

# A Proposed Framework for Supporting Behaviour Change by Translating Personalised Activities into Measurable Benefits

Maurice Mulvenna<sup>1</sup>, Adrian McCann<sup>2</sup>, Maurice O’Kane<sup>3</sup>, Barry Henderson<sup>3</sup>, Karen Kirby<sup>4</sup> and Deirdre McCay<sup>5</sup>

<sup>1</sup>*TRAIL Living Lab, School of Computing & Mathematics, University of Ulster, Newtownabbey, U.K.*

<sup>2</sup>*Biomedical Sciences Research Institute, University of Ulster, Jordanstown, U.K.*

<sup>3</sup>*C-TRIC (Clinical Translational Research and Innovation Centre), Western Health and Social Care Trust, Altnagelvin Hospital, Derry, U.K.*

<sup>4</sup>*Psychology Research Institute and School of Psychology, University of Ulster, Northland Road, Londonderry, U.K.*

<sup>5</sup>*Western Health and Social Care Trust, Altnagelvin Hospital, Derry, U.K.*

**Keywords:** Healthcare, Wellbeing, Social Media, Mobile, Social Networks, Usability, e-Health Applications, Personalised Services, Behaviour Change.

**Abstract:** The aim of this position paper is to examine the case for supporting behaviour change in pre-diabetic obese people in order to improve their health. The paper sets out the background and motivation for supporting behaviour change before outlining the relevant literature in this health and wellbeing area. The paper then explores the feasibility of SmartLife - a patient-driven application involving healthcare practitioners and peer support interaction with a focus on failure-free, positive reinforcement, patient empowerment and wellbeing.

## 1 INTRODUCTION

Obesity significantly increases the risk of developing various life-threatening diseases, including type 2 diabetes, hypertension, coronary heart disease, stroke and certain cancers (<http://www.iotf.org/>). The worldwide incidence of obesity in adults is estimated to exceed 300 million people (<http://www.who.int/nut/>), with countries like the USA having the highest recorded prevalence of more than 30% adults being obese (<http://www.cdc.gov/nchs/>). In Europe, among the 19 Member States for which data are available, the proportion of overweight and obese people in the adult population varied in 2008/09 between 36.9% and 56.7% for women and between 51% and 69.3% for men (Eurostat, 2011). In the United Kingdom (UK), the proportions of obesity for women was recorded as 23.9% and as 22.1% for men, equivalent to around 14.5 million UK adults. The prevalence of obesity has more than doubled in the last 25 years in the UK. In England, nearly a quarter of adults and about 10% of children are now obese, with a further 20–25% of children overweight. In Northern Ireland,

59% of adults are either overweight (36%) or obese (23%). This obesity percentage equates to 326,000 adults in Northern Ireland. Foresight’s (2007) extrapolations suggest that we can anticipate some 40% of Britons being obese by 2025. By 2050, the UK could be a mainly obese society (DHSSPS, 2012).

## 2 BACKGROUND

The benefits attributed to healthy diet and increased physical activity levels (both psychological and physiological) are often overlooked in favour of ‘weight loss’, as the primary objective or goal. In light of the increasing prevalence of obesity and obesity related chronic disease and ill-health, it is plausible that the prioritising of weight loss, and the constant barrage of negative weight loss messages and reinforcement, has had a detrimental impact on any motivation to change and/or continue ‘healthy’ lifestyle practices among at risk individuals and the population in general.

The challenges faced by individuals is that they often perceive themselves as one of the causes of their situation, and may find it difficult to reach out to ask for help and advice, advice they anticipate they will find difficult to follow. For healthcare organisations, there is often a struggle to provide effective care for overweight and obese individuals, pre-diabetic and diabetes patients. Where lifestyle-orientated as opposed to pharmacological interventions are needed, it is often difficult for healthcare organisations to articulate effective advice that amounts to more than a need for patients to simply lose weight.

The opportunity is to devise a communication facility between obese and individuals in a pre-diabetes state and the organisations responsible for their health. The authors propose SmartLife - a framework underpinned by personalised advice to the user that is 'failure-free'. In other words, rather than the user being informed that they have missed some target in their interactions with the system, positive enforcement will be provided. The positive reinforcement advice provided will take cognisance of the user's personal information, including weight, levels of sedentary versus active behaviour and diet. Such advice will be presented in the context of 'wellbeing' rather than being weight loss/maintenance oriented, seeking to induce positive behaviour change.

In our proposed framework, we consider the customer as either the individual or the organisation responsible for promoting and/or caring for the health of the individual. We propose a framework that will focus on 'wellbeing' and 'peer support' through the utilisation of a social media interface similar to Facebook. This will be designed to motivate individuals to be more proactive with their health behaviours, whilst avoiding the potentially detrimental focus on 'weight loss' messages and dogma. By using the user's personal information it is anticipated the software will house bespoke personalisation algorithms that translate the activities into wellbeing related benefits that are measurable, tangible and suitable for communication to friends and family via social media. Users will interact with the system using social media the data will also be available on a custom built portal for healthcare professionals to access. While the designers aim to avoid the completion of a questionnaires-like format to measure benefits, the software will seek to quantify physiological and psychological benefits by incorporating factors such as glycaemic control and lipid profile (available via routine medical assessment and check-up) combined

with a monitoring of social interaction activities with peers, family and friends. The business model for the concept is based on a model of 'free to users', but funded by the healthcare providers.

The ambition in our proposed framework is to bring together experts in different disciplines to address a common problem; that of contributory factors to obesity and the development of type 2 diabetes among these at-risk individuals. Our innovation is to focus on novel approaches to change behaviour facilitated through a software solution that is accessed by users via their social media, for example, Facebook. Healthcare professionals will also use the framework, to monitor their patients or clients and assess behaviour change.

### 3 REVIEW OF THE LITERATURE

Obesity is claimed to be the world's largest single cause of mortality and morbidity in the 21st Century.

The major contributors to the obesity epidemic are the economic, technological and social changes, which appear to promote a sedentary lifestyle with easy access to low-cost, calorie dense, high-fat food acting as the key factors fuelling this epidemic. Researchers and health professionals have trialled and tested all sorts of interventions to tackle the obesity explosion, however, evidence questions the effectiveness of these interventions (Cheetham et al., 2004). Previous research has demonstrated the efficacy of intensive lifestyle intervention in preventing progression of pre-diabetes to diabetes (Tuomilehto et al., 2001); (Knowler et al., 2002). However, interventions that have been effective in a clinical trial setting have proven difficult to implement in routine clinical practice because the patient support required is often resource intensive. There is therefore a need to develop efficacious and cost effective interventions to support lifestyle modification for at-risk individuals.

There are many considerations as to why some interventions fail, and a number relate to the way in which health information/advice is traditionally delivered. To help people become aware of their health risks, health professionals need to clearly inform their 'patient', in plain 'lay man's terms', what will happen if they cannot change their lifestyle. This sometimes involves telling the patient that they are at risk of type 2 diabetes and its complications such as diabetic retinopathy, neuropathy leading to amputations, nephropathy

leading to kidney disease, heart disease - to include stroke and myocardial infarction. The health professional, in some ways, has an ethical obligation to do this, as they must fully inform their 'patient' of the risk and consequences of their precarious health situation. Although this is carried out in a skilled way, highlighting the severe consequences of obesity, it can serve as another negative reminder of the sad situation in which, they find themselves. Such negative information may serve to add further anxiety and worry, to the already existing layer of anxiety/depression, which potentially contributed to their already unhealthy lifestyle and level of overweight /obesity. For instance, research has shown that such psychological distress can influence binge eating episodes, drinking more alcohol to cope, with depressive symptoms leading to even further inactivity and sedentary behaviour, shown also to be linked with the onset of type 2 diabetes for example (Golden et al., 2008); (Knol et al., 2006). These factors are said to create a vicious cycle, which serves to entrap the person into their current unhealthy 'obese' state. As health complications begin to manifest, so too do the negative vicious psychological and behavioural lifestyle cycles.

In an attempt to avoid the negative cycle and further support patients and reinforce positive health messages health professionals, have used 'motivational interviewing' and psychological constructs such as the 'stages of change model' to frame the approach to their work have been used. However, the efficacy of these interventions is unclear (Kirk et al., 2004; 2009). Interventions involve some health education, which by its nature, will have to fully inform the person of the threatening situation they are in, followed by a phase of contemplation and sometimes support with the hope that this will instil action – an approach which works for some people, but not all.

The management of obesity, diabetes and other chronic diseases is based on the interaction between initiatives and resources on the part of patients, relatives, and health care professionals. A modern patient centred approach to care has evolved from an acute-care paradigm where treatment now supports patients in gradually becoming their own treatment experts, and thus the balance in shared responsibilities is shifting over time to patients and their families (Brink et al. 2002). In recent decades, healthcare practitioners have made efforts to enhance peer-to-peer support and learning with activities such as group education, mailing list discussion groups, and chat rooms (Gage et al. 2004; Murphy et al., 2007); (Viklund et al., 2007).

Information technology has also undergone rapid development impacting significantly on social life and modes of communication while technical advances have provided a foundation for proactive health systems that use information from multiple sources for support aimed at improved health and avoidance of health risks (Eysenbach, 2008). Such systems are increasingly connected to the world around them through the use of portable devices, such as laptops and cell phones which allows increased user participation in developing and managing content. This has changed the nature and value of the information, and expanded the possibility for informal and self-directed information seeking by individuals, implying that the individual is in command of what information should be sought and why it is important (Eysenbach, 2008). Furthermore, A continuously greater proportion of online health-related information is created and maintained by *apomediation* from individuals other than healthcare professionals, such as other patients (Eysenbach, 2008).

The eHealth resolution WHA58.28, approved in 2005 by the World Health Assembly, stresses the importance of eHealth (WHO, 2005). The resolution urges member states to make a range of efforts to develop eHealth services for all health sectors and create long-term strategic plans for development and specific implementation, such as reaching communities and vulnerable groups with services appropriate to their needs (WHO, 2005).

Although modern treatment of diabetes includes individualised education, intense multiple-dose treatment regimens, active self-control, and new insulin and insulin delivery technologies, a large proportion of patients are still at risk of acute and/or long-term complications (The Diabetes Control and Complications Trial, 1993). For patients with diabetes, Internet-based interventions may improve access to health services, patient education, and quality of care, and have also been reported to influence these patients' health care utilisation, behaviour, attitudes, knowledge, skills, and, to some extent, metabolic control (Jennett et al., 2003); (Jackson et al., 2006); (McMahon et al., 2005); (Blonde and Parkin, 2006). Improved quality of life has also been reported, but overall, there has been little focus on patient perspectives in clinical studies (Verhoeven et al., 2007).

Changing people's health-related behaviour is the goal of our framework. This will involve helping individuals to understand the short, medium and longer-term consequences of health-related behaviour; and helping them to feel positive about

the benefits and value of health-enhancing behaviours and changing their behaviours. To do this, it will be important for our framework to recognise and incorporate how individual's social contexts and relationships may affect their behaviour- a fundamental aspect of helping people plan changes in their lifestyle. In line with the National Institute for Health and Care Excellence (NICE, UK) recommendations SmartLife will seek to assist individuals in making easy sustainable steps over time as well as identifying and planning for situations that might undermine the positive changes individuals are trying to make (NICE, 2011).

Alongside quantitative physiological measures it is the ambition of the designers to incorporate and assess additional psychological factors which are acknowledged to influence behaviour change including, habits, beliefs, translating intention into action, automatic attitudes versus self-reported attitudes, and moral climate within the framework (Maio et al., 2007). As part of this task, it is anticipated that the framework's design will take into account the social dialogue nuances prevalent between the users of the SmartLife system, helping to provide more personalised and context/situation specific advice while simultaneously facilitating peer support and communication. Developing SmartLife in the guise of a psychosocial model will require the inclusion of monitors and triggers to detect factors such as habits, beliefs and attitudes. The challenge will be to remain flexible in order to continually assess each individual's unique disposition (both physiological and psychological) allowing for ad hoc feedback and support. A key innovation will be the use of a bespoke personalisation algorithm that translates an individual's activities into quantifiable measurable benefits (Mulvenna et al., 2000); (Büchner and Mulvenna, 1998).

Low income people and families are over-represented within the obese, pre-diabetes and type 2 diabetes populations. Research has demonstrated that successful management of modifiable risk factors in patients with type 2 diabetes can be achieved in a way that is independent of socio-economic position (O'Kane et al., 2010). A long-term ambition of SmartLife is to target such low income at-risk population and Stead (2006) suggests that products and services can be successfully marketed to low-income consumers by various means. We will examine such approaches and of key importance is 'value-brand' – suggesting for SmartLife to be truly effective 'as a value brand it needs to offer low-income consumers real

[quantifiable] benefits' (Davidson, 2000). As we seek to identify real user benefits, the development and evolution of SmartLife will further explore this value-brand concept.

## 4 DISCUSSION AND PROPOSED METHODOLOGY

We know that the major contributors to the obesity epidemic are the economic, technological and social changes, which appear to promote a sedentary lifestyle. Technology is one of the factors which have hastened the obesity epidemic in the first instance, and our premise in the proposed framework is that it is technology which may assist to hastily reverse said damage. This is why we propose to use social media to develop specialised health applications to support the positive cognitive behavioural change and associated lifestyle practices and health implications. Scientific results have proven the efficacy of this method in communicating using a cognitive behavioural therapy approach (van Bastelaar, 2011). The efficacy of the cognitive behavioural theories we are using to design our social media approach have previously been demonstrated and we can also draw upon the literature concerning community-based participatory research engaging with people at-risk of type 2 diabetes (Vivian, 2010). The designers believe that the SmartLife framework will be an intervention that goes beyond information campaigns to simultaneously inform, support, shift motivation and provide the necessary skills to lead to behaviour change (Fisher and Fisher, 1992).

The methodology for future work is grounded on an approach which is validated across the different disciplines involved, encompassing psychology, social informatics, social media, dietetics as well and health and wellbeing knowledge. The methodology is to devise a framework where people can self-register to self-manage their wellbeing, and implicit measures are obtained based on the recency, frequency and wellbeing value of the interventions and mediated messages between the system, health and wellbeing advisors in the system and the users themselves.

## 5 CONCLUSIONS

In summary, the proposed framework will draw upon the expertise and experience of a multi-

disciplinary team and devise a solution that uses social media, identifies real benefits for users, based upon the use of a personalised assessment profile. The advice will be 'failure-free', based on a positive wellbeing perspective, and focus on changing people's health-related behaviour.

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