



Making personalised nutrition the easy choice: Creating policies to break down the barriers and reap the benefits



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ABSTRACT

Personalised diets based on people's existing food choices, and/or phenotypic, and/or genetic information hold potential to improve public dietary-related health. The aim of this analysis, therefore, has been to examine the degree to which factors which determine uptake of personalised nutrition vary between EU countries to better target policies to encourage uptake, and optimise the health benefits of personalised nutrition technology. A questionnaire developed from previous qualitative research was used to survey nationally representative samples from 9 EU countries (N = 9381). Perceived barriers to the uptake of personalised nutrition comprised three factors (data protection; the eating context; and, societal acceptance). Trust in sources of information comprised four factors (commerce and media; practitioners; government; family and, friends). Benefits comprised a single factor. Analysis of Variance (ANOVA) was employed to compare differences in responses between the United Kingdom; Ireland; Portugal; Poland; Norway; the Netherlands; Germany; and, Spain. The results indicated that respondents in Greece, Poland, Ireland, Portugal and Spain, rated the benefits of personalised nutrition highest, suggesting a particular readiness in these countries to adopt personalised nutrition interventions. Greek participants were more likely to perceive the social context of eating as a barrier to adoption of personalised nutrition, implying a need for support in negotiating social situations while on a prescribed diet. Those in Spain, Germany, Portugal and Poland scored highest on perceived barriers related to data protection. Government was more trusted than commerce to deliver and provide information on personalised nutrition overall. This was particularly the case in Ireland, Portugal and Greece, indicating an imperative to build trust, particularly in the ability of commercial service providers to deliver personalised dietary regimes effectively in these countries. These findings, obtained from a nationally representative sample of EU citizens, imply that a parallel, integrated, public-private delivery system would capture the needs of most potential consumers.

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1. Introduction

1.1. Public health, inequalities and the need for personalised health promotion

Public health challenges currently facing Europe (EU) are well documented and include the need to reduce the occurrence of obe-

sity, as well as the incidence of non-communicable dietary related diseases such as type-2 diabetes, cardiovascular disease and certain cancers (EC, 2014). Current policy emphasises prevention rather than treatment in addressing public health problems. Interventions to promote health and prevent non-communicable health conditions, however, have tended to focus almost exclusively on educational approaches and interventions based on communication, such as labelling, with only limited success (McGill et al., 2015). Individualised or personalised health promoting interventions, in contrast, have been shown to be successful in bringing about healthy behaviour change in as many as one third of users

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(de Bourdeaudhuij and Brug, 2000; Egglestone et al., 2013; Elder et al., 2009; Webb et al., 2010).

Public health promotion efforts are complicated by unequal distribution of health conditions across societal groups and European countries (Divajevo et al., 2014). In recent years, the gap in health outcomes has widened between the highest and the lowest social strata within the EU (UCL Institute of Health Equity, 2013) and such inequalities are likely to increase further as the economic crisis continues (Stuckler et al., 2010). This indicates that there is a need to widen access to supporting health services promoting prevention (Wilson and Langford, 2014; EC, 2014). Digital technological advances are expected to revolutionise preventative public health care (EC, 2014) by enabling an individualised approach to health that would be cost effective and, if made available to all, could go some way toward addressing cross-national and socio-economic inequalities in health (Wilson and Langford, 2014; EC, 2014).

1.1.1. The future potential for personalised nutrition

Individualised dietary health interventions such as personalised nutrition, which are directed toward reversing current trends in the occurrence of non-communicable diseases, should go some way toward reducing health inequalities in health associated with dietary choices. Personalised nutrition, defined as the delivery of personalised diets based on information related to people's existing diets and lifestyle and/or phenotypic information (e.g. nutrient profile; blood cholesterol; Body Mass Index; blood pressure, etc.) and/or genetic data (Celis-Morales et al., 2015; Ferguson et al., 2014). There is evidence to suggest that an ICT-based approach to personalised nutritional interventions would be cost effective and sustainable in the long term (WHO, 2009). Personalised interventions, particularly those which are web-based, have been shown to be more effective than standard public health directed advice in inducing compliance with healthy eating recommendations (Food4me White Paper, 2015; Hageman et al., 2014). If rolled out to the general population, therefore, personalised nutrition could offer an effective means through which to address challenges and inequalities related to the prevention and management of obesity and non-communicable disease (Brug et al., 1999). In effect, personalised nutrition has the potential to meet at least six out of the ten public health policy objectives outlined by the European Commission: prevention of disease; encouragement of healthier lifestyles; enhancement of well-being; improved access to health care; promotion of health information; and, support of dynamic health systems and new technologies (EC, 2014). Previous research has suggested that these are also the types of benefits perceived to be important among the general public (Morin, 2009; Poínhos et al., 2014; Stewart-Knox et al., 2013; Su and Lu, 2012) (Table 1).

Table 1
Perceived benefits and barriers to the uptake of personalised nutrition: results from the prior qualitative studies.

Benefits	Barriers
Personal health: <ul style="list-style-type: none"> • Fitness • Weight loss • Health of family/future generations 	Practical issues: <ul style="list-style-type: none"> • DIY testing • Unreliable postal service • Trust in interpretation of results.
Convenient: <ul style="list-style-type: none"> • Time-saving 	Data protection: <ul style="list-style-type: none"> • Spurious websites • Lack of privacy • Misuse of data • Data mishandling • Commercial exploitation
Anonymity: <ul style="list-style-type: none"> • Not having to see GP • Allows for honesty 	
Promotes self-efficacy/perceived control: <ul style="list-style-type: none"> • Goal setting • Self-monitoring 	<ul style="list-style-type: none"> • Data destiny • Social context

Personalised nutrition, if adopted widely, holds potential to reduce health care costs by as much as 13% (Marsh and McLennan Co, 2014). Digital interventions are considered relatively simple to adapt to cultural requirements (Scarinci et al., 2014; Thornton et al., 2014) and as such could be particularly useful at the European level. The European Commission (EC) aims to make personalised diets widely accessible by 2050 (EC, 2014; Bock et al., 2014).

1.1.2. Personalised nutrition is based on more than just genetics

Whereas only a few studies have focused on attitudes toward personalised nutrition (Table 2), a corpus of research has examined attitudes toward genetic testing in the context of personalised medicine (Gibney and Walsh, 2013). Genetic testing, however, would constitute only the most 'medicalised' aspect of personalised nutrition. Existing research into genetic testing, therefore, has only limited relevance to personalised nutrition which represents a more holistic concept, which may or may not involve genetic testing. Qualitative and survey studies undertaken within Europe and beyond have indicated positive attitudes toward genetic testing, however, suggest that this aspect of the technology is unlikely to act as a barrier to adoption of personalised nutrition services (for a review see Stewart-Knox et al., 2014).

1.1.3. Personalised nutrition and behaviour change

The EU funded Food4me research project has been novel in taking a 'bottom-up' approach whereby results of qualitative enquiry and existing literature were used to inform the development of theory upon which the survey and intervention study protocols were designed. Food4me has also been unique in taking personalised nutrition as a holistic concept that encompasses an array of personal, lifestyle, dietary, phenotypic and genetic data into account and which may be fed back to the individual along with a personalised prescription for action regarding food choices (e.g. Food4me.org). The effectiveness of tailored interventions can be enhanced by the application of appropriate theory (WHO, 2009). Digital methods can incorporate behaviour change techniques such as those based on Social Cognitive Theory (SCT) (Bandura, 1989). Qualitative research conducted as part of the Food4me project (Rankin et al., 2016; Rankin, 2015) indicated that individuals perceived the direct-to-consumer (D-T-C) approach to personalised dietary health promotion in a way that was consistent with SCT. Self-efficacy can be increased and behaviour change brought about through intervention that sets goals, enables self-monitoring and which provides of feedback and social support (Rankin et al., 2016; McGloin and Eslami, 2015; Prestwich et al., 2014; Lara et al., 2014). According to SCT (Bandura, 1989), self-efficacy, the belief in one's ability to execute behaviour, is an important driver of behaviour change and food self-efficacy is a construct which has been shown an important factor determining food choice (Davison et al., 2015). Self-efficacy, however, is less influential in determining behaviour where there is low perceived control (Bandura, 1989). Personalised nutrition, especially when made available D-T-C, puts control firmly in the hands of the individual (consumer/client/patient, etc.) rendering them active in goal setting, assimilating feedback and monitoring progress. Previous research has suggested that Europeans would welcome the degree of control over their health that such an approach would afford (Ronteltap et al., 2009). This has been corroborated by survey research conducted as part of the Food4me project, which has indicated that high Internal Health Locus of Control (Internal HLoC) (i.e. where health is perceived to be under the control of the individual by that individual) and Nutrition Self-Efficacy (NSE) (i.e. one's beliefs in capabilities to perform a desired task) both constitute major drivers of intention to adopt personalised nutrition (Poínhos et al., 2014). Those who volunteered to take part in the Food4me Proof of Principle study tended to have higher levels of

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