HEALTH AND SPORT COMMITTEE

SOCIAL PRESCRIBING OF PHYSICAL ACTIVITY AND SPORT

SUBMISSION FROM Dr William Bird CEO Intelligent Health and a GP

We are entering the fourth revolution of healthcare. The first revolution was Public Health with drinkable water, sanitation, cleaner air and better housing and working conditions. The second is medical healthcare with the advancement of diagnostics and treatment with a focus on disease cure. The third is personalised health through dissemination of knowledge (internet) and technology such as genomics, wearables and behaviour change that is leading to precision medicine.

However, these revolutions have left three major problems unresolved. The first is unsustainable healthcare including rising costs, antibiotic resistance and the persistence of long-term conditions such as cardiovascular disease, dementia, diabetes, depression and cancers. The second problem is rising health inequalities in which the life expectancy of poorer women in the UK is now falling for the first time in recent history. In Scotland during 2015-2017 the difference in healthy life expectancy (the years of a healthy life) between the 10% most and 10% least deprived areas was 22.5 years for males and 23.0 years for females.16

The third and final problem is climate change driven by unsustainable living which is affecting the health of populations (flooding, urban heat islands) and of the planet. NHS Scotland makes up about 3.6% of the carbon footprint and 1 in 20 vehicles on the road in the UK are NHS related. However, living a low carbon lifestyle (low meat diet, active travel, improved air quality) will help reduce the incidence of many long-term conditions.

So we enter the fourth revolution in healthcare which can be categorised as People, Purpose and Place. This is based on communities rather than individuals, supporting a sustainable active lifestyle, eating local produce and using culture, art and nature to create purpose and connections to each other, leading to greater resilience and happiness. It also ensures that “place” becomes central in delivery of health. At the recent International conference in Glasgow on June 10th Aileen Campbell said:

“A place-based approach is crucial to addressing our public health priorities, helping to improve physical and mental wellbeing by empowering people to shape their local environments”1

The previous three revolutions continue but the fourth if adopted in Scotland will help combat the three of the greatest challenges we face. So what is the science behind this fourth revolution.
**Chronic stress and chronic health conditions**

There has been a rise in long term conditions which is not just caused by people living longer. For example, the prevalence of diabetes is rising in Scotland with 263,000 people diagnosed with type 2 diabetes in 2017 which is forecast to rise to 350,000 cases by 2025. Many long-term conditions such as diabetes, depression, anxiety, cardiovascular disease and dementia tend to cluster in areas of deprivation, which creates a gap between the life expectancy of the rich and the poor. These conditions also tend to cluster in the same person, with 23% of adults having two or more chronic conditions (ranging from 7% of those under 45 years of age to 51% of those 65 years or older) with a significant deterioration of quality of life with each co-morbidity.

Our body is designed to respond to short-term stress; if these responses are used for long term chronic stress then it causes harm and is highly damaging to the body and can result in chronic inflammation in the following ways (Figure 1):

1) Stress leads to the release of cortisol, through the Hypothalamic Pituitary Adrenal (HPA) and Ghrelin hormone both of which increase appetite leading to excess consumption of palatable and “inflammatory food; these extra calories are stored as visceral fat, which can independently cause inflammation.

2) Our body constantly releases catecholamines and cortisol through repeated activation of the HPA axis which switches from being anti-inflammatory to inflammatory.

Figure 1: Highlights two pathways: health/resilience related factors (people, purpose, place) which can inhibit and relieve stress; stressors that can lead to chronic stress and poor health behaviours, both of which can lead to chronic inflammation and chronic health conditions (Adapted from Chapter 1.6, Oxford Textbook of Nature and Public Health 2018).
3) Chronic stress leads to coping mechanisms such as smoking and the use of drugs and alcohol, all of which lead to chronic inflammation.\textsuperscript{6}

4) We become less active to try and conserve energy. We lose our motivation and push activity further down our list of priorities. Sedentary behaviour is strongly inflammatory due to specific build-up of visceral fat, reduced anti-inflammatory Myokines from muscles, mitochondrial damage and telomere shortening.\textsuperscript{7}

Chronic inflammation is a shared pathology of cardiovascular disease, depression, anxiety, dementia, diabetes and frailty which causes damage to the body over many years.\textsuperscript{3} Chronic inflammation is directly related to deprivation and children with adverse childhood experiences will have raised inflammatory markers (such as IL-6, CRP and anti-TNF) compared to their peers. This chronic inflammation in childhood lays the foundations of long-term conditions and premature aging.\textsuperscript{4} Chronic inflammation is a disease in itself and because it has no traditional medical cure, it has to be treated by reducing chronic stress and changes in lifestyle which the third and fourth health revolutions can deliver.

**Evolution of chronic stress**

How do we overcome and reduce chronic (toxic) stress? We evolved to be hunter gatherers and we perfected our survival techniques over 200,000 years through three main factors that are the fundamental basis of health.

1) People: We had social support from family and friends who made us feel valued and loved.

2) Purpose: We had a sense of purpose where we had defined roles, which created a sense of belonging and control over our life.

3) Place: We were outdoors and connected to nature, which we observed, understood and respected.

These three “Ps” create resilience, which can reduce chronic stress, leading to reduced chronic inflammation and therefore greater health and wellbeing.

Today’s society is taking us further away from the factory settings for which we were designed.

1) People: We have a rising problem of loneliness and social isolation.

2) Purpose: A sense of powerlessness and lack of autonomy.

3) Place: A disconnection from nature and the outside world. Children spend less time outdoors than the average prisoner.

While humans may have adapted culturally to these drastic changes, these environmental changes have happened so fast that many aspects of human physiology have not yet had the chance to adapt\textsuperscript{17}. Essentially, our brains and our bodies still function as if we still live like our hunter-gatherer ancestors. Because of this, it has been suggested that humans are mismatched to the environments we currently live in\textsuperscript{18}, which manifests as health problems based on stress and chronic inflammation.
The further we stray away from the context in which we evolved, the less resilience we will have, leading to worsening chronic stress, greater chronic inflammation and subsequent poorer health and wellbeing (Figure 1).

**Overcoming chronic stress**
The early attempts of the NHS to reach out to patients and change their lifestyle were Exercise referral schemes which treated exercise deficit with exercise. This was very linear and did not address the underlying problems. This in general was not shown to be sustained and NICE in England advised against commissioning more programmes.

**Social Prescribing**
Social prescribing is an important part of treating chronic inflammation. Social prescribing uses a link worker to connect people with existing community groups with structured activities such as Health Walks, Park Runs, Zumba classes, sport etc. in addition to providing support for other aspects of their lives like navigating benefits schemes and getting job training. These structured interventions help to promote health and resilience (Figure 1) by directly addressing people, purpose and place and giving people new opportunities to become active, socialise, get their life back in order and feel part of the community rather than depend on new analgesia or anti-depressants.

Social prescribing is a major step forward in disrupting the medical model but there are challenges to its widespread use including funding failing to reach delivering organisations (usually voluntary, charity or social enterprise organisations) and a bias towards patients wanting to be referred in the first place into a system with a hierarchy of professionals, leaders and structures. This means that social prescribing has limited scope to reach the many thousands who have the greatest need.

**Social Movements**
Social movements are not new and devolve delivery and control to the community. Instead of a referral and a link worker referring a patient to an organised activity, the social movement simply connects an individual to a self-created unstructured activity. In this way, every person becomes a link worker. The mum walking her child to school, the teacher taking his class outside, the receptionist getting patients walking, the manager changing the culture of the workplace. The motivation is turned on its head. Exercise and health are now no longer the drivers but merely outcomes that are a by-product of a happier more connected life.

The fourth revolution will ensure a sustainable change that will be driven by communities connecting to each other and to their local (natural environment). The drivers of change are the positive experiences based on the values of the individual and community that increase social connections, create a sense of purpose and connect people to place (people, place and purpose). Social movements use existing social connections (families, workplace, neighbourhoods, schools etc.), as well as new connections through social media, that lead to new habits and new social norms. Instead of structured activities in the community (that often require funding and resource), the vast majority of potential new activities are informal,
family based, local and free (Figure 2). The benefits of health and activity are hidden and, again, are simply outcomes of living a better life.

A healthy place becomes central to this fourth

![Physical activity Opportunities](image)

*Figure 2.* The proportion of physical activity opportunities showing how active travel and unstructured activities have the greatest potential to promote physical activity (adapted from the Sport England Active Lives and Household survey).^{13}

One example of an evidence-based intervention that uses the social movement model is Beat the Street (www.beatthestreet.me), which is a mass participation intervention that aims to get people more active, increase social cohesion and connect people to their local neighbourhood. It combines gamification technology and behavioural psychology to engage whole communities, particularly the least active and those in the most deprived areas. In four years, over 1 million people and 2000 schools have participated.

In Scotland over 100,000 people have engaged with Beat the Street. In Annan and Dalbeattie 38% of the entire population took part with an average of 44% of the inactive population engaged becomes active and staying active six months later with evidence of sustained change two years post-intervention.^{10, 11, 15} In addition to this, Beat the Street can also increase wellbeing^{10}, active travel^{11}, improve air quality, strengthen families and community groups and help people to connect to the very local area. The programme’s 6-week game provides opportunities for individuals to change their lifestyle by shifting extrinsic (the game itself) to intrinsic behaviour (the positive experience) to create sustained change. If we are to deliver the fourth revolution, then communities must take more control and a social movement will change a culture. Beat the Street as with any social movement where health is an outcome, the three domains of people, purpose and place are used as the end points and the physical activity is simply the means to get there:

In summary we have to move away from the medical model and embrace the third and fourth revolutions. However, personalised health which includes social prescribing on its own is unlikely to narrow the health inequalities at scale. Social prescribing needs to embrace the fourth revolution as well. This means that it is delivered in collaboration with a better place to live (accessible green space, a safe walking environment and safe open communal places, culture) and the generation of a social movement that lead to thousands of small innovations from a community that is more empowered and confident in creating a better future with
increasing connections. Beat the Street is one innovation that shows that this can be done at scale, in the most deprived communities and with lasting impact.

References

Moving at Scale – From Inactive to Active
Beat the Street works as a base platform for activity in an area and helps build healthier more resilient communities.

With one million participants and individual programme evidence of success, Intelligent Health commissioned Jump to collate and review impact. Jump analysed data across 10 recent Beat the Street programmes pre, post and 6 months following the game. And compared impact against national data sets.

Summary of key findings:

1. Analysis of the demographics vs national averages to see whether Beat the Street works where it is needed most (in inactive communities)
   Beat the Street participants are initially more inactive than the national average. Beat the Street succeeds in engaging individuals in deprived areas

2. Active vs inactive to compare Beat the Street against the national picture from Active Lives using year on year data to avoid seasonality
   Beat the Street achieves improvements in physical activity and reductions in inactivity that far exceed any movement in the national data

3. Analysis of microdata to see if the wellbeing impacts vary with demographics and socio economics
   Beat the Street has a greater impact on adults from areas of high deprivation and on children more generally

Significant and positive impact on shifting inactive people to active (adults and children)
We shift adults who are inactive to being active
Adults (19+)

<table>
<thead>
<tr>
<th>Beats the Street Active</th>
<th>National* Active</th>
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<tbody>
<tr>
<td>58% at baseline</td>
<td>73% at 6 month follow up</td>
</tr>
<tr>
<td>(14,376/24,651) to</td>
<td>(822/1,125)</td>
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Active\(^1\) up 15%

Inactive\(^2\) reduced by 17%

<table>
<thead>
<tr>
<th>Beats the Street Inactive</th>
<th>National* Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>29% at baseline</td>
<td>12% at 6 month follow up</td>
</tr>
<tr>
<td>(7,075/24,651) to</td>
<td>(1,577/1,125)</td>
</tr>
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</table>

*More than 150 minutes a week * Less than 30 minutes a week
*Active Lives data, Year 1 vs. Year 2 (Oct-Nov 2016 vs. Oct-Nov 2017). Year-on-year difference chosen as opposed to 6 months to avoid seasonality effects.


We shift children who are inactive to being active
Children (under 19)

<table>
<thead>
<tr>
<th>Beats the Street Active</th>
<th>National* Active</th>
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</thead>
<tbody>
<tr>
<td>38% at baseline</td>
<td>52% at 6 month follow up</td>
</tr>
<tr>
<td>(5,782/15,400) to</td>
<td>(119/189)</td>
</tr>
</tbody>
</table>

Active\(^1\) up 14%

<table>
<thead>
<tr>
<th>Beats the Street Inactive</th>
<th>National* Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>37% at baseline</td>
<td>18% at 6 month follow up</td>
</tr>
<tr>
<td>(5,702/15,400) to</td>
<td>(34/189)</td>
</tr>
</tbody>
</table>

Inactive\(^2\) reduced by 19%

*More than 420 minutes a week * Less than 210 minutes a week
Two big numbers show immediate impact of Beat the Street:

**80**

Immediately after finishing the game, people are more active.

Adults do 80 extra minutes of physical activity per week after Beat the Street (based on a matched sample of 5,025 adults using regression analysis).

**161**

For children, the effect is greater at 161 extra minutes (based on a matched sample of 869 children using regression analysis).
And this impact on physical activity endures

After the initial boost of Beat the Street, physical activity levels drop slightly, but remain higher than at registration.

6 months later:

Adults are active for an additional 50 minutes a week compared to registration
(based on 837 individuals)

Children are active for an additional 138 minutes a week
(based on 129 individuals)
Positive impacts for participants in high deprivation areas

There is a positive improvement in physical activity post-game for all deprivation levels.

However, for adults the improvement is strongest for individuals living in more deprived areas.

The same holds for children if we look at lasting impacts (6 months later).

There is a positive improvement in physical activity post-game for both genders.

While for adults the changes are close for men and women.

The improvements for boys are considerably bigger.
What is the impact on the wider community?

As well as clear evidence of shifting the population from inactive to active, Beat the Street also involves the community in volunteering:

- There are about 100 team leaders in each Beat the Street programme.
- 2019 has seen more research establishing the clear links between volunteering and benefits to wellbeing, social mixing and greater trust in and belonging to your community.
- This work has also indicated that there is a greater deficit of trust and wellbeing in low socio economic areas and correspondingly greater benefits from volunteering in these areas.

The DCMS Strategy for Sport has as one of its 5 key outcomes ‘Community Development’. As well as a significant impact on improving activity, Beat the Street benefits the community by involving them directly in delivery of the programme. The social connections and networks that are built through this could be what helps to generate a more sustainable and enduring change (as evidenced by the activity levels enduring for six months). We will investigate this impact further in future.

Increases in physical activity are greatest for adult participants in high deprivation areas (100 minutes as opposed to 69 minutes in medium deprivation areas and 80 in low deprivation areas – disaggregated regression analysis).

27% of participants are from the 30% most deprived areas in England (15,389/56,178).

Beat the Street reaches individuals in deprived areas.

Biggest improvements in tough, inactive communities.
And Beat the Street reduces levels of anxiety

Beat the Street participants experience significantly lower levels of anxiety immediately after the game (a -0.21 change on a scale of 0 to 10) and even more so six months later (a -0.38 change). Results are inconclusive on other wellbeing outcomes and child attitudes to sport, which is surprising as most of the work in the sport, activity sector tends to demonstrate positive wellbeing impacts across the board. Our future work will aim to understand these impacts in more detail.

Sample sizes for physical activity

The summary statistics on minutes and levels of physical activity are based on the following samples:

<table>
<thead>
<tr>
<th>Time point</th>
<th>Registration size</th>
<th>Post game total sample size</th>
<th>6 months later total sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample size</td>
<td>56,670</td>
<td>8,704</td>
<td>1,400</td>
</tr>
<tr>
<td>Non-missing physical activity data</td>
<td>39,752</td>
<td>7,650</td>
<td>1,314</td>
</tr>
<tr>
<td>Of which Adults</td>
<td>24,651</td>
<td>6,766</td>
<td>1,125</td>
</tr>
<tr>
<td>Of which Children</td>
<td>15,400</td>
<td>885</td>
<td>189</td>
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*Note that in the national data the level of anxiety fluctuates slightly over the months, but wellbeing is only registrable as a measure of data and therefore we are unable to compare year-on-year and hence result is not shown.*

Who takes part in Beat the Street?

- 47% of participants are 18 or younger – 25,666 out of 55,049
- 53% are 19 or older – 29,383 out of 55,049 (average age of 40.75 for the adult participants)
- Almost 70% of the adult participants are female – 20,479 out of 29,382
- 22% have a long term health condition (12,409) and 4% have a disability (1,805)
- Slightly lower share of people from ethnic minority groups – this may be evened out by the sizeable proportion (4.7%) of those choosing not to disclose their ethnicity

People engaged from areas of all levels of deprivation

Independent analysis was conducted by Jump-projects.com working with pre, post and six month on survey data of Beat the Street participants. Regression analysis was conducted by those respondents who provided answers at two or more points in time. To provide more confidence that the results can be attributed to participation in Beat the Street summary, technical write up, data tables and caveats and limitations available on request from marc.harris@intelligenthealth.co.uk

Sample sizes for physical activity

- **Registration size:**
  - Total sample size: 56,670
  - Non-missing physical activity data: 39,752
- **Post game sample size:**
  - Total sample size: 8,704
  - Non-missing physical activity data: 7,650
- **6 months later sample size:**
  - Total sample size: 1,400
  - Non-missing physical activity data: 1,314
- **Of which Adults:**
  - Total sample size: 24,651
  - Non-missing physical activity data: 6,766
- **Of which Children:**
  - Total sample size: 15,400
  - Non-missing physical activity data: 885
Building Active Communities

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