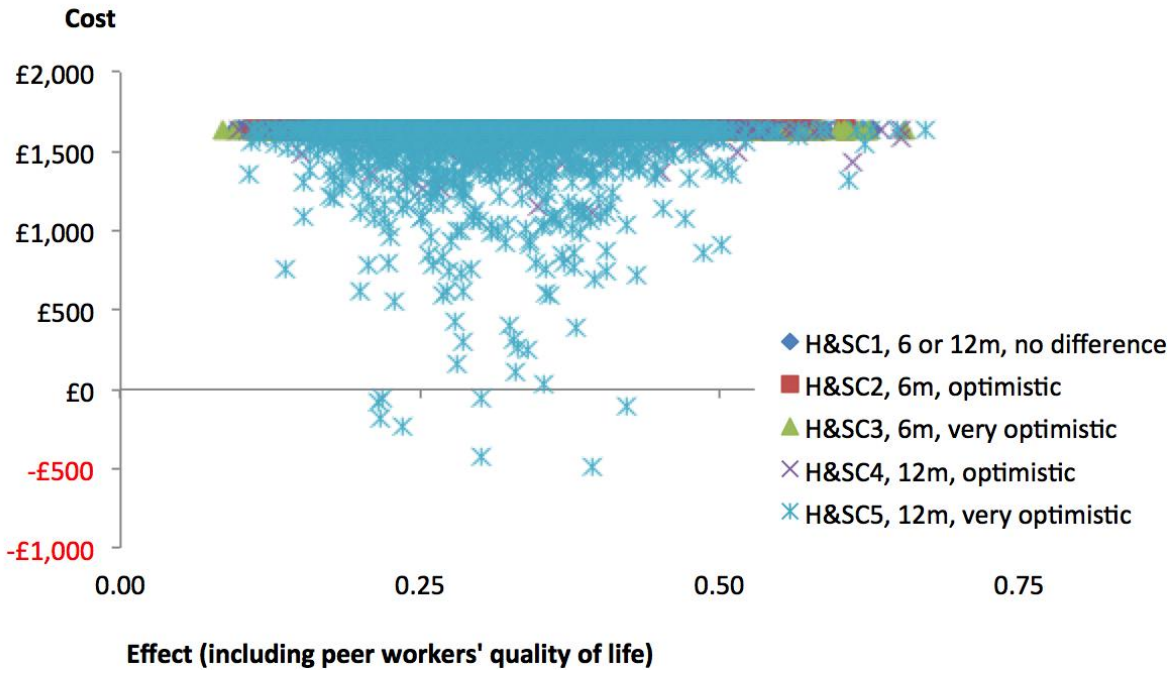
Outcome: Hope



Outcome: Quality of life



Sensitivity analysis
Outcome: quality of life of service user and peer worker



Findings from the cost-effectiveness acceptability curves

1. For the outcome of hope and quality of life, the intervention has similar probabilities of cost-effectiveness (given that they were already similar in effect size and variance). These are illustrated in **Figure 4** on the following page.

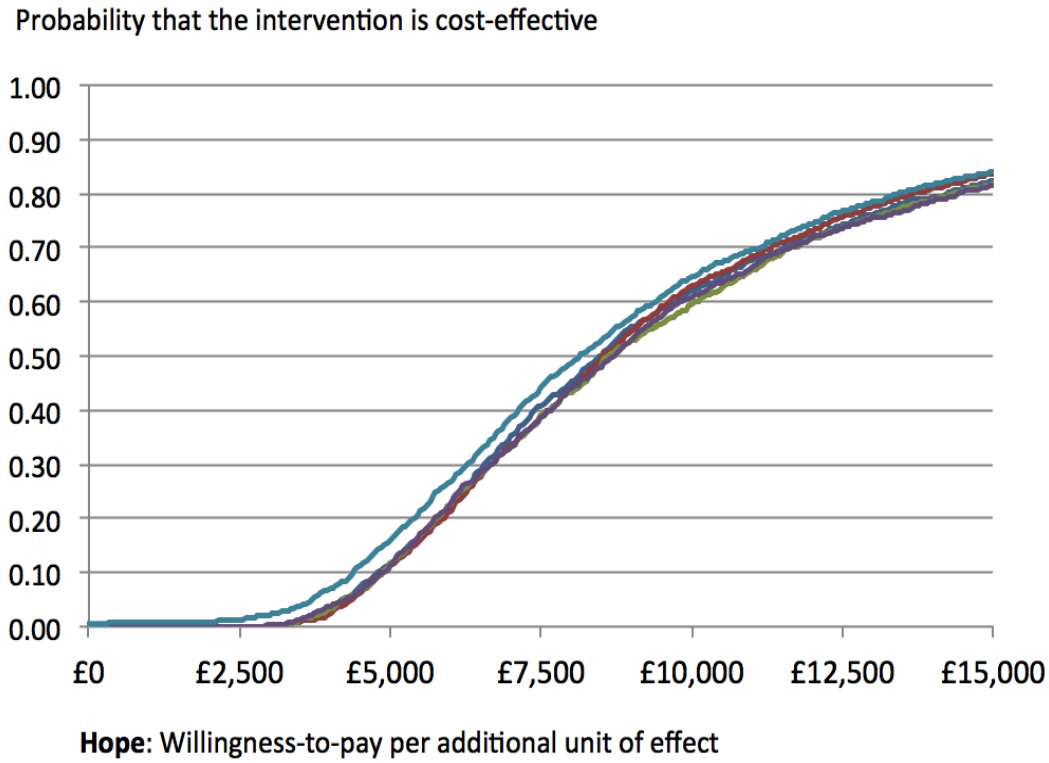
2. For the outcome of hope, there is an 80% probability that the intervention is cost-effective if willingness-to-pay per unit of additional of effect is £14,000.

3. For quality of life, an 80% probability requires a willingness-to-pay of £11,750.

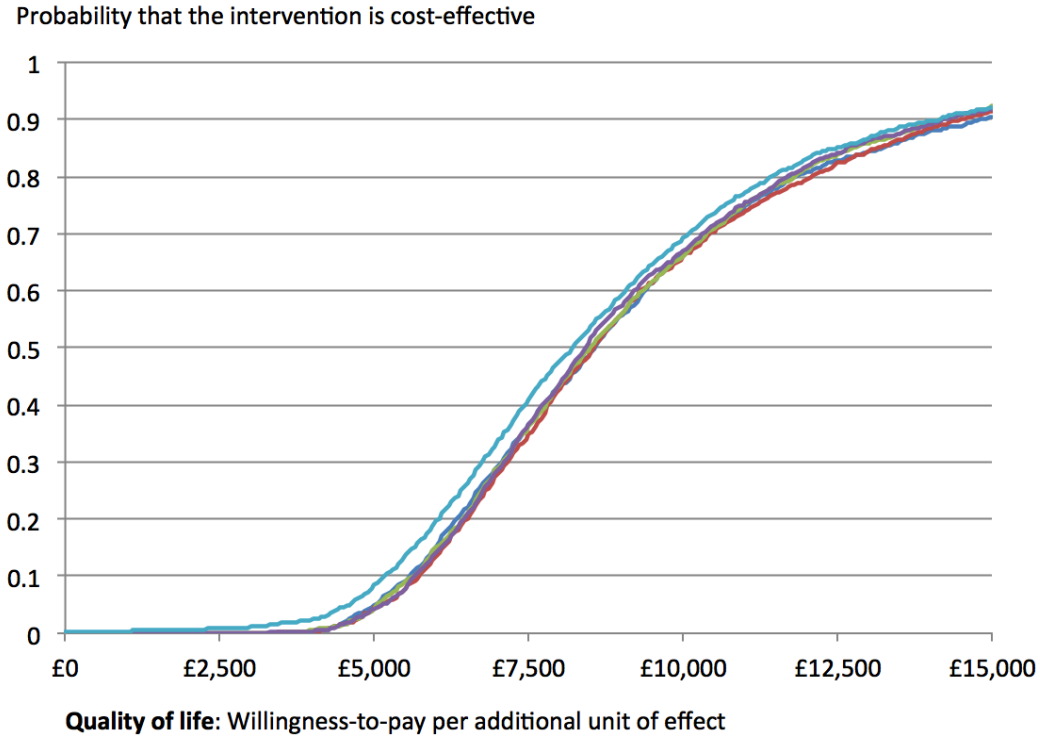
4. Including the impact on peer workers' quality of life makes the intervention more cost-effective. The intervention has an 80% probability of being cost-effective at a willingness-to-pay of £6,900. For the probability to rise to 98%, willingness-to-pay would have to increase to £10,250.

Figure 4 - Cost-effectiveness acceptability curves

Outcome: hope



Outcome: quality of life



Sensitivity analysis:
Outcome: quality of life of service user + peer worker

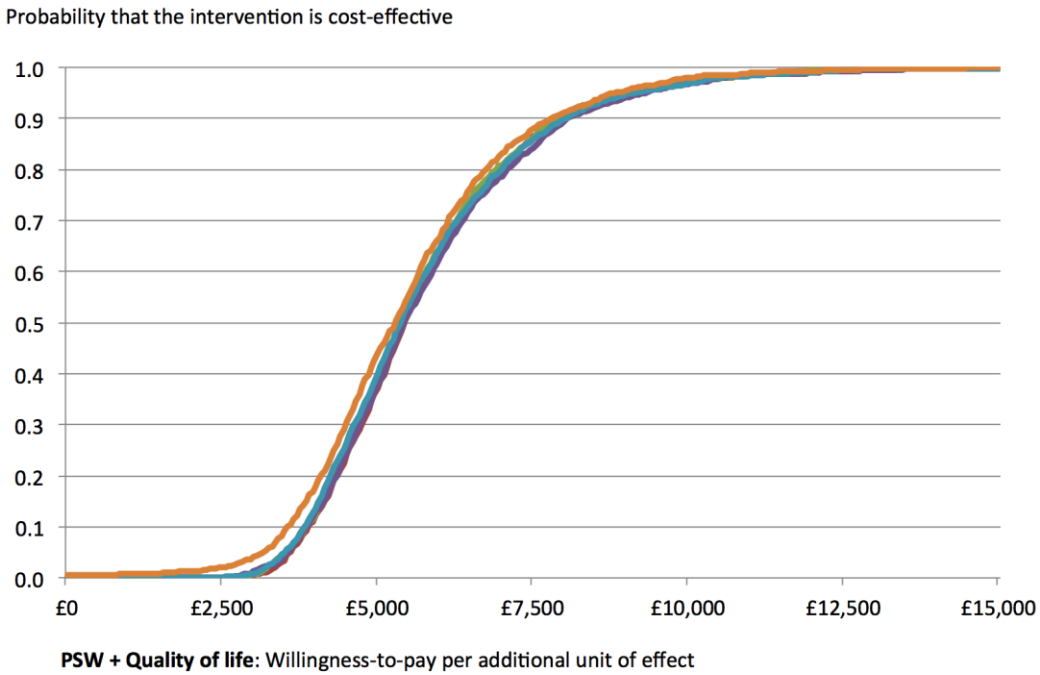


Figure 3). While it is a useful visual aid, this is then transformed into a cost-effectiveness acceptability curve (CEAC). The CEAC shows the probability that the intervention is cost-effective for different assumed values (i.e. £0 to £20,000) that a decision-maker is willing to pay per additional effect gained (Figure 4). In our analysis, the additional effect is measured in terms of hope and quality of life (not to be confused with QALYs).

Findings from the Monte Carlo simulation, scatterplot

The findings from the scatterplot indicate that the ICER is positive, which means that there are additional costs for additional gains in hope and quality of life (

Table 4,

1. **Figure 2**).

2. For the outcome of hope, the minimum and maximum range of mean ICERs is between £7,588 and £8,244 across each of the scenarios.

3. For quality of life, the range is between £7,885 and £8,244.

4. In the sensitivity analysis that assumes peer workers experience gains in quality of life, the intervention is more cost-effective with a range between £5,067 and £5,329.

5. Findings were similar across all health and social care cost scenarios and were broadly similar for 6- and 12-month time horizons.

Table 4 - Mean effect, costs, and cost-effectiveness ratios (ICER)

	Assumptions about cost differences between groups				
	6 or 12 months	**6 months**		**12 months**	
	Conservative	Optimistic	Very optimistic	Optimistic	Very optimistic
Results	No differences between groups	Intervention results in lower health and social care costs			
HOPE					
Scenario	**1**	**2**	**3**	**4**	**5**
Mean QALYs	0.20	0.20	0.20	0.20	0.20
Mean cost	£1,636	£1,636	£1,636	£1,631	£1,552
Mean ICER	£7,995	£8,065	£8,112	£8,097	£7,588
Quality of life					
Scenario	**1**	**2**	**3**	**4**	**5**
Mean QALYs	0.20	0.20	0.20	0.20	0.20
Mean cost	£1,636	£1,636	£1,636	£1,632	£1,562
Mean ICER	£8,224	£8,317	£8,222	£8,224	£7,885
Quality of life sensitivity analysis, assumes peer workers experience gains in quality of life					
Scenario	**1**	**2**	**3**	**4**	**5**
Mean QALYs	0.31	0.31	0.31	0.31	0.31
Mean cost	£1,636	£1,636	£1,636	£1,631	£1,556
Mean ICER	£5,329	£5,271	£5,322	£5,250	£5,067

Figure 2 - Mean ICERs for hope and quality of life outcomes

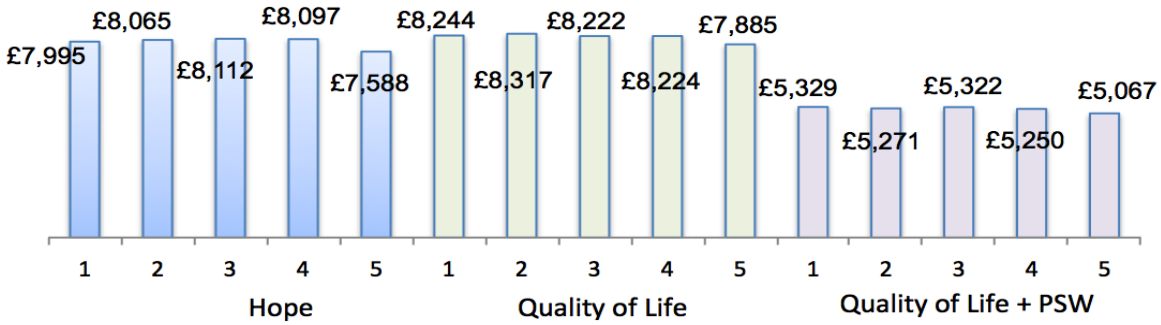
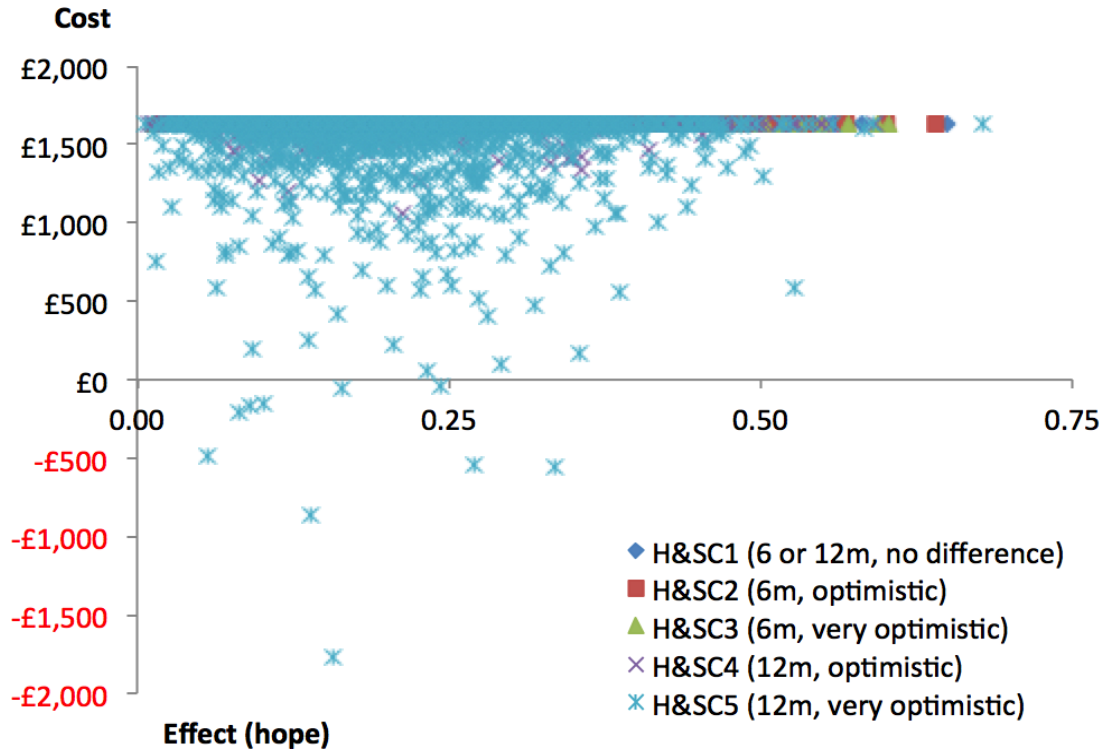
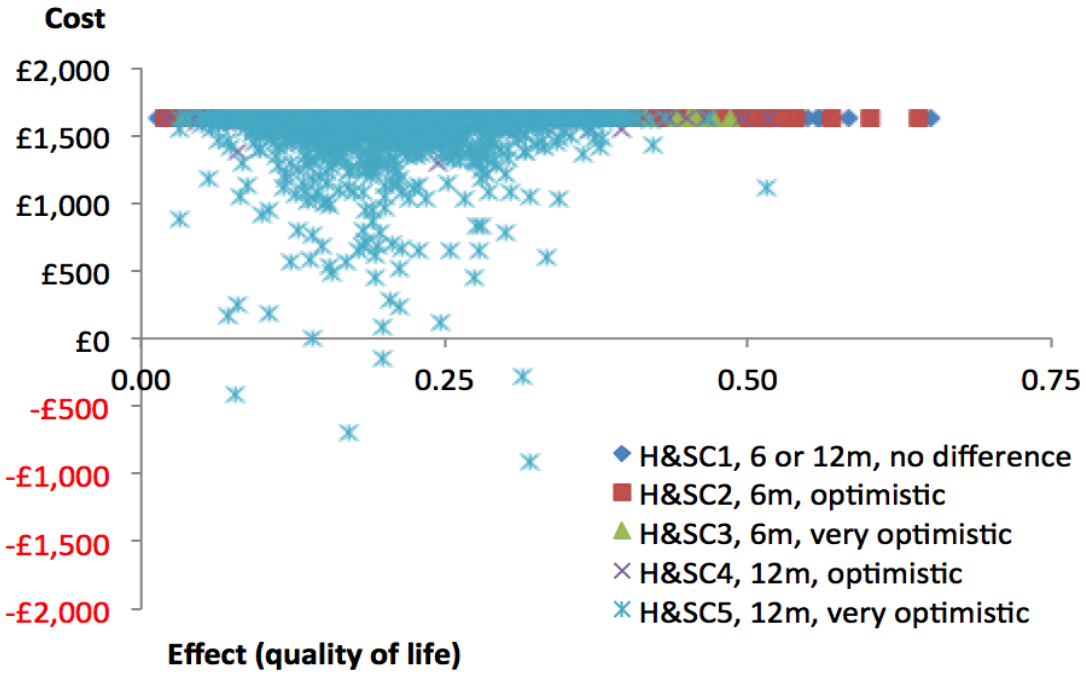


Figure 3 - Monte Carlo simulation, scatterplot, costs and effects

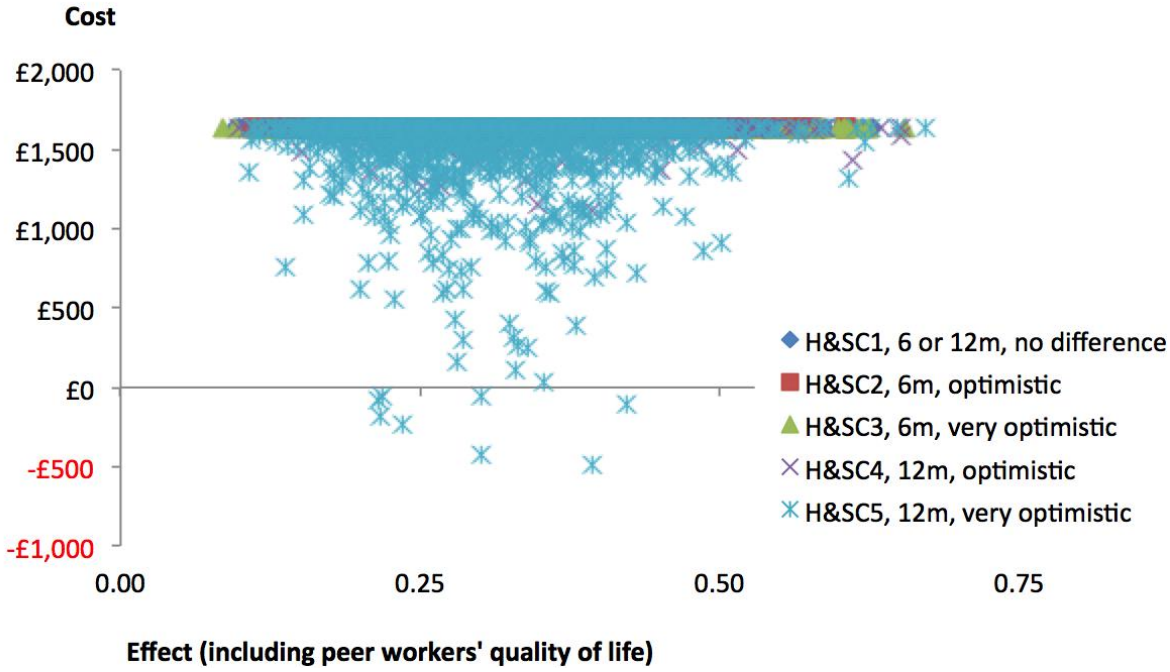
Outcome: Hope



Outcome: Quality of life



Sensitivity analysis
Outcome: quality of life of service user and peer worker



<u>Findings from the cost-effectiveness acceptability curves</u>

5. For the outcome of hope and quality of life, the intervention has similar probabilities of cost-effectiveness (given that they were already similar

in effect size and variance). These are illustrated in **Figure 4** on the following page.

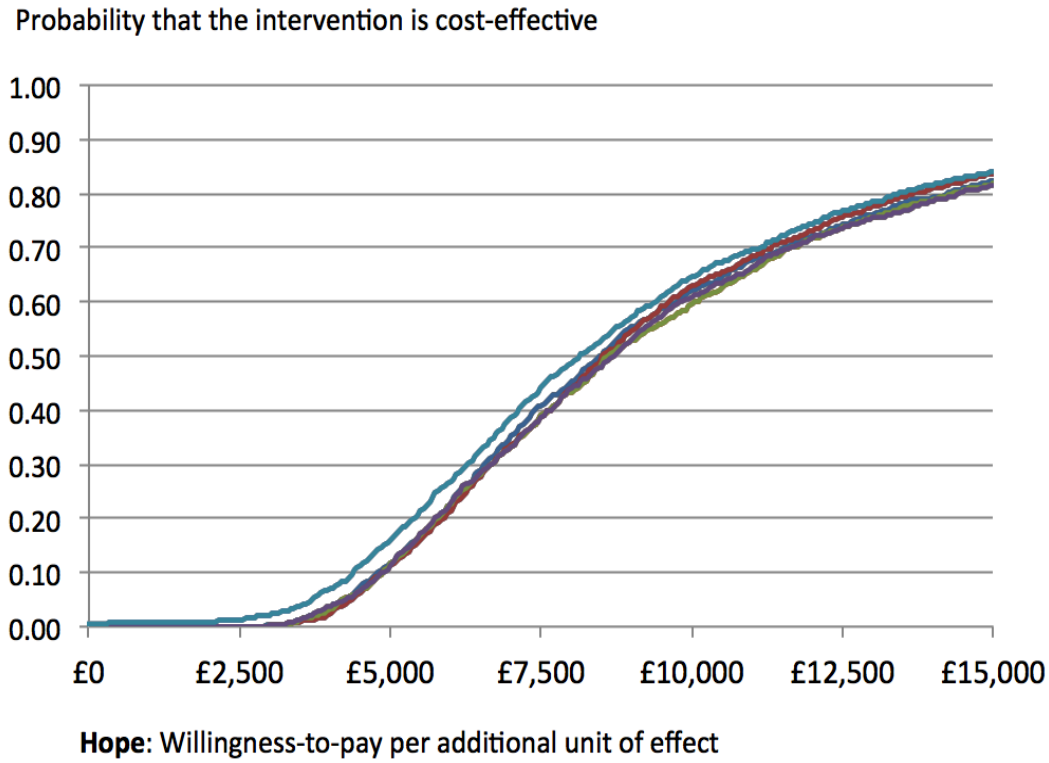
6. For the outcome of hope, there is an 80% probability that the intervention is cost-effective if willingness-to-pay per unit of additional of effect is £14,000.

7. For quality of life, an 80% probability requires a willingness-to-pay of £11,750.

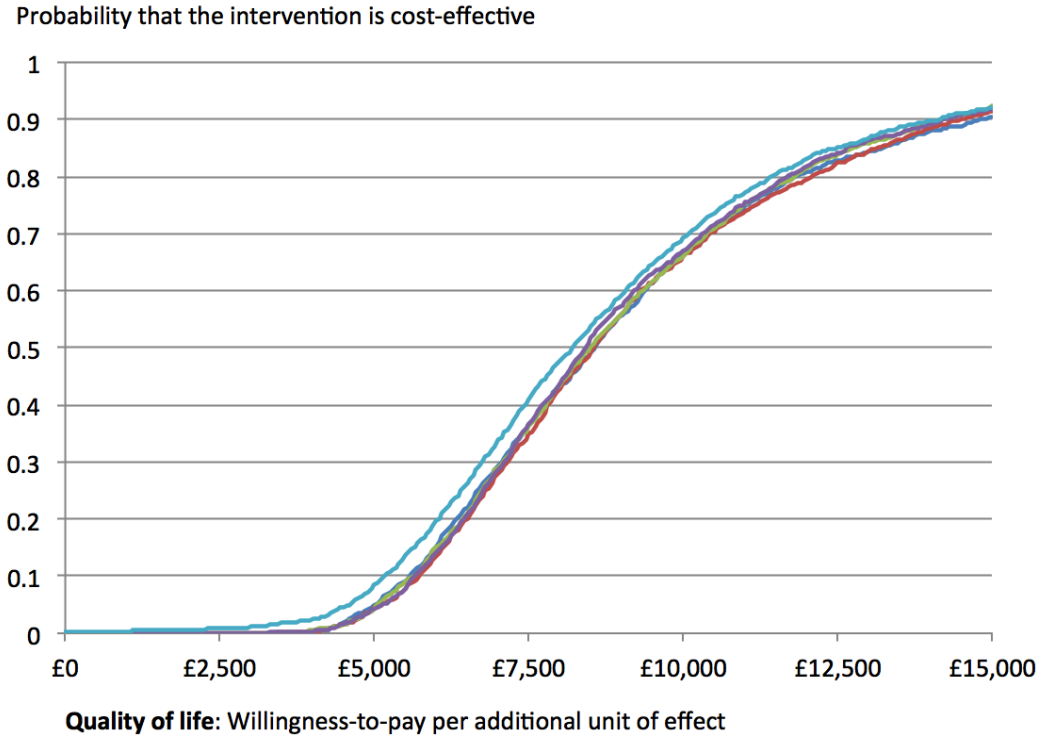
8. Including the impact on peer workers' quality of life makes the intervention more cost-effective. The intervention has an 80% probability of being cost-effective at a willingness-to-pay of £6,900. For the probability to rise to 98%, willingness-to-pay would have to increase to £10,250.

Figure 4 - Cost-effectiveness acceptability curves

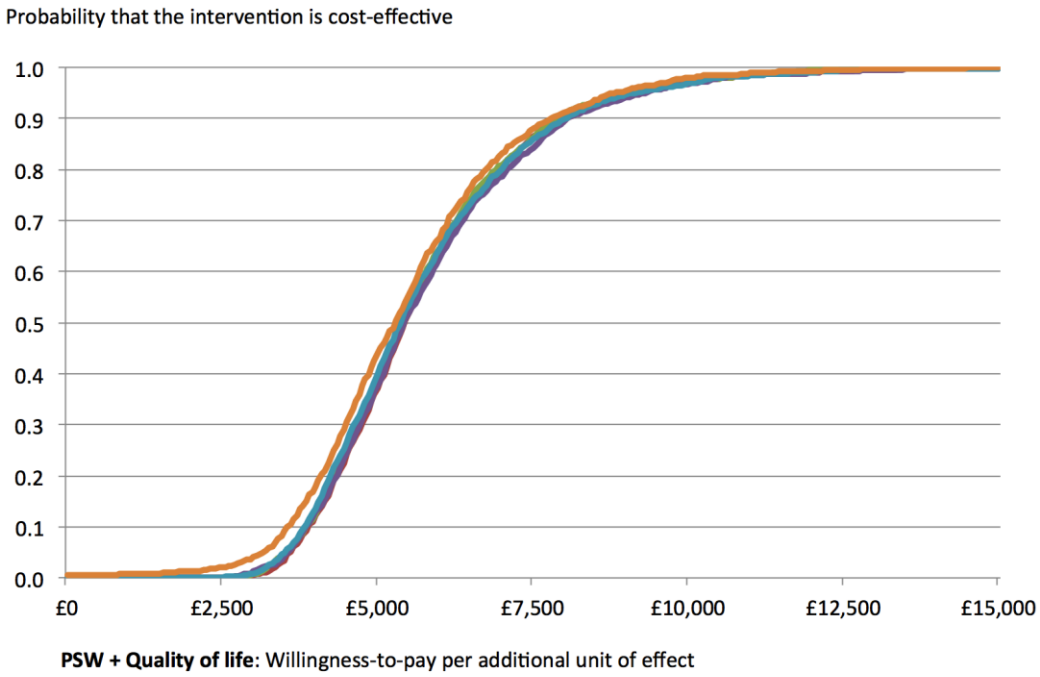
Outcome: hope



Outcome: quality of life



Sensitivity analysis:
Outcome: quality of life of service user + peer worker



PSW + Quality of life: Willingness-to-pay per additional unit of effect

6 Discussion and limitations

Limitations

The analysis does contain some serious limitations: the exclusion of the impacts on individual productivity, on the housing and legal sectors and on informal carers. Furthermore, we had to make assumptions about the impact on health and social care resource use, as these were not measured in the studies.

A further limitation is to acknowledge that 2 of the 3 studies in the meta-analysis provided small financial incentives to study participants with the purpose of minimising data loss (i.e. interview and data collection, not to boost participation in the intervention). In comparison to the study that did not use financial incentives, participation rates were slightly lower but were still very similar. Participation rates were between 80 and 70% (no financial incentive). Among the studies providing financial incentives participation rate was 88% and 86% at first and second follow-up points in one study. In the second study, participation rates were 80% and 75%.

Excluding public sector and societal perspective from the analysis

We did not conduct analyses from the public sector or societal perspectives due to a lack of robust information in this area. The same paper that provided information on the use of health and social care services (Iemmi et al. 2015) also collected information on the use of criminal justice services and impact on individuals' productivity. We did not use these findings in the analysis because the changes were not statistically significant, very small, contained large variation and lacked a randomised control group. Therefore, while we could have incorporated these figures into the analysis, the impact on the results would have been very marginal as the impact was very small. For detail on the exact changes to these sectors, please refer to the footnote below.[13]

Excluding impact on carers

The study did not measure impact on carers. While we would expect that service users' improvements in hope and quality of life could positively impact

[13] From the UK study, mean legal/criminal justice costs per person were slightly higher but not statistically different at 6 months (£70, SD=2,662) and 12 months (£254, SD=1,999) (Iemmi et al. 2015, p20). This was driven by the fact that, even though there are very slight increases in mean criminal court appearances per person (0.07, SD=0.51) and civil court appearances per person (0.03, SD=0.26), these activities have high unit costs (£13,360 per criminal court proceeding and £854 per civil court proceeding). There was also a very slight increase in mean psychiatric assessments per person while in custody (0.05, SD=0.28), which also has a moderately high unit cost (£358 per assessment).[13]

The societal perspective considers the impact on individuals' productivity. Iemmi et al. (2015) collected individuals' employment patterns as measured by days absent from work and working hours per week. At 6 months, there was a very slight decrease in hours per week (-0.08, SD = 6.86) and a very slight reduction in days absent from work (-0.01, SD=14.69). Neither was statistically significant. At 12 months, changes were still not statistically significant, but there was an increase in working hours per week (3.78, SD=8.99) and greater reductions in days absent from work (-24.44, SD=33.24).

on their informal carers, we could not find precise information on those links. Furthermore, it is unclear whether impacts would be immediate or lagged.

Assumptions about impact on peer workers

The studies do not measure impact on peer workers, so we made an assumption that they increased workers' quality of life in our analysis. However, it is unclear what the impacts may have been on their use of health and social care services. Would participating as a peer worker have contributed to lower use of services? We did not attempt to make assumptions about this in the analysis.

Assumptions about service users' use of health and social care services

The studies in the meta-analysis did not directly measure impact on health and social care service use. We attempted to make up for this by referencing the only other similar study available – the one UK pre/post test study (Iemmi et al. 2015). However, this is a potentially minor limitation considering we undertake various cost scenarios in our analyses, all of which left the intervention cost-effective at very low levels of willingness to pay.

Strengths

The strength of our analysis is that it takes a conservative approach and our conclusions reflect this. This includes using the upper end of the intervention costs in all analyses, using a conservative estimate of effects on peer workers in the sensitivity analyses, and testing various 'what if' scenarios regarding potential changes in health and social care resource use.

We deal with the uncertainties in our analysis using a variety of tools. We use probabilistic analyses using Monte Carlo simulations and findings are based on a meta-analysis of three RCTs. We also triangulated our findings, referencing the small pre/post UK study (Iemmi et al. 2015).

Conclusions

With the available information, the probability that the intervention is cost-effective may be underestimated. This is possible if we assume that informal carers would have experienced positive effects, if impacts on peer workers' quality of life would be higher than what we assumed them to be, and finally, if we assume that there would be some reductions in peer workers' health and social care resource use.

7 Linking evidence to recommendations

The Guideline Committee decided they would make recommendations based on this economic analysis. Some Guideline Committee members agreed that the impact on peer workers may be greater than what was used in our analysis. They supported the idea that the cost-effectiveness may be underestimated. One Guideline Committee member specifically drew on their experience of being involved with a peer support programme.

The recommendation is as follows:

> Recommendation 1.6.10
>
> 1.6.10 For people being discharged from hospital consider a group-based, peer-delivered self-management training programme as part of recovery planning. Sessions should:
> - continue for up to 12 weeks
> - be delivered in groups of up to 12 members
> - provide an opportunity for social support
> - cover:
>   - self-help, early warning signs and coping strategies
>   - independent living skills
>   - making choices and setting goals.

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9 Appendix - Study characteristics

Meta-analysis			**Additional literature**
van Gestel-Timmermans et al. 2012 Netherlands	**Cook et al. 2012a USA (Ohio)**	**Cook et al. 2012b USA (Tennessee)**	**Iemmi et al. 2015 England**
Intervention			
Recovery is up to you	Wellness Recovery Action Planning (WRAP)	Building Recovery of Individual Dreams and Goals through Education and Support (BRIDGES)	Mental Health Foundation peer-delivered self management
Each session was organised around a specific, recovery-related theme. - Meaning of recovery to participants, personal experiences of recovery - Personal values - Personal desires for the future - Making choices, goal-setting - Participation in society, roles in daily life, how to get social support, abilities and personal resources, and empowerment and assertiveness	- Personalised wellness strategies - Daily maintenance plan for both physical and mental health - Early warning signs and coping strategies	- Info on mental illness and treatments - Self-help and the philosophy of recovery - Independent living skills such as job readiness, interpersonal communication, and assertiveness	'Aimed to teach goal-setting and problem-solving techniques, to empower people and to facilitate meeting with others and sharing of experiences.' 'Topics covered by the intervention could vary: relaxation, complementary therapies, communication skills, getting the best from appointments with professionals, lifestyle and health, support networks, medication and alternatives, becoming a self-supporting peer group, getting back into employment/voluntary work/education, evaluating information and approaches.'
12 weeks (3 months) 2 hours long 2 peers	8 weeks (2 months) 2.5 hours long 2 peers, 3rd as backup for emergencies	8 weeks (2 months) 2.5 hours long 2 peers, 3rd as backup for emergencies	2-day + 6 half-day workshops (3 months) 6 peer-group meetings (next 6+ months)
Measurement points			
Baseline, 3, 6 months	Baseline, 3, 9 months	Baseline, 2, 8 months	Baseline, 3, 6, 12 months
Primary DSM-IV diagnosis			
Psychotic=29-38% Affective=36-37% Anxiety=20-25% Personality=30-34%	Schizophrenia=12% Schizoaffective=10% Bipolar=38% Depressive=25% Depressive=13% (Does not add up to 100%)	Schizophrenia=15.5% Schizoaffective=5.5% Bipolar=40% Depressive=18% Other=8.5% (Does not add up to 100%)	Schizophrenia, psychosis=5-10% Bipolar=65–83% Depressive=12–15% Depressive=0-5% Personality disorder=1–5%
Mean age			
43–44 (SD = 10)	46 (SD=10)	42 (SD=10)	43 (SD=12)
Gender (female)			
68%	66%	56%	61%
Employed			
55%	15%	9%	21–30%
Living in own home			

75–83%	67%	48%	Not measured
Marital status (married / cohabiting)			
17–15%	10–12%	15%	Not measured
Hospitalisation in past year			
0=85–86% 1=9-10% 2+=5%	Not recorded.		
Services received during intervention			
Not recorded.	Case management 73% Medication management 75% Individual therapy 75% Group psychotherapy 24–27% Employment services 19–20% Residential services 17–18% Substance abuse treatment 5–7%	Case management 71% Medication management 80% Individual therapy 71% Group psychotherapy 28% Employment services 25% Residential services 35% Substance abuse treatment 15%	Difference, baseline to 12 months Inpatient days=-3 (9.4) Outpatient sessions=-1.3 (4.4) Day activity hours=-5.3 (32.1) Community care hours=-1.4 (18.3) Working hours per week=3.78 (8.99) Days of absence=-24.44 (33.24)

Meta-analysis			
Study information	**Cook2012a**	**Cook 2012b**	**Van Gestel 2012**
Monetary incentive for study participants?	YES. 'Participants received a research stipend of $20 for the first interview, $25 for the second, and $30 for the third, and a $10 bonus for completing all three.'	YES. 'Participants received a research stipend of $20 for the first interview, $25 for the second, and $30 for the third, with a $10 bonus for completing all three.'	NO.
Participation rate in assessment interviews	80% and 75% at time 2 and time 3 follow-up periods.	88% and 86% at time 2 and time 3 follow-up periods.	80% and 70% at 3 and 6 months follow-up.
Enrollment period	March 2007–2009	Oct. 2006–April 2008	Sept 2006–July 2008
Exclusion criteria	Very few	Very few	Many more. Suicidal ideation, florid psychotic symptoms, or substance abuse during the peer-run course.
Requirements for peer workers (unrelated to training)	No information given	No information given	'To become a course instructor, individuals had to be in an advanced state of their recovery process – that is, they had to be living "beyond their illness"' (p55).

Training for delivering the intervention	No information given	‘Certification requires attendance at 5-day training sessions sponsored by the Copeland Center for Wellness and Recovery along with mentoring from advanced-level WRAP facilitators who observe and provide feedback’ (p541).	‘Course instructors who previously participated in the course and had then successfully completed a train-the-trainer course – (received on- the-job training) and learned by experience while working with experienced course instructors’ (p55).