Careview Evaluation:

Feasibility study

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Executive summary

Careview is an app which aims to use crowdsourcing to detect signs of neglect in the built environment, to which outreach teams can respond to. The hypothesis is that such signs of neglect help predict the presence of a socially isolated resident.

In the current evaluation study, we focussed on the process of using the app and implementing outreach work based on its data. While we did collect outcome data from door knocking, the final sample sizes were too small to perform statistical significance testing. About 35% (67 cases) of all residents who engaged were classified by the outreach teams as experiencing unmet need(s) that would likely have remained undetected. Around two thirds of all households targeted did not engage with the outreach teams, mainly by not opening the door (85%) or not wanting to talk (8%).

Most outreach teams felt that external signs of neglect are linked to a higher likelihood of finding a resident in need, but the predictive value of Careview signs, or combinations thereof, remains to be confirmed quantitatively. There was anecdotal evidence that Careview may be missing some instances of unmet need which are not associated with external signs of neglect, such as residents in flats or with specific mental health conditions (for example obsessive compulsive disorder). A systemic study would be needed to quantify the true extent of such 'false negatives'.

In addition to locating residents in need, several added benefits for outreach team members and organisations were reported, such as discovering new areas and desired activities for outreach, closer networking between outreach teams and uncovering gaps in the current referral pathway. Also, the evaluation helped raise awareness and led to interest from other teams, such as the fire service and street cleansing, who are interested to (re)use the app for their own purposes.

In the current study, we have identified a number of barriers and explored potential solutions which can be used to inform future studies. The current signs of signs of neglect may need reviewing as some were seen as irrelevant, too vague or missing. Given a potential impact of area (such as through deprivation or cultural composition), Careview would benefit from being tested in a wider, more diverse area. Also, the app was intended to rely on crowdsourcing by non-experts on a continuous basis and should be tested this way. Strategies to improve door knocking success as well as resident engagement should be considered and include training teams, optimising leaflets and linking Careview with other funded initiatives. Finally, Careview flagged up several issues with the existing systems it relies on for helping the identified residents, including referral pathways, services' capacity and outcome collection methods.

Based on the results from this trial, it is clear that Careview has the potential to help find residents with unmet needs and may be valuable beyond social isolation. Careview would benefit from a large scale evaluation study in order to assess the replicability of these results, determine its predictive ability and quantify the resulting social and economic value.

Background

Social isolation and loneliness have become a public health epidemic which is putting people at increased risk of ill health and early death. Common among, but not restricted to, older people, millions of lonely and socially isolated patients are seen by GPs across the UK each year. This number is expected to keep increasing and brings along an economic cost of on average £12,000 per person. Early intervention and prevention are possible by targeting risk factors, such as poverty, reduced mobility, being a carer or belonging to a minority social group. [1,2,3]

Careview is an app developed since 2015 by the Urban Sustainable Development Lab with support from Leeds City Council and NHS England. It was created to address the challenge of finding socially isolated people who are not interacting with their community and/or services. Based on the observation that houses of socially isolated people tend to display external signs of concern or neglect, such as curtains closed or an untidy garden, the hypothesis is that finding such signs may be predictive of a socially isolated resident.

The app was intended to be used by Leeds City Council's public health team and vetted staff, such as police or street cleansing teams, to report signs of concern in the built environment (figure 1). Users do not need to have any experience with health and care or outreach work, and are not expected to interact with residents at any point. The process is meant to be quick and easy, posing a minimal burden on the user, who could be focussed on carrying out another task, such as mail delivery.

When a user reports or 'pins' a concern, the app can automatically detect their location, or alternatively the user can set a location. Optionally, the user then chooses one or multiple categories from a list of possible concerns. The five main categories are: curtains closed, house in disrepair, post piling up, untidy garden and windows not cleaned. The user can also tick the option 'other' if the concern does not fit under any of these categories or specify this was a test.

Each 'pin' contributes to a heat map, which shows a high level overview of the amount of concerns in an area overlaid on a Google map (Figure 1, colour scale blue to red from low to high number of concerns). Individual pins are not visible, but rather blurred and combined with other pins in the same area. By design, this means it is not possible to use the heat map to identify individual houses. Rather, (subsections of) streets with a high number of reported concerns can be identified. Area of high concerns can subsequently be targeted by outreach teams for activities such as leafletting and door knocking.

Careview aims to enhance, not replace, existing council services. It may allow for a more efficient use of outreach resources to find socially isolated residents, by directing them to areas with a higher likelihood of unmet need. If more cases of social isolation can be detected earlier, this could present significant cost savings[4,5].

[1] http://www.rcgp.org.uk/about-us/news/2018/may/national-campaign-needed-to-tackle-loneliness-epidemic-says-rcgp.aspx
[2] https://iotuk.org.uk/social-isolation-and-loneliness-report/
[3] https://www.campaigntoendloneliness.org/frequently-asked-questions/identify-most-isolated/
[4] https://iotuk.org.uk/wp-content/uploads/2017/04/Social-Isolation-and-Loneliness-Landscape-UK.pdf

Careview is a web app: the client side application runs in a web browser. Therefore, Careview can be used on any device with a (compatible) browser and internet connection. GPS/location services are optional and allow for automatic location detection when pinning. A shortcut to Careview can be installed on the home screen so it looks and feels like a native app.

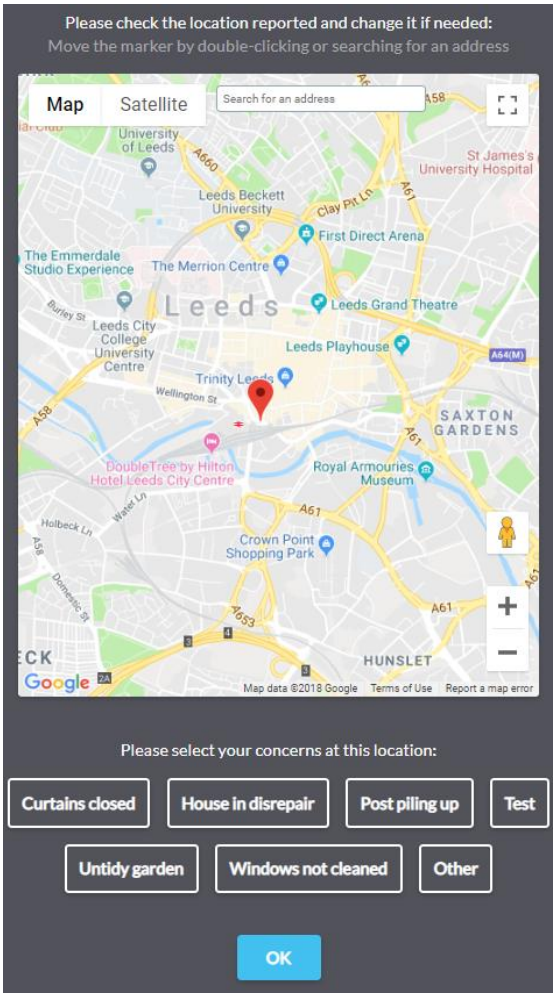
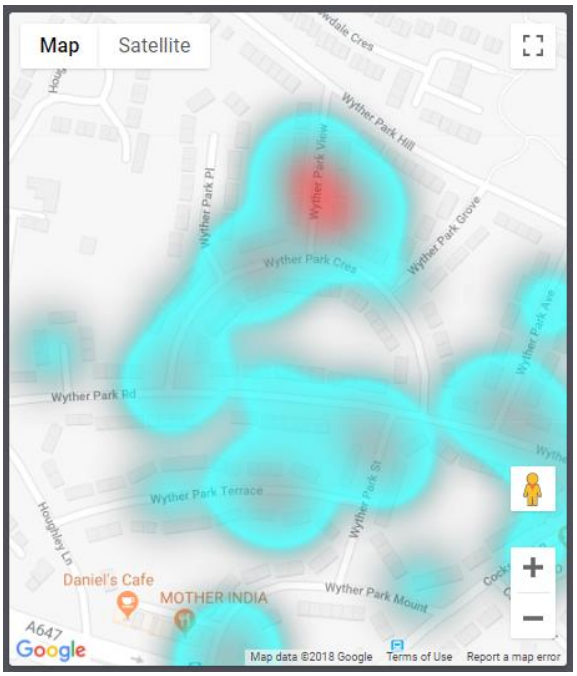


Figure 1. Careview app

The left panel shows the screen for pinning, including the (moveable) location marker and option to tick one or more concerns. The panel below shows an example of a zoomed in heat map.



An unfunded proof of concept study has been carried out using volunteers, including public health team members and police officers. A series of case studies showed that responding to signs of neglect in the built environment can result in making contact with socially isolated residents, either through the volunteer approaching the resident directly, or via a leaflet or neighbour.

The aim of the current evaluation is to test the use of the app and its ability to locate residents experiencing unmet need, including but not limited to social isolation.

[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/461120/3a_Social_isolation-Full-revised.pdf

Evaluation method

Given the small scale of the project and the fact that this was the first feasibility study, we focussed on process evaluation (is it implemented optimally?) and simple outcome evaluation (are there any benefits?). Process evaluation implemented from an early stage onward can help establish the optimal intervention design for future large scale evaluation by refining methods, identifying barriers and testing possible solutions.[6,7]

We created the evaluation plan using a co-design approach, where we worked with all stakeholders to find out what is meaningful and feasible given real world constraints. Stakeholders included the public health and digital project team members who created and manage the app as well as outreach team members who would be doing the pinning and outreach activities.

We started with two workshops to explore what the different stakeholders thought about the aim, methods and outcomes for this study and seek a consensus which all considered relevant and feasible. We constructed a logic model by asking the participants to think about the aim, objectives, activities, resources, outputs and outcomes for the project. We added some components we thought were missing and presented the model for discussion and approval in the next workshop. We also asked participants to identify barriers and needs, to agree on what is considered in scope and approve evaluation methods.

[6] https://www.gov.uk/government/publications/evaluation-in-health-and-well-being-overview/process-evaluation
[7] https://www.bmj.com/content/350/bmj.h1258

The question participants agreed on for the evaluation was as follows:

> *"Does the Careview app (spotting signs of concern in the built environment, especially by non-experts) allow us to find people who are socially isolated and/or experience any other unmet need, who would otherwise not have been found?"*

The decision was made to focus on unmet need more broadly rather than social isolation. Outreach teams were only expected to have short doorstep conversations, which wouldn't allow for formal testing of social isolation or loneliness (for example through standard questionnaires such as the UCLA Loneliness Scale). Also, unmet need includes important risk factors for subsequent social isolation and loneliness. Therefore, the outreach teams were asked to report 'possible unmet need' based on their professional opinion.

Based on these workshops, an evaluation plan was drawn up and circulated to all parties for feedback and approval. This initial plan included four components to evaluate: Use of the app, use of the heat map, engagement with citizens, and referral and follow up. The last component is not included as a separate topic in this report since outreach teams were generally unable to collect follow up on referrals.

The study was restricted to six Lower Layer Super Output Areas (LSOAs) which fall into the worst 1% nationally in terms of deprivation (Table 1). We used LSOA boundaries as defined by https://data.gov.uk/dataset/fa883558-22fb-4a1a-8529-cffdee47d500/lower-layer-super-output-area-lsoa-boundaries.

Table 1: Careview areas

Area name	**LSOA code**		**Outreach team**
Holdforths, Clyde Approach	E01011363	071E	West
Lincoln Green	E01033035	064F	East
Boggart Hill	E01011658	040C	East
Cliftons, Nowells	E01011347	065B	East
Crosby St, Recreations, Bartons	E01011368	082C	South
Stratford Street, Beverleys	E01011372	086C	South

Data was collected through automatic tracking of user activity in the app (analytics), questionnaires and interview with the outreach teams, and paper forms and spreadsheets filled in by the outreach teams about their door knocking activities. Midway through the project, a workshop was held involving the same stakeholders groups to discuss preliminary results and barriers and agree on potential solutions and adaptations. This included issuing the advice 'When in doubt, pin it!', sending out a guide on 'How to report bugs' and the decision to do face to face onboarding for all new outreach workers including explaining the project and getting the app up and running on people's phones. Also, the optimal use for the leaflet and its redesign were discussed.

Results

Using the app to collect data about concerns

A potential bias noted during the initial workshops is that outreach workers were expected to do both the pinning and door knocking, and hence didn't really need to use the app or heat map. Also, the app is intended for non-expert users who do not have previous outreach experience. A proposition to tackle the first bias was to have outreach teams pin and door knock in two separate areas, but this wasn't feasible to arrange in practise. To help address the second issue, a small cohort of non-expert volunteers, recruited by the public health team, went out to pin houses in the areas preselected for this project, populating the heat map with non-expert pins.

App analytics

There were differences in the number of reported pins per area (Figure 2), which was unrelated to the number of people pinning the area (Table 2). Population size may play some role, but could not explain all observed differences (for example, there was a similar population but different number of pins in Lincoln vs Stratford, Table 2).

Figure 2: Pins per area

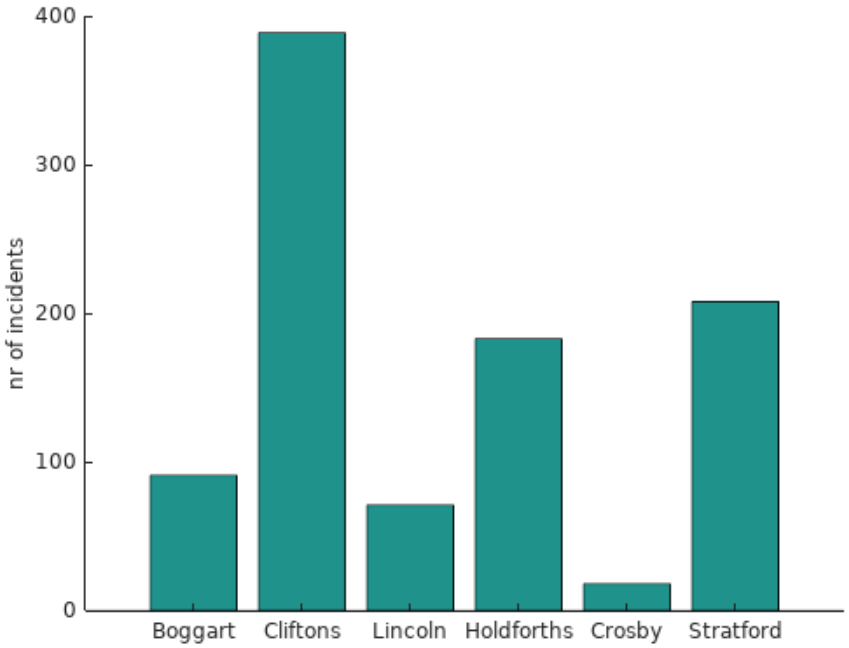
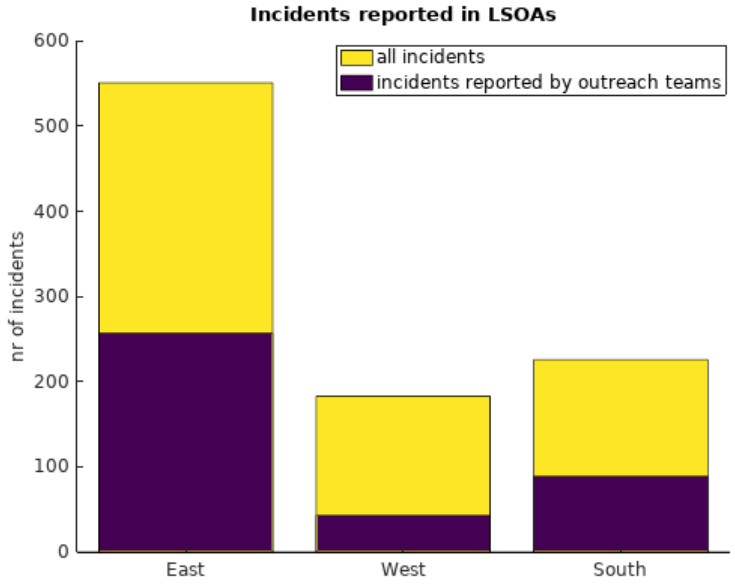


Table 2: Pins, population size and users per area

	Boggart	Cliftons	Lincoln	Holdforths	Crosby	Stratford
Population size[8]	1,417	1,951	1,659	1,689	1,497	1,644
Nr pins	91	389	71	183	18	208
Nr users	6	5	4	4	3	3
Outreach users	3	2	2	1	1	2
Volunteer users	3	3	2	3	2	1

Of all users pinning a given area, slightly over half were non-expert volunteers (Table 2), resulting in volunteers reporting more pins than outreach teams (Figure 3).

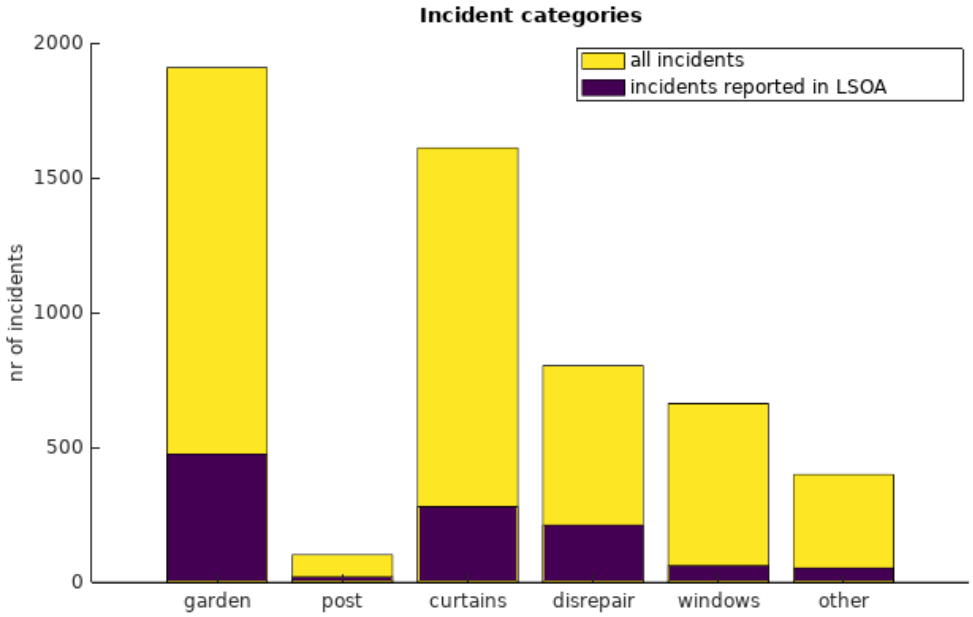
Figure 3



The most frequently reported concern was 'untidy garden', followed by 'curtains closed' and 'house in disrepair' (Figure 4). The least reported was 'post piling up'. This pattern of concerns in the LSOAs is similar to that seen across all pinned areas.

[8] From https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareamidyearpopulationestimates

Figure 4



All teams, including outreach teams and volunteers, aimed to go out for extended 'pinning sessions' rather than only putting one or two pins on the map on a given day. Therefore, we defined a session as a prolonged period of user activity, more specifically reporting at least 5 pins with less than 30 minutes between pins.

Figure 5

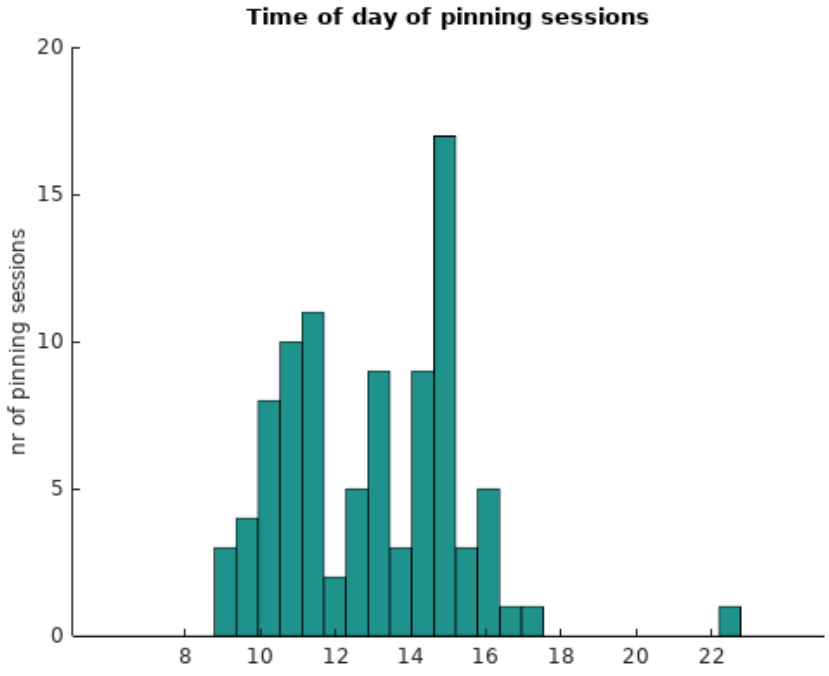
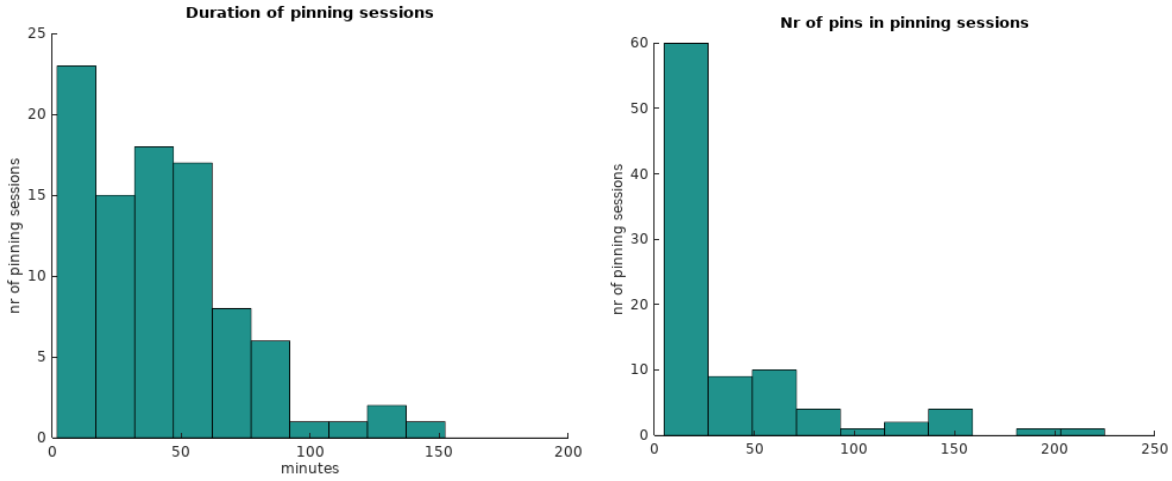


Figure 6



Pinning activity was mainly restricted to within working hours, with late morning and mid-afternoon proving most popular (Figure 5). Pinning sessions lasted a median of 38 minutes and included a median of 14 pins, though there was considerable variability between sessions (Figure 6).

User feedback

Informal conversations with some of the volunteers who went out pinning revealed that people generally thought it was easy to use. Very little instruction was needed. There was a bit of uncertainty about when/how they should pin, prompting questions such as: 'How 'untidy' does a garden need to be?', 'Most houses have their curtains closed, I don't really notice that' or 'I think I notice concerns more on the side of the street I'm walking on'. This was improved by telling volunteers 'when in doubt, pin', and reassuring them that one 'wrong' pin or missing a house wouldn't have a noticeable impact on the heat map. Volunteers spent about 30 to 60 minutes pinning a given area, often in teams. Though encouraged, not everyone in a team would necessarily be pinning on their own phone, resulting in a lower number of apparent users than actual volunteers in Table 2.

Across an anonymous questionnaire and several interviews with the outreach teams, they too reported being generally happy with the user friendliness and technical performance of the Careview app. Using the app was seen as easy and intuitive, though it took some people a little bit of getting used to. One team had no technical issues, others noticed some minor glitches such as a pin appearing in the wrong location (possibly a GPS issue?) and 'freezing'/'crashing'.

Several outreach team members wondered if the process of pinning multiple houses in a row could be made faster (they currently have to use the back button or go to 'menu' then 'home'). Anything that prolongs the pinning process (using the back button, long loading times, having to reset a pin and so on) means that users may need to stop and stand in front of a house for a while, which led some users to worry about what the residents would think or was unpleasant in adverse weather.

One team commented on the confusion around Careview being called an ‘app’ but not displaying the expected properties, such as availability in the app store or installation process onto the phone.

Most outreach teams only pinned a given area once. One team thought they had to keep pinning in order to keep pins from fading. A gradual fade had been implemented but wouldn’t have an impact given the time scales for this study.

Most outreach workers agreed that detecting residents in need based on signs of concerns about their house could work, at least for a majority of cases. However, there was some uncertainty as to whether the current signs are the most relevant ones. For example, ‘untidy’ garden could be overgrown/weeds, rubbish or large appliances in the garden, the first of which was seen as least concerning.

Outreach teams also commented on the signs changing over time. For example, when the weather got better, quite a few gardens were tidied up. One team commented on the importance of tracking Careview signs over time rather than at a single occasion, as this would be more representative. For example they noticed that some privately rented properties seem to show a fairly quick turnover of residents and that a fridge outside for a short time may simply mean the kitchen is being redone.

Another factor is the impact of the personal judgement of the team member doing the pinning. Different people may pick different signs depending on their personal opinion and standards on what constitutes, for example, an untidy garden. A few outreach members remarked ‘Why are we pinning/knocking here, it looks the same/better than my house?!’ One team member fed back that the Careview signs are ‘incredibly subjective and open to wildly different interpretation’. Another member suggested it may encourage separation: judging and seeing residents in need as ‘others’.

There may also be a normalizing effect from other gardens/buildings in the street, potentially influencing both the outreach team member to pin mainly outliers and/or influencing the resident to adjust their standard to that of their neighbours. For example, it may sometimes be more indicative to find an untidy garden in a street of tidy gardens than in a street where lots of other houses have an untidy garden too. Such effect is less likely to play in some ‘problem’ areas where there is little community mind-set, neighbours don’t talk to each other, and people have bigger problems than caring about fitting in with their neighbours.

Some signs, in particular curtains closed, especially in streets where a lot of houses showed this, were often seen as too vague and resulting in false alarms. Reasons other than residents in need could be a fear of crime or keeping warmth in/out. Post piling up, while considered relevant, may not be visible from outside in the majority of cases – some team members only realised as they tried to post the leaflet and acknowledged this could be due to the postman just having been.

Some also questioned the usefulness of Careviews signs for rented accommodation: the landlord may be responsible for the exterior or the renter has little incentive, for example to keep the garden tidy or windows clean. One team commented on the difference in areas with private versus council accommodation, with the former showing more signs of serious neglect, such as cladding coming off. They hypothesized this could be due to the lack of strict rules in the private renting market, for example allowing more people to live in a house than it was built to support.

Several team members spoke about some houses given them a 'gut feeling' that something may be wrong. When prompted, they suggest it may be combinations of signs or specific features:

- Kids toys in garden that are not tidied up, especially when in bad shape
- Rubbish in garden, including bin bags piling up
- Dog faeces
- Path to the door which is dark/overgrown/hard to navigate
- Dark house despite someone possibly being in, for example open window
- Dirty curtains or dirty nets
- Maybe not 'disrepair' but just looking dirty, not looked after properly
- Presumed vandalism (such as paint or eggs thrown on house).

It may be worth asking more outreach workers to try to substantiate their gut feeling and collect a list of potential physical signs. This can then be translated into concrete signs to test in the app.

Two teams also knocked on some doors where no Careview signs were present, but didn't systematically include this in their report. For one team, these were cases when had they accidentally approached the wrong house or the resident had rung in response to the leaflet. The other team had tried knocking on every door in some streets. As a result, a few cases of unmet need were found without signs of concern on the exterior of the house, or 'false negatives'. Some of these did show signs of neglect once inside the house (such as a cluttered or smelly interior). The team who knocked on every door in a given area reported that if the house looked ok, it was more likely the resident was ok too, whereas if a house showed concerns it was likely the resident needed help. This feedback about 'false negatives' remains to be confirmed by quantitative evidence.

The teams suspected mental health conditions such as OCD or anxiety may cause residents to fixate on projecting a normal appearance and one team member speculated that if their condition deteriorated further it may start to affect the external appearance of their house. This team member presented a case study, not related directly to Careview, where she was approached at a stall during a community event by a confident looking, smartly dressed lady with an educated accent. After some initial conversation about a different topic, as soon as no one else was around, she disclosed she needed help herself. The outreach team members went to visit her house which would have ticked various Careview signs and was smelly and messy inside. It turned out that the woman had been abused by her husband for years, and the confident persona was her way of hiding this – her way to cope and avoid drawing attention. This example suggests that some residents who experience unmet may be very focussed on keeping up appearances and may therefore be focussed on ensuring their house looks 'normal'.

Using the heat map to inform outreach planning

The original idea was that the outreach workers would zoom in on the heat map (provided in the app) to see their areas and pick out the most intensely coloured spots for outreach activities. However, due to outreach workers pinning and door knocking the same area, they did not need to

use the heat map for planning outreach activities as they already knew which houses to return to for door knocking.

Only one of the outreach teams encountered technical difficulties in that the heat map wouldn't display correctly on their phone. One team reported finding it hard to navigate with the phone map when out and about, and said it was only useful on the highest magnification level otherwise 'everything looks red'. As a result, two team members resorted to printing out the maps.

It was also suggested that the heat map would work better when outreach teams would be covering larger areas, since LSOAs are artificial areas with effects possibly spilling over. Moreover, the areas of highest deprivation are based on historic figures some of which may be outdated, for example, one of the teams reported newly built houses.

While outreach teams didn't use the heat map for planning outreach activities, other uses were to see which areas had been pinned (useful for a manager or to get positive feedback on one's own work). Everyone agreed that it could be a useful tool to decide which general area to do outreach work in if they hadn't been out pinning themselves. If the outreach team operates in the area, they probably know the places to focus on, so a heat map would be most useful for teams that have to go outside their usual, known areas and to identify gaps not currently covered by teams with large outreach areas.

One of the outreach teams experienced a delay in acquiring a mobile phone and as a result they did for a while use the heatmap (populated by volunteers) as intended, to identify the general areas in which to door knock, and they knocked on every door irrespective of Careview signs. They found this worked well. As a test, they went to door knock in an area which didn't show up on the heat map (no concerns pinned) and found no one in need of help. This suggested that door knocking in areas without concerns could at least in some case be considered a waste of time that could be prevented by the heat map.

This team also suggested that populating the heat map could be done cheaply by volunteers or young/inexperienced people, freeing up team members with more experience (and a higher salary) to focus on door knocking. Having people pin as a dedicated task would also allay their worry that if people like post men or bin collectors would pin alongside their actual job, they may forget or underperform in one of their two tasks.

Engaging with residents

Data collection

The original suggestion was for outreach teams to focus on visiting houses with one or more signs of concern. Teams of two would try to door knock up to three times and record outcomes. The aim was to speak to the resident(s) to establish whether they were experiencing an 'unmet need', defined as the outreach worker's opinion on whether or not the resident was in need of any help they were currently not receiving. This could include social isolation or loneliness but was not restricted to it.

None of the outreach providers had previously done door knocking with the aim to assess and potentially refer residents. Interested outreach workers came to a workshop with a member of the public health team and the evaluator in order to create an example script they could use on the doorstep. At the midterm meeting, issues and suggestions to improve door knocking success were discussed, including using leaflets and some form of identification (such as a badge). A further door knocking 'guide' was provided, created based on the experience of a public health team who went door knocking during a measles outbreak.

Outreach teams tended to keep their door knocking activities between 10 am and 3 pm, avoiding the school run. They generally wore ID badges and went in pairs. Outreach teams did not have uniforms or logos on their clothing and avoided business attire as to not put people off. All outreach workers in this study were female but of diverse ethnic and racial background.

Outreach teams were asked to keep a record of each house they tried to door knock, the presence of any Careview signs and the outcome of the attempt (such as no response, leaflet left, talked to resident). For the current study, if they had managed to talk to a resident, they should also indicate whether they thought the resident needed help. This was irrespective of the kind of help and whether the resident accepted the offer or was followed up. For the purpose of this study, simply finding a resident in need counts as a Careview success. The aim was to correlate such successes with Careview signs, to test the hypothesis that concerns in the built environment may predict residents in need.

Data collection was done by the outreach teams, who had received example forms and spreadsheets as well as a face to face explanation of their use and the aims of the analysis. The outreach teams were not familiar with this type of data collection on individual properties, as they are generally asked to report only summary data, for example the number of residents engaged in an area, and maybe describe some individual cases of interest. Given the novelty of the current approach and the lack of dedicated training or oversight, data collection overall went quite well. One of the outreach teams reported it to be time consuming and another team mentioned it was hard to do everything at the same time, for example having a conversation whilst recording information. Ideally, teams preferred one person (usually the more experienced one) to door knock and lead the conversation while their colleague made notes. However, due to budget constraints this wasn't always possible.

There were missing data and inconsistencies. For example most teams tried to door knock up to three times if they received no answer, but sometimes only one or two records were presented for a given house. This may mean that they didn't return (for example because the house was empty) or have returned but not made a note. Another example of an inconsistency is when there were two forms for the same visit (possibly a duplicate or wrong ID used) or when the house form and the summary table didn't agree (for example 'no unmet need' on the form but 'leaflet left with resident' in the table). Sometimes, no Careview signs were ticked and it was not always clear whether this was forgotten (likely when no signs were ticked for an entire street) or no longer present.

Time of day was not reported often enough to attempt a correlation with success rates.

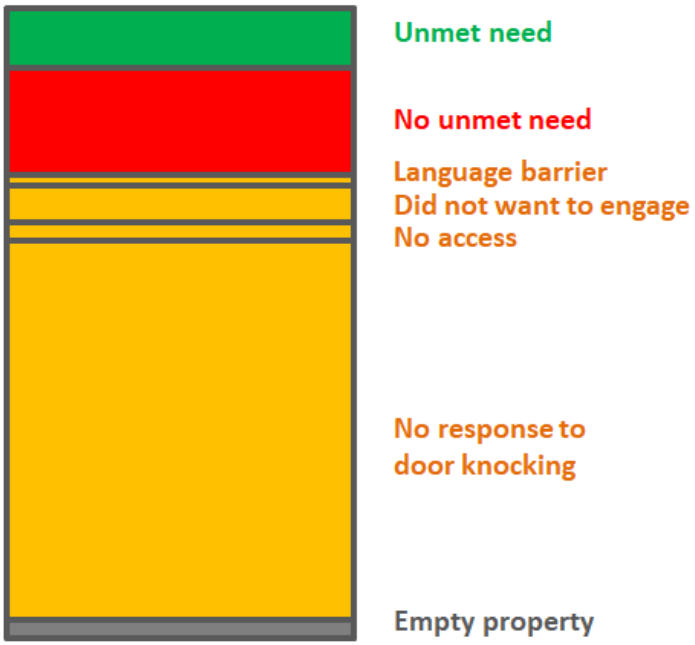
Data analysis

Looking at the data provided by the two teams who reported Careview signs for each visit (up to three visits per house), reported **Careview signs changed between visits in 23-25%**. This could be due to several factors or a combination of them. Firstly, this may represent actual changes in the built environment over time, such as a previously untidy garden fixed up when the weather got better or post picked up when the resident returned from a holiday. Secondly, the way team members coded the data may have differed between members or a given member may have changed their opinion over time (inter and intra rater reliability). For example, if 'untidy garden' was ticked on a given visit, but not on a follow up visit, a different team member who did the follow up visit didn't judge the garden to be untidy or the same team member changed their opinion. Thirdly, this could be a case of misreporting, such as forgetting to tick a sign or ticking the wrong sign by accident. Whereas we can't exclude misreporting, outreach teams reported changing signs and differences between team members during the interviews.

Three outreach teams were able to **engage meaningfully with a resident in around a third** of identified houses (35%, 36%, 33%). One team, which covered the largest number of houses by far and may not have been able to return to each house three times, reported a slightly lower engagement rate of 19%.

Out of those households where outreach teams were able to have a meaningful conversation, **35% showed a clear unmet need**, but there was a large variability between teams (17.5%, 15%, 25%, 65%). Interestingly, it was the team who got the lowest (19%) engagement who found the highest proportion of unmet need (65%). Possible contributing factors may be the areas covered, the team's different way of working and/or differences in reporting.

Figure 7: Breakdown of door knocking results



For the other two thirds of identified houses, it was not possible to decide on a clear status of the resident. For the majority of these houses (**85%**), this was due to **no one answering the door**. In about 10% of cases, people did open the door but didn't engage in a meaningful conversation, either because they didn't want to (8%), encountered a language barrier (2%) or a child answered the door. In the rest of cases, the outreach worker was unable to get access to the property, due to dogs, 'no cold calls' signs, flats or blocked paths.

One of the teams found 21 houses presumed to be empty; this may have been a specific problem for the area (Clifton and Nowells).

In order to analyse the potential link between Careview signs and presence of a resident with unmet need, we restricted the analysis to the 191 houses who showed meaningful engagement. For simplicity, we include any Careview signs identified at any visit (even if only once). In this sample, 67 properties (35%) were linked to unmet need. Given the small sample sizes, we can only provide descriptive statistics.

The number of Careview signs flagged for a single house was on average 1.5 across all teams. 42% of houses showed more than one concern. Of these houses with multiple concerns, 20% turned out to be linked to unmet need. There was no clear relationship between the number of concerns and unmet need. Most houses with more than three concerns were linked to unmet need. However, the majority of houses without concerns were also linked with unmet need. The latter may be due to biased reporting, as most teams did not specifically aim to visit houses without concerns. For example, some of those houses may be linked to a resident ringing up in response to the leaflet.

Table 3: Number of concerns

	0 concerns	**1 concern**	**2 concerns**	**3 concerns**	**4 concerns**	**5 concerns**
Unmet need	21	30	8	1	6	1
No need	4	55	47	17	1	0

Table 4: Signs of concern

	Curtains closed	**Untidy gardens**	**House in disrepair**	**Windows not clean**	**Post piling up**	**Other**
Not in need	107 (56%)	40 (21%)	43 (23%)	12 (6%)	2 (1%)	0
Unmet need	39 (20%)	9 (5%)	14 (7%)	12 (6%)	2 (1%)	2 (1%)

Within this sample, there are no clear signs that are individually predictive of unmet need – the proportion of houses with the same sign without unmet need is always similar or higher.

It is possible that a combination of signs, rather than an individual one, is most predictive. This could be tested with approaches such as statistical regression or machine learning but requires larger samples

It is important to note that 'unmet need' or 'not in need' are the subjective opinions of an outreach team who usually only had a few minutes to talk to a resident once at their doorstep. In particular, residents who seemed fine during this quick conversation may have been hiding an unmet need (for example the case of the confident lady which had been abused by her husband, mentioned earlier in the Using the app – User feedback section) or were having a 'good day' (for example case study of the lady who volunteered for a steering group one day, and disengaged at the next contact, see appendix). Multiple visits to build up a relationship and get more insight into the stability of a resident's behaviour may be needed.

Feedback from the outreach teams

Overall experience

Most outreach teams were generally positive about the experience, with one noticeable exception.

The strongest negative views on the project and questions about the usefulness of the Careview app came from a team which had been brought in at a later stage and had not been involved in the co-design workshops. An additional problem for this team was that, while they had historically worked in the area, they currently don't. As a result, they don't run any local groups or have strong relations with other groups that may work there. This team were briefed by their managers, who had not attended the workshops or met directly with the study coordinator and evaluator. As such, information may have been lost or changed as it was passed on, and conflicting information from different sources may have added to the confusion.

A few weeks into their involvement, the study coordinator and evaluator met the outreach team and found that there had been some misconceptions about the aim, methods and expectations of the study (which had been co-decided in the workshops). Some of the issues mentioned by this team at the final interview could have been addressed if they had been raised at the initial workshops. The recommendation for future studies therefor is to communicate with outreach workers directly and involve at least one member of each team in the evaluation's co-design. Management layers should be kept informed but not solely responsible for decisions or passing on information.

On the other end of the spectrum, one team was overwhelmingly positive about their experience, and is keen to keep door knocking part of their regular activities. On one given day, they reported identifying five isolated older people and finding two young people wanting to be volunteers. While it is possible that their success and experience is due to the area they covered, there are a few noticeable differences about this team and the organisation it sits in which may facilitate implementation of a study like Careview.

Firstly, the team had strong buy-in and support from senior management and colleagues, and was given a lot of freedom by their organisation (for example, holding a donation in the organisation to

help one of the identified residents, or working outside their assigned areas and traditional office hours). This was helped by having other funding in place to start up new activities in response to a resident's reported needs, such as trips, social groups and classes. None of the other organisations had the option to easily start completely new activities, and as a result sometimes felt unable to respond to the residents' needs.

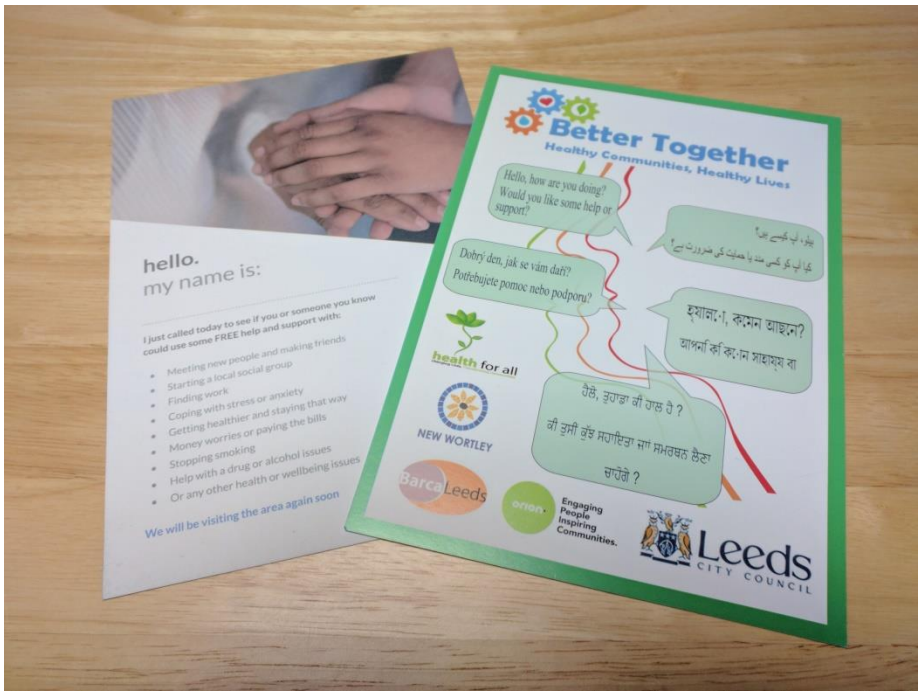
Secondly, their organisation includes a lot of multilingual and multicultural members, which may have worked particularly well given they encountered a lot of immigrants in their assigned areas. Even when they didn't match the language or culture of the resident, there may have been a bonding through mutual non-verbal understanding. Also, non-native English speakers may be easier to understand (for example more likely to have or able to revert to slow speech and simple wording).

Thirdly, the team had received health trainer training and has extensive experience from events and GP referrals on how to talk to people about sensitive topics such as their health. These skills and experience may have offered a potential advantage during doorstep conversations.

Leafletting

Two versions of the leaflet were used (Figure 8).

Figure 8



A first version of the leaflet was created based on suggestions from the workshop participants and featured a greeting in the most commonly used languages in the outreach area and logos of all participating organisations on the front cover. Comments by the outreach teams on the first version

suggested the different languages, which were intended to connect with residents, may actually put some people off. Residents may think the services are intended for non-English people, or be aimed at asylum seekers. The languages may also create an expectation that the outreach teams will be able to answer in these languages, for example when ringing the phone number provided on the leaflet. Finally, some residents may not like or be suspicious of some of the organisations depicted in the logos.

A second version of the leaflet was created in response to this feedback after the midterm workshop. It used a simpler design, was written entirely in English and featured only the Better Together logo. Feedback from the outreach teams on this version was that it looked too generic and wouldn't capture attention if it ended up being one of several items of mail a resident received. Also, they commented it looked like a health and social care leaflet, such as a care home leaflet.

The opinions on both versions of the leaflet came from professionals only, though a more appropriate source of feedback would be to ask the actual residents. Also, the impact of leaflet design on residents' response rates could be tracked in future studies.

Only one team actually saw a few instances of leaflets being put in windows by residents. Another team commented 'Why would any resident do that? The rest of the street would then know they need help [since they also received the same leaflet]'. About half the teams reported attaching a list of activities and resources specific to the local area to the leaflet, providing concrete examples of the support offered. One team included a 'free hot drink' voucher with the leaflet, with the dual intention to get people to come to their centre and be able to track the success of the leaflet. Unfortunately, no one took up the free drink offer, but this was in an area which was particularly hard to engage in the first place.

Three teams reported receiving a few (5 to 10) phone calls which could be directly linked to the leaflet. About half of these called for help (such as the colon cancer case study, in appendix) while the others simply needed help understanding the leaflet (for example when their English was poor) or asked for further information (for example if they worked during the day). Indirect benefits of the leaflet were also reported. One team said they noticed a clear improvement in the number of people opening the door after they started leafleting houses beforehand. Another team found the leaflet useful as a conversation starter: though some residents said they hadn't seen it, others did acknowledge they received it and sometimes even recognized the name of the outreach worker (which was written on the leaflet).

Door knocking

The biggest issue all teams agreed on was getting residents to open the door. Various strategies, including going at different times of the day and leafleting at least some time before knocking, did not seem to have a large impact. In addition, the suspected presence of dogs (one team was chased on one occasion) and signs saying 'no leaflets' and 'no door knocking' (reported in one area) prevented them from knocking on some doors in the first place. This presents a problem for the current study as these households could not be included in the analysis. Moreover, it also made the outreach teams feel like door knocking was a waste of their time, especially because it was seen as a

tiring and time consuming activity in the first place. Bad weather during the winter was cited by several team members as an additional source of stress.

One team commented that 'especially the people we wanted to answer, did not answer the door'. Future studies are needed to confirm whether there truly is a bias, with residents that are not responding more likely than not to be in need of help. In some areas with vandalism (such as graffiti or eggs on houses) and loitering youth on the street, people were understandably nervous to open the door. Another team suggested that a lot of people were probably at work, and those that are clearly in but not answering may simply be a sign of the times (people not knowing their neighbours anymore and interacting more online).

One team received a few questions from residents and neighbours about why they posted leaflets or knocked at one house but not another. Another team were concerned about residents thinking this, though they did not report anyone actually telling them. This underscores the need to be careful with leafleting and door knocking, so residents don't feel singled out or excluded.

One of the teams reported being put off door knocking, being disheartened because of its limited success in their area. It felt inefficient, since they seem to find more socially isolated people through their regular engagement (coming to their centre or activities) than they did door knocking. Their usual approach, leafleting, is also easier because it can be done by volunteers without special training or oversight. Another team reported a palpable tension when door knocking in one particular area. While they didn't feel uncomfortable by what happened per se (such as unwanted advances from teenagers), the realisation that people had to live like this, thought this was normal or feel they have been abandoned, was depressing.

On the other hand, one of the team members reported that her positive door knocking experience completely changed her attitude and way of working. While she found it challenging at the start, she said it helped her become more confident to approach people, for example when out and about, and talk about her job. She enjoyed talking to people and found people she wouldn't have found otherwise (such as through events and GP referrals), so it felt like a very rewarding experience. Her team will continue to door knock for their work in the future.

Doorstep conversations

Further complicating matters, some residents who did open the door, did not engage with the team in a meaningful way. This could be either because they did not speak sufficient English, they did not understand the point of the visit, the decision maker was not at home, they were not interested or they did not think they wanted or needed (to ask for) help. One team member commented that some older people may be quite stuck in their ways, or some people (due to age or culture) may be too proud to admit they need and accept help. Also, some areas are already visited by other teams, such as community engagement, and residents may reach a saturation point, not wanting to engage since they already talked to someone recently. While some teams felt they or their organisation were recognized by residents, others found that lots of residents did not know of their organisation's existence, despite having been established in the area for a long time. Familiarity with the outreach organisation may help build trust more quickly.

Language issues were fairly common given the large migrant and asylum seeker community in some of the areas of interest. In some cases, children attempted to translate but this also poses some issues (such as incorrect translation or parents not wanting children to know). One team explicitly suggested taking a translator as an improvement for future studies. Another team reported that their multilingual competency allowed them to offer help to some residents who would not have been able or willing to express their issues in English.

All teams found that talking to neighbours, especially if people were already outside (for example in their garden) was often useful to find out about residents of properties of possible concern. In one particular area for example, neighbours reported often that residents with curtains closed were rarely at home during the day due to working nights or working away.

All but one team as a rule only attempted to talk to a given resident once, and usually this would be only a few minutes on the doorstep. If someone didn't want to engage, they did not receive any follow up as part of this study, but were considered 'unknown' similar to doors that stayed closed. Only one team was able to provide follow up past the initial visit, as they visited some residents in need multiple times and enrolled them into their own activities as much as possible.

Different teams had different approaches to initiating a conversation. Some went through a list of activities and services offered, asking the resident if they were interested in any. Others asked the resident if they thought anything was missing or should be done in the area. One team mentioned explicitly they didn't feel they could 'push' people for their individual circumstances: 'I would never ask "*do you need support or help";* it's not done, we need to be sensitive and tactical'. Other comments included that it felt invasive, there was no time to get comfortable or explain properly, and they didn't feel they could ask for contact details. One team member remarked that people seemed more keen to share in a group setting in the community than at the doorstep. She gave an example of a community event where people were freely discussing gangs in the area, a topic which had never come up in doorstep conversations in the same area.

All teams agreed that it was hard, if not impossible, to establish conclusively whether a resident was socially isolated or has any other unmet need(s). One team member commented: 'it's hard to get a good impression from the resident or make any impact on them in one quick doorstep conversation'. Residents who accepted a leaflet with activities and services may just be interested in activities and supporting the community, rather than not wanting to admit they are feeling isolated or in need of help. One team member commented that 'unmet need' is not always easily defined. She gave an example of a lady doing crafts outside, who was interested in accessing local crafts groups and may simply be proactive and open to new ideas rather than experiencing a true need.

Moreover, it is not possible to be certain that someone who appears normal during a short conversation on a given day, is truly fine. In most cases, multiple visits would be needed to create trust and nurture a meaningful relationship that allows people to open up and talk about their issues. One team remarked that they are too often judged (in terms of KPIs) on the number of engagements, not their depth or duration.

Referrals and follow up

In case the outreach team suspected that the resident had an unmet need, they were not always able to help, either because the resident was unwilling to cooperate or because they could not provide the desired activity (for example language classes close to the resident's home). Even when a referral was made, it was usually not possible to follow up on the result. There were no existing ways to track referrals to external services, such as Citizens Advice. Even referrals to groups within the same organisation wouldn't necessarily be picked up, as it would depend on residents remembering and mentioning how they got referred. Moreover, there were usually no dedicated time and resources to attempt to track referrals in the first place. Two teams were able to track some referrals, all to their own activities (three people for one team and at least six people for the other).

Long term outcomes would be even harder to track. One team member commented that it can take years to see a meaningful change in someone and everyone's journey is different, so it's hard to objectively measure 'success' of referrals. Typically used tools such as the Wellbeing wheel and the short version of the Warwick–Edinburgh Mental Well-being Scale (SWEMWBS) were seen as flawed and not very useful. Such tools ask how people are feeling on the day (which can fluctuate wildly depending on the day) and people often don't understand or care and hence don't respond accurately. In her two years working in her organisation, she estimates only about three people clearly turned their lives around for the better. A larger number has been attending groups fairly reliably, which could also be seen as a positive change. She commented that she felt they were judged more by quantity rather than quality.

Optimising the process

None of the outreach team members had ever done this particular kind of door knocking before, where they had to assess a resident's unmet needs using a one-off doorstep conversation. They could build on their other experiences of working with people and learned as they went along. One of the team members commented door knocking should be done by someone with experience and confidence. Another comment was: 'We have had a number of people talking to us with some heavy duty issues that going to Zumba or a gardening group aren't going to answer, and, yes, we can point them in the right direction but we aren't in a position to deal with some of the conversations we have.'

All teams agreed that specific training would be useful. Suggestions included health trainer training or something similar to the 'Making ever contact count' training[9]. This would teach outreach teams how and what to ask to optimise the effectiveness of their doorstep conversations, such as asking better questions, reading subtle signs and eliciting longer more in depth conversations. It would also allow volunteers or team members with little experience to be trained for this role. However, several team members agreed that experience and personality are also important factors contributing to success. An associated issue is debriefing and emotional support for the outreach teams.

One team encountered some cases where the leaflet or their offer for support were misinterpreted and request were made for 'lady friends' or 'extras'. They questioned what people's expectations are, and highlighted the need for safety measures taken by the outreach team. Another suggestion was to focus on creating more of a community feel rather than focussing on unmet need and 'classifying' people. For example, instead of asking about specific needs and referring people directly to a specific group (such as a social group or debt management class), one could start by inviting everyone to the same generic group, in order to get people to open up and get them ready to receive possible help.

Various suggestions regarding potential solutions to get more people to open their door and/or engage in conversation involved the composition of the outreach team. This could be joining up with a 'specialist', including a translator, someone who is well-known in the area (such as a member of the migrant community network), someone with legal power to enter (such as the council housing team) or someone wearing a 'trusted' uniform. Examples of the latter could be police officers, fire service members of nurses, though some of these uniforms might actually be a barrier for some residents. Another point raised was the potential positive and negative impact of factors such as gender and ethnicity. Would residents generally prefer an outreach worker who looks and sounds like them, because they find it easier to relate to and trust them? Other suggestions were to have a special team which focusses on following up on non-responders and going out in larger groups which would split into teams of two but have access to backup.

[9] https://www.gov.uk/government/publications/making-every-contact-count-mecc-practical-resources

Wider system

One case study, a serious safeguarding issue of self-neglect through diminished mental and physical capacity, was classified as an emergency situation by the attending outreach team (case study in appendix). Guided by their experience and their manager, they went through a series of attempts to get help for the resident, which escalated into a 999 call. This was very stressful for the outreach team through no fault of their own. They were shocked as they felt that the resident was in a more serious state than some of the services they phoned, who had prior interactions with him, seemed to assume. Having protocols in place (such as who to call and what information would be asked for) and/or having a single point of access to phone for help in emergencies would be useful.

In this instance, Careview exposed a serious system malfunction, which was discussed with the services involved and prompted a review of procedures to avoid this from happening in the future. However, this caused the team involved to question whether the existing system is able to deal with the (additional) cases found by Careview: 'Sending workers out to identify people but then not being able to provide a system that is fit for purpose to help support those identified means that Careview itself has some fundamental flaws.'

In general, teams reported feeling unable to respond to a lot of the unmet need they encountered, due to lack of existing services and activities, sustained funding to set up the latter and suitable community locations that are fit for purpose. From the doorstep conversations with residents, it became clear that people generally only want to sign up to activities that occur at a time and place convenient to them. One team member said 'It was especially important that it is in their locality, on their doorstep- they will not walk to a community centre elsewhere!'.

As previously mentioned, only one team had existing funding to start up new activities in response to doorstep conversations, and this was limited to a specific age group. One other team acquired temporary funding to start new activities in one of the worst areas they door knocked, but were unsure if they could secure additional funding to continue. They suggested focussing on youth groups and activities, which would help get young people off the streets, prevent boredom, teach them skills and help them see and create a positive future. One team member commented that they understood the need to prioritise and that activities or services may have to be asked for by multiple people, be sustainable and have some evidence for their effectiveness.

Most teams brought up the sentiment that Careview may be able to find people in need, but the current system is often not able to offer the right support for them, especially when it comes to preventative work, the associated cost savings of which are hard to quantify. One team member commented 'We come to offer help, we tell them we want to help them, but then we can't really give them what they need'. This made outreach teams feel powerless, upset and sometimes frustrated. This may have negatively impacted their opinions on Careview. Comments such as 'we can't do much, we're only allowed to visit once, we can't follow up and have no capacity to set up new activities' were given in response to negative experiences with Careview, although both the app and the current study are only intended to find people in need, under the assumption that the current system would then be able to deal with referrals.

This highlights the importance of integrating Careview into other work which focusses on expanding the current offer of services and activities. Several members brought up the point that if they asked people what they needed, and then couldn't provide or act on it, the resulting disappointment could make residents lose hope and make them harder to engage with in the future, creating even more isolation.

Additional benefits

All teams reported one of the best aspects of the study was to be able to talk to and learn from residents, including finding out how residents think about an area and what they really want. This community intelligence gathering helped the outreach teams better understand the community's needs, tailor existing activities (for example, are residents interested in Zumba classes or a running group) and spark new ideas to offer support (such as organising activities in an area where there are none). Team members reported they got to know their areas better and found new neighbourhoods in need that would benefit from setting up activities.

As a result of the response to the leaflets, one team decided to put more leaflets at GP services and in health centres, as well as put promotional information for an event aimed at parents in children's school bags. The latter worked very well as evidence by a great attendance at the event.

Other positive experiences included opportunities to network at Careview events and create new partnerships, such as outreach team members forging closer links with the community engagement team. One team reported that Careview had strengthened their relations with existing partners because the project allowed them to work and talk directly with outreach team members rather than through managers. This also helped them become more aware of what their partners were doing and make referrals to their activities. Another team used the opportunity to refer residents identified through Careview to another project in the organisation, allowing key performance indicators for both projects to be ticked at the same time.

Future direction

When asked what the outreach teams thought should be next for Careview, everyone said it was worth continuing to test it, though some people suggested a different pitch and/or use case. Most teams commented that Careview (as implemented in this study) was not simply about social isolation, but other types of unmet need as well. The data collected in the current study suggests that the majority of cases with unmet need may not necessarily be socially isolated. Hence, outreach teams thought Careview should not be marketed as a social isolation tool. One team member suggested putting an emphasis on prevention.

Suggested alternative or additional uses for Careview included improving collaboration between teams (for example housing, social, community) and focus on the physical signs rather than what may or may not be behind them (such as community clean up). Another suggestion was to give the public access to the app so they can reported concerns, for example about their neighbours, with the

outreach team only responding to the heat map. Neighbours can often spot something an outreach worker, who visits only a few times and during the daytime only, can't, including hearing arguments, tracking when/if people leave the house, signs of domestic violence, etcetera.

The team who felt quite negative about the whole experience was the only one who questioned whether Careview had any value worth funding from the public purse. They questioned whether the Careview signs were relevant (they had found a lot of false negatives) and whether the funding for building and maintaining the app would not be better spent by paying dedicated workers to knock on all doors regardless of external signs, and focus on follow up and relationship building with residents.

However, most teams thought that door knocking had allowed them to find people in need they would otherwise have missed. One member commented 'We need to knock, even if we only find a few people, otherwise we would miss them'. Teams generally agreed that it would be a good idea to use Careview across all of Leeds, because, as one member put it: 'social isolation [and unmet need] is everywhere and not restricted to deprived areas'.

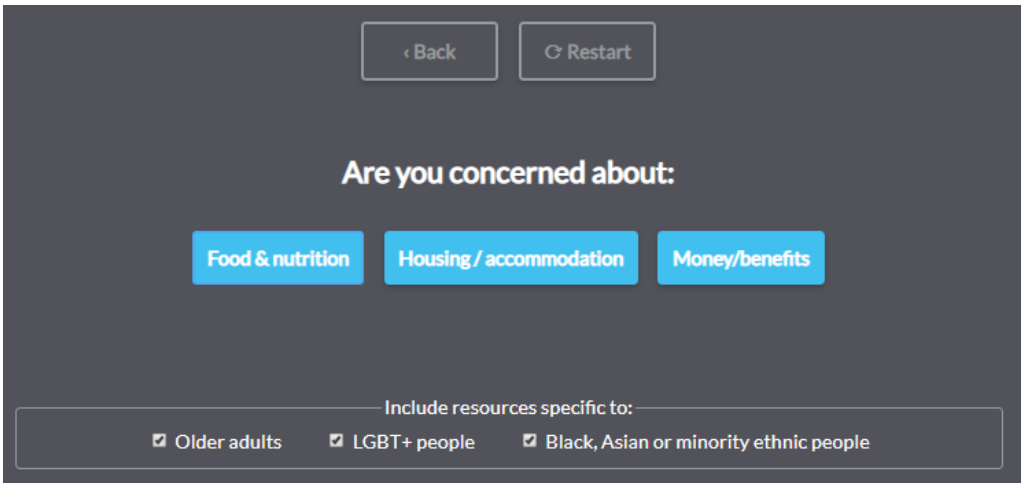
Several team members alluded that using the app in other areas may yield different results. Outreach teams and other services already concentrate on most of the areas in this study and know most of the problems. One member said that they may miss a lot more in less deprived areas, which they tend to focus on less. There may also have been differences between the areas in this study, at least partially explaining why some team found more cases than others. One team with a good result and experience was mainly working within a multicultural community, including Indian, Pakistani and Eastern European populations. They suggested that these mixed communities may generally be more open and proactive. Another team only found one clear case of unmet need while lots of other people in the area seemed to be doing fine, and questioned whether the deprivation index in the area was still current and relevant to detecting unmet need.

Additional data

Social isolation guide

On 9 April 2018, a new 'social isolation guide' was added to Careview, which has had 412 page views as of 30 September 2018. The guide offers two options to find local services that residents can be referred to: a list and guided search. The list allows quick access to contact details for users who are experienced and know exactly which services they are looking for. The guided search option is aimed at less experienced users, taking them through a series of choices.

Some teams had used the guide a few times when out and about door knocking, especially for benefits and mental health contact information. They thought it was easy to use and found what they wanted quickly. All teams had a look at it and agreed it would be a useful addition, especially when sending out less experienced outreach workers or volunteers. One team thought it needed to be tailored to the specific local area and more comprehensive.



Feedback from other teams/services

Two locality managers from the East Communities Team visited a Careview area (Cliftons and Nowells) with over forty people door knocking from different departments (such as housing and police). They reported four cases in the Nowells, three of which were related to a property in disrepair which would have been pinned by Careview. This included a cock roach infestation, truancy and a request for language lessons. The single case without signs of disrepair involved a potentially overcrowded property involving a migrant family who had experienced hate crime. In contrast, most areas of the Cliftons were in good repair and residents seemed content, some having resided there for over thirty years. As a result, the locality managers decided to focus the community team's efforts on the Nowells. This echoes the results of Careview pinning, where the Nowells showed a much larger number of concerns than Cliftons.

The Barca team used the first version of the leaflet created for Careview when doing outreach work on the Wyther's estate, which is notorious for non-engagement. They put 100 leaflets through letterboxes after unsuccessful door knocking. As a result, they received around 40 requests for information or support. This is an unusually high response as the usual hit rate is one to two responses per 100 leaflets.

Services across Leeds have expressed interest in using the Careview app. The Police has helped test the original prototype. The Fire Service are making plans to trial it with their fire prevention and health and wellbeing checks. Royal Mail was approached originally, as postal workers could be particularly well placed to use the Careview app, but negotiations were ultimately unsuccessful. Housing and street cleansing teams, the Older People's Forum and the Neighbourhood Networks are interested in using the app, as is the Essex County Council commissioning unit.

To test the feasibility of getting volunteers for Careview pinning, a nudge programme was set up aimed at Leeds City Council employees. While successful in reaching the intended target, the programme was put on hold to await the results of this pilot for optimal deployment.

Summary and recommendations

Based on the data and feedback from the outreach teams in the current study, Careview shows promise to help detect unmet need, including social isolation. Larger studies are needed to confirm and expand on the observed data trends using statistical analysis, as well as quantifying its social and economic value. The following topics should be considered to inform the design of future evaluation studies.

Branding as social isolation or unmet need in general

The current study focussed on finding unmet need in general rather than social isolation specifically. Outreach teams were not asked to, nor would have been able to, accurately assess whether a person was socially isolated or lonely given a few minutes of doorstep conversation. Likewise, the 'social isolation guide' has been used by the outreach teams to refer people who were unlikely to be socially isolated at the time of referral. If the aim is to focus on social isolation for future studies, outreach teams may require multiple visits and specific training in order to accurately detect this. On the other hand, since a lot of unmet need presents a risk factor for future social isolation, Careview could be rebranded as a tool which can be used more widely to help detect unmet need, with social isolation being only one instance.

Crowdsourcing and heat map testing

The use of Careview was originally intended to be crowdsourced, i.e. having a large group continuously report concerns to populate the heat map.

Crowdsourcing may help alleviate concerns about the subjective nature and variability of pinning. The current study suggests there may be variability between users (such as different standards for 'untidy'), within a user (do people notice and judge signs the same on repeat visits), over time (for example gardens may be better kept when the weather is good) and differences between expert and non-expert opinions. Having a much larger non-expert user group continuously pin will help reduce such inherent noise in the signal.

Also, crowdsourcing can help with further testing of the use and usefulness of the heat map. In the current study, outreach teams did not have to, and generally did not use the heat map to plan their outreach activities.

Reviewing the signs of concern

Some concerns reported via the app may be too broad. For example, 'untidy garden' may benefit from splitting up into 'overgrown/weeds' versus 'rubbish', the latter of which was considered more serious. New categories such as 'dirty curtains/nets' could be included either separately or as part of, in this case, 'windows not clean'. Other categories may be too broad. For example, 'curtains closed' in isolation often resulted in false alarms, but did also lead to the discovery of some cases of unmet

need. Rather than removing less relevant categories, giving them a lower weight related to the likelihood of finding unmet need may be an option to consider.

Outreach teams generally agreed that external signs of neglect are predictive of unmet need, saying some houses give them a 'gut feeling' that something may be wrong. It would be useful to try and substantiate this by asking more outreach workers about signs and combinations of signs they feel may be predictive, such as a dark or hard to navigate path to the door. This could then be translated it into concrete signs for the app.

Improving engagement

Currently, we have no data on two thirds of identified houses. It is possible that an unknown proportion of these residents are in need of help, but do not want to admit this, feel ready to open up or accept help, and therefore are less likely to open their door or talk to an outreach team.

Improving engagement means improving the success of door knocking and/or conversations with residents. Possible solutions to test include training teams, having 'specialist' teams (including a uniformed member, culturally competent member and/or translator) for hard to reach households, giving teams the option to door knock more than three times and/or have multiple visits to build up a relationship with residents.

Further process evaluation can help test which methods and delivery are optimal. For example, in the current study, we found indications that leafletting, multicultural teams and buy in from senior management may help improve engagement. Other suggestions include providing support, both practical and emotional, for outreach teams, making sure they feel valued and sharing learning between teams (prevent 'reinventing of the wheel').

In order to provide the best possible intervention, we would need to get feedback from socially isolated people or those who have significant experience, such as specialist workers or people who have experienced loneliness in the past. If Careview is to be aimed at any unmet need, finding a group with lived experience would be easier. This expert group can give feedback on what they find acceptable and what would help them engage.

Quantifying predictive value and false negatives

Most outreach teams felt that external signs of neglect are linked to a higher likelihood of finding a resident in need. However, given the small sample size in the current study, it was not possibly to quantitatively test this. In other words, it is theoretically possible that a new study would also show around 35% or more residents in need if outreach teams were to knock irrespective of signs of neglect, i.e. without being informed by Careview. Furthermore, it would be useful to refine which signs, or combination of signs, are most predictive of finding unmet need. This could help prioritise areas for outreach work, especially when Careview is used at scale.

Future studies should also aim to quantify the amount of false negatives: residents who are experiencing unmet need but live in a house with no external concerns and therefore are not found by Careview. A proportion of this group may be residents of flats or council houses, where the exterior of the building is maintained by a third party. Another suggested group are people with specific mental health conditions, for example obsessive compulsive disorder, who are trying to project an outward image of normality. Several such 'false negative' cases were reported in this study but this wasn't systematically investigated. As such, we don't know how large this cohort is that we are potentially excluding.

Tracking success

Future studies can track a range of measures of success, from positive experiences and predictive value of Careview signs to estimated social and economic value. Especially for the latter outcome measures, follow up data becomes very important. Outreach teams in the current study said it was not easy or even impossible to track referrals, never mind collecting long term outcomes. They also suggested that pure quantitative measures, such as the standard questionnaires and key performance indicators, may not provide the best picture. Co-designing outcome measures for future studies with all relevant stakeholders may help pick the most relevant and feasible measures and methods.

In the current study, data collection about house visits was done by the outreach teams, who were not used, specifically trained or closely supervised to do so. This resulted in missing and inconsistent data and potentially biased reporting (for example, did they fill in a sheet if there were no concerns). The quality of reported data may depend on the outreach team, with the clarity of structure and amount of detail provided varying quite a bit. Future studies, especially at larger scale, should explore providing training, supervision and other methods to optimise record keeping.

Scaling Careview

Since Careview is only intended to find unmet need, it relies on the existing systems for actually helping those identified, including referral pathways, services' capacity and outcome collection methods. This study flagged up several issues regarding these systems, such as the lack of funding to start new local services in response to residents' demands or the failure of emergency referral procedures in one case study. Such issues may reflect badly on Careview, as evidenced by some of the outreach teams' comments about negative experiences with referral and signposting: 'Why are we trying to find these residents if we then can't help them (properly)?' In addition to managing expectations, integrating Careview with other initiatives can help, for example programs or funding sources to start activities to meet the uncovered need.

Since there may be an impact of area (such as cultural composition of population or proportion of private renting), Careview needs to be validated across a wider area. This should include more affluent areas, where Careview may work differently.

Scaling up Careview brings new challenges, such as recruiting and retaining volunteers to pin, providing induction and training to outreach teams at scale, and finding easy to use yet rigorous ways to collect data and gather feedback from participants. Therefore, a controlled, possibly step wise, expansion with a continued inclusion of process evaluation is recommended.

Appendix: Case studies

Door knocking on houses with concerns

The outreach team found a property with curtains closed around 4 pm, with a wheelchair ramp and the grass looking a little high. Since this was a flat and council property, the exterior may not be very indicative as it could be maintained by the council or a neighbour. They knocked and found a gentleman aged over 90 who was obviously unwell and in need of help. He wore a dirty T-shirt and a nappy and walked with a Zimmer frame at a very slow pace. His flat was dirty, smelly and unsanitary. While he seemed unable to clean or tidy, some fresh food and folded up towels indicated that someone was visiting him. He was happy to invite the team in, and it seemed as if he would let anyone in, thinking they were there to help him. He seemed a little confused and kept repeating himself. He had multiple complaints about his health, including multiple heart attacks, catheter problems, need for a chiropodist, cancer in his big toe, as well as sight and hearing impairments. He was obviously very lonely, upset and vulnerable. The outreach team stayed in the flat for 45 minutes, making him some food and listening to his stories. They left very concerned and called adult social care services, who deemed this was not an emergency. They tried other services, including a GP, Age Concern and 111. The latter recommended they phone 999, who said they would send someone. They were on the phone for at least 1 hour trying to get the gentleman some help and felt concerned that they had been unable to get him the help he really needed. Later, they received a call back from 111, giving a bit more detail about what they were doing for the gentleman and his history. He had recently made calls to 999/111 about his catheter and they had made referrals to the district nurse which they would follow up. The clinician on the phone said they suspected that he might be refusing care.

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The team knocked on the door of a house with curtains closed at midday. A lady, presumed to be over 60 years of age, opened the door and told the team she suffered from fibromyalgia (chronic widespread pain). This meant she can't get out and about much, and feels isolated and alone. She would love to go out, but there aren't many groups in the area, especially since she can't travel far. The team looked for local groups suitable given her age and condition, and signposted her to St Matthews Church. One of the team members later discovered a 'slow dance class' run by Yorkshire Dance, which sounded suitable. She had some trouble reaching the organisers to confirm, but eventually found out the classes run in partnership with Holbeck Elderly Aid. She went back to the elderly lady to suggest the class to her but found her not home. She left a leaflet with all the information about the class and will revisit later.

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The team knocked on a house with closed, dirty windows but received no response. They talked to a neighbour, who said they didn't know the person living there. They knocked again on the way back and an old lady opened the window to talk. She was quite friendly, saying she's ok and has family who visits her. However, when asked about friends especially of her own age, she suddenly realised that all of her old friends had gone. Through the conversation with the team realised she was socially isolated. She then expressed an interest in joining a friendship group and receiving further home visits by the outreach team. Despite her saying she could make it to the group herself, a team member told her she would drive her (knowing from experience that a lotsof people otherwise find excuses not to go), and have a quick coffee and chat at her house before leaving (setting her at ease). They drove her to a Better Together group to see whether or not she liked it, stayed for a while till

she was comfortable, and she ended up signing up to the group. They also invited her to join a trip to Scarborough, which she did, and she expressed an interested in future trips. She enjoyed it, and reported that her children had said she should do more like this, as it was good for her. While she iss quite old, she is still active and able to travel easily. The outreach team think active people may not enjoy sit down groups much and may instead prefer to go on trips.

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When knocking on the door of a dilapidated property, the outreach team found a Slovakian man who needed help with rubbish removal. He had a sofa, cushions, carpet and doormats he wanted to dispose of, but wasn't sure how to proceed. He complained that he couldn't use his black bin, as one bin was too small, and the bin collectors don't take rubbish that isn't actually in a bin. He had tried to order an extra bin, but wasn't very fluent in English or using internet based services (the main route to relevant services in this case). The outreach team offered to help him arrange bins and book a collection. They have now visited him three times and are on very good terms with the resident.

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The team found a family where the wife suffered from mental health problems and the daughter was dealing with drug and alcohol abuse. They offered resources such as Getaway Girl. On the next visit to the area, despite them not intending to visit the house again, the husband came out explicitly to thank them.

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The team talked to a couple who had just moved and found out they were pregnant. They were invited in, given a drink and had a good chat. They signposted maternity services, a men's group and language classes. Another recently immigrated, and very welcoming, family asked for language classes and for the husband to get in touch with others sharing his interests (around engineering). He was referred to a men's social group as a starter.

Finding unmet need through leaflets

A 45 year old Indian man whose house had shown concerns, rang in response to the leaflet that had been left. His English wasn't good and he noticed one of the outreach team's names on the leaflet and correctly assumed she might speak Punjabi. He told her he was going through a crisis: he had colon cancer, his benefits had stopped and he had run out of money. Moreover, his partner was pregnant and he needed advice on obtaining legal immigration status for her. He used to get sick pay, which had now stopped and he had no money to drop off his sick note to get it reinstated. The team gave him a bus ticket to drop off the paperwork in town and later visited him at home. His house was small, dirty and full of bugs. He had been relying on food donations from friends. He walked with the help of a stick, and said that his doctor told him he had suspected colon cancer and advised him not to go to work. He put up a very brave front and didn't want to admit he had cancer. The team uncovered that he hadn't been submitting the right paperwork, so they phoned around and helped sort out his benefits. They also offered him immigration information and suggested food banks and donations for the baby. However, he did not want to accept donations, seeing himself as his family's provider and finding it hard to accept help without feeling ashamed and a failure. As a result of the team's support, his benefits have now been reinstated and his girlfriend has expressed an interest in language classes and looking for work after her pregnancy.

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In response to a Careview leaflet dropped through their door, an Indian lady rang a member of the outreach team. She could only speak Punjabi and correctly assumed the outreach worker (whose name was on the leaflet) would be able to understand her. The outreach worker visited her house, which was well-kept and did not show any signs of neglect that would be pinned using the Careview app. The lady was living alone and in poor health, suffering from severe, but currently controlled, epilepsy and suspected mental health issues. The epilepsy meant she was no longer allowed to cook by her doctor, and had to accept meals from a family member. She angrily said she had no one left, blaming her husband and adult daughter for leaving her. The outreach worker suggested she attend an Indian women's group which is part of the Better Together initiative. Given she couldn't drive, transport was arranged to take her to the group.

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A young lady from Holbeck responded to a Careview leaflet. The outreach worker visited her house, which was well-kept and did not show any signs of neglect that would be pinned using the Careview app. She suffered from anxiety, panic attacks and low confidence but was keen to learn and do volunteer work. She has a young daughter and only has limited time when her daughter is in the nursery. Combined with her panic attacks, this prevented her from driving long distances and busses would take too long. The outreach team referred her to the local Better Together friendship group and arranged transport. One of the team members suggested she could accompany her if that would help with the anxiety. She was also invited to try volunteer work with them, when she is ready, and told she's welcome to bring her daughter along if she wants.

Examples of non-engagement

The outreach time knocked on the door of a property which was dirty and had curtains closed in the middle of the day. A young man spoke to them from an upstairs window. He kept rocking backwards and forwards, and the team were initially concerned about possible drug abuse. However, as they kept him talking, it became apparent he was lucid, and apart from the rocking, seemed fine. They talked about there not being much in his area in terms of services for the local community. As he said he was looking for work, the team suggested a local job centre and community cafe could be very useful. Unfortunately, he did not want to commit or engage further at that time.

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The team knocked on the door of a property where all Careview concerns were present. An older white man opened the door but wasn't very communicative when the team explained what they do. He implied he doesn't go out much, he doesn't need any information or help and closed the door. The team left a leaflet through the letterbox with their contact details, in case he changes his mind at a later time. The team speculated he might be suffering from depression and may not be in the right frame of mind to accept help at this point in time.

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One older woman found through door knocking was initially very keen and signed up to be part of a Time To Shine steering group. However, at a next visit she was cold and distant and no longer interested in engaging. The team suspects this could this be a sign of mental illness.

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The team approached a man working on an art project outside his house. When they suggested he could join a local arts and crafts group, he responded he wasn't keen on the idea of a group, as he enjoyed doing things on his own. Groups may not be the answer for everyone.

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The team approached an Asian woman sitting on her front door steps. Initially, she didn't want to take the leaflet but a team member suspected there may be a language barrier and switched to the woman's native language. Soon, they found out that her husband was disabled and she spends most of her time looking after him. They have no children. She used to go out but hadn't done so for 30 years, and her husband had not even left the house itself. They did not receive much in terms of benefits, so the team suggested to arrange a meeting with a colleague who offers wellbeing visits to help people check if they are receiving the right benefits. The lady did not want any help or to claim any extra benefits and started crying. She said it was so nice that the team took the time to talk to her, as no one does that these days. The team visited her again on multiple occasions but every time she declined any offer of help. The team is unsure whether to keep suggesting ways to support as this could result in her getting annoyed and disengaging.

Addendum - January 2019

Door knocking data from one team was received in December 2018 and discussed with the team's manager in January 2019, after the official end of the study. This team had been brought in late and as such had had no opportunity to participate in the initial workshops or midterm meeting. The outreach workers only had one face to face contact with the study coordinator and the evaluator at the start of their involvement. The debriefing at the end of the study was done by their manager, and it had been unclear whether or not this team had done door knocking or only leafleting of the area.

A total of **96 houses** were door knocked. While data was given for one occasion only, the outreach workers did try multiple times. Only three residents opened the door (97 % no response) but all **three** had a meaningful conversation (100% engagement) and were referred to Better Together groups (100% unmet need). Ultimately only one resident actually attended a group. Two of the three referred residents indicated that they felt isolated. Both had spoken to their GP, but only one of them had been referred to Better Together. However, this resident had not acted upon the referral, reluctant to initiate contact. He valued the door step conversation as a way to 'put a face on the team' and get his referral sorted.

	Nr of residents
Engaged (meaningful conversation)	194
Experiencing unmet need	70
No unmet need found	124
Unknown	606
Resident did not want to talk/engage	43
Language barrier	11
Child opened door, no adults present	1
No answer to door knocking	530
No access (such as signs, dogs, flat)	21
Empty house	21
Total	821

The manager said low responses to door knocking are quite typical for the area. Based on previous experience in the area she would expect about two or three out of 50 people to open the door, irrespective of the time of day. Previous conversations with residents suggest that door knocking is quite common in the area and people have grown tired of it. The community has also changed over the last few years. One particular problem may be that a lot of residents don't understand English well enough to read a leaflet or feel confident to have a doorstep conversation. Another contributing issue could be the relative lack of activities, services and venues in the area. Other areas may have more established, high profile and/or well promoted events, groups and centres, so that more residents are aware and potentially more open and willing to participate.

The outreach team tends to run a lot of events instead of door knocking, and relies on partnerships such as health centres, chemists and schools to display their leaflets and (in case of GPs) directly refer to them. Finding socially isolated people by being present in locations where these people are likely to go offers an alternative to door knocking, particularly in areas where door knocking is not very effective or cost effective. Careview's heat map could be used to target relevant public places near areas of concern. In order to optimize methods to reach residents, we need more information about and feedback from this 'missing' cohort, preferably from those with lived experience.

The team manager echoed the sentiment, also alluded to by others, that there isn't a simple answer or protocol for what to do once someone has been found to be isolated or experiencing other unmet need. Residents have different needs, capacities and personal preferences, and they progress at different rates. For example, people with anxiety may not feel comfortable attending a (large) group, the travel and/or venue may not be accessible for a disabled person, or the resident may not have the capacity to initiate self-help. In such cases, befrienders can be a better option, by visiting residents at their home and accompanying them to activities to increase their confidence. However, potentially more effective options like a befriender service or multiple small groups require more resources and capacity from the outreach team. Similarly, the cost effectiveness of incentives such as arranging travel or free food is not well known.

This underscores the need for Careview ('finding people') to be optimally integrated with outreach work ('helping people'), both in further evaluation and implementation. The pathway to reconnect citizens to their community can only be as strong as its weakest link. Ideally, future studies to evaluate the use and benefits of Careview should include the testing and improving of outreach activities, follow up, and indicators of effectiveness and cost effectiveness.