

Shifting demand for non-medical services

An evaluation for the People Keeping Well in the Community programme

Final Report

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The
University
Of
Sheffield.

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Evaluation Team, University of Sheffield School of Health & Related Research

Janet Harris

Abu Abualbashir

Robert Akparibo

Steve Ariss

Annette Haywood

Fabrizio Messina

John Soady

Tracey Young

Enquiries to: Janet Harris janet.harris@sheffield.ac.uk

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Executive Summary

1. Introduction

This evaluation looked at the effectiveness of **one component** of the People Keeping Well Programme – the brief intervention provided by **Community Support Workers** to identify people at risk who had non-medical issues, and link them with a range of services in Sheffield.

The evaluation was split into three stages:

- The **first stage** of the evaluation which started in September 2015 was formative, looking at how the service was set up, whether there was demand and how Community Support Workers connected clients to sources of support.
- The **second stage** of the evaluation continued to monitor demand, while exploring two aspects of cost benefit e.g. client and wider stakeholder satisfaction with the service, and whether the brief intervention could be related to changes in unplanned hospital admissions and use of social care.
- The **third state** searched for evidence of impact in similar services, and compared the findings with the wider evidence base for community support.

2. Demand for the Service

There is a demand for the service, as evidenced by the increasing number of referrals.

Key points around demand are:

- All sectors are referring to the service, indicating **increased awareness of risk**.
- **Demand is increasing** despite relatively low levels of publicity outside of general practice, with increasing numbers of referrals from the below 70 age groups.
- The service **successfully identifies people at high risk**, as evidenced by the significantly higher proportion of conditions related to avoidable admission in the PKW cohort.
- The service also **identifies people with a wide range of non-medical needs**, as evidenced by the very low number of people who are actually referred back to the health sector.

All of these factors indicate that **awareness has been raised** across health and non-health sectors about risks associated with **financial issues, unsuitable housing, social isolation and general lack of knowledge** about how to access services. Variation in referral sources across neighbourhoods may indicate areas where there are **insufficient local assets** and a lack of community cohesion.

From the formative stage of the evaluation, we can conclude that there is solid evidence that the referral process effectively identifies people at high risk for avoidable hospital use and enables targeted assessment of need for social care packages.

3. Short Term Effectiveness of the Community Support Worker Service

The CSW service is a brief intervention, consisting of 1-2 sessions with a client and a maximum time period of 21 days to sort issues and refer clients on to further sources of support. Both quantitative data and interview data showed that assessment is able to **successfully identify additional issues that were not identified at the time of the original referral.**

The main issues identified are:

- loneliness/social isolation
- concerns for carers
- need to determine benefits eligibility
- struggles with mental and health conditions

These require social intervention and peer support. Clients report that the brief intervention provided by CSWs **reduces anxiety and social isolation**, and increases wellbeing over the short term.

Both client interviews and worker job descriptions confirmed that the approach used by CSWs is **consistent with the international evidence base** for effective peer support. CSWs are able to shift some demand by referring clients to a wide range of non-medical services. Short term interventions **make home environments safer, reducing risk of accident and injury.** They connect clients to relevant sources of information and support, which **reduces anxiety and increases quality of life.**

The service cannot, however, be associated with a reduction in avoidable use of secondary care or change in the number and size of social care packages. It was not possible to establish a relationship because the service was rolled out across the entire city. This meant that there was **no opportunity to compare the group receiving the intervention with a control group.** General practitioners reported a reduction in non-medical appointments, but it was not possible to quantitatively assess change **due to city-wide barriers to sharing primary care patient data.** This barrier has been recognised as an issue across most areas of England. As a result, **it was not possible to complete an economic cost benefit analysis.** The other component of cost benefit – satisfaction with the service – was confirmed across clients, general practitioners, and other stakeholders in Sheffield.

4. Longer Term Effectiveness of the CSW Function

Although the majority of cases were closed within 21 days, the data showed that 14% of clients returned more than once. In follow up interviews, clients and CSWs reported **a range of barriers to accessing the services** that they were referred to.

Systems barriers include:

- waiting for assessment after being referred on to another organisation
- being told you are eligible, but experiencing long waits with no update on what to expect next
- being told that you are not eligible for a service after being referred

The first two reflect issues with **systems capacity**, while the third illustrates an issue with **'line of sight'** e.g. situations where eligibility criteria have changed, or

are deemed too narrow to fit the client's needs. At each of these points, clients may become **disillusioned and disengage**.

Effects from the brief intervention cannot be sustained when clients experience barriers in accessing services after their case is closed. **Long waits and disengagement return clients to the high risk group**. Referral rebound harms clients, increases health risk, decreases wellbeing and contributes to health inequalities. Effectiveness of the CSW service – which basically links and connects clients – is **dependent upon the capacity and responsiveness of the sectors** to which clients are referred.

5. Short Term Assessment & Signposting: The Wider Evidence Base

There is no evidence that short-term signposting and brief support with navigation has a direct impact on reducing unplanned hospital admissions. Referral to longer term support **may** have an indirect impact by connecting clients, but the wider evidence base cannot show that a CSW service indirectly impacts unplanned admissions by linking people with case management.

There is, however, a strong international evidence base across diverse health and social care settings that community-based self-care is effective because it is based on **peer support**.

Peer support is most commonly provided via health trainer services (moderate to strong evidence base), Social Prescribing and Local Area Coordination (emergent evidence base). Workers who are actually based in communities can provide the most effective peer support and increase health literacy. It is likely that increased health literacy is related to utilisation of health services. Focusing on improving health literacy **may therefore shift demand for services**. Although the CSW service provides peer support, it is a brief intervention and as indicated in the evaluation effects are likely to be difficult to sustain unless people are connected to workers who can provide longer term peer support.

6. How the CSW Service Can Reduce Risk

Raising awareness across health, social care and other sectors promotes early identification of risks and then referral to the CSW.

Key points around reducing risks are:

- Referring people to a link worker, who has a **comprehensive knowledge of local assets** and centralised services, which will enable the worker to match client's needs with existing resources.
- Workers who are skilled in providing peer support and assessing health literacy will be able to engage with clients, **identify unarticulated needs**, and enable clients to understand and apply information to adjust to and improve their life circumstances.
- When workers who receive referrals from CSWs are aware of the resources in their own organisation as well as other services, they can continue to match client needs to services. This **reduces referral rebound** and reduces risk.
- When workers across the system are able to sustain and build upon the original connections made by the CSW, clients will experience increased wellbeing, be

less socially isolated, have better health literacy, be able to independently access information and apply it to maintain health.

- Improved health literacy and peer support will **shift demand for non-medical support to local services**, reduce non-medical GP visits, lead to more timely and appropriate use of primary care, and eventually reduce avoidable use of secondary care.

However, if workers in different sectors are not aware of literacy and health literacy issues, and unable to provide rapid response, then clients will experience frustration, and may disengage. They will continue to be **socially isolated and at high risk of needing health care and social care packages**.

7. Keeping People Well in Communities: The Wider Evidence Base

Research was reviewed in order to link the findings from the CSW service evaluation to international research on effectiveness.

We looked at two areas:

- a) whether self-management, case management, social prescribing and local area coordination reduces hospital admissions; and
- b) whether the provision of peer support increases health literacy and can be related to utilisation of health and social care services.

Community-based services that identify people who are potentially at risk are unable to show a relationship with reduced hospital admissions. Recent reviews in the UK have **questioned whether this is an appropriate outcome** for services that aim to identify, connect and develop skills in navigating systems and self-managing situations.

There is a **solid international evidence base for interventions that offer peer support and aim to increase health literacy, which are the key elements of the CSW service**. Peer support aims to provide information, signposting, and practical support by 'going with' and 'doing things with' clients until they are able to independently navigate their way through systems to get their needs met. A recent systematic review showed how ongoing peer support is related to improved health literacy and reduced health inequality, and research has indicated that **improved health literacy is related to lower utilisation of health services**.

8. Conclusions: Do we have 'good enough' evidence for decision making?

When deciding whether evidence is good enough to inform decisions about services, policy makers generally ask:

1. Does doing this work better than doing that?
2. How does it work?
3. Does it matter?
4. Will it do more good than harm?
5. Will service users be willing to or want to take up the service offered?
6. Is it the right service for these people?
7. Are users, providers and other stakeholders satisfied with the service?
8. Is it worth buying this service?

For the CSW service, these questions could be phrased as:

1. Does early identification and referral to a CSW channel non-medical demand better than addressing these issues in a GP consultation?

General practitioners felt that the CSW service was **better at rerouting non-medical issues**. Service data on actions taken by CSWs confirmed that a very low proportion of clients were referred back in to the health sector.

2. How does early identification and referral work?

Referral works because CSWs are able to provide peer support, **which identifies client issues and signposts clients to relevant information and sources of support**.

3. Does it matter whether a referral service is provided?

If the service were decommissioned, it is likely that clients would continue to use general practices for non-medical issues. The **phenomenon of 'frequent flyers'**, who return to general practice because underlying social issues are not addressed, **would be perpetuated** and clients with complex social needs would remain in high risk groups.

4. Does a CSW service do more good than harm?

The service **connects 86% of clients to non-medical sources of support**. There is, however, potential to harm clients if referral rebound occurs when systems are unable to provide a timely response. It should be noted, however, that this harm is no different from the current situation where clients describe being 'passed from pillar to post' as a result of fragmented systems.

5. Will service users be willing to or want to take up the service offered?

Over **90%** of service users took up the CSW service when it was offered.

6. Is it the right service for these people?

The brief intervention **responds rapidly** to client issues and signposts to other service. Continuing issues with fragmented and non-responsive systems, however, indicate that it may be better placed within neighbourhood partnerships which provide longer term peer support, which can follow up with agencies when there are systemic barriers to accessing support.

7. Are users, providers and other stakeholders satisfied with the service?

High levels of satisfaction were documented in interviews. **GPs report being very satisfied** with the service, this is confirmed by the increase in referrals across most practices. The increasing proportion of referrals from other sectors indicates that **other stakeholders are also satisfied**.

8. Is it worth buying this service?

Discussion with GPs indicates that if the service were decommissioned, **rates of non-medical consultations would return to previous levels**. Lack of access to GP appointment data means that this perception can't be confirmed. If embedded within emerging neighbourhood partnerships in Sheffield, the referral service could contribute to reducing pressure across a range of public services and more effective self-care.

8.1 Conclusions: Achieving Outcomes

In terms of the degree of confidence that the service can achieve outcomes for non-medical support, we could conclude that the referral system represents:

- a) **good practice**, because practitioners have trialled the system, they like it and feel it has made an impact; and
- b) **a promising approach** that is evidence based when the brief intervention is linked to longer term community-based peer support.

The CSW service has **achieved its original aim**, which was to raise awareness about risk, and promote referral to other sectors for support with non-medical issues. We can conclude that a concerted effort promotes referral by health professionals and positive experiences with the service increase referral from other sectors. The CSW service, however, is only one part of the People Keeping Well Programme so impact needs to be considered as part of the wider system of shifting demand. The main message is that **the success of the service depends on being able to connect people to longer term peer support**. Peer support is already provided across a number of areas in Sheffield via anchor organisations under the PKW neighbourhood partnership model. Neighbourhood partnerships are currently developing networks of support via social prescribing.

8.2 Conclusions: Future Commissioning & Data Collection

The questions for future commissioning are:

1. There are many referral routes for non-medical issues so how does the service contribute to what is already provided, and how does it affect other aspects of the health and social care system?
2. Is it possible to embed the service within neighbourhood partnerships, who refer directly to community-based workers in anchor organisations?
3. What is the capacity of anchor organisations to respond to non-medical issues?
4. What is the impact of shifting demand to non-medical sources of support, in terms of increasing health literacy and reducing use of GPs?
5. How much resource is needed to address non-medical needs?

Given the positive response to the service, an **incremental approach** could be taken where data on the above questions is collected in selected areas of the city over a period of 6-12 months, and used to inform future commissioning decisions.

Although the evaluation has begun to document how the service contributes to shift in demand, plans to continue to monitor should be implemented in order to **capture longer term effects**. Linking identification, assessment, and referral is critical to move clients out of high risk groups.

People who are referred on to other sources of support need to be monitored to determine whether the original issue defined by People Keeping Well – which is the experience of being passed from pillar to post – has been alleviated.

The function of CSWs overlaps with the function of community organisations in the more well resources areas of the city. This **potential duplication needs to be reviewed** in order to make decisions about spreading support to less resourced areas. The next stage of service development needs to consider **where workers would be best placed**. Blockages and barriers in systems need to be mapped to identify where to target resources to ensure that clients are not lost to networks of support.

Specific evaluation activities that could inform future decisions include:

- Comparing job descriptions of CSWs and community-based workers, to establish where there is duplication and added value.
- Monitoring current capacity to take referrals and mapping how clients currently move through systems in order to create baseline data which can be used to identify where there are ongoing issues with system capacity.
- Establishing the real cost of services received on both a single service level and as a 'bundle' of services for clients with multiple and complex needs. This data can be used to determine whether there are distinct clients groups. If there are, then segmentation can be used to decide which bundles of services are most likely to be cost effective.
- The impact of connecting clients to appropriate services needs to be redefined, based on outcomes that can be directly attributed to what was provided. Access to general practice data is needed in order to assess whether the service can shift non-medical demand and free up more GP time to address medical needs.
- Impact needs to be redefined as a process of providing peer support, and relating support to increased health literacy. Impact should be measured by costing non-medical GP appointments, costing peer support services, monitoring shift in demand.

Section 1:

Overview of the People Keeping Well Programme

In 2015, Sheffield received a Transformation Challenge Award to pilot a community support service to enable people to keep well in the community. The programme was developed through a series of consultations with a wide range of people in Sheffield, who described how life circumstances such as challenges with finance and housing and life transitions such as becoming a carer and experiencing bereavement affect health and wellbeing. These challenges are even more difficult when people are socially isolated. People who lack a support network have limited opportunities to get advice and information, or access the support needed to care for themselves in the community. Where people have support networks, their family and friends may not have the knowledge or experience to help them navigate through complicated systems. The proposed solutions were outlined as:

- More comprehensive identification of people at risk of declining health and wellbeing
- Earlier provision of support, ideally in people's homes and communities
- More integrated, joined-up care that brings together NHS, social care, and other forms of care and support

An outcomes framework was coproduced with a wide range of providers, voluntary, charitable and faith organisations (VCF) and citizens (Figure 1). The key components of the People Keeping Well model are:

- **Personalised Support / Outreach (risk stratification):** People at risk of poor health and wellbeing outcomes are identified and *proactively* supported (e.g. through home visits where good quality information and advice is taken to the people that need it most)
- **Life navigation:** People at high risk of poor outcomes get longer-term support to help them achieve their goals
- **Information and advice:** Everyone has access to good information and advice to help them achieve better health and wellbeing – e.g. advice about the things they can do to achieve their wellbeing goals
- **Wellness planning:** People are supported to set their own goals, make plans, and take action to improve their health and wellbeing
- **Community assets:** Every neighbourhood has the *right* services, activities and support – tailored to the needs of the people living in that neighbourhood

Figure 1: Outcomes Framework

Outcomes Framework – People Keeping Well in their Community						
Function	Risk Stratification	Local Inform & Advise	Asset Based Community Development	Targeted Support	Self-Care – Wellness Planning	Life Navigation
Outcome	Targeting of people (including Carers, children and young people) at moderate to high risk of declining health and wellbeing is informed by comprehensive risk stratification.	People and communities get advice and support locally to make informed choices to improve their health and wellbeing for themselves and/or the person they may care for.	The community has developed a range of support that improves health and wellbeing.	People experiencing poor health, carers, people with a LTC or at risk of declining wellbeing are supported to engage in activities and access targeted support to improve their health and wellbeing	People at risk or with long term conditions are actively engaged with effective goal setting to improve health and wellbeing.	People who don't have anyone to help them navigate the health and social care system and daily life issues, are enabled to maximise their choice and control in managing their day to day lives.
Outcome Indicators	Written justification for all targeted activity and resource allocation is supported by comprehensive risk stratification data.	Improved wellbeing (5 Ways to Wellbeing). Improved health literacy in target populations. Increased awareness of, and involvement in, community activities. Reduced inequalities in access to services.	Improved wellbeing (5 Ways to Wellbeing). Individuals report feeling engaged & in control of their health. Range of activities to improve health and wellbeing are established and sustained in partnership with other organisations. Local people actively engaged in planning and delivery of activities. Range and take up of volunteering opportunities by local people.	Improved wellbeing (5 Ways to Wellbeing). Maintenance and improvement in independence, health and wellbeing is reported by people identified as being moderate to high risk of hospital admission. Improved health literacy in targeted population. Use of community support, resources and activities within target populations.	Improved wellbeing (5 Ways to Wellbeing). Increase in uptake of vaccinations, annual health checks & screening Self-care based on best evidence (e.g. self-help groups, peer support, structured programmes). People set and achieve personal goals related to their health and wellbeing Access to & take up of training & motivational coaching	Improved wellbeing (5 Ways to Wellbeing). Reductions in missed appointments (DNAs). People report positively on quality of life and clarity about how to seek help to navigate the health and social care system, and daily life issues.

The PKW approach is based on public, voluntary / charitable, and other organisations forming Collaborative Partnerships (CPs) that will become ‘approved providers’ of preventative health and wellbeing services in their neighbourhood. Collaborative Partnerships will collectively manage and coordinate preventative health and wellbeing services, integrating their work at neighbourhood level with related services like primary care, social services, Multi-Agency Support Teams, and employment and training support providers. Partnerships have been established this year between small and large VCF organisations and local health and wellbeing providers (e.g. GP Practices).

1.1 The theory behind the People Keeping Well Programme

This evaluation focuses on one component of the People Keeping Well strategy, which is providing personalised support, outreach and navigation via the Community Support Worker (CSW) service. As a first step, we used the outcomes framework above and discussions with CSWs to develop a description for how the service is supposed to work.

The theory for the programme is:

- IF we comprehensively identify people at risk of declining health and wellbeing while they are still at home THEN we will be able to connect them with a worker (Identification)

- IF they engage with the worker THEN the worker will be able to assess social and health needs and identify forms of support in their home and in their community (Engagement)
- IF clients accept the support offered/are able to access support services THEN they will be less socially isolated. Being connected to people who can offer support will improve health and wellbeing and/or reduce risk of further decline (Acceptance/Access)
- IF the population at risk receives this in-home and community support THEN we will see a trend in reducing avoidable usage of secondary and primary care and a trend in reduction of the number and level of social care packages (Reduced risk/Improved health and wellbeing)

This programme theory provided a structure to evaluate each stage of implementation.

1.2 Methods for the evaluation

During the first year of the Programme, we conducted a process evaluation (see section 2). This looked at how the Programme was implemented, using the following methods:

- The types of people who were identified to be at risk were quantitatively monitored over time to determine whether the target group was correctly identified and referred to the Programme.
- The needs identified and actions taken by CSWs were descriptively analysed, using the Council's Share Point database.
- Descriptions of the role and function of CSWs, and how workers engage with clients and match them to resources were obtained from individual and group meetings with workers.

In the second year of the Programme, we looked at how the Programme fits into the wider process of integrating health and social care, using the following methods:

- Worker perceptions of the ability of the programme to connect people to other support systems were explored via focus groups and interviews with the CSWs.
- Interviews with clients were conducted to see whether they were actually connected to relevant resources, whether they experienced improved wellbeing and health, and whether they felt more oriented toward navigating systems to get needs met.
- Decreased risk was qualitatively explored via client interviews and discussions with workers. We quantitatively assessed impact by analysing avoidable A&E visits and hospital admissions.
- Cost benefit analysis and time series analysis were conducted to determine whether there were trends in avoidable use of secondary care or changes in the number and size of social care packages.
- The process of integrating the CSW role with other community based support was explored via discussions with workers and community organisations.

- The learning was used to construct a map showing how clients move through systems in Sheffield to get needs met – and what sorts of gaps meant that clients remain in high risk groups.

1.3 Structure for the report

This report aims to inform a number of different audiences – members of the City Council, the Clinical Commissioning Group, general practitioners and other primary care workers, community organisations and the VCF sector. Key questions for different people are:

- Can demand be shifted away from primary and secondary care, for non-medical needs?
- Do prevention strategies, which focus on early identification and rapid response, reduce risk of declining health and wellbeing?
- What is the cost for implementing this sort of strategy and will we see a return on investment?
- How does a brief community support worker intervention fit with what is already available in different sectors and systems?
- How do findings compare with the wider evidence on community-based support?

Section 2 gives a detailed overview of how the service was implemented. Short term outcomes, defined as connecting people to sources of support and improving wellbeing, are presented in section 3. Client journeys are illustrated using a systems perspective to show where there are blockages in the wider system, which potentially increase risk. Section 4 presents a predictive model of how the service could work if integrated with community based support. We compare the findings with similar research to provide some perspective on the strength of the evidence, with recommendations for how policymakers can use the information to inform decision making about cross-sectoral working and resource allocation.

Section 2. Demand for the service

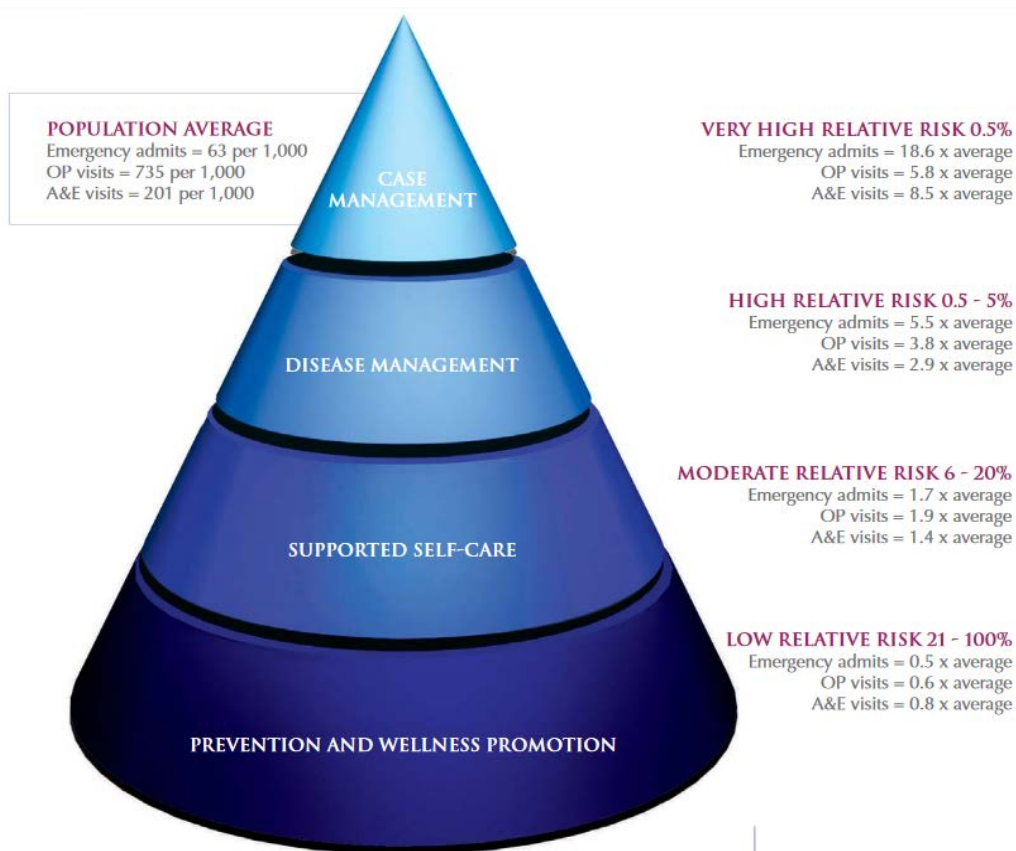
This section answers the questions

- Is there a demonstrated need for the service?
- Were people at high risk of identified and referred to the service?
- What are the characteristics of people who are referred?
- What are the most common needs for support?

2.1 Identifying and referring people at risk

In the first year of the service, general practitioners in Sheffield were asked to use a tool called Combined Predictive Modelling to identify people with high to moderate risk of avoidable hospital admission.

Figure 2: Using risk groups to plan effective interventions



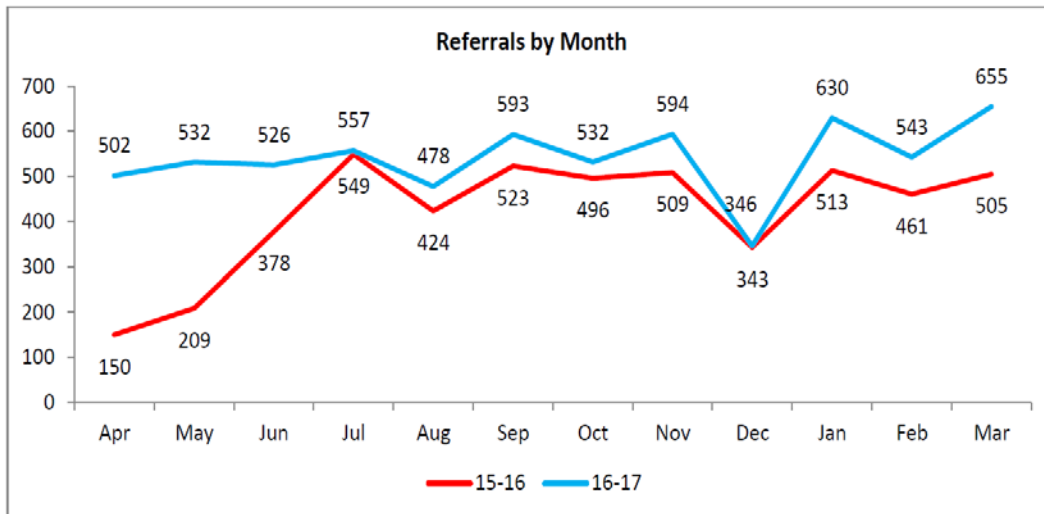
Source: Health Dialog UK

People at moderate to high risk were targeted for the service using risk stratification (Figure 2), because predictive modelling indicates that people with chronic and long term conditions will benefit most from community interventions that help them to self-manage their conditions (Kings Fund, 2011). It is important to note that the definitions of risk for these groups, however, have been developed using data from inpatient, outpatient, A&E, and general practice data. General practitioners, however, pointed out that they were also referring people based on their judgements of ‘social risk’. As a result, the original target population – which was people with a risk score of 30-70 – was expanded to include people at lower health risk (20-70). The new definition for the target group posed challenges for doing cost benefit analysis, which will be discussed in section 3 and is detailed in Appendix A of the report. .

There were a total of 11,548 referrals from April 2015 to March 2017. In the second year of the service referrals increased by 29%, indicating increased awareness of how to refer to the service.

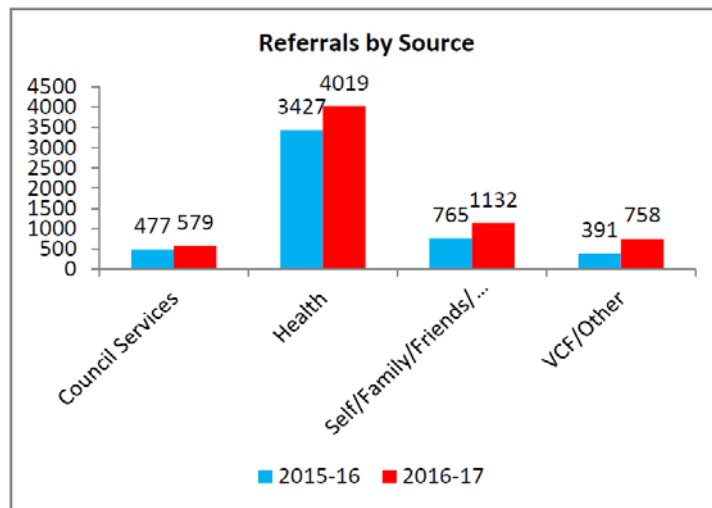
The rate of referrals remains steady with the exception of seasonal fluctuations (Figure 3) indicating a consistent demand.

Figure 3: Referral increases 2016-2017



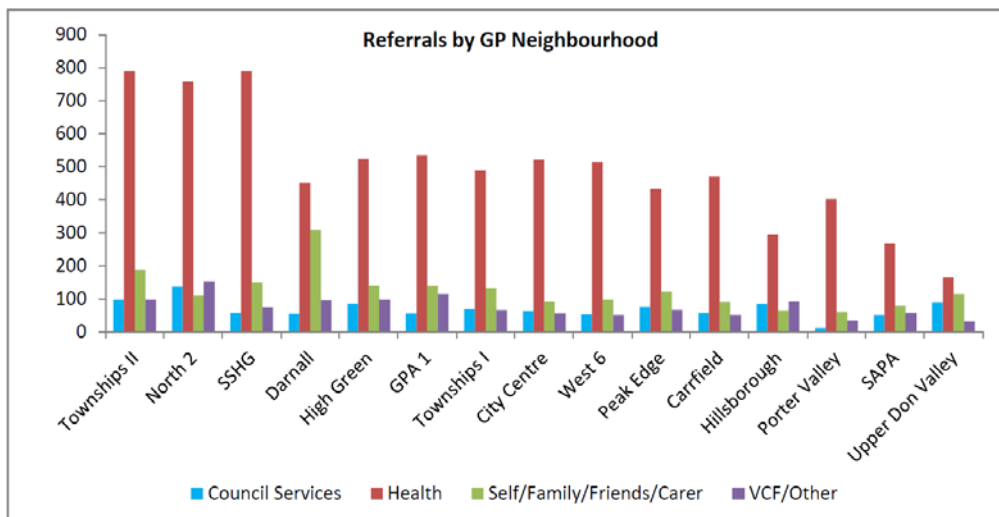
Although the majority of referrals come from the health sector, referrals from self/family and VCF/other have increased by 86% and 50% respectively in 2016-17 (Figure 4). This indicates that local people, community organisations and workers in non-medical sectors are now proactively recognising risk before it needs medical attention.

Figure 4: Change in referral source over time by sector



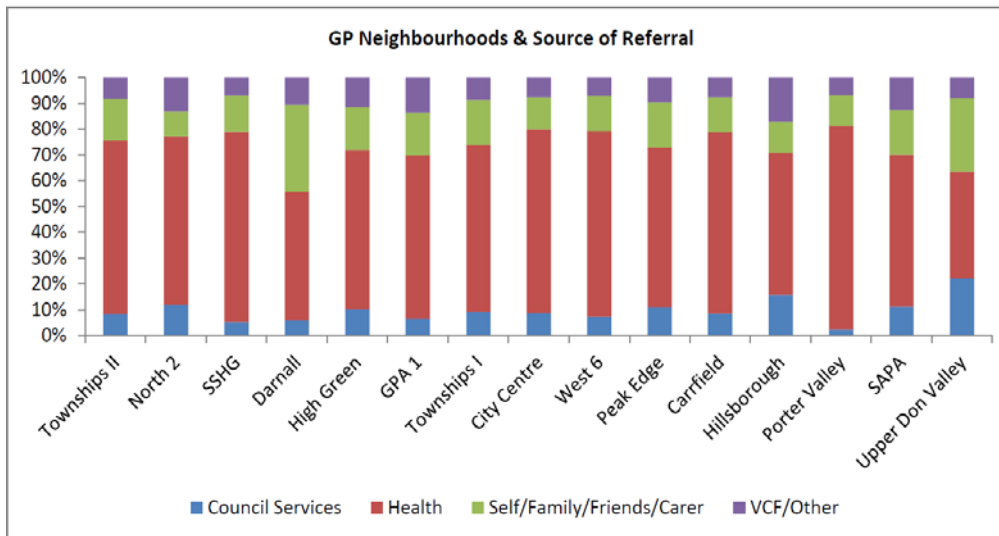
The service was originally promoted via general practices, so the spread of referral sources beyond the health sector indicates that the service is now being promoted via word of mouth. Increase in word of mouth happens when providers and beneficiaries of a programme have positive experiences with the service, to the point where they informally recommend it to others. Figure 5 shows that non-health referrals are occurring across Sheffield neighbourhoods. Some areas such as Darnall and the Upper Don Valley may reach a ‘tipping point’, where local people self-refer, reducing non-medical visits to general practices.

Figure 5: Number of referrals by GP Neighbourhood



Variations in referral source may also serve as indicators of community assets (Figure 6).

Figure 6: Proportion of referrals by GP Neighbourhood



For example, Upper Don Valley has the highest proportion of referrals from Council Services, which may be reflect a lack of other community infrastructure in the area.

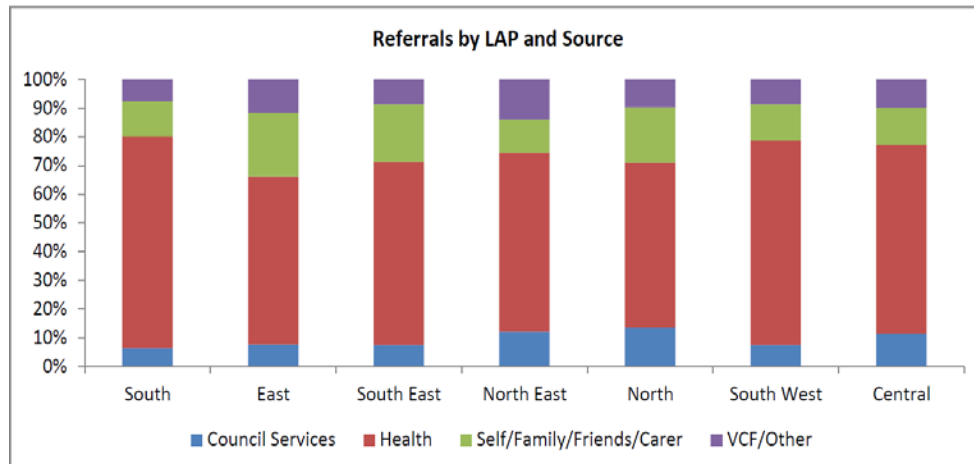
Discussions with GPs have confirmed the value of the service. General practitioners who use the Programme say that it

- fulfils a need for patients who have non-medical issues
- reduces the proportion of patients who are frequent returners because issues requiring social support and support with navigating other systems are addressed by the community worker
- thereby shifting provision to more appropriate sources and releasing time for them to focus on medical needs.

Referrals increased in all LAP areas in 16-17. Increases ranged from 14% in North to 70% in Central (although Central had the lowest number of referrals in 15-16 and second lowest in 16-17).

As with GP Neighbourhoods, there are differences in referral source across the LAP areas (Figure xx). South LAP has the lowest proportion of referrals from Council Services, while North LAP has the lowest proportion from Health. East LAP has the highest proportion of referrals from Self/Family/Friends, and North East LAP has the highest proportion from VCF/Other.

Figure 7: Referrals by LAP and source



All wards saw an increase in total number of referrals between 15-16 and 16-17, except West Ecclesfield (1% decrease), Stocksbridge & Upper Don (-17%), and Crookes (-7%). There is wide variation in age breakdown by ward (Figure 7). Referrals from more affluent areas tend to be for older people – for example, more than 60% of referrals in Eccleshall and Dore & Totley are for people aged 80+. Referrals for younger people tend to be in more deprived areas of the city, such as Burngreave, Central and Manor.

Box 1: Key messages about need for the service

There is a demand for the service, as evidenced by the increasing number of referrals.

All sectors are referring to the service, indicating increased awareness of risk. Demand is increasing despite relatively low levels of publicity outside of general practice, indicating positive experiences of using the service.

GPs report a shift in demand, noting that they are able to refer people with non-medical needs to other sources of support.

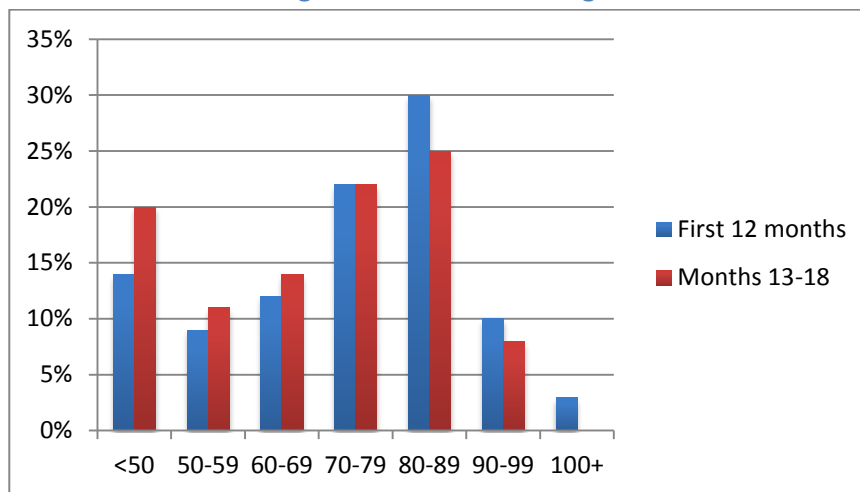
Variation in referrals across neighbourhoods indicates areas where there are insufficient local assets.

2.2 Client characteristics

The cohort referred to PKW is older than the general population and includes more females (see Appendix 1 Table 1). Review of A&E and hospital admissions data showed that people in the PKW cohort have higher rates of ambulatory care sensitive conditions than the general population in Sheffield, such as asthma (16.4 % versus 12%), chronic obstructive pulmonary disease (14.3% versus 2.4%); dementia (10.4% versus 0.9%); heart failure (11.3% versus 1.2%); and stroke (9.2% versus 1.4%). Higher proportions are consistent across the remaining ambulatory care sensitive conditions. This demonstrates that the service is effectively targeting people at much higher risk than the general population in Sheffield.

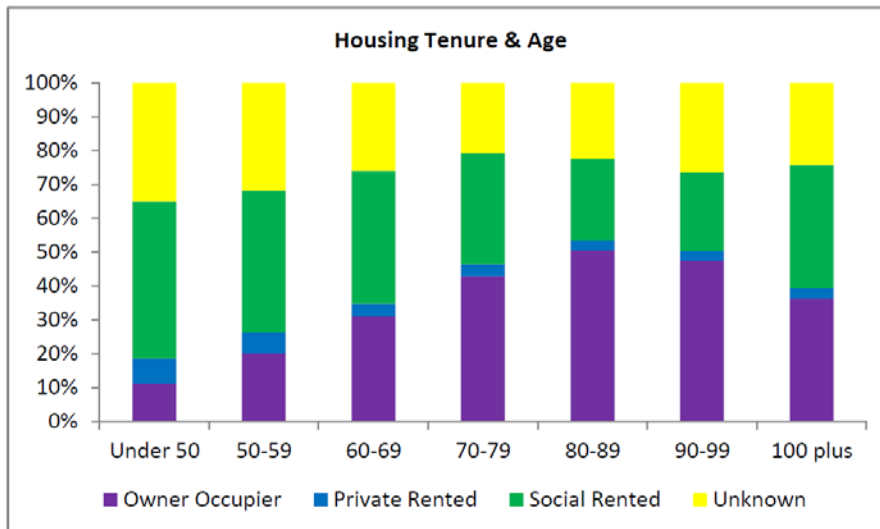
The proportion of men and women referred has remained consistent at 60/40 over the past two years. The proportion of referrals across the younger age bands, however, has increased in the second year of the Programme. The proportion of under 70s rose from 34% of referrals last year to 42% in 2016-17. This is a 58% increase for the under 70s, nearly double the percentage increase in overall numbers of referrals (Figure 8). The CSWs believe that this shift from older to middle aged adults may be related to the increasing recognition of complex social needs.

Figure 8: Shifts in client age



In terms of housing tenure, 37% of people were owner occupiers; 33% were in socially rented accommodation; and 4% were in privately rented (Figure 9).

Figure 9: Housing tenure by age



These proportions vary greatly when taking age into account – for example, 50% of those in the 80-90 age band are owner occupiers, compared to only 11% of the under 50’s. As expected, under 60’s are more likely to live in privately rented housing. Unfortunately, 26% of referrals had no housing tenure information recorded.

2.3 Reasons for referral and issues identified

The top four referral reasons are loneliness and isolation, need for benefits check, concerns for the carer, and struggling with medical/mental health conditions. Reasons for referral changed little over the two years of the Programme (Table 1).

Table 1: Reasons for referral

Referral Reason	2015-2016			2016-2017		
	Rank	No.	% Total Referrals	Rank	No.	% Total Referrals
Loneliness & Isolation	1	960	19.0	3	964	14.9%
Benefits Check	2	873	17.3	1	986	15.2
Concerns for the Carer	3	553	10.9	4	595	9.2
Struggling with Medical/ Mental Health Conditions	4	518	10.2	2	986	15.2

Issues identified during assessment by the CSW were slightly different, with concerns for the carer actually being identified less (Table 2).

Table 2: Issues Identified by CSW

Issues Identified	2015-2016			2016-2017		
	Rank	No.	% Total Referrals	Rank	No.	% Total Referrals
Benefits Check	1	1150	22.7	1	1530	23.6
Loneliness & Isolation	2	825	16.3	3	743	11.5
Concerns for the Carer	3	522	10.3	8	477	7.4
Struggling with Medical/ Mental Health Conditions	4	515	10.2	2	825	12.7

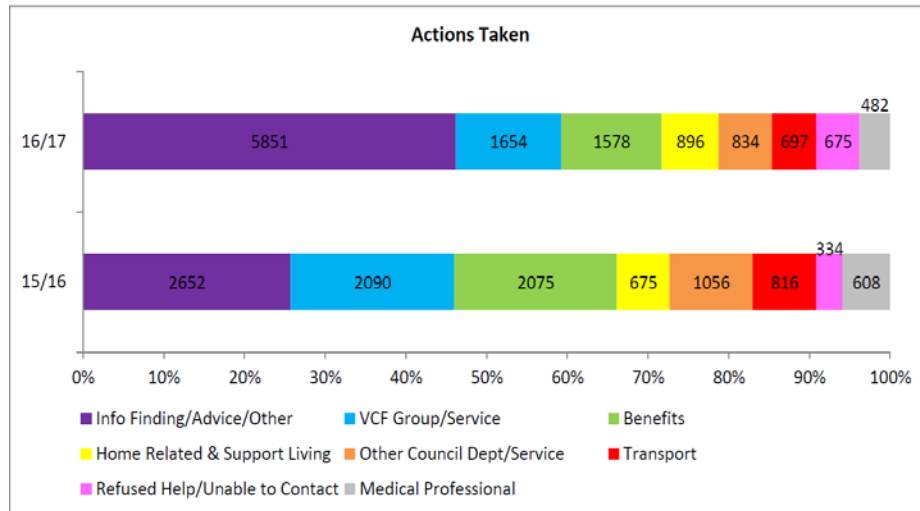
We compared the initial reasons for the referral with the issues identified by CSWs. CSWs can spend up to an hour with clients in order to get a comprehensive picture of their issues. Does this time make a difference? Overall, the CSWs were more likely to identify additional issues that the initial referrer was unaware of, which shows the value of a longer conversation to identify problems.

Why are workers successful at identifying additional needs? When we asked CSWs to explain what they did during assessment, they basically described effective peer support. This includes having time to listen, establishing rapport, being non-judgemental, allowing the client to be in control of describing what they needed and how much they wanted to manage on their own, offering informational support, and signposting to advice and services. Client interviews confirmed that all of these components were offered, saying “it was the first time that someone has listened”; “she offered advice when needed, but was good at taking a step back and letting me get on with it” . The CSW approach mirrors the effective components of peer support (Dennis, 2003). Peer supports promotes the ability to access and appraise information, and apply it, increasing health literacy (Harris et al 2015).

2.4 Actions taken by CSWs

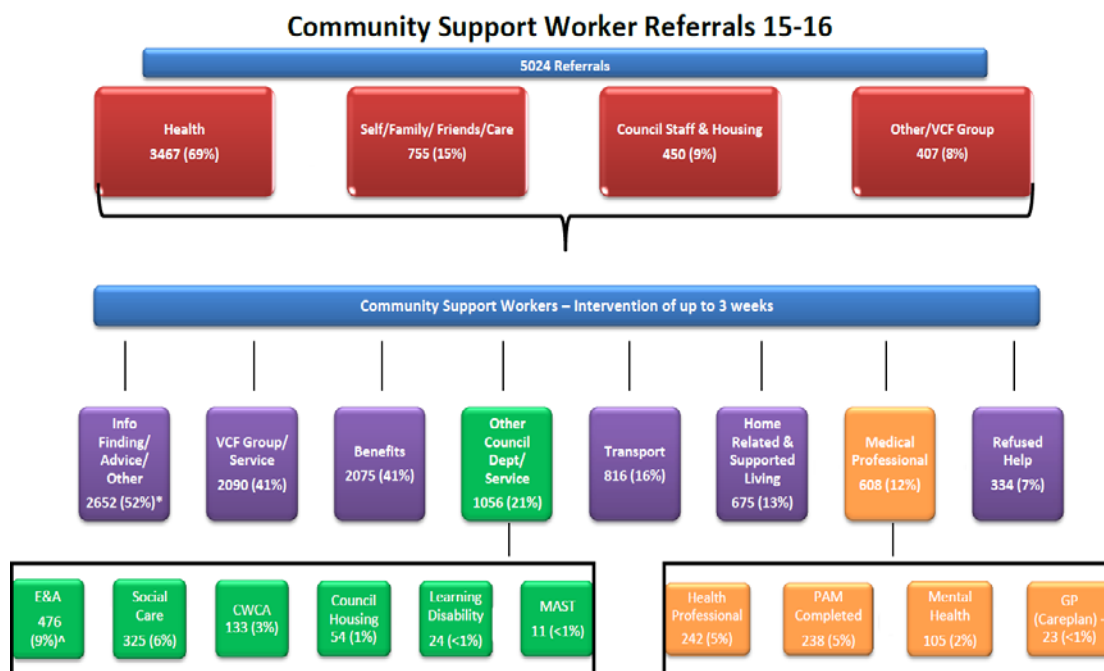
Over 50 different types of actions taken by CSWs are recorded on the SharePoint database, which have been grouped for ease of analysis (Figure 10). The proportion of actions taken is different in the second year of the service, and further discussion is needed to identify reasons for the differences. For example, the under 60’s age group may be more able to access sources of support by simply being offered information and advice. The lower number of referrals to the VCF sector may indicate a lack of capacity, as this sector now takes an increased number of referrals from social prescribing as well as the CSW service. The higher proportion of Refused Help/Unable to Contact may be associated with the higher proportion of non-GP referrals.

Figure 10: Actions taken by CSWs



A more detailed picture of the wide range of agencies and services that CSWs refer people is presented in Figure 11. This not only illustrates diversity of need but also shows how non-medical issues are distributed across different service sectors.

Figure 11: Proportion of referrals by type of service

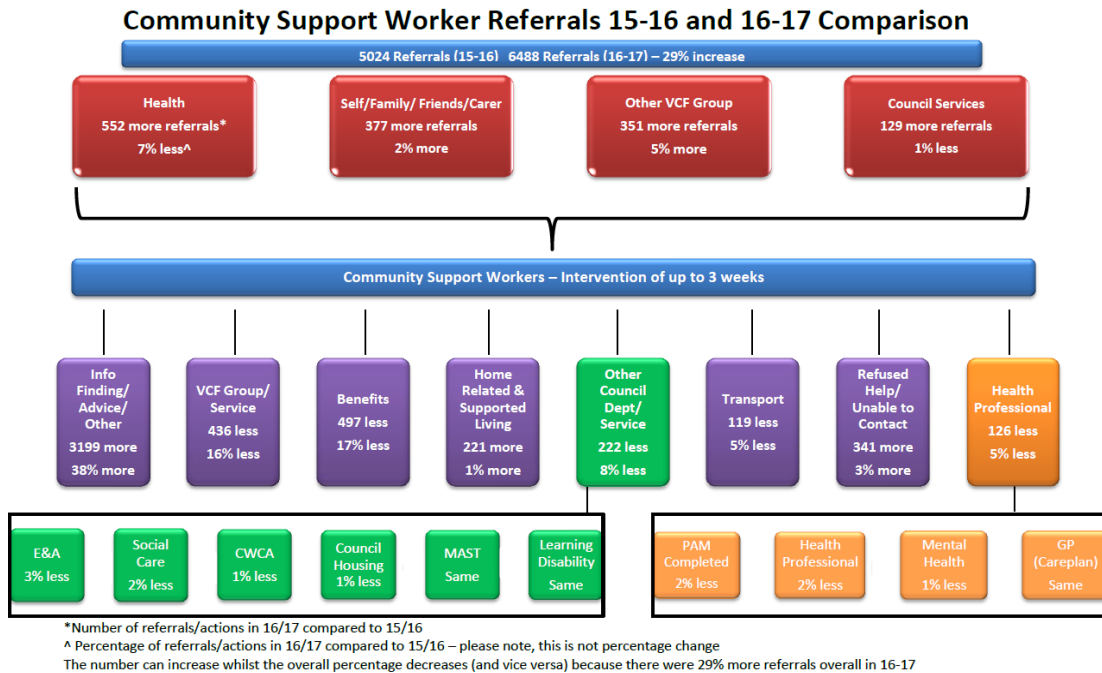


* Number of people receiving this action/intervention (Percentage of people receiving this action/intervention). Most people received more than one action/intervention, so the percentages add up to more than 100% ^This is the number/percentage of all referrals, not only of the subset.

In the first year of the service, 69% of the referrals to CSWs were from the health sector, which were subsequently referred to a wide spectrum of services. Only 12% were subsequently referred back to the health sector, for actions such as completing the Patient Activation Measure and developing a care plan, as well as for specific needs requiring professional support. A comparison of referrals made by CSWs in the second

year of the service shows a further reduction in referrals back to health (Figure 12) providing additional evidence that the service has the potential to shift demand.

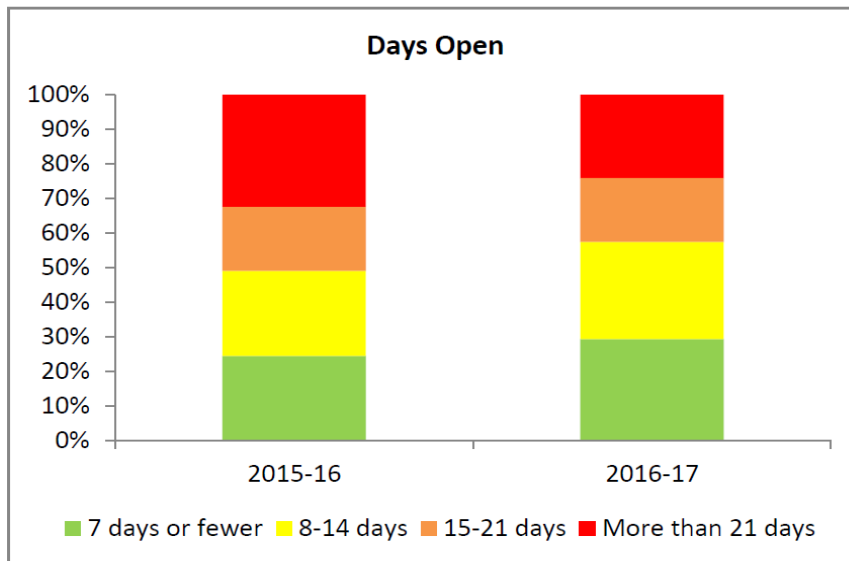
Figure 12: Comparison of CSW referrals 2015 -2017



Our time series analysis suggests that there may be no increase in hospital utilisation for the period covering one year before and after receiving the service. However, this finding needs to be treated with caution, as noted in Appendix 1 of the report.

The service is a brief intervention, aiming for rapid response. In the first year of the programme, the target for closing cases within 21 days of first client contact was achieved for 70% of the cases (Figure 13). In 2016-2017 the proportion of cases closed increased across all time bands. Some of the change may be attributed to more accurate recording in the past year. Because CSWs are now managing a higher workload as a result of increased referrals, it is likely that cases are being closed more quickly. In focus groups, CSWs explained that when working in a new area, it takes time to become familiar with local resources. As knowledge about local services grows, finding a match for clients becomes quicker.

Figure 13: Proportion of cases closed within 21 days



The reduction in days open may reflect increased knowledge and experience of configuring local resources.

Box 2: Key messages about the target population

- The service successfully identifies people at high risk, as evidenced by the significantly higher proportion of conditions related to avoidable admission in the PKW cohort.
- The service identifies people with a wide range of non-medical needs.
- CSW assessment is able to successfully identify additional issues.
- The issues identified – loneliness/social isolation, concerns for carers, need to determine benefits eligibility, and struggles with mental and health conditions – require social intervention and support.
- The type of signposting and referral offered to clients is consistent with the evidence base for providing effective peer support.
- CSWs are able to shift some demand to appropriate sources of support by referring clients to a wide range of non-medical services.

Section 3: Effectiveness of the service

This section of the report provides data related to these questions:

- Did clients experience that needs were met?
- What were their experiences of actually accessing services after cases were closed?
- Have CSWs noted challenges in getting a rapid response from different sectors?
- Do prevention strategies, which focus on early identification and rapid response, reduce risk of declining health and wellbeing?

3.1 Client experiences of accessing services

Successfully closing a case means that people have been provided with information and advice, referrals and links with agencies that can potentially address longer term needs. Follow up interviews (30) were conducted by community workers trained and supervised by the evaluation team 3 to 10 months after cases were closed. These interviews used the idea of a client journey to map what happened to people when they were referred on to other places. The interview data confirmed that 28 of the 30 clients were happy with the information, advice and personalised support that CSWs provided, saying that it reduced anxiety related to getting information and finding services.

Clients found the information provided by CSWs was very useful. Those who were signposted to support for gardening, cleaning and other activities of daily living said “I would have struggled to sort all these things on my own”; “I wouldn’t have known how to go about it”; “without the People Keeping Well programme I wouldn’t have been here”. Some people who were experiencing reduced capability were reluctant to ask for support, saying “I’ve always worked and been independent”, “I’m not used to asking for help” and “I’m used to taking care of myself”. Pride and independence were significant barriers to seeking support and the ability of workers to normalise situations was instrumental in taking up advice. Information giving was generally seen to be successful, with clients agreeing that “without the worker I would not have known where to go for any help” and “I didn’t know who to ring for all sorts of things.”

Clients reported that CSWs also provided emotional and affirmational support. They were empathetic, provided a “listening ear” and in cases where clients lacked confidence to make connections they “advised on what to say and what to ask for”. Workers explained that they could call organisations on behalf of clients, and let them know that the client

would be getting in touch. They also assisted carers and families by linking them up with “someone to talk to about these things, someone who is knowledgeable”.

In situations requiring completion of applications, they provided practical support, which means doing things for clients and doing things with them. Clients said “Dad tried to fill in the [benefits] forms for us but we had to call the CSW”. “ It’s knowing how to fill the forms in...it’s knowing what to say”. If clients felt unable to attend a new group on their own, workers accompanied them for the first 1 or 2 sessions. One socially isolated client with mental health issues said “She came with me until I felt able to go on my own.” Another with mental health issues said “She encouraged me to start a knit and natter group, and came to the first meeting. I realised that I have something to share with other people. We meet every week now.” Clients who had no food said “She looked in my cupboards. I wouldn’t normally let anyone do that but she was very matter of fact...She took me to the local food bank. I wouldn’t be here without her.”

People who had recently been discharged from hospital or recently received a diagnosis said “The support came at the right time”. This was especially useful when family members living far away needed to go back to home and work after being present during hospital stays. Clients agreed that that CSWs “sorted everything” which made a big difference to quality of life. When a diagnosis was “overwhelming - a lot to take in”, the CSWs were good at providing information in ways that were easy to follow: “they broke it all into steps”. When you are in shock, they “figure it all out for you”. “For every question they have an answer” and “they make it clear for you”.

In terms of wellbeing, clients felt the support was “invaluable” and led to “feeling less stressed” and “more able to cope”. One client said “the support was poor before [the CSW intervention] but now everything has come together suddenly. I am happier these last few days”. And finally, people said “no one ever asked me before how I felt” and “someone is finally listening”. “It’s made a difference – now I have got my independence”.

In focus groups and individual discussions, CSWs agreed that they offer different levels of support based on their judgements of how much clients can cope. They aim to leave clients with links to services and knowledge of how to continue to access them.

We asked clients what they think would have happened if the CSW hadn’t stepped in to provide the service. It is difficult to measure what hasn’t happened, and some clients were reluctant to consider this sort of scenario. Some people felt that they would have become stuck in “a poverty trap”. One client said he would have gone without food for two weeks as he would never have gone to the food bank himself. Others reported feeling suicidal and felt that the service had averted self harm. People who were physically frail described quick fixes that reduced the risk of falls and other accidents in

the home and garden, and improvements to housing that enabled them to continue to be mobile, and to be warm and dry thereby reducing risk of respiratory infections.

The case study presented below shows how the connections were *with* the client rather than *for* the client. This is a key element of effective peer support, putting the client in control and promoting confidence in being able to manage in future.

Case study: The range of support offered by CSWs

This client has multiple chronic and long term conditions and was recently diagnosed with life threatening cancer. He lives alone, and said that he didn't know who or how to ask for help, as he has never been in this situation before. His gas supply was also about to cut off and as a council tenant, he was having problems paying rent. He describes having 'a battle with housing' and 'being passed from pillar to post'. The CSW advised that he would be eligible for a rent reduction, and helped to arrange it. His front garden had become overgrown and client was feeling pressured by the council housing department to move into sheltered accommodation. The worker organised help to keep his garden tidy, which resolved the conflict with the council. The worker arranged for the client's community charge to be reassessed and reduced, and arranged for attendance allowance. The client states that he was initially resistant to this as he did not think of himself as 'disabled', despite having increasing difficulty with any physical activity. The worker advised that he would be eligible for 'assisted collection' of bins, so that he no longer has to run the risk of collapsing whilst taking out refuse. The client felt that the worker 'planted the seeds and put things in place'. He 'smoothed the ground' by speaking to people beforehand and saying that 'I've spoken to them and they are expecting you to call', and then handed the action over to the client when appropriate - while always being on hand to support and give further assistance if required.

The client felt that he was 'genuinely managing his own situation' and was 'back in control' of his life. He stated that without the PKW worker he 'wouldn't have made it through'.

In 2015-16, CSW benefits checks brought an additional £1,374,384 to keep people in Sheffield independent. From April 2015 – December 2016, the CSWs have supported 1898 people – approximately 1 in every 5 people in Sheffield - to claim Attendance Allowance. One CSW has been successful in helping her clients to claim more than £150,000 in benefits. The monetary value of benefit of these successful claims for a 12 month period for the 1898 people is £6.5 million.

Across the two years of the service, £2,722,564 has been successfully claimed. A total of 375 have received Higher Attendance Allowance and 389 have received Lower Attendance Allowance. A further 671 clients are awaiting the outcome of their application.

3.2 Reducing risk

Evaluations of prevention programmes cannot measure what doesn't happen to clients. We can, however, list the risks of negative events that could have occurred without intervention. Across the clients interviewed, these risks include:

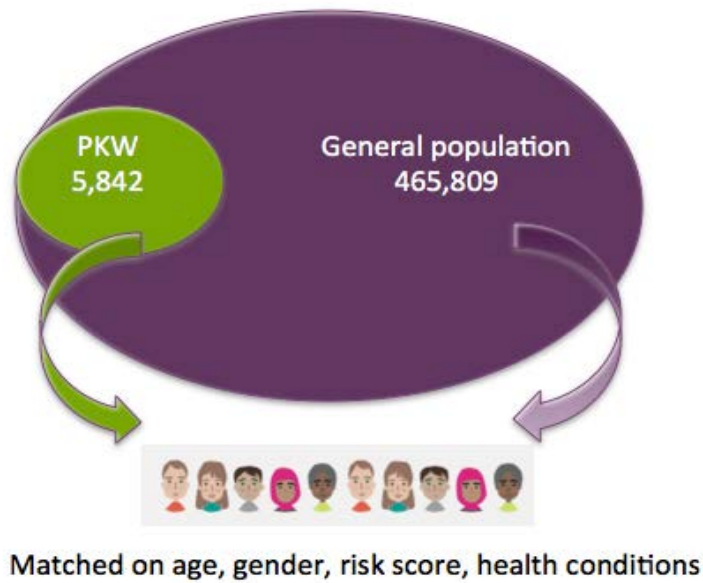
- Stressors related to adapting to new living accommodation when in frail health
- Struggling with inadequate income for basic needs – food, heating, insulation
- Dealing with unsafe home environments because accommodations are needed to the stairs, walkways and bathrooms.
- Dealing with rubbish disposal, moving heavy bins
- Being unable to go out due to lack of transport

Each of these issues involves a health risk, including risk of falls, fuel poverty, cold homes, inadequate nutrition and social isolation leading to depression. The solutions require contact with a number of different systems, where the worker acts a “bridging point”. Clients said that if they “hadn't received support from the CSW, I would have been depressed and overwhelmed” and “without the worker I wouldn't have been able to manage”.

The data confirms that the service has successfully targeted people who are potentially high users of secondary care and social care packages. But can the CSW intervention be related to reduction in hospital utilisation, need for social care or use of primary care?

There is a long causal chain from preventing or reducing risk and seeing a reduction in avoidable hospital admissions. We looked for a relationship by obtaining health and gender information for 5,842 of the people in the PKW cohort from their primary care records. We were then able to match clients' characteristics and their risk scores with people in the general population in Sheffield who did not receive the brief intervention (Figure 14). People were matched on 5 health conditions – stroke, diabetes, heart failure, chronic obstructive pulmonary disease (COPD) and dementia – because these are common conditions requiring hospital admission for older people.

Figure 14: Matching people in PKW with the general population



The PKW group had a 5% higher risk of avoidable A&E attendance and a 30% higher risk of inpatient admissions of one or more nights' stay, showing that the PKW group accesses services at a significantly higher level. The costs in the PKW group for unscheduled secondary care were higher (£3,230) when compared with the general population (£429).

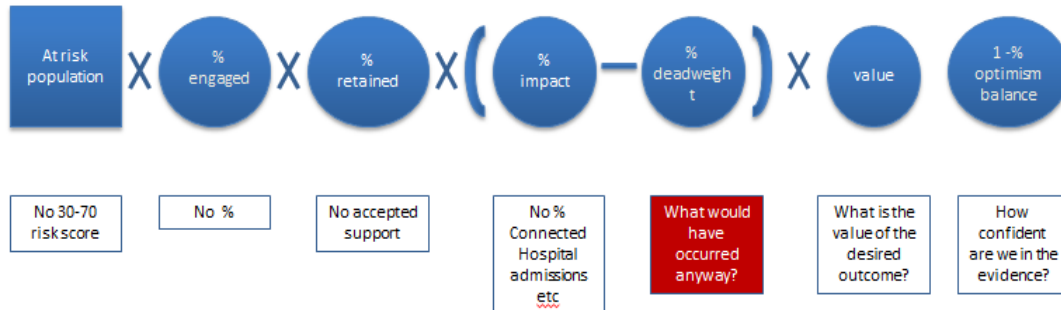
In terms of social care, over 25% of the people in the PKW cohort were assessed for a social care package, compared with just over 1% of the general population. Over 11% of the PKW group went on to receive a social care package during the assessment period, compared to 0.4% of the general population. The cost of those who received a package was higher in the PKW group. The incremental cost per social care package avoided is the ratio of the difference in costs of social care packages between PKW and the general population (£629.49) to difference in proportion receiving social care packages (0.112). This is on average £5,620 higher for people on PKW. The higher proportion of assessments and higher numbers of people in PKW going on to receive social care is to be expected as PKW people much at much higher risk.

In the PKW group 51.2% had avoidable attendances and in-patient stays of one or more nights compared with 20.2% in the general population. This was a difference of over 28%. The mean cost of a contact was £2,583 higher for the PKW group at an incremental cost per contact (ratio of difference in costs to difference in proportion of contacts) of £9,127 in favour of the general population. Again, the higher costs are to be expected reflecting higher risks in the PKW group.

It was a condition of the Prime Ministers Transformation Challenge funding that the Manchester Cost Benefit Analysis (CBA) tool be used to calculate cost benefit (HM Treasury, 2014). Cost benefit analysis assumes that providing support via the CSW services will have an impact in terms of reducing hospital utilisation (Figure 15). This

analysis depends on being able to create two groups for comparison – one group receiving the service (“impact”) and another similar group that does not (“deadweight”).

Figure 15: Formula for estimating cost benefit analysis



We originally planned to do a cohort study. This design was selected because it enables comparison between people who receive the CSW intervention with a similar group that did not receive it, in the same 'source population'. The source population is people at moderate to high risk of hospital admission and at risk of needing a social care package. We planned to match individuals who were referred to a CSW with people who were not referred, by asking general practices to select non-participating patients who were similar. In this way, we could ensure that the groups were the same size, and had the same characteristics.

Ideally, people would have been selected from the same practices, but it was not ethical to ask participating practices to refrain from referring some people who were in need. Even if GPs were willing to exclude some patients, during the course of the study some of these people may have needed a CSW referral. If GPs decided to refer them to the service, then the size of our comparison group would be at risk of becoming smaller. We agreed that the fall back position was to select people from general practices in Sheffield who were not referring to the service. This seemed feasible, as PKW staff reported that there were a number of non-participating practices. About 8 months into the programme, however, the decision was made to promote the programme across all practices. Practices that could have given us a similar cohort were subsumed into the programme.

The only remaining option was to compare the CSW group with the whole population. From the population registered with general practices, we selected people in the same risk group with similar conditions, age and gender but were not able to match on other characteristics. Comparing with a larger group on a smaller number of characteristics is a less precise match and makes for a much weaker comparison, which means that we cannot say with confidence that changes in the CSW group could be attributed to the intervention. As a result, we were unable to answer the question “What would have

happened anyway?” because the at risk population was expanded and the service was rolled out across Sheffield.

A comparison group was also needed to compare number and size of social care packages over time between the group receiving the service and those that did not, but baseline information on social care contacts was not available prior to the PKW intervention. This meant that there was no opportunity to match people who were not referred on similar characteristics for each client referred (‘deadweight’ in Figure 15). Our only comparison was the general population e.g. people registered with a GP who did not receive the service. As we don’t have a clear definition of the size of the target population two CBA analyses were proposed with the population size defined as:

- Those with a risk score between 20 and 70 (N = 28,000)
- The general adult population of Sheffield (N = 440,000)

The general population is too broad to use as an appropriate comparator group to the PKW population. The various statistical approaches that were tried to compensate for lack of a control group are explained in Appendix 1, but they were less than ideal and therefore could not produce a good comparator group.

Time series analysis showed that those who were more likely to attend A&E or be admitted as in-patients were being targeted by the PKW intervention as the number of attendances or admission increased prior to PKW being received. This results in regression to the mean and biases the results making this an inappropriate analysis.

We were unable to analyse change in number or type of non-medical GP appointments because it was not possible to access general practice data. Lack of access to practice data in Sheffield is a major issue that is seriously limiting the ability to do meaningful cost benefit analysis.

If the funding had allowed us to define outcomes for the service, a better indicator would have been to assess change in non-medical appointments in order to document whether the service’s ability to shift demand away fro the service produced a cost benefit. As noted, lack of access to GP data prevented this analysis.

Box 3: Key messages about the ability of the service to reduce risk

- The service effectively targets people at high risk for avoidable hospital use and need for social care packages
- Identifies issues that would not otherwise be noticed until people were more at risk
- Makes home environments safer, reducing risk of accident and injury
- Raises awareness of what clients will need over the longer term
- Refers clients to longer term support services
- Reduces anxiety and increase quality of life
- The service cannot be associated with a reduction in avoidable use of secondary care.
- It is not possible to conduct a meaningful analysis of change in the number and size of social care packages because the evaluation lacked a true control group.
- Change in number of non-medical appointments was reported by GPs, but it was not possible to quantitatively assess change due to city-wide problems with information sharing.

3.3 Assessing risk after receiving the service

Interviews revealed that clients had stories of ongoing stress and mental health issues after their case was closed, which appeared to be caused or exacerbated by delays with the organisations receiving referrals. We therefore looked at whether a lack of response after clients were referred on to other services increased risk.

All clients are told that they can contact their CSW after the case is closed should they experience further need, and most clients clearly remembered this offer at the time of interview. An analysis of the proportion of clients who used the service more than once shows that across the 11,548 clients seen to date nearly 82% were seen only once. This suggests that clients either found one visit to be sufficient, or chose not to contact the Programme for further support. Nearly 14%, however, needed a second contact for further assistance (Table 3).

Table 3: Clients requiring more than one CSW session

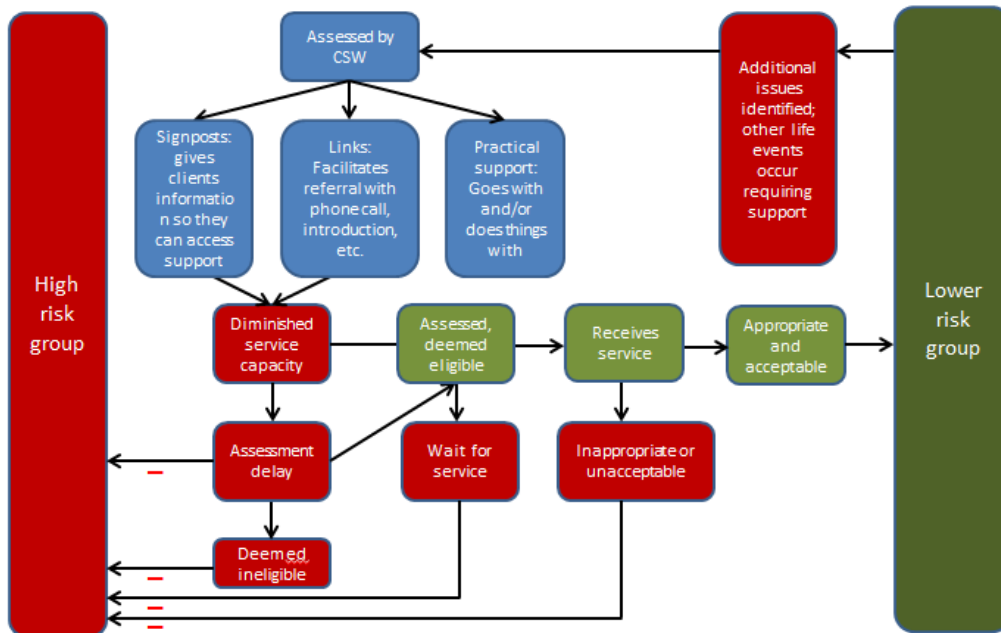
No. sessions	No. Clients	%
1	9520	82.44%
2	1268	10.98%
3	238	2.06%
4	61	.53%
5	14	.12%
6	8	.07%
Duplicate records	439	3.80%
Total	11548	100.00%

This may reflect complex and new needs experienced after the first episode, or may reflect system failure.

In focus groups with workers, barriers to resolving cases were described as gaps in local assets, systems barriers and diminished systems capacity. In under-resourced neighbourhoods that have less assets, workers are unable to find a local service for the client. Systems barriers include finding the right person to contact. This becomes more difficult when organisations have downsized or reorganised to deal with reduced capacity. With staff turnover, the people who take on additional and unfamiliar roles are less experienced in connecting clients to the right worker. Clients may be initially told that they are eligible, but after being assessed are told that their needs don't fit the criterion for the service. They are then referred back to the CSW. Reduced capacity also means that professionals are referring cases to CSWs that are high risk or outside of the remit of the worker. The case then needs to be referred back to the original worker. Workers described this as 'referral rebound' and CSWs agreed that this is not only harmful, but also contributes to health inequality. Interviews with clients, focus groups with CSWs, discussions with community organisations and health workers all confirmed that one of the main problems with the current system of care in Sheffield is the fact that workers rarely have knowledge what happens after people are referred on. These issues with 'line of sight' contribute to clients experiences of being 'sent from pillar to post'.

We returned to the client interview data and worker focus group with the specific question: What are the barriers to obtaining ongoing support after a case is closed? Can we identify specific blockages in the system? Conversely, how do CSWs enable receipt of support and how do they interact with other parts of the system? The data was used to construct a system dynamics map (Figure 16) illustrating what currently happens for clients who need support after their case has been closed. Clients at risk are assessed by a community worker. A subset of clients receive a 'quick fix', practical peer support where the CSW is able to sort something immediately by offering personal assistance. For example, replacing light bulbs, repairing loose carpeting or taking clients to a food bank. They also signpost to maintenance services, such as gardeners and cleaners who can provide similar support. These actions increase safety in the home and reduce risk. Issues arise when clients are referred on to services where another assessment is needed to determine eligibility.

Figure 16: System dynamics for community-based support in Sheffield



As shown in the system dynamics map, clients can experience multiple blockages. These seem to be occurring for several reasons, which include diminished capacity within a service to perform assessments; turnover and staffing cuts leaving less experienced workers to do assessment and linkage; long delays in updating clients; and in some cases no response from the provider unless they are chased by the client.

In most cases, these blockages occur after their case is closed. People are then in a position of having to negotiate the service on their own, or request further help from the CSW. Success is dependent upon individual levels of health literacy, e.g. ability to access, understand, appraise and apply information and navigate through different service sectors. It also depends on access to social support networks. The blockages potentially increase risk as well as disillusioning clients.

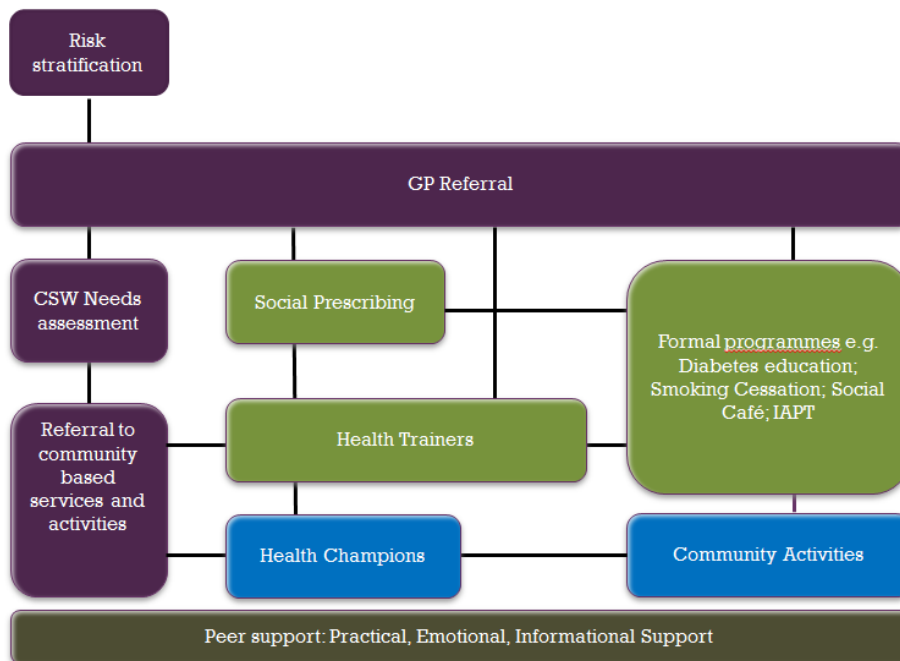
For example, one older client who was hospitalised for a serious fall stated that they had experienced long waits for equipment to help them to cope at home. What was eventually provided was not felt to be appropriate. They were also given conflicting information from the hospital and community physiotherapists about the use of a walker. A cart was provided “long after I stopped needing it”; and “there was a 6 month wait to organise attendance at the Falls Clinic”. Although the client has type 2 Diabetes – which is recorded in his notes - the home meals were not delivered on time and there was no contact to say that they would be late. A carer for someone with Alzheimers described how they waited nine months for an appointment with the Memory Clinic. The long wait led the carer to ringing what she described as ‘emergency social services’ for respite care. She said “They took him for a week. I

thought I'd use the time to see friends, get things done for myself. But by the time I got the support, I was tired that I spent the first 3 of my five days in bed." Both situations echo the comments of others, who described contacts with support services as sporadic, leading them to describe the experience as feeling like they had "just been left". Both cases also illustrate that while brief interventions by CSWs appear effective, more changes are needed in terms of integrating health and social care to sustain the reduction in risk that has been achieved via the CSW intervention

Communication issues pose another barrier. In one case, the Clinic worker went to the old address because the new address hadn't been entered into the system. There was a further delay of two months before the worker appeared at the new address. No apology was given for the delay or the error. Three clients were unable to get any updates about home visits, saying "they just showed up" and workers on arrival were unfamiliar with cases, meaning that "you have to tell your story over and over to different people". A carer with a hearing impairment asked repeatedly for the hospital to email rather than ringing her. Although she had been assured that her special needs were recorded on the system, she received several letters from the hospital stating that her husband would be removed from the clinic list because she hadn't responded to phone calls. There was no apology offered by the head of the service when she contacted them to complain. From a systems perspective these clients were at risk of another unplanned A&E attendance/hospital admission due to delayed response and problems with communication. Clients experiencing frustration with unresponsive services reported feeling anxious, depressed, and powerless to improve circumstances.

In contrast, the benefits of integrating CSWs with other services are illustrated by a client seen in the Darnall integrated care pilot (Figure 17). The client had problems with mobility, and needed a ramp installed by the Department of Work and Pensions to get out of the house without assistance.

Figure 17: Integrated care compensates for waits in the system



He waited a year for ramp. During this time, he was very satisfied with the service, because there was a coordinated effort to provide a network of support across the CSW and community workers. The network included health Trainer sessions, taking the client to DESMOND for diabetes education and support, involving him in lunch clubs and activity groups, with volunteers who arranged transport. The client lost weight, there was documented improvement in wellbeing scores from the Health Trainer programme and more confidence in achieving life goals.

Box 4 Key messages about systems barriers

- Clients report that the brief intervention provided by CSWs may be effective in reducing anxiety and social isolation, and increasing wellbeing over the short term, but effects cannot be sustained when clients experience barriers in accessing services after their case is closed.
- Systems barriers include: waiting for assessment after being referred on to another organisation; being told that you are not eligible for a service after being assessed; being told you are eligible, but experiencing long waits with no update on what to expect next.
- At each of these points, clients may become disillusioned and disengage.
- Long waits and disengagement return clients to the high risk group.
- Referral rebound harms clients, increases health risk, decreases wellbeing and contributes to health inequalities.

Section 4 Conclusions and recommendations

In this section, we provide a revised programme theory explaining how the service currently works, which is based on evidence from the evaluation. Findings are compared to the evidence base for similar interventions, which are based on peer support. The solid evidence base for peer support, which is related to increasing health literacy and shifting demand, is summarised. The report concludes with recommendations for how policymakers can use the information to inform decision making about cross-sectoral working and resource allocation.

4.1 How, why and when does the Community Support Service work?

The CSW service works over the short term to provide advice and brief interventions to people experiencing issues with life circumstances by providing short term peer support. It has the potential, which is already being piloted in various neighbourhoods in Sheffield, to link clients to longer term support. If this support includes peer support with the aim of promoting increased health literacy, then the international evidence base indicates that demand for non-medical support could be shifted away from primary care. This predictive model is presented below (Box 5).

Box 5: How the CSW service could connect with neighbourhood services

Raising awareness across health, social care and other sectors of the risks associated with poor wellbeing and health will promote early identification of risks. Community support workers who have a comprehensive knowledge of local assets and centralised services can match clients' needs with existing resources.

Workers who are skilled in providing peer support and assessing health literacy will be able to engage with clients, identify unarticulated needs, and enable clients to understand and apply information to adjust to and improve their life circumstances.

If workers receiving the referrals from CSWs are not skilled in rapid response and assessment, then clients will experience frustration, anxiety and depression. They will continue to be socially isolated and at high risk of needing health care and social care packages. When workers who receive referrals from CSWs are aware of local resources, they can continue to match client needs to services. This reduces referral rebound and reduces risk.

When workers across the system use peer support to sustain and build upon the original connections made by the CSW, clients will experience increased wellbeing, be less socially isolated, have better health literacy, be able to independently access information and apply it to maintain health. Improved health literacy and peer support will shift demand for non-medical support to local services, reduce non-medical GP visits, lead to more timely and appropriate use of primary care, and eventually reduce avoidable use of secondary care.

4.2 Comparing findings to the wider evidence base

Research has been completed in three areas relevant to the CSW service: reduction in hospital admissions, provision of peer support, and health literacy. We searched for similar services in other localities to establish whether any were able to demonstrate direct or indirect impact on reducing hospital admissions or social care packages. The number of similar services for comparison is limited in the UK. Most interventions that aim to reduce hospital admissions are health interventions, focusing on providing direct care to older populations with one or more long term conditions, to people who have ambulatory care sensitive conditions, and/or are at risk of deterioration or unstable (Erens et al, 2016). Only 4 interventions were found that provided a brief intervention consisting of assessment, signposting and navigation related to benefits entitlement, community transport, housing, and leisure activities (Bardsley et al, 2013) There was no evidence of a reduction in emergency hospital admissions for any of them.

We then looked for similar interventions where indirect impact had been evaluated e.g successful referral to organisations that provide case management and support for self-care. *Case management* includes case finding, assessment, planning and coordination of care (Ross et al, 2001). Systematic reviews indicate that a community-based coordinated approach may reduce admissions for some conditions that make up over 50% of admissions e.g. urinary tract infection and pyelonephritis; COPD; pneumonia; ear, nose, and throat infections; and convulsions or epilepsy (Blunt, 2013). There is, however, no evidence that case management impacts on hospital admissions for frail elderly patients (Gravelle et al, 2007). Evaluations of 11 integrated care pilots in England found no evidence of a general reduction in emergency admissions (Bardsley et al, 2013). None of the initiatives looked at change in social care packages. The problem of attributing a reduction in unplanned hospital admissions to integrated services has been extensively recognised in recent research. Thwaites et al (2017) conclude from their recent review that definitions of an inappropriate hospital admission are inconsistent and problematic, lacking the patient perspective. Walsh et al (2014) found that professionals hold diverse views on the reasons for unplanned admissions. Further, all of the studies conducted so far have evaluated the relationship between health interventions and reduced admissions – we could find no evaluations of relationship between services that provide signposting to non-medical resources and support.

From the evaluation and the evidence base, we question whether reduction in unplanned admissions is a meaningful outcome for the CSW service. A Health

Foundation review of self management suggests that focusing on reducing use and cost of services is too simplistic and we should be assessing changes in patterns of service use (da Silva, 2011). In other words, developing outcomes that assess shifts in demand.

Clients who are referred to places providing information and advice, VCF services, and Council services receive support for self-care. *Support for self-care* refers to the actions people take to maintain health and wellbeing by addressing social needs, staying fit physically and mentally; preventing illness and accidents; caring for their own minor and long-term conditions; and caring for themselves after acute illness and hospital discharge (Department of Health 2005). Interventions supporting self-care include education to promote self-management of health conditions, Health Trainers, social prescribing and local area coordination. Systematic reviews of evidence show that self-management support can reduce health care utilisation for respiratory and cardiovascular disorders (Imison et al, 2017). Health Trainer programmes have successfully enabled clients to stop smoking, change their diet and increase activity as well as addressing social needs to get connected and develop support networks (Visram et al, 2014). Both Health Trainer and Health Champion programmes report significant increases in knowledge, wellbeing and confidence (Altogether Better, undated). There is an emerging evidence base for social prescribing, where GPs refer patients to a link worker who connects them with sources of support for non-medical needs (Imison et al, 2017). A review of social prescribing in Rotherham has indicated that it reduces GP workload by enabling shorter and/or better quality consultations and reducing repeat appointments particularly for non-medical issues. It helped patients to self-manage symptoms and reduced social isolation and loneliness (Dayson & Moss, 2017). Evaluations in Sheffield demonstrate that both Health Trainer and social prescribing improve wellbeing (Harris et al, 2014; Moss, 2015).

All types of support for self-care rely on peer support. Peer support is the provision of emotional, informational, appraisal and practical assistance by someone with experiential knowledge of a specific situation (Dennis, 2003) . A recent comprehensive international review established that there is solid evidence for the effectiveness of community-based peer support in terms of improving health outcomes (O'Mara-Eves et al, 2013). A review including services from Sheffield has established that peer support promotes increased health literacy across a range of conditions and situations (Harris et al, 2015). Community-based peer support is more effective than support provided by people from outside the community, because local workers are seen to have greater understanding of neighbourhood contexts, stressors and local sources of support and are better placed to facilitate linkages after referrals are made.

4.3 Redefining impact: Peer support, health literacy and shifting service use

The real impact of the CSW service – as documented in the evaluation – is that it has

- raised awareness of the extent of non-medical need in Sheffield
- illustrated how short term peer support is effective in identifying issues that place people at risk
- demonstrated that a system can be implemented for referring non-medical needs to the appropriate sectors
- is the first step in connecting clients to ongoing community-based peer support, which can potentially increase health literacy, improve wellbeing and shift non-medical demand away from primary care

A recent evaluation of local area coordination (Marsh 2016) found that there were direct relationships between the support provided by community workers and wellbeing (Box 7).

Box 7 How support worker actions relate to improved wellbeing

Providing information and advice reduces anxiety

Helping people make connections reduces social isolation

Providing benefits advice reduces worries about debt and finances

Accessing support to make housing safer leads to an increased sense of security

Providing practical help to access property repairs decreases risk of eviction, reduces stress

Connecting to social networks leads to an increased feeling of being a part of the community

Building trust with the worker leads to increased self confidence and an improved outlook on life and hope for the future.

Support from the community worker enables people to do tasks for themselves, leading to increased independence.

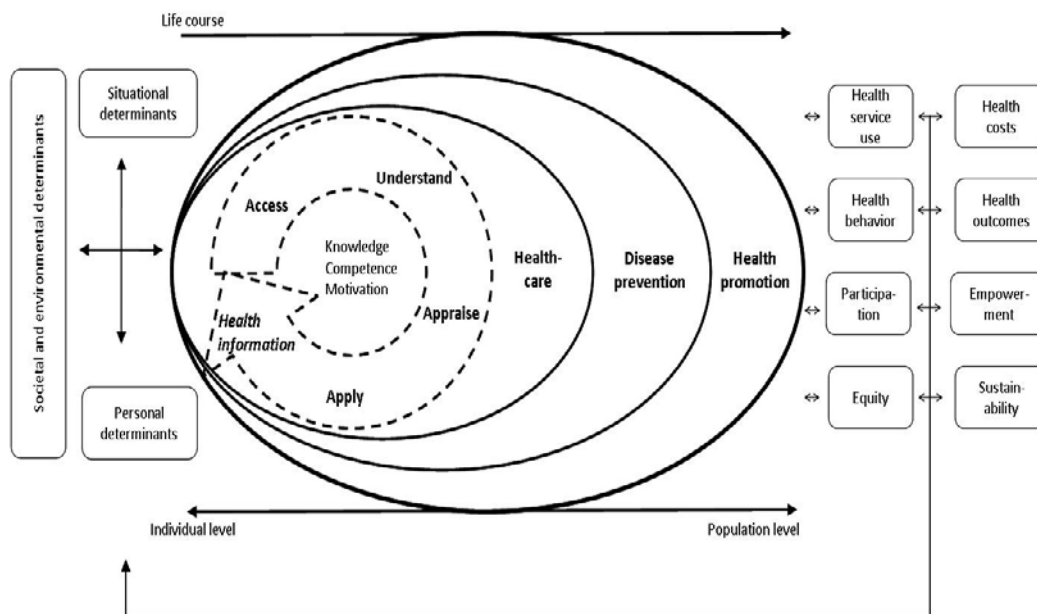
Increased health literacy means that people are able to make better informed decisions leading to a greater sense of control.

From a user perspective, clients participating in CSW interviews mentioned similar things, which align with providing effective peer support and increasing health

literacy (Table 4). Health literacy is the ability of people to address health and social issues by accessing information, developing an understanding of health related-information and advice, appraise whether it is relevant to their personal circumstances and capabilities, and apply it to get the health care that they need, prevent disease and promote ongoing health and wellbeing (Kickbusch, 2001). Levels of health literacy have been shown to be directly related to utilisation of health services. Research has found that older and disabled people with low or marginal levels of health literacy have a significantly higher risk of hospitalization (Baker et al, 2002). In outpatients, lower health literacy is associated with poorer understanding of information, increased risk of hospital admission and poorer clinical outcomes (McNaughton et al, 2011; Baker et al 1998; Baker et al, 2004).

Lower literacy also means that people are less likely to seek services related to preventing ill health and are more likely to use A&E (Scott et al, 2002; Ginde et al, 2008). Ways in which health literacy can impact on population level health, including health costs, have been systematically mapped from the research (Figure 18).

Figure 18: Model of health literacy (Sørensen et al, 2012)



Promotion of health literacy is one of the outcomes for the CSW and wider People Keeping Well programme. Data from workers’ descriptions of their role and clients’ experiences of interacting with workers show that CSWs provided peer support

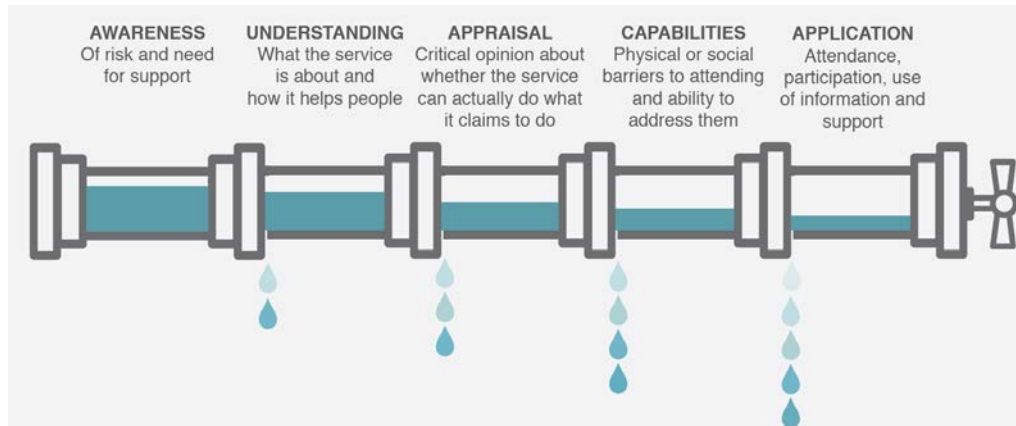
which had the potential to increase health literacy (Table 4). The positive effects, however, are diluted or negated by issues with systems capacity, which frustrates client attempts to continue to access, understand, and appraise information and use support to improve health.

Table 4: CSW provision of peer support

Type of peer support	Actions taken by CSWs	Health literacy skills developed	Health literacy stage
Informational	Information finding	Functional: challenges understanding written information (reading, numeracy)	Access Understand
Appraisal	Finding out what clients need and interpreting eligibility Discussing whether the resources are relevant and appropriate for needs at that particular point in time	Helping people to understand, judge, sift and decide what information and support would be useful in the context of one's own life	Appraise
Practical	'Showing how': to speak with organisations and describe needs; 'Doing for/with': Help completing Benefits Check; Carer Allowance; applications for other entitlements. 'Going with': Taking people to places and connecting people to social groups where they can share experiences.	Interactive: having the skills and confidence to discuss your situation with other people	Apply

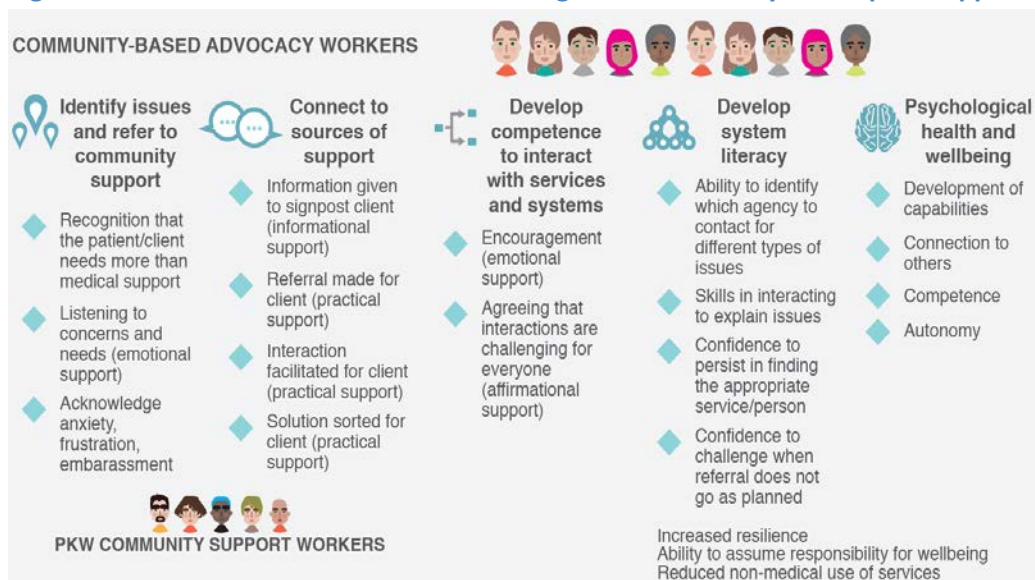
While constructing the systems map, we discussed systems capacity with a number of workers and organisations in Sheffield. The discussions as well as case studies indicate that simply providing information and signposting to services is not enough for clients who struggle to understand what a service does, and how it can help. Without the longer term support, the impact of the original signposting is lost, just as water is lost when it moves through a leaky system (Figure 19).

Figure 19: Leaky systems dilute the impact of information giving and signposting



The CSW service is most effective when it is linked with the longer term services where advocacy workers provide peer support across Sheffield neighbourhoods (Figure 20).

Figure 20 Differences between short and long term community-based peer support



Making links with community-based support provides opportunities over the long term to reinforce 'system literacy' skills, where clients learn to navigate and negotiate needs for themselves.

Although length of support varies with individual clients, community-based peer support can be effective within 2 to 6 months depending on the number and complexity of issues and client's capabilities (Harris et al, 2015). Peer support services may also be cost effective. A recent evaluation of the Local Area Coordination that offers similar support indicates that the social return on investment is £3-4 for every pound spent (Marsh, 2017). Further evaluation of the specific costs of peer support needs to be conducted, and related to changes in use of primary care services and ability to access social support thereby delaying the need to apply for social care.

Box 6 Key messages about impact

- There is no evidence that short-term signposting and brief support with navigation has a direct impact on reducing unplanned hospital admissions.
- There is no evidence that a CSW service indirectly impacts unplanned admissions by linking people with case management.
- There is a strong evidence base that linking people to community-based self-care is effective. Promising interventions include health trainer services, social prescribing and Local Area Coordination.
- The CSW service may increase health literacy by providing peer support, but the effects are likely to be difficult to sustain unless people are connected to workers who can provide longer term support.
- There is a solid evidence base that workers who are actually based in communities can provide the most effective peer support and increase health literacy.
- It is likely that increased health literacy is related to utilisation of health services. Focusing on improving health literacy via community-based peer support may shift demand for services.
- Impact needs to be redefined as a process of providing peer support, and relating support to increased health literacy.
- Impact should be measured by costing non-medical GP appointments, costing peer support services, monitoring shift in demand and costing the benefits in relation to utilisation of community-based services.

5. Conclusions: Do we have 'good enough' evidence for decision making?

Reviews of decision making in health and social care agree that policymakers base their decisions on a range of knowledge that comes from organisations, practitioners, users, policymakers, and research (Pawson & Boaz, 2003). When using knowledge for decision making, there are 8 basic questions that need to be answered (Box 7).

Box 7: Key questions for commissioning

- 1) Does doing this work better than doing that?
- 2) How does it work?
- 3) Does it matter?
- 4) Will it do more good than harm?
- 5) Will service users be willing to or want to take up the service offered?
- 6) Is it the right service for these people?
- 7) Are users, providers and other stakeholders satisfied with the service?
- 8) Is it worth buying this service?

(Adapted from Petticrew and Roberts, 2003)

These questions take into account how different types of knowledge can compliment or contradict each other, enabling policymakers to consider the strength of argument that can be made to support decisions to buy a service. Data sources from the evaluation have been mapped to these questions in Table 4.

The table shows where qualitative data from practitioners and users experiences of the service answered questions, compared with quantitative data on CSW service use from Section 2 of the report. The final column is ticked if there is national or international evidence supporting the question about the service. For example, interviews with users showed that the CSW service was better at addressing non-medical issues, GPs experiences confirmed this, and service data on actions taken by CSWs confirmed that the service shifted demand (Table 4, Question 1). Focus groups where CSWs described how they provided peer support, and interviews with clients indicated that clients received relevant support, which agrees with the wider evidence base for peer support (Question 2).

Table 4 Stakeholders' views of the service

Key commissioning questions	Practitioner Experiences	User Experiences	Service Data	Wider Evidence Base
1. Does early identification and referral to a CSW channel non-medical demand better than addressing issues in a GP consultation?	✓	✓	✓	
2. Referral works because CSWs are able to provide peer support, which identifies client issues, provides relevant signposting and information		✓	✓	✓
3. The service matters because if it was decommissioned, then clients would continue to use general practices for non-medical issues	✓			
4. The service does more good than harm, connecting 86% of clients to non-medical sources of support, but systems are unable to provide a timely response to some referrals	✓	✓	✓	
6. Are users, providers and other stakeholders satisfied with the service?	✓	✓	✓	
7. Over 90% of service users took up the CSW service when it was offered			✓	
8. Is it the right service for these people?	✓	✓	✓	
8. Is it worth buying this service?	✓			

Discussion with GPs indicates that if the service were decommissioned, rates of non-medical consultations would return to previous levels. Lack of access to GP appointment data means that this perception can't be confirmed (Question 3). There was agreement across different stakeholders about benefits, systems issues (Questions 4-5). High levels of satisfaction with the support is also found in the wider evidence base. Satisfaction is supported by quantitative data on take up of the service (Question 7). The brief intervention responds rapidly to client issues and signposts to other service. Continuing issues with fragmented and non-responsive systems, however, indicate that it may be better placed within neighbourhood partnerships which provide longer term peer support, that can follow up with agencies when there are systemic barriers to accessing support (Question 8). If embedded within emerging neighbourhood partnerships in Sheffield, the referral

service could contribute to reducing pressure across a range of public services and more effective self care (Marsh, 2017; Dickinson et al, 2013).

In terms of the degree of confidence across policymakers, practitioners and other stakeholders that the service can achieve outcomes for non-medical support, we could conclude that the referral system represents (a) good practice, because practitioners have trialled the system, they like it and feel it has made an impact; and (b) a promising approach that is research based when the brief intervention is linked to longer term community-based peer support.

The CSW service has achieved its original aim, which was to raise awareness about risk, and promote referral to other sectors for support with non-medical issues. We can conclude that a concerted effort promotes referral by health professionals and positive experiences with the service increase referral from other sectors. The CSW service, however, is only one part of the People Keeping Well Programme so impact needs to be considered as part of the wider system of shifting demand. The main message is that the success of the service depends on being able to connect people to longer term peer support. Peer support is already provided across a number of areas in Sheffield via anchor organisations under the PKW neighbourhood partnership model. Neighbourhood partnerships are currently developing networks of support via social prescribing. The questions for future commissioning appear to be:

- 1) There are many referral routes for non-medical issues so how does the service contribute to what is already provided, and how does it affect other aspects of the health and social care system?
- 2) Is it possible to embed the service within neighbourhood partnerships, who refer directly to community-based workers in anchor organisations?
- 3) What is the capacity of anchor organisations to respond to non-medical issues?
- 4) What is the impact of shifting demand to non-medical sources of support, in terms of increasing health literacy and reducing use of GPs?
- 5) How much resource is needed to address non-medical needs?

Given the positive response to the service, an incremental approach could be taken where data on the above questions is collected in selected areas of the city over a period of 6-12 months, and used to inform future commissioning decisions.

Although the evaluation has begun to document how the service contributes to shift in demand, plans to continue to monitor should be implemented in order to capture longer term effects. People who are referred on to other sources of support, however, need to be monitored to determine whether the original issue defined by People Keeping Well – which is the experience of being passed from pillar to post – has been alleviated.

The function of PKW CSWs overlaps with the function of community organisations in the more well resources areas of the city. This potential duplication needs to be reviewed in order to make decisions about spreading support to less resourced areas. The next stage of service development needs to consider where workers would be best placed. Blockages and barriers in systems need to be mapped to identify where to target resources to ensure that clients are not lost to networks of support.

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Although the evaluation has begun to document how the service contributes to shift in demand, plans to continue to monitor should be implemented in order to capture longer term effects. Linking identification, assessment, and referral is critical to move clients out of high risk groups. People who are referred on to other sources of support need to be monitored to determine whether the original issue defined by People Keeping Well – which is the experience of being passed from pillar to post – has been alleviated.

The function of PKW CSWs overlaps with the function of community organisations in the more well resources areas of the city. This potential duplication needs to be reviewed in order to make decisions about spreading support to less resourced areas. The next stage of service development needs to consider where workers would be best placed. Blockages and barriers in systems need to be mapped to identify where to target resources to ensure that clients are not lost to networks of support. Specific evaluation activities that could inform future decisions include:

Comparing job descriptions of CSWs and community-based workers, to establish where there is duplication and added value.

Monitoring current capacity to take referrals and mapping how clients currently move through systems in order to create baseline data which can be used to identify where there are ongoing issues with system capacity.

Establishing the real cost of services received on both a single service level and as a 'bundle' of services for clients with multiple and complex needs. This data can be used to determine whether there are distinct clients groups. If there are, then segmentation can be used to decide which bundles of services are most likely to be cost effective.

The impact of connecting clients to appropriate services needs to be redefined, based on outcomes that can be directly attributed to what was provided. Access to general practice data is needed in order to assess whether the service can shift non-medical demand and free up more GP time to address medical needs.

Impact needs to be redefined as a process of providing peer support, and relating support to increased health literacy. Impact should be measured by costing non-medical GP appointments, costing peer support services, monitoring shift in demand.

The Houses of Parliament evidence briefing on Integrating Health and Social Care (2016 POSTNote Number 532) integration as a process organisations and professionals "bring together all of the different elements of care that a person needs." From this perspective, CSWs have connected people to a diverse range of services across Sheffield, by providing effective peer support and increasing health literacy. The next stage— which is achieving a more structured integration, is yet to be realised – as evidenced by client interviews that listed a number of systemic barriers to obtaining responsive services. Responsiveness and linking across services is dependent upon building professional relationships and understanding across sectors of how systems can be configured to connect, providing a network of support for clients. As noted by the Integrated Pioneers Programme, this process can take up to five years (Erens et al, 2016).

The House of Lords Select Committee Report on [long-term sustainability of the NHS and Adult Social Care](#) concluded that

"Although recent efforts to promote joined-up health and social care services have delivered mixed results, integrated health and social care with greater emphasis on primary and community services still presents the best model for delivering patient-centred, seamless care. Although there is disagreement on the financial gains to be derived from this integration, the benefits to patients are a clear justification for continuing to pursue this agenda."

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Appendix A: Economic analysis and cost-benefit model results

Report prepared by: Tracey Young, Abualbishr Alshreef, Robert Akparibo, Janet Harris, John Soady for the PKW project.

INTRODUCTION

This document presents the analysis and results for the Sheffield People Keeping Well (PKW) study. The aim of the analyses is to investigate the effectiveness and cost effectiveness of the PKW programme across secondary care and social care. Two analyses are presented here, the first is a comparative analysis of the PKW programme with the general population of Sheffield using propensity score matching. The second analysis uses an interrupted time series approach to compare the number of A&E attendances and inpatient admissions in the year before and after the PKW intervention was introduced.

Finally the Manchester Cost-Benefit Model is explored, the model was originally derived for identifying the cost-benefits in terms of fiscal, economic and social value of public sector programmes. Sheffield City Council received funding from the Prime Ministers Challenge award to evaluate People Keeping Well, and it was a condition of the funding that a tool be used to that was developed by New Economy working with local authority and public sector agencies in Greater Manchester – informally referred to as the Manchester CBA model (HM Treasury, 2014).

METHODS

Datasets

Secondary care service (SUS) data were provided for the adult population of Sheffield for the period from April 2013 to March 2017. Data were provided on primary care, A&E attendances and inpatient admissions.

Avoidable attendances are defined from HRG codes using the method suggested by Whittaker *et al.* where HRG codes: category 1 investigation with treatment category 3 or 4 (VB06Z), category 1 investigation with treatment category 1 or 2 (VB09Z), dental care (VB010Z) and no investigations with no significant treatment (VB11Z) are defined as minor injuries and thus assumed to be minor attendances. Dental care (VB10Z) and no investigations with no significant treatment (VB11Z) were assumed to be avoidable attendances. Inpatient admissions were categorised as those with no overnight stay and those who stayed one or more nights.

Data were provided from Sheffield City Council on the people who received the PKW intervention, this data included information on the participants, referral information, reason for referral to PKW, issues and actions (see Section 1 in the main body of the report for further details of PKW). Further data was also provided on Council data on social care contacts in Sheffield between April 2015 and October 2016. This data included details of social care contact, assessment and if a support plan was implemented when this occurred and the cost of the plan.

This information was used to compare social care contacts between the PKW and general population.

PKW population

The PKW population comprises of 6890 people (8237 referrals) who referred to the PKW intervention between April 2015 and October 2016. Mean age = 70.6 (SD= 18.1, range 15 to 116), 39.8% of the population were male. It was possible to match 5,842 cases (85% of cases matched) with their primary care records, therefore all subsequent analysis is based on 5,842 cases. The mean age of these case was 69.9 (SD = 18.2, range 18 to 107) and 39.0% were male.

General population

The general population consisted of 465,809 cases, the mean age of the population was 45.7 (SD = 19.1 range 17 to 114) with 49.5% male. As the two populations differed in terms of demographic characteristics, risk scores and geographic location a technique known as propensity score matching was used to match PKW patients with the general population prior to the economic analysis.

Propensity score matching

Propensity score matching can be used in non-RCTs in order to ensure the control and intervention groups are comparable in terms of patient characteristics and risk factors. Propensity score matching was used to match those receiving PKW with the general population. A logit model was fitted to predict those receiving the PKW intervention or not and included information on age, gender, predictive risk score, stroke, diabetes, heart failure, COPD and dementia. Once a propensity score weighting has been estimated it should be checked to ensure there is a balanced in terms of person characteristics between scores in the intervention and control groups. Therefore, checks were made to ensure balance was achieved for the fitted model. Kernel density, stratified and radius matching were used to match patient characteristic, there methods are described below:

Nearest neighbour matching matches a participant with the individual in the comparator group with the nearest propensity score. NN matching can match 1 to 1, 1 to many or many to many. It was not used here as it is recognised as producing bad matches.

Kernel matching uses a weighted average of all individuals in the intervention group so uses more information than other methods, though this could result in bad matches. Weights are estimated based on the distance of each individual from the general population is from the control group.

Stratified (block) matching. The propensity score is ordered from smallest to largest and divided into stratas or blocks. A check is made to establish whether the blocks are balanced (comparison of propensity score mean and variance for the PKW and general population samples).

Radius (calliper) matching is similar to NN matching but a boundary or radius can be imposed so that those with propensity scores outside that radius are not considered in the matching process. All of the individuals within the radius are used in the matching "pair". In this study the radius was set at 0.01.

All methods gave similar estimates, which in part is due to using a large general population for the control group. Kernel matching was selected as the preferred method for this study as it is recommended as a more accurate method when there are large numbers in the control population (Caliendo & Kopeing, 2005).

The difference in proportion of attendances or admissions the difference in the mean number of attendances or admissions and the differences in the cost of attendances or admissions were examined using T-test after matching using the propensity score method. Results are presented as the average treatment effect on the treated (ATT) which is the effect of PKW only on those who receive it.

Economic analysis

The economic analysis presents results from the NHS prospective and a social care prospective, respectively. Analysis compares the costs for those receiving and not receiving the PKW intervention before presenting:

- costs per A&E attendance avoided
- costs per avoidable A&E attendance avoided
- costs per minor A&E attendances avoided
- costs per in patient admission avoided
- costs per in-patient admission or one or more night's stay avoided
- costs per secondary care contact avoided (A&E attendance and in-patient stay)
- costs per secondary care contact avoided (avoidable A&E attendance and in-patient stay of one or more night's)
- costs per secondary care contact avoided (minor A&E attendance and in-patient stay of one or more night's)
- cost per social care contact avoided.

Unit costs for A&E attendances and inpatient stay are from Department of Health Healthcare Resource Group (HRG) codes which were provided in the SUS data. Costs of social care packages are provided by Sheffield City Council.

Analysis will be presented as mean costs and incremental mean costs per attendance, admission or contact avoided. This incremental mean is the difference in costs divided by the difference in

effects between the PKW intervention and the general population. Results are presented for the 18 month study period.

Costs of the PKW intervention include the cost of setting up the programme, the cost of support staff, staff time, recruitment, dissemination, community assets, wellness plans and local advice and information. These have been provided by Sheffield City Council.

Interrupted time series analysis

SUS data relating to A&E attendances and in-patient admissions was available for a period of 185 weeks prior to the introduction of the intervention (Figure 3). Therefore an interrupted time series analysis was carried out to explore whether there was a reduction in the number of attendances and admissions per week in a 52 week period prior to and post intervention for those receiving the PKW intervention (Kontopantelis et al, 2015). Only participants who had complete 52 weeks of data before and after the PKW intervention were included in the model (Figure 4). Interrupted time series models were fitted to the data to see if there was a reduction in the number of weekly attendances or admissions post PKW.

All analysis was carried out in STATA version 13.1

Manchester Cost Benefit Model

One of the requirements of this piece of analysis is to use the cost benefit analysis tool developed by New Economy to evaluate PKW. This tool which will be referred to here as the Manchester CBA model was originally designed to perform “CBA in the context of local programmes to improve public services”. It was initially used to evaluate the pilot PKW programme.

The model requires two key inputs, costs and benefit. Costs are defined as the additional costs needed to deliver a project or programme, in this case the costs of setting up and delivering the PKW programme, these were provided by Sheffield City Council and are listed in Table 10. Benefits are defined as the benefits are defined as the fiscal, economic and social benefits, for example reduction in avoidable A&E attendances, reduction in GP visits, reduction in in-patient attendances, reduction in social care contacts, improved well-being or avoided time of public sector agencies. No information was available to GP visits, nor was it possible to collect information on participant well-being. Therefore benefits were defined in terms of financial benefits and were: avoidable A&E attendances, in-patient admissions and social care admissions.

Information on costs and benefits in terms of the costs of the set-up and running of PKW, the size of the population (known as the level of need in the model), the level of engagement with the population, the impact of the outcome (e.g. percentage of A&E attendances in the PKW and the general population (known as the deadweight in the model)) and the time between the intervention being delivered and the effect of the outcome being observed. This information can then be inputted into an Excel model provided by the New Economy group (New Economy, 2014). The model then provides results in terms of the economic and financial case for the intervention.

There were a number of challenges in obtaining reliable effectiveness data to input into the Manchester CBA model, that is details of the impact of the outcome and these are described in the results section.

RESULTS

Table 1 below presents the descriptive statistics for the PKW and general population of Sheffield. The PKW population are older and have higher predictive risk scores than the general population and there are a lower proportion of males. Figure 1 presents the distribution of predictive risk scores for each group, it can be seen that the PKW recruits over the full range of the risk score distribution, though there are more people in the general population with lower risk scores. There is a higher proportion of people with comorbidities in the PKW group. This reflects successful targeting of moderate to high risks groups by the service. Similarity in deprivation scores (IMD) shows that the PKW population was comparable to the general population in terms of levels of deprivation.

Table 1: Descriptive statistics

	PKW (N = 5842)	Sheffield general population (N = 465,809)
Male (%)	2,280 (39.0%)	230,434 (49.5%)
Mean age (SD)	69.95 (18.2)	45.7 (19.1)
Median age (IQR)	75 (58 to 84)	44 (29 to 60)
Range	18 to 107	17 to 114
Predictive risk score		
Mean (SD)	22.3 (18.9)	7.0 (7.23)
Median (IQR)	16.6 (7.8 to 30.3)	3.9 (3.15 to 7.95)
Range	1.8 to 99.9	1.8 to 98.6
IMD score 2010		
Mean (SD)	28.7 (14.3)	29.0 (14.4)
Median (IQR)	24.1 (18.2 to 42.8)	24.6 (18.5 to 44.7)
Range	3.6 to 58.7	3.6 to 58.7
Diagnosis		
Percent with COPD	14.3%	2.4%

Percent with asthma	16.4%	12.0%
Percent with diabetes	24.6%	6.3%
Percent with hypertension	48.5%	15.8%
Percent with angina	12.9%	2.0%
Percent with AF	13.4%	6.6%
Percent with heart failure	11.3%	1.2%
Percent with IHD	21.8%	4.2%
Percent with AMI	9.5%	1.9%
Percent with PVD	4.8%	0.8%
Percent with TIA	7.3%	1.2%
Percent with stroke	9.2%	1.4%
Percent with CKD	23.2%	4.1%
Percent with hypothyroidism	12.4%	4.4%
Percent with cancer	13.9%	3.8%
Percent with epilepsy	3.6%	1.4%
Percent with depression	35.4%	15.9%
Percent with dementia	10.4%	0.9%
Percent with severe mental illness	3.7%	1.1%
Percent with learning disability	1.7%	0.7%

Figure 1: Distribution of predictive risk scores for PKW (N = 5,842) and the general population (N = 22,213) (prior to propensity score matching)

a) PKW (N = 5,842)	b) General population (N = 465,809)
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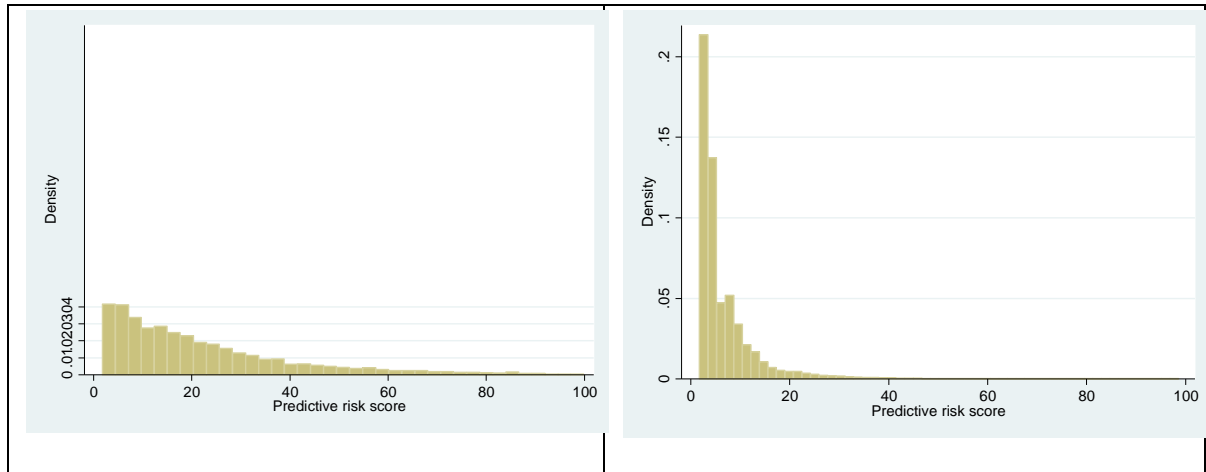
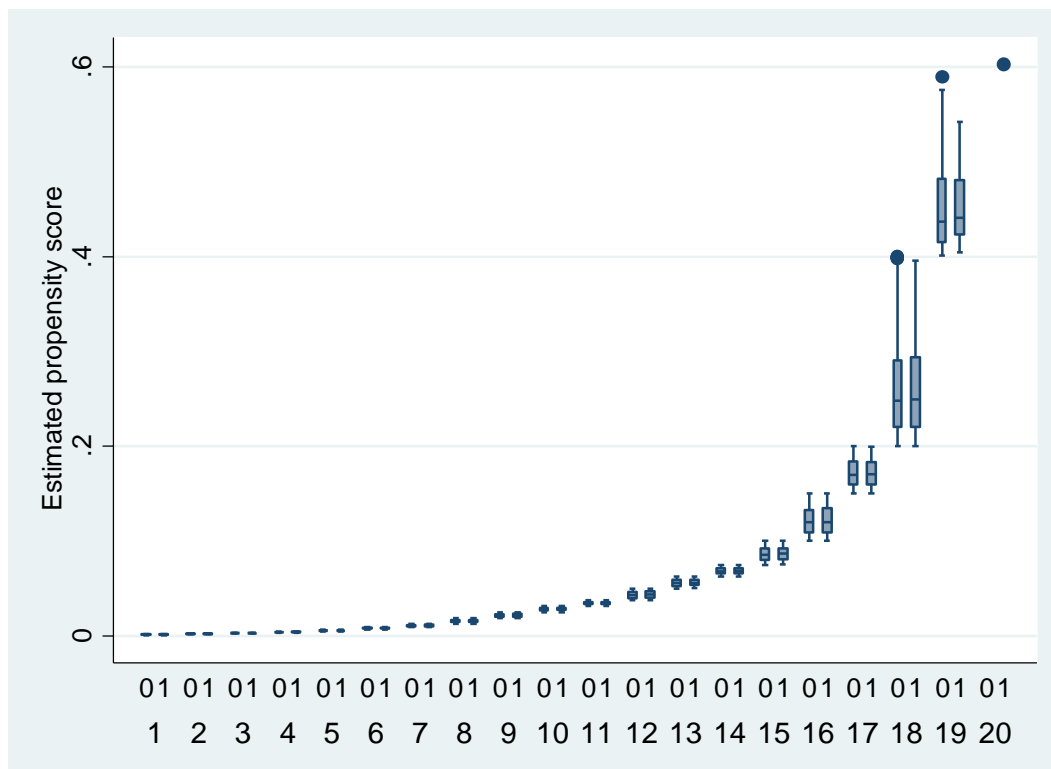


Figure 2 below presents the propensity scores for PKW and the general population stratified by the propensity score. Generally groups are balanced with the exception of the final propensity score strata. A number of alternative models were fitted and this pattern was the case in all models and is due to one PKW observation where no match was available. As this is one observation in a large sample it will not skew or affect the results and therefore was kept in the analysis.

Figure 2: Propensity score matching by strata (All)



Secondary care: A&E attendance

i) All A&E attendance

Table 2: Summary of all A&E attendances and costs (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with an attendance (%)	4,945 (84.7%)	397,516 (85.2%)	-0.005 RR = 0.96 (0.89 to 1.03) X ² =1.46 p = 0.227	-0.005 T = 1.23 NS
Mean number of attendances per person	1.94 (2.78) 1 (1 to 2) 0 to 91	1.08 (1.24) 1 (1 to 1) 0 to 234	0.86 T = 51.10 p < 0.001	0.62 T = 34.28 P < 0.001
Mean cost of attendance	£189.90 (£324.25) £109 (£0 to £252) (£0 to £5,934)	£50.66 (£137.03) £0 (£0 to £57) £0 to £14,618	£139.24 T = 75.08 P < 0.001	£128.81 T = 21.79 P < 0.001
Incremental cost per A&E attendance avoided			-£27,848	-£25,762

Table 2 presents the number and proportion of all types of A&E attendance, the mean number of attendances per person over 18 months, and the mean cost of an attendance. The proportion of A&E attendance was 84.7% for the PKW group which is slightly lower (-0.5%) than the proportion of attendances in the general population, this difference was not statistically significant. However the average number of attendance to A&E is significantly higher in the PKW group and thus A&E costs are about £128 higher for this group. Thus PKW cost more but have a slightly lower proportion of attendances. The incremental cost across all types of A&E attendance per A&E attendance avoided is the ratio of the difference in costs (£128.81) to the difference in the proportion of attendances (-0.005) and is -£25,762. Results are similar with and without propensity score matching.

ii) Avoidable A&E attendances

Table 3: Summary of avoidable attendances and costs (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with an attendance (%)	1,032 (17.7%)	57,923 (12.4%)	0.053 RR = 1.50 (1.41 to 1.61) $X^2=145.5$ p < 0.001	0.052 T = 10.13 P < 0.001
Mean number of attendance per person	0.28 (1.23) 0 (0 to 0) 0 to 71	0.17 (0.67) 0 (0 to 0) 0 to 180	0.112 T = 12.60 P < 0.001	0.112 T = 5.34 P < 0.001
Mean cost of attendance	£15.81 (69.95) £0 (£0 to £0) £0 to £4,047	£9.41 (37.94) £0 (£0 to £) £0 to £10,260	£6.40 T = 12.60 P < 0.001	£6.39 T = 6.80 P < 0.001
Cost per A&E attendance avoided			£120.75	£122.88

The number of avoidable A&E attendance is higher for the PKW group and this is a statistically significant increase. Further, the average number of attendances to A&E is slightly higher in the PKW group. The mean cost of attendance, therefore, is £6.39 higher for this group. The incremental cost per avoidable A&E attendance avoided is the ratio of the difference in costs (£6.39) to the difference in the proportion of attendances (0.052) and is £122.88, showing PKW is more costly with a higher number of attendances

iii) Minor A&E attendance

Table 3: Summary of minor attendances and costs (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching

Number with an attendance (%)	1,471 (25.18%)	82,297 (17.64%)	0.074 RR = 1.56 (1.47 to 1.66) $\chi^2 = 962.0$, P < 0.001	0.074 T = 9.49 P < 0.001
Mean number of attendances per person	0.44 (1.52) 0 (0 to 1) 0 to 81	0.26 (0.88) 0 (0 to 0) 0 to 230	0.18 T = 15.66 P < 0.001	0.181 T = 10.59 P < 0.001
Mean cost of attendance	£28.78 (£95.33) £0 (£0 to £57) £0 to 4,817	£16.71 (56.78) £0 (£0 to £0) £0 to £14,110	£12.07 T = 15.96 P < 0.001	£11.87 T = 6.35 P < 0.001
Cost per A&E attendance avoided			£163.11	£160.41

The number of minor A&E attendance is higher for the PKW group and this is a statistically significant increase. Further, the average number of attendances to A&E is slightly higher in the PKW group and thus A&E costs for minor injuries are about £11.87 higher for this group. The incremental cost per minor injury A&E attendance avoided is £160.41 where PKW is more costly with a higher number of attendances.

In summary the PKW intervention appears to be targeting people who are more likely to attend A&E. If all A&E attendances are considered there is a slight insignificant reduction in the number of attendances for the PKW group, however for avoidable and minor attendances the proportion of attendances is higher for the PKW group. On average there are more A&E attendances at a higher cost per person in the PKW group. The incremental cost per attendance avoided is much lower for minor and avoidable attendances than for all attendances.

Secondary care: In-patient admissions (All admissions)

Table 4: Summary of all inpatient admissions and costs (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with an admission (%)	3,360 (57.5%)	107,342 (23.0%)	0.345	0.309

			RR = 4.42 (4.2 to 4.7) P < 0.001	T = 16.17 P < 0.001
Mean number of admissions per person	1.96 (3.51) 1 (0 to 3) 0 to 62	0.49 (1.82) 0 (0 to 0) 0 to 152	1.46 T = 59.87 P < 0.001	1.35 T = 17.28 P < 0.001
Mean LOS	10.87 (25.48) 0 (0 to 9) 0 to 428	1.00 (8.34) 0 (0 to 0) 0 to 1,126	9.87 T = 85.60 P < 0.001	9.09 T = 19.02 P < 0.001
Mean cost of admissions	£3,860 (£7,454) £720 (£0 to £5,084) £0 to £204,301	£664 (£2,505) £0 (£0 to £0) £0 to 207,778	£3,197 T = 92.55 P < 0.001	£2,940 T = 19.33 P < 0.001
Cost per in-patient admission avoided			£9,266.67	£9,514.98

The number of people with an in-patient admission is higher in the PKW group. Further, the mean number of admissions per person is 1.96 for those receiving PKW compared with 0.49 in the general population. The average length of admission is also longer for those receiving the PKW intervention (PKW mean = 10.9 days, general population mean = 1.0 days). The incremental cost per admission avoided is the difference in the costs between PKW and the general population (£2,940) divided by the difference in the proportion of admissions (0.309) which is £9,515

Secondary care: In-patient admissions (Those staying one or more nights)

Table 5: Summary of all inpatient admissions of one or more nights and costs (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with an admission (%)	2,556 (43.8%)	46,632 (10.0%)	0.338 RR = 6.69 (6.4 to 7.0)	0.306 T = 38.86

			P < 0.001	P < 0.001
Mean number of admissions per person	1.11 (2.03) 0 (0 to 2) 0 to 31	0.16 (0.68) 0 (0 to 0) 0 to 75	0.95 T = 100 P < 0.001	0.874 T = 20.31 P < 0.001
Mean LOS	10.88 (25.48) 0 (0 to 9) 0 to 428	1.0 (8.34) 0 (0 to 0) 0 to 1,126	9.87 T = 85.60 P < 0.001	9.09 T = 17.87 P < 0.001
Mean cost of admissions	£3,230 (£6,292) 0 (0 to £4,142) 0 to £86,953	£428.88 (£2,056) £0 (£0 to £0) £0 to £103,544	£2,801 T = 98.51 P < 0.001	£2,576 T = 35.70 P < 0.001
Cost per A&E admission avoided			£8,286.98	£8,419.84

Table 5 presents a summary of in-patient admissions of one or more nights. The proportion of people with an in-patient admission is higher in the PKW group. Further, the mean number of admissions per person is 1.11 for those receiving PKW compared with 0.68 in the general population. The average length of admission is also longer for those receiving the PKW intervention (PKW mean = 10.9 days, general population mean = 1.0 days). The incremental cost per admission avoided is the difference in the costs between PKW and the general population (£2,576) divided by the difference in the proportion of admissions (0.306) which is £8,420 and is similar to the cost per admission avoided for all admissions (Table 4).

Secondary care: Overall NHS costs

- i) All A&E attendance and all in-patient admissions

Table 6: Summary of all inpatient admissions and A&E attendances (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with any contact (%)	5,336 (91.3%)	412,247 (88.4%)	0.0297 RR = 1.38 (1.26 to 1.51) P < 0.001	0.027 T = 4.49 P < 0.001

Mean cost of contact	£4,050 (£7,641) £856 (£0 to £5,307) £0 to £205,547	£714 (£2,564) £0 (£0 to £210) £0 to £207,892	£3,336 T = 94.34 P < 0.001	£3,069 T = 21.59 P < 0.001
Cost per contact avoided			£113,318	£113,702

Over ninety-one per-cent of PKW participants had either an A&E attendance or in-patient admission, this was 2.7% higher the proportion of admissions and/or attendances of the general population. The mean cost of a contact was £3,069 higher for the PKW group at an incremental cost per contact (ratio of difference in costs to difference in proportion of contacts) of £113,702 in favour of the general population.

ii) Avoidable A&E attendances and in-patient admissions of more than one night

Table 7: Summary of inpatient admissions of more than one night and avoidable A&E attendances (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with any contact (%)	2,990 (51.2%)	94,230 (20.2%)	0.310 RR = 4.05 (3.84 to 4.26) P <= 0.001	0.283 T = 27.70 P < 0.001
Mean cost of contact	£3,245 (£6,298) £57 (£0 to £4,164) £0 to £86,953	£438 (£2,059) £0 (£0 to £0) £0 to £103,601	£2,807 T = 98.59 P < 0.001	£2,583 T = 17.41 P < 0.001
Cost per contact avoided			£9,055	£9,127

Focusing on the avoidable attendances and in-patient stays of one or more nights then 51.2% had contact with secondary care in the PKW group compared with 20.2% in the general population, a difference of over 28%. The mean cost of a contact was £2,583 higher for the PKW group at an incremental cost per contact (ratio of difference in costs to difference in proportion of contacts) of £9,127 in favour of the general population.

iii) Minor A&E attendance and stay more than one night

Table 8: Summary of inpatient admissions of more than one night and minor A&E attendances (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with any contact (%)	3,177 (54.4%)	114,448 (24.5%)	0.299 RR = 3.60 (3.4 to 3.8) P < 0.001	0.273 T = 40.53 P < 0.001
Mean cost of admissions	£3,258 (£6,301) £57 (£0 to £4,202)	£446 (£2,062) £0 (£0 to £0) £0 to £103,601	£2,813 T = 98.67 P < 0.001	£2,588 T = 24.92 P < 0.001
Cost per contact avoided			£9,407	£9,481

Focusing on the minor attendances and in-patient stays of one or more nights then 54.4% had contact with secondary care in the PKW group compared with 24.5 in the general population, a difference of over 27%. The mean cost of a contact was £2,588 higher for the PKW group at an incremental cost per contact (ratio of difference in costs to difference in proportion of contacts) of £9,481 in favour of the general population.

In summary secondary care contacts were higher for the PKW at a higher cost, thus the cost per contact costs at least £9,000 less for the general population compared to PKW>

Social care contacts and social care packages

Table 9: Summary of social care contacts, social care contacts with assessment and social care packages (with (ATT) and without (unadjusted) propensity score matching)

	PKW	General population	Unadjusted	ATT after PS matching
Number with any contact (%)	1,475 (25.3%)	5,254 (1.1%)	0.242 RR = 23.4	0.229 T = 34.63

			(22.1 to 24.7) P < 0.001	P < 0.001
Number with any contact who were assessed (%)	787 (13.5%)	2,352 (0.5%)	0.130 RR = 23.3 (21.8 to 24.9) P < 0.001	0.133 T = 24.48 P < 0.001
Number who started a care package (%)	679 (11.6%)	1,934 (0.4%)	0.112 RR = 23.6 (22.0 to 25.4) P < 0.001	0.112 T = 28.31 P < 0.001
Mean number of contacts	0.39 (0.81) 0 (0 to 1) 0 to 15	0.01 (0.16) 0 (0 to 0) 0 to 9	0.37 T = 160.0 P < 0.001	0.356 T = 23.88 P < 0.001
Mean number of contacts who were assessed	0.15 (0.39) 0 (0 to 0) 0 to 4	0.01 (0.08) 0 (0 to 0) 0 to 4	0.14 T = 120.0 P < 0.001	0.12 T = 25.55 P < 0.001
Mean number of contacts on a care package	0.12 (0.35) 0 (0 to 0) 0 to 4	0.004 (0.07) 0 (0 to 0) 0 to 3	0.12 T = 120.0 p < 0.001	0.106 T = 22.89 P < 0.001
Mean cost of social care packages	£717 (£2,767) £0 (£0 to £0) £0 to £34,876	£33.78 (783.19) £0 (0 to £0) £0 to £137,094	£683.64 T = 62.04 P < 0.001	£629.49 T = 14.40 P < 0.001
Cost per social care package avoided			£6,103.93	£5,620.45

Table 9 presents the number and proportion of PKW participants with a social care contact, social care contact with assessment and those who started a care package. It can be seen that the percentage in the general population is very low and as such there is a significantly higher proportion of contacts for the PKW population. The table also shows the mean number of

contacts which is again higher for the PKW population. The cost of those who receive a packages is also higher and the incremental cost per social care package avoided, which is the ratio of the difference in costs of social care packages between PKW and the general population (£629.49) to difference in proportion receiving social care packages (0.112), is on average £5,620 higher for people on PKW.

The costs of the PKW intervention were provided by Sheffield City Council (Table 10), and include the cost of setting up the programme, the cost of support staff, staff time, recruitment, dissemination, community assets, wellness plans and local advice and information. The cost for the set-up and running of the programme are £1.15 million which works out to be £198 per person seen over the period from April 2015 to October 2016.

Table 10: PKW set-up and running costs

Cost category	Amount (£)	Who pays	Type of cost	Recurring (Yes/No)
Sort & support staff	£579,343	BCF	Revenue	Yes
Life navigator staff	£186,690	BCF	Revenue	Yes
Recruitment	£10,000	BCF	Revenue	No
Commissioning staff time	£60,000	BCF	Revenue	Yes
Dissemination	£20,000	SCC	Revenue	No
Communication campaign	£50,000	SCC	Revenue	No
Community assets	£100,000	BCF	Revenue	Yes
Wellness plans	£50,000	SCC	Revenue	No
Local advice and information	£100,000	SCC	Revenue	No
Total	£1,156,033			
Cost per person seen	£197.88			

Time Series Analysis

There were a total of 17,116 A&E attendances (3,096 avoidable and 4,990 minor) and 19,111 in-patient admissions (10,410 with one or more night's stay) within the observation period.

Figure 3: A&E attendances and in-patient admissions over an approximate 4 year period (104 weeks prior to and post PKW intervention)

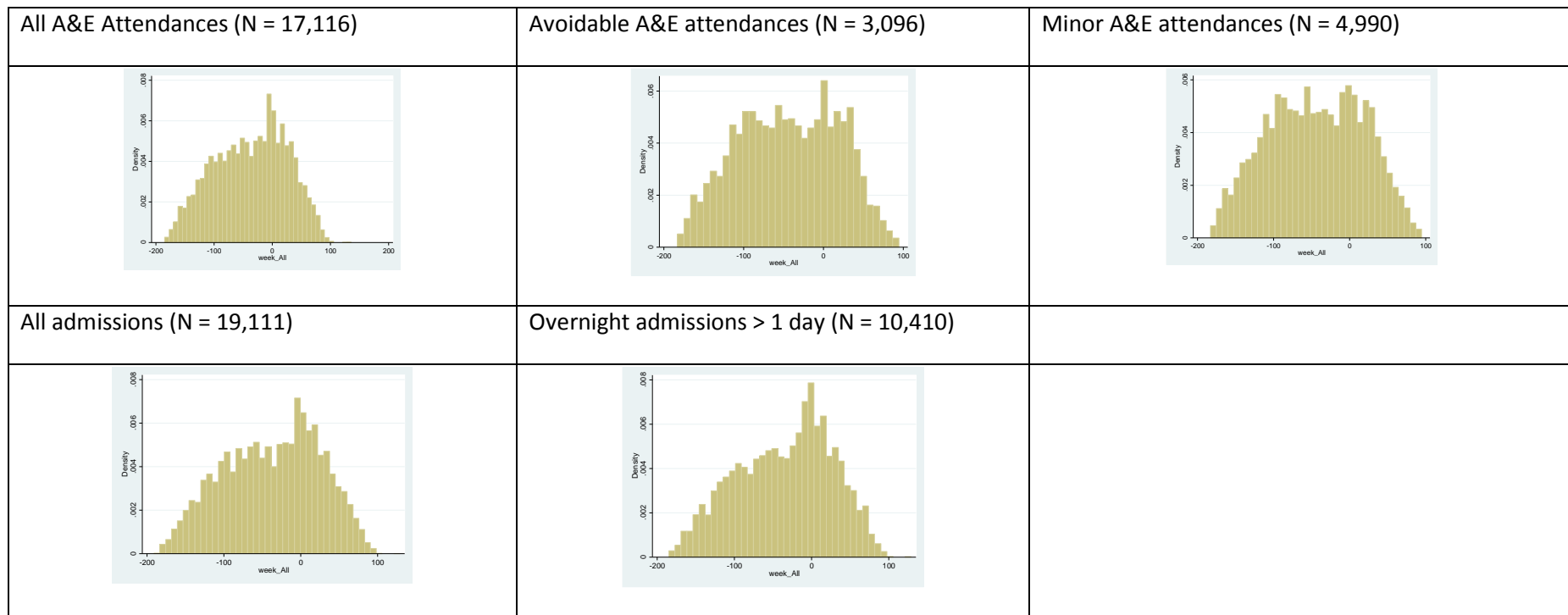
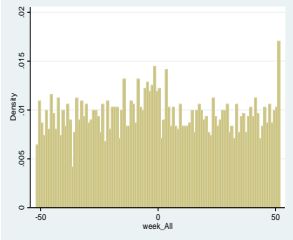
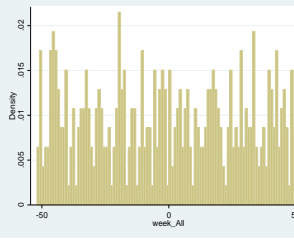
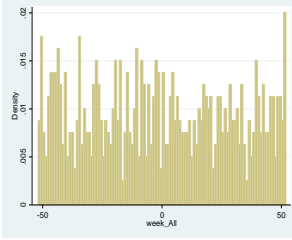
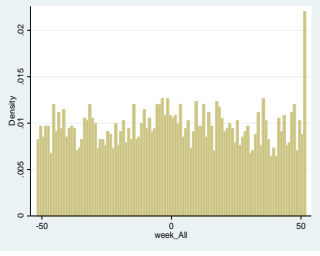
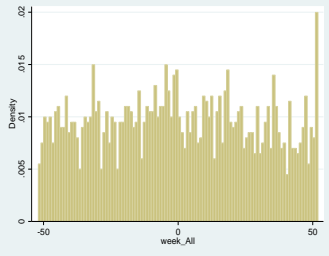


Figure 4: A&E attendances and in-patient admissions centred 52 weeks either side of first contact data for those with 52 weeks complete data pre and post contact

All A&E Attendances (N = 3,110)	Avoidable A&E attendances (N = 465)	Minor A&E attendances (N = 797)
 <p>No significant effect on the average reduction in all attendances = -0.03 (SE = 0.045) p = 0.574</p>	 <p>The average reduction in avoidable attendances = 0.003 (SE = 0.016) p = 0.876</p>	 <p>No significant effect on the average reduction in minor attendances = 0.003 (SE = 0.020) p = 0.869</p>
All admissions (N = 3,412)	Overnight admissions > 1 day (N = 2,001)	
 <p>Average reduction in all admissions = -0.06 (SE = 0.051) p = 0.207</p>	 <p>Average reduction in overnight admissions = -0.06 (SE = 0.036) p = 0.078</p>	

The results suggest that there is an increase in the number of A&E attendances and in-patient admissions prior to the PKW intervention, suggesting the intervention is being targeted at those with increased need of secondary health care. The interrupted time series analysis showed that although there was generally reduction in the number of all A&E attendances and admissions, indicated by the average negative reductions presented in Figure 4 these reductions were not statistically significant reductions. Further, there was a suggested increase in the number of avoidable A&E and minor A&E attendances, indicated by the average positive reductions presented in Figure 3 but again these reductions were not statistically significant.

A final simple analysis examined the mean number of admissions and attendances per week before and after PKW was introduced. There was a significant increase in the mean number of A&E attendances per week after the PKW intervention was introduced, this was observed for all A&E attendances (Mean before = 2.4, mean after = 4.3 $t = -7.43$, $p < 0.001$), avoidable attendances (Mean before = 1.6, mean after = 2.2 $t = -3.22$, $p = 0.002$) and minor attendances (Mean before = 1.7, mean after = 2.5 $t = -3.83$, $p < 0.001$). The mean number of inpatient admissions were also higher after post PKW, though this was not significant when only admissions of one or more nights were included (All admissions - mean before = 2.8, mean after = 4.6 $t = -5.58$, $p < 0.001$; Overnight admissions > 1 day - mean before = 3.6, mean after = 3.8, $t = -0.68$, $p = 0.498$).

Manchester CBA

The aim was to use the results from the analysis of the comparison between PKW and the general population to inform the population and benefits in the Manchester CBA model. Prior to analysis it was assumed that the population who would benefit from PKW were those with a predicted risk score of between 20 and 70. However, these criteria were not adhered to by those delivering the PKW intervention and the definition of who the intervention was being delivered to was broadened and undefined. This creates a problem for the Manchester CBA model as one of the key inputs into the model is the size of the population who would benefit from the PKW intervention, defined as the target population in the CBA model. As we don't have a clear definition of the size of the target population two CBA analyses were proposed with the population size defined as:

- Those with a risk score between 20 and 70 (N = 28,000)
- The general adult population of Sheffield (N = 440,000)

The cost of the PKW intervention was provided and listed in table 10. However there were issues in estimating the effect of the PKW intervention for the three proposed benefit outputs (A&E attendances, in-patient admissions and social care contacts in

PKW population in comparison with a control group (what would be observed in terms of attendances, admissions and social care contacts before the intervention). The aim of the analysis above was to use the results of either the propensity score matching or the time series analysis to populate the Manchester CBA model. However, as the analysis progressed it became obvious that it was not possible to use either analysis to provide an estimate of an appropriate effect size, that is the difference in the proportion of attendances, admissions or social care contacts either between PKW and a comparator population or the difference in the proportion of attendances, admissions or contacts before and after PKW. The general population is too broad to use as an appropriate comparator group to the PKW population and it was not possible to refine the definition of the comparator group owing to the broadening of the inclusion criteria for receipt of PKW. Time series analysis showed that those who were more likely to attend A&E or be admitted as in-patients were being targeted by the PKW intervention as the number of attendances or admission increased prior to PKW being received. This results in regression to the mean and biases the results making this an inappropriate analysis.

A further final simple before verses after analysis was also considered to look at the impact of A&E attendances and in-patient admissions. However, this showed an increase in the mean number of attendances and admissions after PKW was delivered thus making it an inappropriate input into the CBA model.

Information on social care contacts was not available prior to the PKW intervention so it was not possible to include these in either time series or before verses after analysis to estimate an effect.

DISCUSSION AND CONCLUSIONS

The PKW intervention is targeting those most at need evidenced by the larger number of inpatient admissions and A&E attendances in this group, with time series analysis showing that this increases prior to the delivery of the intervention (regression to the mean Figure 3 and Figure 4).

This is the first time that propensity score matching and time series have been used to attempt to evaluate an intervention within a social care setting. The analysis shows that it is possible to evaluate the results in this way however, definition of the intervention group need to be adhered to for the comparison to be meaningful. The results suggest that the PKW group are more likely to attend A&E, be admitted as in-patients and receive social care packages in comparison to the general population, and this difference was significant even after using propensity score matching to allow for differences in characteristics between the general population and the PKW population. However, issues remain as to whether the general population is the appropriate comparator group. Clearly defined inclusion and exclusion criteria are needed so that it is possible to identify a meaningful control population. It was initially intended that the PKW population would be matched with those in the

general population with a risk score between 20 and 70 as the PKW intervention was initially targeted at this group. However, when analysis began it became apparent that the PKW intervention was not restricted to those in the 20 to 70 risk group, therefore it became necessary to widen the comparator population to the general population. This resulted in a lack of overlap between the PKW and general population in terms of matching criteria making the general population an unrealistic comparator group for measuring the impact of PKW on A&E attendances, in-patient admissions and social care contacts.

The interrupted time series showed that there was no significant reduction in A&E attendances or hospital admissions after the introduction of PKW. However, the results also show that the intervention is targeted at those at most risk of attending A&E or being admitted as inpatients which means that these are masking the true effect of not having PKW in the population and thus masking what the true reduction in attendances and admissions might be.

Finally, owing to issues with the definition of the population of the PKW group it was not possible to populate the Manchester CBA model as owing to biases in the analysis it was not possible to accurately measure an effect of PKW on A&E attendances, in-patient admissions and social care contacts, in comparison with a control population. This being the essential component to populate the CBA model.

There is a further issue as to whether A&E attendances, in-patient admissions and social care are the most appropriate outcomes for evaluating the programme. GPs reported they felt GP visits had reduced, but we are not able to evaluate this. Further they report the service fulfils patients with non-medical issues so trying to evaluate this using outcomes related to health is potentially inappropriate.

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