safefood

Bodyweight Perception on the Island of Ireland

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Executive summary

Background

In recent years, the prevalence of overweight/obesity has increased dramatically, both globally (Figure 1) and on the island of Ireland, with a myriad of factors affecting this change. Over time being overweight has become a social norm and, as a result, people often no longer recognise that they are carrying excess weight.

The authors acknowledge the multiplicity of factors that affect the aetiology of obesity and the many models and methods to address behaviour change. This report will focus on just one factor; the growing body of evidence that a large proportion of the population may fail to identify themselves or their children as overweight or obese.

While it is possible in some cases to change behaviour without raising awareness, behaviour-change models often state that awareness of the need to change is a prerequisite for successful behaviour change. Adults and carers of children and others, who do not recognise that they or their charge is an unhealthy weight, may be unlikely to seek intervention, or to understand that health information relating to being overweight or obese is relevant for them or those in their care. This may constitute an important barrier to self-lead dietary and lifestyle change and may have consequences for the potential effectiveness of interventions to address weight status.

With this in mind, *safe*food set up a working group in 2011, bringing together experts in this area from across the island of Ireland, to produce this report and develop a series of recommendations to address this issue specifically.

The general terms of reference are to:

- Collate information on current research on bodyweight perception including factors associated with, and consequences of, bodyweight misperception
- Identify knowledge gaps
- Recognise key target groups
- Examine international data for methods to address recognition of bodyweight status
- Identify key stakeholders with a view to developing potential partnerships for future *safe*food campaigns on raising awareness of weight status
- Develop recommendations for both research and communications practice.

Prevalence of overweight and obesity

Internationally, the prevalence of overweight/obesity has increased in recent years. Rates of obesity among children are estimated to have tripled during the last 20 years. Worldwide, it is estimated that nearly 43 million children under the age of 5 years are overweight or obese and 1.5 billion adults, 20 years and older are overweight or obese.

Several studies have examined bodyweight status in children and adults on the IOI during the past decade. While methods, sample size, timing and age groups vary, over all, the data shows that around a quarter of children are in the overweight or obese categories. For adults two out of three are carrying excess weight.

The health consequences of being overweight or obese are many and varied, ranging from an increased risk of premature death to several debilitating illnesses that have an adverse effect on quality of life. Being overweight or obesity are major risk factors for non-communicable diseases such as type 2 diabetes, cardiovascular disease and certain cancers including kidney, breast, endometrium. The cumulative anticipated impact of overweight during childhood and adolescence on disease prevalence on IOI in future years will significantly increase the burden on the healthcare system.

Bodyweight perception on IOI

While the prevalence of overweight/obesity has increased steadily in recent years, local and international data suggests that a large proportion of the population does not recognise their own or their children's weight status. The available data on the IOI for the key target groups identified by the Expert Advisory Group are outlined below. For adults and health professionals data are available on an all-island basis. For data on children's and parental perception of bodyweight, data are available for ROI only. While vulnerable groups, such as individuals with mental and physical disabilities, have been identified, to the knowledge of the authors, no research on bodyweight perception is currently available for these groups on the IOI. This finding presents a clear research need if overweight and obesity is to be addressed in these groups.

Children/Teenagers and their perception of overweight/obesity

Evidence suggests that children are unlikely to perceive themselves as overweight. The 2011 Growing Up in Ireland Report on Overweight and Obesity Among 9-year-olds found that of those measured as overweight, only 15 per cent of children perceived themselves to be overweight. The National Teens' Food Survey in Ireland revealed misperceptions regarding healthy bodyweight among teenagers, with 48 per cent of healthy-weight teens expressing dissatisfaction with their bodyweight, whereas 34 per cent of overweight teens were happy with their weight. The majority of obese teens wished to lose weight. These results show that normal weight and overweight teens are more likely to have misperceptions than

obese teens, who appear to be aware of their weight status. Overall the results from children and teen studies indicate that an emphasis on raising awareness of being a healthy weight is merited.

Parents' perception of children's weight

Research has shown that parents of overweight children systematically underestimate their children's weight. In the Growing Up in Ireland Report on Overweight and Obesity Among 9-year-olds, 54 per cent of parents of overweight children and 20 per cent of parents of obese children reported that they are 'about the right' weight for their height.

Among parents of teenagers participating in the National Teens' Food Survey, misperceptions of the weight status of their children were also apparent. Three quarters of those with overweight teenagers thought that their weight was 'fine'. Hudson *et al.*, conducted further analysis of parents' ability to correctly classify their child's weight status using data from the National Children's Food Survey (2003-2004) and the National Teens' Food Survey (2005-2006). Parents were 86 per cent less likely to be correct about their child's weight if their child was overweight and approximately 59 per cent less likely to be correct if the child was obese, compared to parents of normal weight children.

Adults' perception of overweight and obesity

Currently two in every three adults are overweight or obese on the island of Ireland. However, less than four in ten adults actually believe that they are overweight. According to research commissioned by ***safe***food, 38 per cent of people believe they are overweight and 57 per cent feel they do not need to lose weight. Results from the National Teens' Food Survey revealed that 69 per cent of overweight fathers thought that their weight was 'fine' and one in five obese fathers thought their weight was 'fine'. Mothers were more likely to correctly recognise their own body weight status.

Healthcare professionals

Health professional groups could have a vital role in initiating recognition of elevated bodyweight among the population. The Weight Care Project, funded by ***safe***food, assessed the attitudes, current practices/behaviours and knowledge of bodyweight status amongst key health professional groups; and assessed their ability to identify bodyweight categories in both adults and children on the island of Ireland.

An online assessment programme was developed to assess health professionals' ability to identify the bodyweight category of adults and children. It showed that 56-95 per cent were able to accurately recognise normal weight status in individuals wearing their own clothes across different age categories (child, teenager, young adult, middle-aged adult, older adult models). However, the ability to accurately

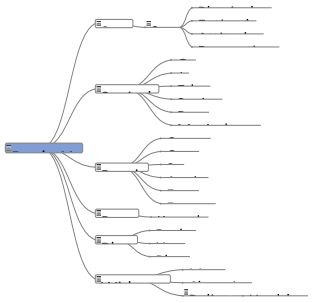
recognise underweight, overweight, and obese bodyweight status categories was poorer with 2-50 per cent accurately recognising obesity in models wearing their own clothes.

Health professionals with lower BMI and increasing age were significantly more accurate in assessing bodyweight categories. Health professionals reported a lack of confidence in assessing bodyweight status, and were significantly less confident when assessing bodyweight in children compared to adults. Some differences were observed between health professionals (i.e. Public Health Nurses (community), Public Health Nurses (schools), GPs and Practice Nurses, and Occupational Health Nurses). Health professionals reported limited training to-date, and the need for training in obesity-related issues and assessing bodyweight status.

Influences on bodyweight misperception

Research studies, mainly from the United States, but with some data available from the island of Ireland, have explored factors that may determine misperception of body weight. These include socio-demographic factors, physical factors, social factors, personal factors and psychological factors. These are outlined below and depicted in Figure 1.

Figure 1: Influences on bodyweight perception



Studies of influences on bodyweight perception give some direction for targeting messages. Men and boys, those with lower incomes and lower educational attainment, younger population groups, and those from ethnic minorities, may be more at risk of lower ability to correctly assess bodyweight status. In terms of personal factors, knowledge and awareness of the health consequences of obesity can effect individual perception, while key psychological and behavioural factors such as optimistic bias and cognitive dissonance also play a part. Such factors may help explain why individuals fail to recognise or acknowledge the health risks including high BMI.

Mean BMI in the population may influence the social norm for bodyweight, as individual weight status has been found to be strongly influenced by the weight status of close friends and family. The potential effects of the wider social and physical environment mean that many stakeholders could have a role to play in realigning perception of bodyweight status.

Efforts to change perception of bodyweight will have to be particularly cognisant of the consequences of being labelled as overweight or obese, the associated fears, particularly for parents, and potential for blame. The needs of those who tend to overestimate weight status, namely young women, must also be borne in mind.

Consequences of bodyweight misperception

While studies are limited, theoretical understanding of the process of behaviour change, combined with the small evidence base available, indicate that overcoming bodyweight misperception may be an important precursor to behaviour change. Lack of recognition of weight status in overweight and obese individuals and parents of overweight children presents a potentially important barrier to successful treatment of obesity. The literature suggests that overweight/obese adults, who perceive they are a normal weight, diet less, are less concerned about their weight, are less distressed about overeating and controlling overeating, employ less eating disinhibition and may have low levels of physical activity.

Addressing bodyweight perception

In developing this report, and in the absence of an extensive evidence base around changing bodyweight perception, discussion with the Advisory Group led to a decision to review methods used to address other health behaviours, which could offer insight into the kinds of interventions that might be effective in raising awareness of true bodyweight status. We examined some of the strategies employed and outline here the lessons that can be learnt from health behaviours with similar traits. These include willingness to stop smoking or take a HIV test, awareness of alcohol consumption, driving safely, seeking treatment for problem gambling, practicing safe sun protection behaviours and adopting environmentally friendly behaviours. The key learnings from other disciplines are outlined below in Table 1.

Table 1: Key learnings from other disciplines

Address risk denial and risk perception	Studies of willingness to quit smoking, awareness of level of drinking and the use of sun protection behaviours have shown that risk denial and risk perception are factors affecting health behaviour. The literature examining the effectiveness of threat appeals to address risk denial is inconclusive and may not be appropriate given the sensitivity of the issue of overweight/obesity. However, increased fear of the consequences of being overweight may trigger a movement from pre-contemplation to a contemplative stage and so the use of threat appeals for the communication of bodyweight perception may warrant further investigation.
Take a social norms approach	We are all embedded in social networks and so are influenced by the appearance and behaviour of those around us. In the UVR skin protection debate, researchers have indicated that relevant health promotion programmes should incorporate factors to account for peer pressure, social norms and other social barriers. Developing our understanding of how people are interconnected and how they influence each other could contribute to addressing bodyweight misperception. Making measurement of weight status routine has the potential to change population awareness of bodyweight status. To date, routine measurement has been mainly limited to the measurement of children in the school setting.
Make measurement of bodyweight status easy	While not directly related to overcoming bodyweight misperception, the evidence on environmental health behaviours points to the importance of highlighting resources and supports that can facilitate behaviour change and make the healthy choices appear 'easy'.

Intervene early	Insights from strategies used to control smoking indicate that early information on the risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change. Similarly, efforts to promote treatment among problem gamblers include messages to encourage them to make changes before the harms become too great. This may also be relevant to communications on bodyweight misperceptions as younger cohorts may be a key group to target for early intervention.
Reduce stigma	There is no doubt that raising awareness of bodyweight status will cause some discomfort for some individuals and so the reduction of fear of discrimination, particularly for parents concerned about their children, and reduction of stigma of being overweight or obese may be key when addressing bodyweight perception on IOI.
Enhance public trust	Enhancing public trust is crucial for the success of any intervention. Only when trust in a communicator has been established can other goals, such as raising awareness and behaviour change be achieved.
Adopt a multistakeholder approach	Changing bodyweight perception on IOI will require engaging all relevant stakeholders. Complex problems demand a more integrated approach, incorporating multiple stakeholders working simultaneously in various sectors and settings, and refocusing on the influence of environmental forces in addition to changing the behaviours of the individual.

Given the many environmental influences on bodyweight perception identified in this report, it is clear that those planning to change perception will need to acknowledge this and draw on best practice from health promotion, social marketing, risk communication and, less well documented in this domain, behavioural economics.

The potential effects of the wider social and physical environment mean that many stakeholders could have a role to play in realigning perception of bodyweight status. Specific recommendations for research and communications for relevant groups are found in Table 2.

Table 2: Recommendations

Research			
Knowledge gap	**Public health implication(s)**	**Recommendation**	**Relevant for**
No data available on bodyweight perception in vulnerable groups or their carers.	Vulnerable groups may not be targeted in communications campaign.	Conduct studies on bodyweight perception of carers and vulnerable groups.	Research funders. NGOs working with vulnerable groups.
No data on bodyweight perception in women who are planning to get pregnant.	Health consequences for women and their babies.	Conduct studies on bodyweight perception in women who plan to get pregnant.	Research funders. Researchers. Health Service Providers.
On the IOI little is known about the views of individuals from different racial backgrounds with regard to perception of bodyweight.	Individuals from ethnic minorities may be more at risk of health consequences of obesity because of poor recognition of bodyweight status.	Research is required to elucidate this issue.	Research funders. Policy makers and planners working with ethnic minorities.
Little data is available on wider environmental influences on bodyweight perception.	Lack of data on wider influences such as the built environment and food and health policies may result in over emphasis on promotion of change in individuals rather than the whole eating environment.	Studies to investigate environmental influences on bodyweight perception.	Research funders. Researchers.
Few studies have examined psychological and behavioural factors relating to weight status misclassification.	Further understanding could enhance effectiveness of behaviour change interventions.	Investigation of key concepts such as optimistic bias or cognitive dissonance may help explain why individuals fail to recognise or acknowledge health risks including high BMI.	Research funders. Researchers.
Social influences may affect our ideas about what is a healthy size yet	Developing our understanding of how people are interconnected and how they	Conduct studies on social influences on bodyweight perception.	Research funders. Researchers.

Research

Knowledge gap	Public health implication(s)	Recommendation	Relevant for
few studies have examined this effect on IOI.	influence each other could contribute to addressing bodyweight misperception.		
Increased fear of the consequences of being overweight may trigger movement from pre-contemplation to contemplation and so the use of threat appeals regarding bodyweight. perception may warrant further investigation	Further understanding could enhance effectiveness of behaviour change interventions.	Studies to assess the effectiveness of threat appeals in relation to bodyweight status.	Research funders. Communications. Researchers.

Communication

Priorities for communication/intervention	Public health Implication(s)	Recommendation	Relevant for
Campaigns that address bodyweight perception are rare, most address obesity related behaviours.	Low evidence base for the effectiveness of campaigns to raise awareness of bodyweight status.	Invest in development and evaluation of such campaigns.	Public health bodies. Health promoters.
The majority of parents do not recognise their child's true weight status.	Obesity in children continues to rise with health implications for the child.	Develop National Campaigns to address this issue.	Parents. Public health bodies. Health promoters.
A large proportion of overweight children fail to recognise themselves as such. However, research indicates that for a child, knowing that you are overweight may be detrimental to positive self-concept.	Campaigns to promote knowledge of weight status in young children must be cognisant of potentially negative consequences.	Parents should be the target for campaigns on bodyweight status of children. Communications to children on bodyweight status must emphasis health, healthy eating and	Public health bodies. Health promoters.

Communication			
Priorities for communication/intervention	**Public health Implication(s)**	**Recommendation**	**Relevant for**
		physical activity, not weight status per se.	
Approximately half of overweight adults on the IOI do not recognise that they are overweight.	Behaviour change interventions are currently unlikely to be effective in this group.	Communications efforts to address obesity in adults must first raise awareness of bodyweight status before attempting to change dietary and physical activity behaviour.	
Men and boys, those with lower incomes and lower educational attainment, younger population groups, and those from ethnic minorities, may be more at risk of misperceiving their own bodyweight status.	Targeting these groups may enhance effectiveness of behaviour change programmes.	Behaviour change programmes and campaigns should target these groups specifically.	Public health bodies. Health promoters working with relevant groups.
Early information on risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change.	Targeting younger groups may enhance effectiveness of behaviour change programmes.	Behaviour change programmes and campaigns should target younger adults.	Public health bodies. Health promoters working with young people.
Fear of stigma, blame and of development of eating disorders have been shown to affect recognition of bodyweight status.	These may present barriers to efforts in raising awareness of bodyweight status.	Health promoters must be cognisant of these risks when developing awareness campaigns. Communications relating to raising awareness of bodyweight status will need to strike a balance between clearly outlining the importance of acknowledging weight status, while avoiding	Public health bodies. Health promoters. NGOs working with people with eating disorders.

Communication			
Priorities for communication/intervention	**Public health Implication(s)**	**Recommendation**	**Relevant for**
		creating an impression of judgement and blame. This is particularly relevant for communication with parents. Parents should be provided with practical tools and advice on how to talk to their children about bodyweight and to overcome their fear of eating disorders.	
Media framing of obesity may be important in determining recognition of bodyweight status	Blaming individuals or confusing messaging around obesity may undermine efforts to address recognition of bodyweight status.	Work with the media to address uncertainty, mistrust in experts, confusion about what constitutes a healthy weight and portrayal of male and female relationships with weight.	The media. Public health bodies. Health promoters.
Campaigns must address risk denial and risk perception relating to bodyweight status.	These may present barriers to efforts to raise awareness of bodyweight status.	Health promoters must be cognisant of these factors when developing awareness campaigns.	Public health bodies. Health promoters.
Mistrust in a communicator is a major barrier to effective risk communication. Only when trust has been established can other goals, such as raising awareness and behaviour change, be achieved.	Enhancing trust in institutions may improve effectiveness of campaigns emanating from those institutions.	Four important determining factors have been observed in establishing trust. These include caring and empathy, dedication and commitment, competence and expertise, and honesty and openness. These factors must be considered in the development of	Public health bodies.

Communication			
Priorities for communication/intervention	**Public health Implication(s)**	**Recommendation**	**Relevant for**
		communications aiming to realign bodyweight perception to true weight status.	
Social influences can affect our ideas about what constitutes a healthy size and social norms have be associated with overweight being “spread” among close friends and family..	Acknowledging and addressing social norms on communications efforts may enhance effectiveness.	A targeted intervention that incorporates social relationships in families, friendship groups, schools and communities may be successful in encouraging greater awareness of true bodyweight status and the adoption of healthier eating patterns and greater levels of physical activity. Campaigns that highlight difference in bodyweight status between previous generations may be effective.	Public health bodies. Health promoters.
The reduction of fear of discrimination, particularly for parents concerned about their children, and the reduction of stigma of being overweight or obese are important factors in efforts to reduce bodyweight misperception.	These fears may reduce effectiveness of awareness campaigns.	Acknowledging the many environmental factors that can influence obesity in campaigns to raise awareness of bodyweight status many help reduce feelings of blame and stigmatisation.	Public health bodies. Health promoters. The media.
Bodyweight perception is influenced by a wide variety of factors and stakeholders.	Complex problems demand a more integrated approach, incorporating multiple stakeholders working simultaneously in various sectors and settings, and refocusing on the influence of	Changing bodyweight perception on IOI will require engaging all relevant stakeholders.	Public health bodies. Health promoters. Primary care professionals. All stakeholders.

Communication			
Priorities for communication/intervention	**Public health Implication(s)**	**Recommendation**	**Relevant for**
	environmental forces in addition to changing the behaviours of the individual.		

Training			
Key issues	**Public health implication(s)**	**Recommendation**	
Health professionals lack confidence and training in measurement and communication of bodyweight.	Primary and community care are potentially key settings for the identification of overweight individuals – opportunity missed.	Training programmes are needed to address lack of confidence and competence among health professionals in addressing bodyweight.	Third level providers of nursing and medical education. Primary care and community care professionals. Professional bodies.

Measurement			
Key issues	**Public health implication(s)**	**Recommendation**	**Relevant for**
The majority of parents do not recognise their child's true weight status.	Obesity in children continues to rise with health implications for the child.	Conduct a regular National Measurement Programme in schools.	Depts. Education. Depts. Health. Principals and teachers. Parents.
Approximately half of overweight adults on the IOI do not recognise that they are overweight.	Behaviour change interventions are currently unlikely to be effective in this group.	Make home measurement easy. Provide training to key health professionals and create a culture of measurement in primary care.	Public health bodies. Third level providers of nursing and medical education.

Measurement			
Key issues	**Public health implication(s)**	**Recommendation**	**Relevant for**
			Primary care and community care professionals. Professional bodies.

1 Introduction

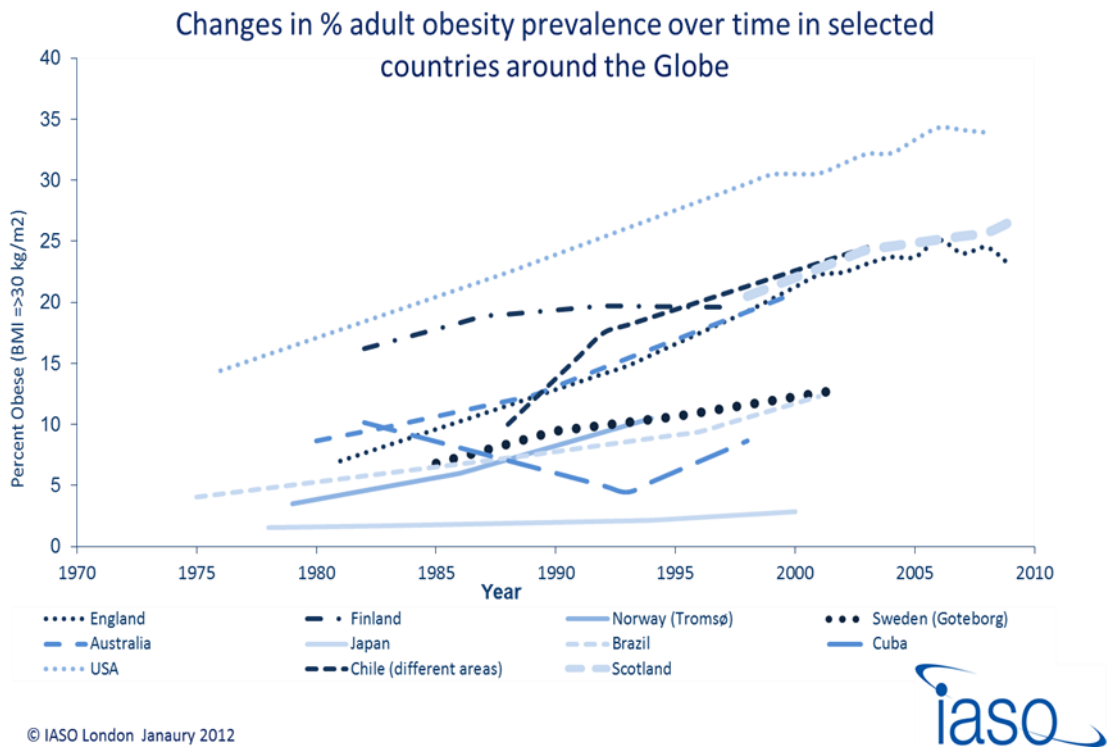
1.1 Background to *safe*food

***safe*food** is a North-South body, responsible for the promotion of food safety and healthy eating on the island of Ireland (IOI). In carrying out this function, ***safe*food** regularly both commissions independent research and conducts market- and literature-based research, to better understand attitudes to food and health, and food-related behaviour. This includes attitudes and behaviour relating to bodyweight as a key risk factor for non-communicable diseases (NCD), including cardiovascular disease, diabetes and cancer.

1.2 Objective and terms of reference for the report

In recent years, the prevalence of overweight/obesity has increased dramatically both globally (Figure 2) and on the island of Ireland with a myriad of factors affecting this change (1). Over time, being overweight has become a social norm and, as a result, people often no longer recognise that they are carrying excess weight.

Figure 2: Changes in % adult obesity prevalence in selected countries (IASO)



The authors acknowledge the multiplicity of factors that affect the aetiology of obesity and the many models and methods to address behaviour change. This report will focus on the growing body of evidence that a large proportion of the population may fail to identify themselves (2) or their children as overweight or obese (3-8).

Behaviour-change models often state that awareness of the need to change is a prerequisite for successful behaviour change. Adults and carers of children and others, who do not recognise that they or their charge is an unhealthy weight, may be unlikely to seek intervention, or to understand that health information relating to being overweight or obese is relevant for them or those in their care. This may constitute an important barrier to dietary and lifestyle change and may have consequences for the potential effectiveness of interventions to address weight status.

With this in mind, ***safe***food set up a working group in 2011, bringing together experts in this area from across the island of Ireland, to produce this report and develop a series of recommendations to address this issue specifically.

The general terms of reference are to:

- Collate information on current research on bodyweight perception including factors associated with, and consequences of, bodyweight misperception
- Identify knowledge gaps
- Recognise key target groups
- Examine international data for methods to address recognition of bodyweight status
- Identify key stakeholders with a view to developing potential partnerships for future ***safe***food campaigns on raising awareness of weight status
- Develop recommendations for both research and communications practice.

In order to identify factors contributing to bodyweight perception in different cohorts of the population, a number of specific target groups were identified as follows:

- Children (perception of their own bodyweight)
- Parents (perception of their child's bodyweight)
- Adults (perception of their own bodyweight)
- Peri-natal (new mothers' perception of their own bodyweight)
- Healthcare professionals (perception of patients' bodyweight)
- Vulnerable persons including disabled persons/those with learning difficulties (a small but increasingly overweight group).

This report will address each group individually and review the literature currently available with regards to bodyweight perception on the IOI.

1.3 Methods

The methods used to compile this report were primarily extensive online searches, conducted using a variety of scientific literature databases including PubMed, Scientific Citation Index, PSYCINFO, Web of Knowledge (including Web of Science and ISI database), Google Scholar, Science Direct, Business Source Premier and Emerald. A variety of search terms were used for different aspects of the report and are included in Appendix 1. Our searches for local information on overweight and obesity, and on bodyweight perception on the island of Ireland, included literature searches, consultation with experts, both internal and external to ***safe***food and searches of the websites of key nutrition and health agencies including the Departments of Health in NI and in ROI, as well as other national and international agencies and research institutions.

2 Overweight, obesity and bodyweight perception

Key findings

- Data shows that around a quarter of children on IOI are in the overweight or obese categories, while data across adult cohorts indicate that two out of three adults on IOI are carrying excess weight.
- Figures vary from survey to survey but, in general, reports show that on the island of Ireland a large proportion of adults fail to perceive that they are overweight. Children are also unlikely to perceive that they are overweight. Data on vulnerable groups is largely absent.
- Parents of overweight children and adolescents have been found to systematically underestimate their child's weight. This may be due, in part, to a fear of stigma and blame.
- A large proportion of health professionals failed to correctly classify bodyweight categories of a range of study models. Thus training in assessing bodyweight status amongst health professionals is required.
- Misperception of bodyweight has been associated with age, gender, race, BMI, physical activity level, smoking behaviour, income and educational background. Mean BMI in the population may influence the social norm for bodyweight, as individual weight status has been found to be strongly influenced by the weight status of close friends and family.
- Men and boys, those with lower incomes and lower educational attainment, younger population groups, and those from ethnic minorities, may be more at risk of misperceiving their own bodyweight status.
- Knowledge and awareness of the health consequences of obesity can effect individual perception, while key psychological and behavioural factors such as optimistic bias and cognitive dissonance also play a part. Such factors may help explain why individuals fail to recognise or acknowledge the health risks including high BMI.
- Lack of recognition of weight status in overweight and obese individuals presents a potentially important barrier to the successful treatment of obesity. The literature suggests that overweight/obese adults, who perceive they are a normal weight, diet less, are less concerned about their weight, are less distressed about overeating and controlling overeating, employ less eating disinhibition and may have low levels of physical activity.

2. Background

2.1 International evidence

Internationally, the prevalence of overweight/obesity has increased in recent years. Rates of obesity among children are estimated to have tripled during the last 20 years. Worldwide, it is estimated that nearly 43 million children under the age of five years are overweight or obese and 1.5 billion adults, 20 years and older, are overweight or obese (9). While the prevalence of overweight/obesity has increased steadily in recent years, there is a growing body of evidence that a large proportion of the population may fail to identify themselves (2, 10, 11) or their children as overweight or obese (3, 5-8, 12). This can happen for a variety of reasons (13) and may constitute an important barrier to dietary and lifestyle change. Being overweight has become the norm and, as a result, people often no longer recognise that they are carrying excess weight. Below is an account of the prevalence of obesity among key population groups on the island of Ireland and an exploration of the data available on perception of bodyweight among different groups.

2.2 Obesity rates on IOI

2.2.1 Children

Several studies have examined bodyweight status in children on the IOI during the past decade. While methods, sample size, timing and age groups vary, over all, the data shows that around a quarter of children are in the overweight or obese categories (Table 3). According to the National Children's Food Survey, there was a two-four-fold increase in childhood obesity in ROI from 1990 to 2005 in children aged 8-12 years, depending on the growth standard used (14). In 2005, the prevalence of overweight and obesity among 5-12 year old children in ROI was 11% and 9% respectively in boys, and 12% and 13% respectively in girls (15). The first round of the WHO Childhood Obesity Surveillance Initiative, which was carried out in 2008, found that 13% of Irish boys aged 7-7.9 years were overweight and 5% were obese, and 19% of 7-7.9 year old girls were overweight and 8% obese, using the IOTF (International Obesity Task Force) standards (16). Key findings from the 2011 Growing Up in Ireland: Infant Cohort Study showed that 19% of three-year-olds were classed as overweight and 6% as obese (17). This translates to almost a quarter of all three-year-olds having a BMI beyond the range that is considered healthy for this age group, according to the IOTF thresholds (18, 19). The Growing Up in Ireland: Child Cohort Study found that 22% of girls and 17% of boys were overweight, and 8% of girls and 5% of boys were obese (20). In Northern Ireland, data from the Northern Ireland Health and Social Wellbeing Survey 2005/06 reported 19% of children were overweight and 8% obese, using IOTF standards (21). This remained constant in the most recent Health Survey in Northern Ireland 2010/11 (22). The North-South Survey of Children's Height, Weight and BMI conducted between 2001/02 found similar prevalence rates of overweight and obesity among 4-16 year olds in ROI and NI, with almost a quarter of girls and boys being overweight and 7% of girls and 5% of boys being obese (23).

Table 3: Bodyweight status of children on IOI

Study	Organisation/Author	Location	Year	Age	% Girls Overweight	% Boys Overweight	% Girls Obese	% Boys Obese
North-South Survey of Children's Height, Weight and BMI (23)	Whelton *et al.* (2007)[1]	ROI and NI	2002	4-16 year olds	28%	23%	7%	6%
National Children's Food Survey (15)	Irish Universities Nutrition Alliance[2]	ROI	2005	5-12 years olds	12%	11%	13%	9%
Growing Up in Ireland (20)	Economic and Social Research Institute (ESRI)[1]	ROI	2007	9-year olds	22%	17%	8%	5%
Growing Up in Ireland (17)	ESRI[1]	ROI	2011	3-year olds	19%		16%	
WHO Obesity Surveillance Initiative (16)	Health Service Executive and Department of Health and Children[1]	ROI	2008	7-7.9 years olds	19%	13%	8%	5%
Health and	Department of Health,	NI	2005/06	2-15	18%	19%	7%	8%

[1] Based on International Obesity Taskforce (IOTF) cut-offs for BMI 18. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. British Medical Journal. 2000;320(7244):1240-3. Epub 2000/05/08, 19. Cole TJ, Flegal KM, Nicholls D, Jackson AA. Body mass index cut offs to define thinness in children and adolescents: international survey. Ibid. 2007:bmj.39238.399444.55.

[2] Based on UK90 BMI reference 24. Cole TJ, Freeman JV, Preece MA. Body mass index reference curves for the UK, 1990. Archives of Disease in Childhood. 1995;73(1):25-9. Epub 1995/07/01.

Social Wellbeing Survey 2005/2006 (21)	Social Services and Public Safety[1]			year olds			
Health Survey 2010/11 (22)	Department of Health, Social Services and Public Safety[1]	NI	2010-2011	2-15 year olds	19%	8%	9%

2.2.2 Adults

Several studies have examined bodyweight status in adults on IOI during the past two decades. Table 4 outlines the data available, and while methods, sample size, timing and age groups vary, these data demonstrate that two out of three adults on IOI are carrying excess weight. The most recent survey in ROI found that 61% of the population were overweight or obese, with 37% overweight and 24% obese. A greater percentage of men were both overweight (44%) and obese (26%) compared with women (31% and 21% respectively). Population data from the latest SLÁN survey (Survey on Lifestyle, Attitudes and Nutrition) in 2008 revealed that over a third of women and almost a quarter of men in the ROI are trying to lose weight. The most recent survey in NI found that 59% of adults were either overweight (36%) or obese (23%). A great proportion of men (44%) were overweight than women (31%), however, equal numbers of men and women (23%) were obese. In NI, data from the Northern Ireland Health and Social Well-being Survey has revealed that over a third of women and almost a quarter of men are trying to lose weight.

Table 4: Data on overweight and obesity rates on IOI

Study	Jurisdiction	Age (y) of population	N	Prevalence (% population)			Year of data collection
				Healthy Weight	Overweight	Obese	
North-South Ireland Food Consumption Survey (25)	IOI	18-64	1379	34 (Men) 51 (Women)	46 (Men) 33 (Women)	20 (Men) 16 (Women)	1997-1999
Survey of Lifestyles, Attitudes and Nutrition in Ireland (26)	ROI	18+	1207	32 (Men) 44 (Women)	44 (Men) 31 (Women)	16 (Men) 16 (Women)	2006
National Adults Nutrition Survey(27)	ROI	18-64	1274	30 (Men) 47 (Women)	44 (Men) 31 (Women)	26 (Men) 21 (Women)	2008-2010
Low Income Diet and Nutrition Survey (28)	UK including NI	18+	2796	36* (Men) 33* (Women)	35 (Men) 30 (Women)	27 (Men) 33 (Women)	2003-2005
Northern Ireland Health and Social Wellbeing Survey 2005/06 (21)	NI	16+	4245	32 (Men) 38 (Women)	39 (Men) 30 (Women)	25 (Men) 23 (Women)	2005-2006
Young Hearts Study (29)	NI	22	489	63*	31	4 Males; 8 Females	1989-1990
Health Survey Northern Ireland 2010/11	NI	16+	4085	39	44 (Men) 31 (Women)	23 (Men) 23 (Women)	2010-2011

2.3 The public health impact of overweight and obesity

The health consequences of being overweight or obese are many and varied, ranging from an increased risk of premature death to several debilitating illnesses that have an adverse effect on quality of life (30). Being overweight and obesity are major risk factor for non-communicable diseases such as type 2 diabetes, cardiovascular disease and certain cancers including kidney, breast, endometrium (31) (32, 33). The relative risk of these conditions with overweight and obesity are given in Table 5.

Table 5: Estimated relative risk (RR)[3] of disease by BMI category: overweight and obesity (34)

Disease	RR Overweight*		RR Obesity*		Age adjustments** (multiplier of differential risk)	Smoking adjustments** (never smoker = 1.0)
	Men	Women	Men	Women		
All-cause mortality	1.20	1.15	1.55	1.50	x 0.98 from age 50 x 0.95 from age 60 x 0.90 from age 70	inconsistent
Ischaemic Heart Disease	1.35	1.35	2.00	2.00	x 0.70 age > 65	x 2.5 for current smokers
Stroke	1.20	1.20	1.50	1.55	x 0.75 age 65+	
Diabetes	2.25	2.30	5.50	7.00	x 0.92 age 60+ x 0.90 age 75+	
Cancer – Lung	0.80	0.88	0.65	0.70		
Cancer – Breast	1.00	1.00	1.00	1.00	1.12 >age 50	1.25 > age 50
Cancer – Oral	0.80	0.88	0.65	0.70		
Cancer – Colorectal	1.20	1.08	1.40	1.10	x 0.90 age 45+	
Cancer – Oesophagal (Adenocarcinoma)	1.60	1.50	2.45	2.15		
Cancer - Kidney (renal)	1.24	1.32	1.55	1.80		x 0.60 for current smokers
Cancer – Gallbladder	1.05	1.35	1.25	1.85	x 1.17 age 45+ men x 0.80 age 45+ women	
Cancer – Womb	---	1.50	---	2.50		

* Overweight BMI 25-29.9 kg/m2, Obesity BMI =>30kg/m2.- Normal weight = 1.0

** Adjustments for age and smoking are given as multipliers of the differential risk from base (1.0). Thus an adjustment multiplier of x 0.95 applied to an RR of 1.20 would lead to an RR of 1.19 (calculated as RR' = 1 + A(RR-1) where RR is the given relative risk, RR' is the adjusted relative risk and A is the adjustment multiplier).

A study by the Institute of Public Health estimated and forecasted the prevalence of some obesity-related chronic conditions across IOI between 2007 and 2020 (Table 6a) (35). Table 6b shows the average

[3] Relative risk is the ratio of the risk of occurrence of a disease among exposed people to that among the unexposed.

annual incidence of some of the main obesity-related cancers on IOI between 2000 and 2004 (36). Other health impacts of overweight and obesity, in which there is emerging evidence, include asthma, gallbladder disease, osteoarthritis and chronic back pain (37). Evidence also suggests that excess weight is linked to additional disorders such as infertility (38).

Table 6: Scale of conditions related to excess weight

(a) Prevalence rates in 2007 and 2020 for stroke, coronary heart disease (CHD) and diabetes in Ireland (35)

Disease	No. of cases	
	2007	Projected 2020
CVD		
-Stroke	58,778	86,845
- CHD	130,703	195,248
- Hypertension	851,658	1,192,415
Type 1 and 2 Diabetes	143,618	232,644

(b) Annual average incidence for some of the main cancers diagnosed between 2000 and 2004 on IOI (36)

Type of cancer	No. of cases
Colorectal	2,915
Breast	3,095
Kidney	550
Stomach	705
Oesophagus	479
Ovary	561
Corpus uteri	423

There is an increased risk of maternal morbidity and mortality associated with overweight and obesity (39). The major maternal complications include gestational obesity, pregnancy-induced hypertension and pre-eclampsia, sepsis, venous thrombo-embolism and spontaneous abortion (40, 41). Obese women

have increased risk of intrapartum and postpartum complications and are more likely to require assisted or surgical delivery (42). Women with obesity are also twice as likely to have a stillborn baby as women with a healthy BMI (43).

Bodyweight status during childhood and adolescence are important risk factors for the presence of adult overweight or obesity and the associated risks of increased morbidity and mortality (44). The problems of childhood obesity have been widely documented (45). An obese child is not only at increased risk of chronic disease later in life but also at risk in the short-term of co-morbidities (Table 7). Obese children are also more likely to suffer various orthopaedic and neurological conditions, breathing disorders and psycho-social problems (45). Children who are overweight or obese are more likely to remain that way in adulthood. Between one fifth and more than one third of overweight pre-school children will become overweight adults and about half of overweight children and adolescents are expected to be overweight adults (44).

Table 7: Prevalence of co-morbidities in overweight and obese children (46)

Co-morbidity	Studies	Aggregate sample (n)	Prevalence among obese children (%)
Hypertension	17	5690	25.8
Hypercholesterolaemia	8	2030	26.7
Hyperinsulinaemia	4	938	39.8
Impaired glucose tolerance	14	2699	11.9
Type 2 diabetes	9	1851	1.5
Metabolic syndrome (three factors)	7	1540	29.2
Fatty liver (steatosis)	7	900	33.7

Finally, the cumulative anticipated impact of overweight during childhood and adolescence on disease prevalence on IOI in future years will significantly increase the burden on the healthcare system. While bodyweight status has a strong impact on non-communicable diseases, it is not surprising that they have a major economic cost on the IOI. For obesity alone, the direct health costs in the ROI in 2004 were €13.3 million, with estimated indirect costs of €4 billion per year (47). In the UK, the costs of excess-weight and obesity (i.e. the treatment of obesity and its consequences) to the National Health Service has been estimated at £1 billion, while the total impact on employment may be as much as £10 billion (48). It is projected that there will be 11 million more obese adults in the UK by 2030. This in turn will increase the number of cases of diabetes, heart disease and stroke, and cancer. The medical costs

associated with treatment of these preventable diseases are estimated to increase by £1.9-2 billion/year in the UK by 2030. Effective policies to promote healthier weight will have economic benefits (49).

2.4 Bodyweight perception on IOI

While the prevalence of overweight/obesity has increased steadily in recent years, local and international data suggest that a large proportion of the population does not recognise their own (2) or their children's weight status (3-8). The available data on the IOI for the key target groups identified by the Expert Advisory Group is outlined below. For adults and health professionals data are available on an all-island basis, while data on children's and parental perception of bodyweight are available for ROI only.

2.4.1 Children/Teenagers and their perception of overweight/obesity

Evidence suggests that children are unlikely to perceive themselves as overweight. The 2011 Growing Up in Ireland Report on Overweight and Obesity Among 9-year-olds, found that of those measured as overweight, only 15% of children perceived themselves to be overweight (50). For those measured as obese, the proportion perceiving themselves as overweight increased to 35%, however, this means that 65% saw themselves as 'about right' or underweight. The National Teens' Food Survey of teenagers in Ireland revealed misperceptions regarding healthy bodyweight among teenagers and their parents. Forty-eight per cent of healthy-weight teens expressed dissatisfaction with their body weight, whereas 34% of overweight teens were happy with their weight. The majority of obese teens (30 out of 33) wished to lose weight (51). These results show that normal weight and overweight teens are more likely to have misperceptions than obese teens who appear to be aware of their weight status. Overall the results from children and teen studies indicate that an emphasis on raising awareness of being a healthy weight is merited.

2.4.2 Parents' perception of children's weight

Research has shown that parents of overweight children systematically underestimate their children's weight (12). In the Growing Up in Ireland Report on Overweight and Obesity Among 9-year-olds, the assessments of some parents on the weight status of their children disagreed significantly with the assessment based on BMI (50). Fifty four per cent of parents of overweight children and 20% of parents of obese children reported that they are 'about the right' weight for their height. There are many reasons a parent might not recognise or wish to acknowledge that their child is overweight, including discomfort and sensitivity around this issue for individuals (13). The upward trend in the prevalence of adult overweight and obesity may also play a role. Equally, from a historical perspective, parents and public health personnel have traditionally been more concerned about underweight than overweight in children, particularly younger children and babies.

Among parents of teenagers, misperceptions of the weight status of their children were also apparent. Three quarters of those with overweight children thought that their teenagers' weight was 'fine', indicating that a higher proportion of parents incorrectly perceived the weight status of their teenage children. Hudson *et al.*, conducted further analysis of parents' ability to correctly classify their child's weight status using data from the National Children's Food Survey (2003-2004) and the National Teens' Food Survey (2005-2006) (52). Parents were 86 per cent less likely to be correct about their child's weight if their child was overweight and approximately 59 per cent less likely to be correct if the child was obese, compared to parents of normal weight children. A recent study which looked at childhood overweight and obesity in general practice in Ireland found that parents were poor at recognising their children's increased weight (53). Eighty two per cent of overweight children were perceived as normal weight by their parents. None of the obese children were identified as such, with parents perceiving that they were in lower weight categories. Research has shown that parents are unlikely to implement changes to their child's diet/lifestyle unless they recognise the need for such changes or perceive their child at risk (54).

2.4.3. Adults' perception of overweight and obesity

Currently two in every three adults are overweight or obese on the island of Ireland. However, less than four in ten adults actually believe that they are overweight. According to research commissioned by *safe*food, 38 per cent of people believe they are overweight and 57 per cent feel they do not need to lose weight (55). Results from the National Teens' Food Survey revealed that healthy-weight parents were able to accurately judge their own weight status. However, sixty nine per cent of overweight fathers thought that their weight was 'fine' and one in five obese fathers thought their weight was 'fine'. Mothers were more likely to correctly recognise their own body weight status. Hudson *et al.*, examined mothers of teenagers and school children's ability to classifying their own weight status (52). 4.8 per cent (n=6) of obese mothers and 38.2 per cent (n=99) of overweight mothers reported that their weight was fine for age/height. This finding suggests that although mothers may not recognise weight problems in their children, overweight mothers are generally able to recognise themselves as overweight.

2.4.4. Healthcare professionals

Health professional groups could have a vital role in initiating recognition of elevated bodyweight among the population. The Weight Care Project, funded by *safe*food, assessed the attitudes, current practices/behaviours and knowledge of bodyweight status amongst key health professional groups; and assessed their ability to identify bodyweight categories in both adults and children on the island of Ireland. The target health professional groups were: 1. Public Health Nurses (community; postnatal home and clinic visits and developmental checks); 2. Public Health Nurses (schools); 3. GPs and Practice Nurses (primary care); 4. Occupational Health Nurses (workplace) (56).

The methods used in the study included in-depth interviews with GPs, focus groups with nurses and a survey of 382 GPs and nurses. Results found that the majority of GPs and nurses (79%) reported measuring patient's height weight and determining BMI, however, there was a consensus that training in relation to obesity/body weight status was limited.

An online assessment programme was developed to assess health professionals' ability to identify the bodyweight category of adults and children. It showed that 56-95 per cent were able to accurately recognise normal weight status in individuals wearing their own clothes across different age categories (child, teenager, young adult, middle-aged adult, older adult models). However, the ability to accurately recognise underweight, overweight, and obese bodyweight status categories was poorer with 2-50 per cent accurately recognising obesity in models wearing their own clothes (for further detail see Appendix 2).

Overall health professionals were significantly ($P<0.001$) more accurate at assessing the bodyweight category of individuals when presented in standardised project clothes (rather than the model's own clothing) and when provided with information on bodyweight. Health professionals with lower BMI ($P<0.05$) and increasing age ($P<0.05$) were significantly more accurate in assessing bodyweight categories. Health professionals reported a lack of confidence in assessing bodyweight status, and were significantly ($P<0.001$) less confident when assessing bodyweight in children compared to adults. Some differences were observed between health professionals (i.e. Public Health Nurses (community), Public Health Nurses (schools), GPs and Practice Nurses, and Occupational Health Nurses). Health professionals reported limited training to-date, and the need for training in obesity-related issues and assessing bodyweight status. Furthermore, there were additional differences between the variables in the survey and assessment study for region (Northern Ireland and Republic of Ireland), health professional groups, age, BMI, and years of professional experience as a health professional (all $P<0.05$).

This project has shown that while health professionals working in community and primary care settings have generally positive attitudes towards overweight and obese individuals on the island of Ireland, they lack confidence and training in both addressing and assessing bodyweight status. Furthermore, a large proportion of health professionals misperceived bodyweight status in a range of study models, but particularly in overweight/obese individuals.

2.4.5. Vulnerable groups

Several groups were identified as vulnerable in relation to bodyweight perception, including women who are trying to conceive because of the risk both to their own health and that of their unborn child. Children and adults with mobility limitations and intellectual/learning disabilities may be at greater risk of obesity (57). People with disabilities, for example, may find it more difficult to eat healthily, control their weight, and be physically active (57). Reasons for this include:

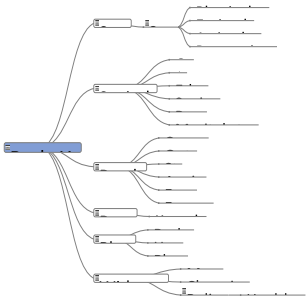
- A lack of healthy food choices
- Difficulty with chewing or swallowing food, or its taste or texture
- Medications that can contribute to weight gain, weight loss, and changes in appetite
- Physical limitations that can reduce a person's ability to exercise
- Pain
- A lack of energy
- A lack of accessible environments (e.g. footpaths, parks, and exercise equipment) that can enable exercise
- A lack of resources (e.g. money, transportation, and social support from family, friends, neighbours, and community members).

While vulnerable groups have been identified, to the knowledge of the authors, no research on bodyweight perception is currently available for these groups on the IOI. This finding presents a clear research need if overweight and obesity is to be addressed in these groups.

2.5 Influences on bodyweight misperception

Research studies, mainly from the United States, but with some data available from the island of Ireland, have explored factors that may determine misperception of bodyweight. These include socio-demographic factors, physical factors, social factors, personal factors and psychological factor. These are outlined below and depicted in Figure 3.

Figure 3: Influences on bodyweight perception



2.5.1 Socio-demographic influences

Internationally, a number of studies have identified a variety of socio-demographic factors that appear to influence ability to correctly assess bodyweight status. Misperception of bodyweight has been associated with age, gender, race, BMI, physical activity level, smoking behaviour, income, and educational background (2, 10, 11, 58-61).

2.5.1.1. Age

In a study conducted between two survey cohorts from NHANES in the US, Burke *et al.,* found a significant decline in the probability of self-classifying as overweight between 1999 and 2004, this was despite an increase in mean BMI during this period. The declines were particularly pronounced among younger (17-35 year old), normal weight women and among young-to-middle-aged (20-45) overweight men, perhaps indicating a greater degree of normalisation of overweight status among younger cohorts. In health professionals, Moorhead *et al.*, has shown that health professional's ability to correctly assess bodyweight status increased significantly with age and years of experience (56).

In children, Huang *et al.*, reported that younger children are less likely to be correctly classified by their parents (62) with similar findings by (52) in ROI. In this case the age of the mother did not appear to affect the accuracy of the parent's perception of their child's weight status.

2.5.1.2 Gender

Large scale studies in the US have repeatedly shown a tendency for men to under-assess weight status in comparison to women (10, 63, 64)**.** This has also been found in ROI (65). Studies demonstrate a tendency for individuals who were overweight, and for men in particular, to underestimate the extent to which they were overweight. For example, Gregory *et al.*, showed that among persons with a BMI $\geq$25 93 per cent of women described themselves as 'slightly' or 'very overweight' compared to 73.5 per cent of men. 70.4 per cent of obese women vs. 49.5 per cent of obese men described themselves as 'very overweight' (11). Burke *et al.*, showed that while men are significantly less likely than women to self-classify as overweight and significantly more likely to classify as underweight, for both men and women self-perceptions shifted significantly between two survey periods (63). For example, among overweight (but not obese) men, the share that self-classified as overweight fell from 58 per cent in NHANES III to 53 per cent in NHANES 1999–2004.

In children, there is evidence from international data that parents are more likely to misclassify their sons' weight than their daughters' weight (66). Similarly Maynard *et al.*, reported that mothers were almost three times more likely to classify their overweight daughters as being overweight as compared with their overweight sons (67), and Mamun *et al.*, reported that gender was associated with mother's misclassification of their overweight child (68). In ROI, analysis of the National Children's Food Survey and National Teens' food survey showed that parents were significantly less likely to be correct about their sons' weight status compared to their daughters' weight status (52).

2.5.1.3 Race/Ethnicity

Research carried out in the US has shown that bodyweight misperception is more prevalent in ethnic minorities (10, 63, 69), (11) (70), with members of minority groups being significantly less likely than whites to consider themselves overweight (63). Non-hispanic blacks and Mexican-Americans were more likely to have weight misperceptions than non-hispanic whites (70). Even after adjusting for age, education, income, marital status, self-reported health, and self-reported medical diagnosis of overweight, Blacks were twice as likely, and Hispanics were 70-per cent more likely than Whites, to misperceive their weight (69). Previous studies have shown that larger body size tends to be more acceptable in the Black community and that Black women express less body dissatisfaction than their white counterparts (71, 72). In an IOI context, little is known about the views of individuals from different racial backgrounds with regard to perception of bodyweight. Public health messages may be more effective if they are specifically tailored to target audiences who are most affected.

2.5.1.4 Educational and socio-demographic status

Several US studies have shown an association between both socio-economic status and educational attainment and erroneous perception of bodyweight. Paeratakul *et al.*, using multiple logistic regression showed that the odds ratio of perceived overweight was significantly higher in those with higher income and higher education (10). Burke *et al.*, showed that high school graduates and those who had attained third level education were more likely to self-classify as overweight than those that did not complete high school. The same authors found that those with middle and high incomes are also more likely to perceive themselves as overweight compared to those with the lowest incomes (63). These findings are supported by Gregory *et al.*, who showed that among obese women household income was related to underassessment of body weight (11).

In addition, parental education has been associated with parental ability to correctly identify their child's weight status; with those with lower educational attainment being more likely to misclassify their child's weight status (73, 74). Similar results have been found using data from the National Children's Food Survey and National Teens' Food Survey, with parents of medium or high socio-economic status being more likely to be correct about their child's weight than parents of low socio-economic status (52). However, results from the Growing Up In Ireland Study showed that, after controlling for the child's actual weight and other factors, social class had no impact on the perception of overweight by the mother (20), therefore the importance of socio-economic status remains unclear in an island of Ireland context.

2.5.1.5 Marital status and household composition

Few studies have examined marital status or household composition as a predictor of ability to correctly self-assess body weight status. However, one large scale study in the US based on the NHANES data has shown that married people are more likely to feel overweight than never-married people (63). In ROI, Hudson *et al.*, found that in households with a greater number of people, parents were more likely to be correct about their child's weight status (52).

2.5.2 Physical factors

2.5.2.1 Weight status

Burke *et al.*, has shown that in large scale population studies, the probability that an individual self-classifies as overweight increases with BMI (63), however overweight and obese individuals have been found to be more likely to misclassify in comparison to their lean counterparts (75). Equally, health professionals with lower BMI were more accurate in assessing bodyweight categories (56)

In children, Mamun *et al.*, reported that maternal overweight was particularly associated with maternal misclassification of their overweight child (68). This has been shown in children in ROI. The Growing Up in Ireland Study report showed that mothers who were themselves overweight or obese were less likely to perceive their child as overweight, although interestingly, this only occurred for girls and not for boys. An overweight mother was 35 per cent less likely to perceive her daughter as overweight than a mother with a 'healthy' body weight (controlling for the child's BMI). An obese mother was almost 60 per cent less likely (20). With regard to the influence of a child's body weight on parental ability to correctly classify bodyweight, Hudson *et al.*, showed that parents were over 86 per cent less likely to be correct about their child's weight if their child was overweight and approximately 59 per cent less likely to be correct if the child was obese compared to normal weight children (52).

Analysis of child perception of their own weight status shows that the likelihood of a child perceiving themselves to be overweight, as actual BMI increases, is lower among girls than boys. Given that rates of overweight were higher among girls in that study, this could suggest that their perception of overweight has been biased by a general increase in the prevalence among girls (20).

2.5.2.2. Health status and physical activity

In obese men, feeling unhealthy, or having relatively more co-morbid conditions, has been associated with misperception of healthy weight (75). Self-rated health has also been found to influence perception of weight status among obese women (11). In a study by Miller *et al.*, investigating perceived risk of stroke, the authors found that active obese and overweight individuals were more likely to incorrectly perceive themselves as normal weight, and thus misperceive their risk for stroke. Therefore a greater

physical activity level and its perceived health benefits may reduce the perceived importance of bodyweight. (59).

2.5.3 Social factors

2.5.3.1 Changing social norms

Evidence exists of a generational shift in social norms related to bodyweight. On IOI, for example, a 14-year-old boy today, is on average three stone heavier than his grandfather was at the same age (76). In a study conducted by Burke *et al.*, in the US, differences in self-perception of weight status between two survey cohorts from the National Health and Nutrition Examination Surveys (NHANES) observed 10 years apart on average, were examined (63). A significant decline was found in the probability of self-classifying as overweight between the 1999-2004 survey periods, despite an increase in mean BMI during this period.

The fact that people are embedded in social networks and are influenced by the evident appearance and behaviours of those around them, suggests that weight gain in one person might influence weight gain in others i.e. having obese social contacts might change a person's tolerance for being obese or might influence his or her adoption of specific behaviours (e.g. eating and exercising). Burke *et al.*, showed that mean BMI in the population could influence the social norm for body weight in the US (77). Similarly, using cross-sectional data from the Eurobarometer study, which contains data on 29 EU countries, and the German Socio-economic Panel (GSOEP), Blanchflower *et al.*, (2009) found that for European women, weight dissatisfaction and overweight perceptions depend not just on their absolute BMI but also on their BMI relative to their peers. Peers were broadly defined as those in the same age-group, gender and country (78).

Peers can influence a variety of weight-related choices including healthy and unhealthy eating patterns, dieting and physical activity. They have been found to influence adolescents' consumption of snack foods and foods high in fat (79, 80), and social support from friends has been found to be positively related to physical activity (81, 82). One's peers can also affect perceptions of acceptable weight (83). Social networks have been found to play an important role in adult obesity, with individual weight status strongly influenced by the weight status of close friends and other non-biological ties (84). Recent research has also found that adolescents' weight is associated with their friends' weight cross-sectionally (85) and longitudinally; one study has claimed these effects were explained by shared environmental factors (86), while others have reported that network effects on adolescent overweight were suggestive of social influence (87, 88).

2.5.4 Personal factors

2.5.4.1. Knowledge, attitudes and education around bodyweight

Little is currently known about the effects of provision of information or of awareness campaigns on bodyweight perception. Our examination of campaigns by government agencies internationally and locally has shown that most campaigns aim to change dietary and physical activity behaviours and generally do not focus on raising awareness of bodyweight status.

Preliminary evaluation of ***safe***food's recent 'Stop the Spread' campaign, which aimed to raise awareness of cut-offs for healthy waist size among the general population, showed that in baseline research (a nationally representative sample of 1,962 adults aged 18+ were surveyed on an all-island basis) 35 per cent of overweight or obese individuals said that they were overweight. Following a four-week advertising campaign, this figure had risen to 40 per cent. One in five people said that they had measured their waist as a result of the campaign. Details of this campaign can be found in Appendix 4.

Awareness of the health consequences of obesity may also influence perception, for example Gregory *et al.*, showed that among the overweight and obese of both sexes, disagreement with regard to current weight as a health risk was associated with underassessment of weight (11).

One ROI study has shown that maternal views influenced a child's perception of their own weight. If the mother perceives their child to be underweight or overweight, this significantly increased the likelihood that the child would agree, underlining the importance of making sure that mothers are aware of child weight (20).

Burke *et al.*, pointed out that with regard to over assessment of bodyweight status, particularly in young healthy-weight women, this group experienced some of the greatest reductions of any demographic group in the probability of self-classifying as overweight (63). The authors suggested that government programmes which aimed to promote healthy body image and healthy eating behaviour during that time period may have contributed to their finding (63) (89).

2.5.5. Psychological influences

Few studies have examined psychological and behavioural factors relating to weight status misclassification. Key concepts such as optimistic bias or cognitive dissonance may help explain why individuals fail to recognise or acknowledge health risks including high BMI. 'Optimistic bias' occurs where people tend to ignore information about health risks because they perceive their own health risks to be lower than those of an 'at risk' member of the population (90). This type of bias has been observed in connection with high fat diets, in relation to personal risk, risk for other people and to society (91), and could constitute an important barrier to behaviour change. Weinstein *et al.*, have also shown that individuals underestimate their risk in relation to a number of safety and health risks, despite carrying out actions or engaging in behaviours that make them more susceptible (90).

Related to optimistic bias is a desire to overcome cognitive dissonance. Cognitive dissonance is an uncomfortable feeling caused by holding two contradictory opinions, beliefs or items of knowledge simultaneously. The theory of cognitive dissonance proposes that people will reduce dissonance by changing their attitudes, beliefs, and behaviours, or by justifying or rationalising them (92). For example, in relation to being overweight, parents may choose to believe that their child will simply "grow out of it". This has been shown in an ROI study of parental attitudes to body weight (93). Both optimistic bias and the rationalisation of cognitive dissonance may present mental coping mechanisms for dealing with the threat of consequences of our health behaviours and warrant further investigation in relation to acknowledgement of bodyweight status.

2.5.5.1 Stigma and blame

Avoidance of the stigma and blame associated with being labelled overweight or obese seems to be particularly pertinent for parents. Towns & D'Auria and Doolen *et al.*, explored the reasons why parents tend to misclassify their child's weight status (94, 95) which included fear that their child would be stigmatised. Parents also felt they might be blamed by health professionals for their child's overweight problem (96). One qualitative study conducted in the west of Ireland has suggested that parents find children's visual or hearing problems easier to accept than excess bodyweight and the response by parents to information about their child's excessive weight was both angry and defensive (97). This gives some indication of the sensitivity of the issue of childhood overweight for parents (52).

2.5.5.2 Fear of eating disorders

One recent qualitative study has elicited general information about parental attitudes to children's bodyweight, as well as attitudes to measurement of children in the school setting (93). All participants considered overweight and obesity to be an important issue and displayed general awareness of the causes of obesity. They referred to psycho-social consequences of childhood overweight and obesity (bullying, teasing and depression) and the immediate physical impact (not being able to participate/perform well in sports) as well as the long-term health implications (diabetes/cholesterol) and the cost to the Health Services. While many parents expressed concern that this may be an issue in the future for their children, some parents were conflicted about the size of their child and were reluctant to label their child as overweight or obese. The study reported that many parents of children, who they perceived as overweight or obese, did not discuss this with the child as they were worried about the child developing an eating disorder. This fear of eating disorders may contribute to avoidance of acknowledgement of overweight status by parents of overweight children. Measures to address bodyweight misperception will need to be cognisant of such parental concerns.

2.5.5.3 Overestimation of bodyweight

While this report focuses on underestimation of bodyweight status, it must be acknowledged that a large proportion of normal-weight teenage girls perceive that they are overweight (65). The evidence from the National Teens' Food Survey of large scale dissatisfaction with bodyweight among Irish teenagers, is supported by an earlier study by (98) which showed that among teenage girls in Dublin, unhealthy dieting practices were relatively common. In NI a study by McKinley *et al.*, (2005), using qualitative methods, shows that among 12-year-olds, for girls, bodyweight concerns were an issue (99). Boys were more concerned about their sports performance as a motivator for eating healthily. Efforts to correct underassessment of bodyweight status must consider the needs of this demographic to ensure that overestimation of bodyweight status is not exacerbated.

In adults on the island of Ireland, there is little data available on over assessment of bodyweight status. However, Hudson *et al.*, did assess parental self-perception of bodyweight(52). The authors found that 11.3 per cent of mothers and 1.9 per cent of fathers who were in the healthy-weight category thought that their weight was not fine.

As mentioned previously, in the US, Burke *et al.,* showed that young healthy-weight women experienced some of the greatest reductions of any demographic group in the probability of self-classifying as overweight over a 10-year period. The authors suggested that government programmes promoting healthy body image and healthy eating behaviour during that time period may have contributed to their finding (63). This indicates that public health campaigns may be a potential means to address misperception of overweight status by healthy-weight individuals.

2.5.6. Wider environmental influences

With the exception of media representation of obesity in ROI, wider environmental influences on bodyweight perception have not been extensively studied in either jurisdiction, but some anecdotal evidence will be explored here. It is possible that imagery in the popular media can contribute to normalisation of overweight status. For example, some cosmetic companies have begun to employ larger than average models in their campaigns. In the US, the National Association to Advance Fat Acceptance is an organisation fighting size discrimination. While the intention of such organisations/campaigns may be to promote a healthy body image, it is possible that there may be a link to self-classifying as "normal". In the UK and Ireland, certain fashion TV shows have similar goals, but fail to point out the health consequences of being overweight or obese. Such media representations may contribute to an increasing belief that being overweight or obese is normal and may undermine any progress being made towards the promotion of healthy eating and physical activity.

Manufacturers use vanity sizing (labelling clothing with measurements of a larger size with a smaller size label) to psychologically entice women to purchase. This recalibration of clothing sizes may have contributed to changes in perception of overweight. The classic figure of the 1950s was appropriately known as the 'Hour-Glass' figure, with a size 12 clothing representing measurements of 34 inches (Bust);

26 inches (Waist); 36 inches (Hips) (100). In the 1990s, the average size 12 represented measurements of 37.5 inches (Bust); 37 inches (Waist) and 36 inches (Hips) (101). This demonstrates a move from the 'Hour-Glass' to the 'Pear' shape through the decades. In 2004 the first UK National Sizing Survey (102) using 3D body scanning results were published. In 1951 the average women recorded measurements of 63 inches (Height); 37 inches (Bust); 27.5 inches (Waist) and 39 inches (Hips). In the 2004 study the average women was recorded as 64.5 inches (Height); 38.5 inches (Bust); 34 inches (Waist) and 40.5 inches (Hips) (102).

Larger plates, bowls, glasses and utensils; wider seats in cars and movie theatres; and bigger portions are further examples of ways the environment has changed, making it easier to be overweight and harder to motivate people to take steps to lose weight.

2.5.6.1 Media influences

Research has shown that the media has the power to influence public opinion and to raise awareness of health issues (103). Analysis of media representation of obesity in ROI in recent years indicates that obesity has become an issue of major concern. For example, between 2002 and 2004 there was a 600 per cent increase in coverage of obesity (104). A quantitative content analysis was conducted on 479 Irish Times articles from 1997 to 2009 to examine the causes, consequences and solutions to obesity and how obesity has been described. A frame analysis showed that the behavioural frame was dominant, indicating that the individual was mainly responsible for his or her weight status, although environmental and mixed frame stories became more frequent over time. Similar findings were reported by The National Heart Lung and Blood Institute in the US (105) and by an Australian study in children (106). While it is difficult to fully assess the impact this might have on bodyweight perception, it is possible that a growing media emphasis on obesity could enhance public awareness. However, any feeling that individuals were being blamed could also disempower and contribute to inaction.

Further qualitative analysis of obesity discourse in the Irish media reveals other possible influences that may impact on perception of bodyweight. De Brun *et al.*, examined a data set of 368 articles from six major newspapers and purposefully searched for discussion on the contestability of the obesity epidemic. A total of 13 articles were identified. While this sample is small, issues such as uncertainty regarding obesity claims, the appropriateness of Body Mass Index, 'fit and fat' debates and mistrust in experts, may all contribute to confusion in relation to what constitutes a healthy body weight (107).

With regard to higher rates of overweight and obesity among men (27) and some evidence of lower ability to correctly perceive bodyweight status (108), further analysis by De Brun *et al.*, reveals gender differences in discourse on bodyweight issues in a variety of Irish media. The authors examined discourse on obesity for the discussion of gatekeepers to health, attribution of blame or responsibility for obesity and the portrayal of male and female relationships with weight and dieting (109). There was a dominant portrayal of the traditional construction of masculinity evident, which is characterised by a 'macho' approach to living, a disinterest in health issues and a reliance on women for healthy dietary practices. The authors suggested that engaging in healthy behaviours may be viewed by men as a threat

to their masculinity, which may contribute to a tendency for men not to recognise weight status. Women were often portrayed as gatekeepers for men's health, and parents, particularly mothers, as gatekeepers for children's health. While their tendency to engage with health issues may contribute to better understanding and recognition of their own weight status, the importance of the role of caregiver for many women may contribute to a reluctance to recognise overweight and obesity in their children.

2.6 Consequences of bodyweight misperception

2.6.1. Behavioural change theories

For several decades, researchers have sought to predict, change and explain health behaviour by the development and application of theories and models (110). The study of health behaviour change, including nutrition and physical activity behaviours, has historically been rooted in a cognitive-rational paradigm. Key examples of theoretical models that are most often used in nutrition research include social cognitive theory (111), the transtheoretical model of behavioural change/stages of change model (112) and the health belief model (113). These theories and others suggest that, without first understanding and acknowledging a health risk, behaviour change will not occur. A first goal of health communications efforts or other actions to address bodyweight misperception could therefore be to invoke consciousness-raising, so that the target audience becomes aware of this serious problem. Using the transtheoretical model of behavioural change/stages of change model (112) as an example, this would mean moving from the pre-contemplative to contemplative stage, or perhaps from contemplative to preparation or action stages.

2.6.2 Misperception of bodyweight status and behaviour change

A limited number of studies have exampled the effect of bodyweight misperception as a determinant of behaviour change (114). Duncan *et al.*, examined data from the 2003-2006 NHANES to explore the relationship between bodyweight misperception and weight loss attitudes and behaviours (wanting to weigh less and having tried to lose weight), energy intake and physical activity (114). Overweight or obese men and women who under assessed their weight status were 71 per cent and 65 per cent less likely to report that they want to lose weight, and 60 per cent and 56 per cent less likely to have tried to lose weight within the past year respectively, compared to those who correctly perceived themselves as overweight. Weight misperception was not a significant predictor of total energy intake but did appear to influence physical activity levels, with apparent gender differences. Men who misperceived their weight were less likely to be insufficiently active but women who misperceived their weight were less likely to meet activity recommendations.

2.7 Conclusions

Studies on bodyweight perception give some direction for targeting messages. Men and boys, those with lower incomes and lower educational attainment, younger population groups and those from ethnic minorities may be more at risk of lower ability to correctly assess bodyweight status. The potential effects of the wider social and physical environment mean that many stakeholders could have a role to play in realigning perception of bodyweight status. Efforts to change perception of bodyweight will have to be particularly cognisant of the consequences of being labelled as overweight or obese, the associated fears, particularly for parents, and potential for blame. The needs of those who tend to overestimate weight status, namely young women, must also be borne in mind.

While studies are limited, theoretical understanding of the process of behaviour change and the small evidence base available indicate that overcoming bodyweight misperception may be an important precursor to behaviour change. Lack of recognition of weight status in overweight and obese individuals and parents of overweight children presents a potentially important barrier to successful treatment of obesity.

3 Addressing bodyweight perception

Key findings

- Studies of willingness to quit smoking, awareness of level of drinking and the use of sun protection behaviours have shown that risk denial and risk perception are factors affecting health behaviour. Psychological and attitudinal barriers are among the most challenging to overcome.
- The literature examining the effectiveness of threat appeals is inconclusive and may not be appropriate, given the sensitivity of the issue of overweight/obesity. However, increased fear of the consequences of being overweight may trigger a movement from pre-contemplation to a contemplative stage, and so the use of threat appeals for the communication of bodyweight perception may warrant further investigation.
- We are all embedded in social networks and so are influenced by the appearance and behaviour of those around us. In the UVR skin protection debate, researchers have indicated that relevant health promotion programmes should incorporate factors to account for peer pressure, social norms and other social barriers. Developing our understanding of how people are interconnected and how they influence each other could contribute to addressing bodyweight misperception.
- Insights from strategies used to control smoking indicate that early information on the risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change. Similarly, efforts to promote treatment among problem gamblers include messages to encourage them to make changes before the harms become too great. This may also be relevant to communications on bodyweight misperceptions as younger cohorts may be a key group to target for early intervention.
- There is no doubt that raising awareness of bodyweight status will cause some discomfort for some individuals, and so the reduction of fear of discrimination, particularly for parents concerned about their children, and reduction of stigma of being overweight or obese, may be key when addressing bodyweight perception on IOI.
- While not directly related to overcoming bodyweight misperception, the evidence on environmental health behaviours points to the importance of highlighting resources and supports that can facilitate behaviour change and make the healthy choices appear ‘easy’.
- Enhancing public trust is crucial for the success of any intervention. Only when trust in a communicator has been established can other goals, such as raising awareness and behaviour change be achieved.

- Changing bodyweight perception on IOI will require engaging all relevant stakeholders. Complex problems demand a more integrated approach, incorporating multiple stakeholders working simultaneously in various sectors and settings, and refocusing on the influence of environmental forces, in addition to changing the behaviours of the individual.
- Communications relating to raising awareness of bodyweight status will need to strike a balance between clearly outlining the importance of acknowledging weight status, while avoiding creating an impression of judgement and blame. This is particularly relevant for communication with parents.

3.1 Introduction

In developing this report, and in the absence of an extensive evidence base around changing bodyweight perception, discussion with the Advisory Group led to a decision to review methods used to address other health behaviours, which could offer insight into the kinds of interventions that might be effective in raising awareness of true bodyweight status. We examine some of the strategies employed and outline the lessons that can be learnt from health behaviours with similar traits. These include willingness to stop smoking or take a HIV test, awareness of alcohol consumption, driving safely, seeking treatment for problem gambling, practicing safe sun protection behaviours and adopting environmentally friendly behaviours. The findings from this review are available in Appendix 3 with potential actions based on these findings below.

3.2 Possible approaches to improving recognition of bodyweight status

3.2.1 Address risk denial and risk perception

The most widely accepted model of risk perception is the psychometric model. It was developed in the late 70s by Fischhoff (115) and used nine explanatory scales including voluntariness, immediacy, uncertainty, dread, controllability, catastrophic potential, severity of consequence, known to science and novelty. The strongest predictors of risk have included 'dread', whether people can tolerate living with a risk and think about it calmly, and 'novelty', how precisely the risks are known (115, 116). These factors help to explain why people react, or fail to react, to different types of food risks. Whereas technological and food safety issues with immediate consequences appear to elicit a dramatic response, advice to maintain a healthy body weight, aimed at improving chronic health, does not, because the consequences are not immediately apparent.

Studies of willingness to quit smoking and awareness of level of drinking have shown that risk denial and risk perception are factors affecting health behaviour. For example Peretti-Watel *et al.*, showed that those with higher risk denial or lower risk perception were less ready to quit (117, 118). In relation to drinking, Delaney *et al.,* have shown that factors including optimism about future drinking trajectories,

perceptions of individual differences in tolerance, and lack of awareness of health consequences mediated perception of excess for the students (119). Such risk denial is also apparent in parents in ROI who believe their children will simply 'grow out' of being overweight or obese (93).

Given the sensitivity of the issue of overweight/obesity, the use of a fear campaign, often used in road safety campaigns, may not be appropriate. However, increased awareness of the consequences of being overweight may trigger a movement from the pre-contemplative to a contemplative stage (112). The use of threat appeals for the communication of bodyweight perception may therefore warrant further investigation. In particular, drawing attention to the slow loss of ability experienced by those who chronically gain weight may be relevant to overcome the effects of health adaptation (120).

3.2.2 Enhance public trust

Related to the effectiveness of risk communication is the issue of public trust. Mistrust in a communicator is a major barrier to effective risk communication (121). Only when trust has been established can other goals, such as raising awareness and behaviour change, be achieved. Provision of contradictory information or changing dietary recommendations has been met with scepticism, confusion and anger (122). Furthermore, research has shown that trust in nutrition experts is a strong predictor of attention to nutritional recommendations (123). A current backlash against recommendations that may be considered 'Nanny statist' may also contribute to mistrust in experts.

Four important determining factors have been observed in establishing trust. These include caring and empathy, dedication and commitment, competence and expertise, and honesty and openness (124). These factors must be considered in the development of communications aiming to realign bodyweight perception to true weight status.

3.2.3` Take a social norms approach

We are all embedded in social networks and as a result are influenced by the appearance and behaviours of those around us (125). It is these social influences which can affect our ideas about what is a healthy size and be associated with overweight being "spread" among close friends and family (84). Using the same logic it seems possible that a social norm of knowing your true weight status could be achieved. Health promotion programmes aiming to promote skin protection have aimed to create new social norms of seeking shade, wearing a hat and using sunscreen (126). The same can be said for overweight/obesity interventions whereby social influences and a perception of what is the norm do have an effect on what individuals and society view as being "ok" or even "healthy". Research on recycling has shown for example, that external incentives include social influence, whereby a person is concerned about how relevant others, such as family and friends would react to not recycling.

Developing our understanding of how people are interconnected and how they influence each other could contribute to addressing bodyweight misperception. A targeted intervention that incorporates

social relationships in families, friendship groups, schools and communities may be successful in encouraging greater awareness of true bodyweight status and the adoption of healthier eating patterns and greater levels of physical activity (127).

3.2.3.1 Make measurement of weight status a social norm

Routine measurement of weight status has the potential to change population awareness of bodyweight status. To date, routine measurement has been mainly limited to the measurement of children in the school setting. Children in NI are already routinely measured in P1 and P6.

In the US, Kubik *et al.,* (128) showed that 78% of parents believed it was important for schools to assess student's height/weight annually and wanted to receive height, weight, and BMI information yearly. Johnson *et al.,* (129) assessed parent reactions to school-based body mass index (BMI) screening and found that most parents viewed these screenings and after-school exercise programmes favourably. Parents reported taking action in response to a BMI result outside of the normal range.

The National Nutrition Surveillance Centre in ROI recently investigated parents' (including parents from disadvantaged backgrounds) attitudes and acceptability of anthropometric measurements to Irish children in the school setting (93). The findings from this study demonstrate that parents are aware of childhood overweight and obesity and the many factors that contribute to it. Parents were concerned for their own children and the impact that being overweight or obese may have, particularly in relation to immediate outcomes such as bullying and teasing and impact on fitness, but many parents also were aware of the long-term health implications. Parents were able to point to the fact that society is normalising obesity and that we may not even be aware of it in our children.

3.2.3.2 Acceptability of regular measurement in children

The acceptance of regular measurement of school children to parents, teachers, principals and the children themselves has examined in ROI, the UK and internationally. The National Nutrition Surveillance Centre in ROI has previously carried out an investigation into children's attitudes towards having their measurements taken in the school setting (130). Younger children were generally happy to be measured, with older children wishing to be measured in a private setting.

Kalich *et al.,* (131) evaluated the perceived comfort, utility and impact of school-based weight screening from the perspective of middle-school-aged students in the US. Overall, the majority of the middle-school students did not report discomfort with school-based weight screening, did report that receiving height and weight information was useful, and generally reported appropriate weight control intentions. These proportions did vary across weight status categories, with students who were at risk for overweight, or overweight reporting higher levels of discomfort.

In the UK, the attitudes of parents to the National Measurement Programme were assessed qualitatively. The programme was generally accepted by parents and although the measurements collected were not

routinely fed back to parents, a major finding was that parents would value such feedback along with information on the weight status of the child (132).

3.2.3.3 Measurement in primary care

While routine screening in primary care is not the norm, several studies indicate that this may be a helpful approach. Studies on HIV screening has shown that those who visit healthcare settings more frequently are more likely to get tested (126). Qualitative research by ***safe***food has shown than in men, a prompt from a health professional to eat more healthily has results in behaviour change (133). While this is the case, it must be acknowledged that men tend to attend their GPs and other health professionals less frequently than women. Equally, while the NICE Guidelines on the treatment and prevention of obesity (134) indicate that 'Healthcare professionals should use their clinical judgement to decide when to measure a person's height and weight', data from Moorhead *et al.,* have shown that, even for health professionals, correctly perceiving overweight status proves difficult (56). Therefore, pursuing this approach will certainly require additional training of health professionals.

In ROI, a Weight Management Subcommittee, comprising representatives from the Department of Health, HSE, ICGP and the National Nutritional Surveillance Centre, has developed a Weight Management Treatment Algorithm in primary care for both adults and children. This is being circulated to primary care practitioners providing a blueprint for GPs and primary care staff to assist in the prevention, detection and management of overweight and obesity in the community.

3.2.4 Make measurement of bodyweight status easy

Research on recycling behaviour has shown that making the environmentally responsible option the easy option is important and the same is probably true for being able to easily measure bodyweight status. Campaigns in the US, for example the 'Aim for a Healthy Weight' campaign, focus on providing online tools for measuring BMI (105). Equally, resources and campaigns by ***safe***food have both provided online tools (www.weigh2live.safefood.eu) and distributed resources to pharmacies on the IOI (55).

3.2.5 Reduce stigma

It is likely that raising awareness of bodyweight status will cause some discomfort for individuals who then discover that they are either overweight or obese. To use the stages of change model (112), a smoker is often described as moving from being a 'happy smoker' (pre-contemplation) to being an 'unhappy smoker' (contemplation). While raising awareness of bodyweight status may cause uncomfortable feelings that may ultimately illicit positive behaviour change, communications that cause stigmatisation may undermine the likelihood that an individual would be open to such messages. For example, individuals with stigmatising attitudes toward people living with HIV and AIDS were less likely to have been tested or to have heard of routine testing. Compared to people who had been tested,

individuals who were not tested for HIV demonstrated significantly greater AIDS-related stigmas; ascribing greater shame, guilt, and social disapproval to people living with HIV (135).

The reduction of fear of discrimination, particularly for parents concerned about their children, and the reduction of stigma of being overweight or obese may therefore be important factors in efforts to reduce bodyweight misperception. Equally, the issue of stigmatisation means that encouraging home testing may be beneficial. Therefore, distribution strategies, such as *safe*food's recent campaign where 450,000 tape measures were delivered through pharmacies in the IOI, may prove effective (see Appendix 4 for a case study).

To date, framing of obesity in the media has emphasised the responsibility of the individual for bodyweight status (104) and mass media campaigns to address obesity have tended to focus on individual behaviour change. Acknowledging the many environmental factors that can influence obesity in campaigns to raise awareness of bodyweight status many help reduce feelings of blame and stigmatisation.

3.2.6 Intervene early

Insights from studies on smoking would indicate that early information on risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change. Gambling studies also showed that early intervention (before major harmful effects take place) could be beneficial (136). Given that studies have shown that bodyweight misperception is greater in younger cohorts (Burke *et al.*), these findings are consistent with epidemiological evidence that younger people may be a key target.

3.3. Best practice in communicating health behaviour change

*safe*food has recently conducted a review of best practice in communicating for behaviour change. Details can be found in the Consumer Focused Review of Food-Related Behaviour (137). It draws on best practice from health promotion, social marketing, risk communication and, to a lesser extent, behavioural economics.

Given the many environmental influences on bodyweight perception identified in this report, it is clear that those planning to change perception will need to acknowledge this using a combination of theoretical models in their planning or using a theoretical model that incorporated wider environmental influences such as social ecological theory (138).

The *safe*food report (*safe*food 2012) acknowledges the need to tackle complex problems through a more integrated approach, incorporating multiple stakeholders working simultaneously in various sectors and settings, and refocusing on the influence of environmental forces in addition to changing the behaviours of the individual. A multi-stakeholder approach and stakeholder map are detailed below.

3.3.1 Adopt a multi-stakeholder approach

In this case a stakeholder is a person or group whose activities impact on bodyweight perception, or who can be affected by action to raise awareness of this issue. Stakeholders control assets, information, communications and markets. In many instances, their support is needed to implement change and sometimes, they are a barrier. To help identify potential action to change bodyweight perception, key stakeholders have been identified, along with their actions and potential actions. This is with a view to revealing competing interests.

The role of each stakeholder can be either synergistic or negative, or both. If synergistic, value can be created through co-ordinating, collaborating and co-operating strategies. The approach taken here is to list stakeholder as public, private, or third sector, with as separate category for the general public (see Figure 4). Table 8 categorises the stakeholders according to their perceived power to influence.

Changing bodyweight perception on the island of Ireland will require engaging all stakeholders in pursuit of this goal.

Figure 4: Key stakeholders influencing bodyweight perception on the IOI

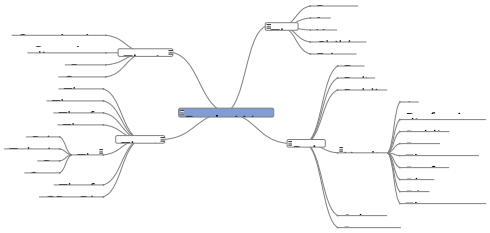


Table 8: Categorisation of key stakeholders

	Influence – High	Influence – Low
Interest – Active	Critical stakeholders	Secondary stakeholders
The voluntary sector	Organisations responsible for eating disorders	Organisations promoting obesity awareness e.g. Heart Foundations, Cancer societies, etc.
The private sector	The advertising industry Print media Television programmes Radio Social media channels and key influencers	Parents' groups
The public sector	Public health bodies Health professionals	Researchers and academics
The public	Women Parents and carers	
Interest – Passive	Core stakeholders	Fringe stakeholders
The private sector	The food industry The fashion industry The retail industry	
The public sector	Funders Policy makers Schools	
The public	Men	

3.3.2 Consult consumers

Consumers constitute a key stakeholder in the development of communications around bodyweight perception. While studies on the island of Ireland and the UK (56, 139) have shown that primary care and community-based health professionals feel they need more training in communicating to patients re bodyweight status, little is known about how adult patients wish to hear about this issue. During recent formative research with consumers for the development of ***safe***food's 'Stop the Spread' media campaign (See Appendix 4), participants asked for 'more hard hitting campaigns' to tackle obesity. Response to the campaign that aimed to promote measurement of waist size was positive with 450,000 consumers picking up measuring tapes from their local pharmacy. The evaluation showed that one in five had measured their waist as a result of the campaign. For a minority however, the campaign was deemed too harsh, with concerns expressed about promoting eating disorders and stigmatising those who were overweight.

With regard to ease of understanding of information on children's bodyweight status, some insight is available from feedback from parents on both the format of feedback on bodyweight status of their child and a resource supplied by the National Measurement Programme in the UK (132), a leaflet entitled 'Your Child's Weight'. The study showed that views on the most appropriate format for feedback varied. In general, a letter was considered adequate although some parents suggested a phone call from a teacher or school nurse may be more appropriate if a child was found to be overweight. It was deemed important for a letter to be either sent home in a sealed envelope or posted to the parents to avoid children comparing results.

Views on the leaflet supplied by the National Measurement Programme were mixed. Criticisms of the leaflet focused on the tone, language and to a certain extent, the content. Parents considered the leaflet to be informative and helpful, highlighting tips and hints that parents wanted to try out and use with their families. Parents viewed the leaflet as well designed and in particular, liked that the child's height and weight data was on the inside cover to protect privacy. However, parents were concerned about the length and wordiness, alarmist and negative tone, that it might frighten parents, and that it seemed judgemental, particularly to overweight parents. Therefore, communications relating to the consequences of obesity needs to strike a balance between clearly and succinctly outlining the risks while avoiding causing unnecessary fear or creating an impression of judgement and blame.

4 Conclusions and Recommendations

Conclusions

In recent years, the prevalence of overweight and obesity has increased dramatically both globally and on the island of Ireland. While this is caused by multiple factors, lack of recognition of bodyweight status may constitute an important barrier to dietary and lifestyle change. This has clear consequences for the potential effectiveness of interventions to address weight status.

Approximately one half of adults on the island of Ireland who are overweight or obese do not recognise that they are carrying excess weight. For children, the majority of parents fail to identify their children as overweight. Children are also unlikely to correctly identify their own overweight status. Even for health professionals, correctly identifying bodyweight status has proved difficult.

Studies on bodyweight perception give some direction for targeting messages. Men and boys, those with lower incomes and lower educational attainment, younger population groups and those from ethnic minorities may be more at risk of incorrectly assessing bodyweight status.

Research on behaviour change in other areas of health offers key learnings for changing bodyweight perception; risk denial and risk perception are important psychological and attitudinal barriers; health promotion programmes should incorporate factors to account for peer pressure and social norms; early information on the risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change; efforts to change perception of bodyweight will have to be particularly cognisant of the consequences of being labelled as overweight or obese, the associated fears, particularly for parents, and potential for blame; resources must be in place to make it easy to measure weight status and finally, enhancing public trust is crucial for the success of any intervention.

The potential effects of the wider social and physical environment mean that many stakeholders could have a role to play in realigning perception of bodyweight status. Specific recommendations for research and communications are found below in Table 9.

Table 9: Recommendations

Research			
Knowledge gap	**Public health implication(s)**	**Recommendation**	**Relevant for**
No data available on bodyweight perception in vulnerable groups or their carers.	Vulnerable groups may not be targeted in communications campaign.	Conduct studies on bodyweight perception of carers and vulnerable groups.	Research funders. NGOs working with vulnerable groups.
No data on bodyweight perception in women who are planning to get pregnant.	Health consequences for women and their babies.	Conduct studies on bodyweight perception in women who plan to get pregnant.	Research funders. Researchers. Health Service Providers.
On the IOI, little is known about the views of individuals from different racial backgrounds with regard to perception of bodyweight.	Individuals from ethnic minorities may be more at risk of health consequences of obesity because of poor recognition of bodyweight status.	Research is required to elucidate this issue.	Research funders. Policy makers and planners working with ethnic minorities.
Little data is available on wider environmental influences on bodyweight perception.	Lack of data on wider influences such as the built environment and food and health policies may result in over emphasis on promotion of change in individuals rather than the whole eating environment.	Studies to investigate environmental influences on bodyweight perception.	Research funders. Researchers.
Few studies have examined psychological and behavioural factors relating to weight status misclassification.	Further understanding could enhance effectiveness of behaviour change interventions.	Investigation of key concepts such as optimistic bias or cognitive dissonance may help explain why individuals fail to recognise or acknowledge health risks including high BMI.	Research funders. Researchers.
Social influences may affect our ideas about what is a healthy size yet few studies have examined this effect on IOI.	Developing our understanding of how people are interconnected and how they influence each other could contribute to addressing bodyweight misperception.	Conduct studies on social influences on bodyweight perception.	Research funders. Researchers.
Increased fear of the	Further understanding could	Studies to assess the	Research funders.

Research			
Knowledge gap	**Public health implication(s)**	**Recommendation**	**Relevant for**
consequences of being overweight may trigger movement from pre-contemplation to contemplation and so the use of threat appeals regarding bodyweight perception may warrant further investigation.	enhance effectiveness of behaviour change interventions.	effectiveness of threat appeals in relation to bodyweight status.	Communications Researchers.

Communication			
Priorities for communication/intervention	**Public health implication(s)**	**Recommendation**	**Relevant for**
Campaigns that address bodyweight perception are rare, most address obesity related behaviours.	Low evidence base for the effectiveness of campaigns to raise awareness of bodyweight status.	Invest in development and evaluation of such campaigns.	Public health bodies. Health promoters.
The majority of parents do not recognise their child's true weight status.	Obesity in children continues to rise with health implications for the child.	Develop National Campaigns to address this issue.	Parents. Public health bodies. Health promoters.
A large proportion of overweight children fail to recognise themselves as such. However, research indicates that for a child, knowing that you are overweight may be detrimental to positive self-concept.	Campaigns to promote knowledge of weight status in young children must be cognisant of potentially negative consequences.	Parents should be the target for campaigns on bodyweight status of children. Communications to children on bodyweight status must emphasis health, healthy eating and physical activity, not weight status per se.	Public health bodies. Health promoters.
Approximately half of overweight adults on the IOI do not recognise that they are overweight.	Behaviour change interventions are currently unlikely to be effective in this group.	Communications efforts to address obesity in adults must first raise awareness of bodyweight status before attempting	

Communication			
Priorities for communication/intervention	**Public health implication(s)**	**Recommendation**	**Relevant for**
		to change dietary and physical activity behaviour.	
Men and boys, those with lower incomes and lower educational attainment, younger population groups and those from ethnic minorities may be more at risk of misperceiving their own bodyweight status.	Targeting these groups may enhance effectiveness of behaviour change programmes.	Behaviour change programmes and campaigns should target these groups specifically.	Public health bodies. Health promoters working with relevant groups.
Early information on risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change.	Targeting younger groups may enhance effectiveness of behaviour change programmes.	Behaviour change programmes and campaigns should target younger adults.	Public health bodies. Health promoters working with young people.
Fear of stigma, blame and of development of eating disorders have been shown to affect recognition of bodyweight status.	These may present barriers to efforts in raising awareness of bodyweight status.	Health promoters must be cognisant of these risks when developing awareness campaigns. Communications relating to raising awareness of bodyweight status will need to strike a balance between clearly outlining the importance of acknowledging weight status while avoiding creating an impression of judgement and blame. This is particularly relevant for communication with parents. Parents should be provided with practical tools and advice on how to talk to their children	Public health bodies. Health promoters. NGOs working with people with eating disorders.

Communication			
Priorities for communication/intervention	**Public health implication(s)**	**Recommendation**	**Relevant for**
		about bodyweight and to overcome their fear of eating disorders.	
Media framing of obesity may be important in determining recognition of bodyweight status.	Blaming individuals or confusing messaging around obesity may undermine efforts to address recognition of bodyweight status.	Work with the media to address uncertainty, mistrust in experts, confusion about what constitutes a healthy weight and portrayal of male and female relationships with weight.	The media. Public health bodies. Health promoters.
Campaigns must address risk denial and risk perception relating to bodyweight status.	These may present barriers to efforts to raise awareness of bodyweight status.	Health promoters must be cognisant of these factors when developing awareness campaigns.	Public health bodies. Health promoters.
Mistrust in a communicator is a major barrier to effective risk communication. Only when trust has been established can other goals, such as raising awareness and behaviour change, be achieved.	Enhancing trust in institutions may improve effectiveness of campaigns emanating from those institutions.	Four important determining factors have been observed in establishing trust. These include caring and empathy, dedication and commitment, competence and expertise, and honesty and openness. These factors must be considered in the development of communications aiming to realign bodyweight perception to true weight status.	Public health bodies.
Social influences can affect our ideas about what constitutes a healthy size and social norms have be associated with overweight being “spread” among close friends and family.	Acknowledging and addressing social norms on communications efforts may enhance effectiveness.	A targeted intervention that incorporates social relationships in families, friendship groups, schools and communities may be successful in encouraging greater awareness of true bodyweight status and the	Public health bodies. Health promoters.

Communication			
Priorities for communication/intervention	**Public health implication(s)**	**Recommendation**	**Relevant for**
		adoption of healthier eating patterns and greater levels of physical activity Campaigns that highlight difference in bodyweight status between previous generations may be effective.	
The reduction of fear of discrimination, particularly for parents concerned about their children, and the reduction of stigma of being overweight or obese are important factors in efforts to reduce bodyweight misperception.	These fears may reduce effectiveness of awareness campaigns.	Acknowledging the many environmental factors that can influence obesity in campaigns to raise awareness of bodyweight status many help reduce feelings of blame and stigmatisation.	Public health bodies. Health promoters. The media.
Bodyweight perception is influenced by a wide variety of factors and stakeholders.	Complex problems demand a more integrated approach, incorporating multiple stakeholders working simultaneously in various sectors and settings, and refocusing on the influence of environmental forces in addition to changing the behaviours of the individual.	Changing bodyweight perception on IOI will require engaging all relevant stakeholders.	Public health bodies. Health promoters. Primary care professionals. All stakeholders.

Training			
Key issues	**Public health implication(s)**	**Recommendation**	
Health professionals	Primary and	Training programmes are needed to	Third level providers

Communication			
Priorities for communication/intervention	**Public health implication(s)**	**Recommendation**	**Relevant for**
lack confidence and training in measurement and communication of bodyweight.	community care are potentially key settings for the identification of overweight individuals – opportunity missed.	address lack of confidence and competence among health professionals in addressing bodyweight.	of nursing and medical education. Primary care and community care professionals. Professional bodies.

Measurement			
Key issues	**Public health implication(s)**	**Recommendation**	**Relevant for**
The majority of parents do not recognise their child's true weight status.	Obesity in children continues to rise with health implications for the child.	Conduct a regular National Measurement Programme in schools.	Depts. Education. Depts. Health. Principals and teachers. Parents.
Approximately half of overweight adults on the IOI do not recognise that they are overweight.	Behaviour change interventions are currently unlikely to be effective in this group.	Make home measurement easy. Provide training to key health professionals and create a culture of measurement in primary care.	Public health bodies. Third level providers of nursing and medical education. Primary care and community care professionals. Professional bodies.

Appendices

Appendix 1

Search terms

Smoking cessation

'Interventions AND smoking cessation', 'Barriers AND smoking cessation', 'Promoters AND smoking cessation', 'Influences and smoking cessation', 'Predictors and smoking cessation', 'Risk perception AND smoking cessation', Risk denial AND smoking cessation.'

HIV testing

'Interventions AND HIV testing', 'Barriers AND HIV testing', 'Promoters AND HIV testing', 'Influences and HIV testing', 'Predictors and HIV testing'.

Alcohol

'Interventions AND alcohol use/abuse, 'Barriers AND alcohol use/abuse', 'Promoters AND alcohol use/abuse', 'Influences and alcohol use/abuse', 'Predictors and alcohol use/abuse', Alcohol AND behaviour change', 'Social norms AND alcohol', 'Perception AND alcohol use/abuse', 'Perception AND binge drinking', 'Perception AND excessive drinking'.

Road safety behaviour

'Road safety AND behaviour change', 'Interventions AND road safety', 'Road safety AND risk awareness/risk perception'.

Gambling

'Interventions AND gambling', 'Seeking help/treatment AND gambling', 'Behaviour change AND Gambling', 'Barriers/promoters AND gambling', 'Risk perception AND gambling'.

UV Skin protection

'Prevention AND skin cancer/melanoma', 'Skin cancer/melanoma AND UV skin protection', 'Barriers/motivators AND UV skin protection', 'Causes AND skin cancer/melanoma AND barriers/motivators', 'Barriers/motivators AND sunbed', 'Skin cancer AND causes AND knowledge', 'UV skin protection AND behaviour', 'Predictors AND sun seeking behaviour', 'Influences AND skin protection', 'Tanning beds AND facilitators'.

Dates:

21st - 23rd December 2011

Environmental responsibility awareness

'Environmental risk AND waste', 'Environmental risk AND waste AND health', 'Recycling AND environmental risk', 'Perception AND environmental risks', 'Barriers AND recycling', 'Motivators/facilitators AND recycling', 'Non-participation AND recycling'.

Date:

22nd December 2011

Appendix 2

Percentage agreement of the health professionals accurately identifying the correct bodyweight by age category (n=128)(56). 2012)

	Screen 1 - Own clothes (%)	Screen 2 - Study Clothes (%)	Screen 3 - Study clothes and additional info (%)	Overall (%)
Child (< 10 years)				
Underweight	35	59	88	**61**[a]
Normal weight	95	93	73	**87**[b]
Overweight	7	9	12	**9**
Obese	11	12	13	**12**[b]
Average	**37**	**43**	**47**	**42**
Teenager (11-19 years)				
Underweight	5	10	77	**31**[b]
Normal weight	56	48	61	**55**[b]
Overweight	77	73	82	**77**[b]
Obese	23	29	41	**31**[b]
Average	**40**	**40**	**65**	**49**
Young adult (20-39 years)				
Underweight	93	81	81	**85**[c]
Normal weight	75	80	81	**79**
Overweight	61	69	84	**71**[b]
Obese	2	5	41	**16**[a]
Average	**58**	**59**	**72**	**63**
Middle-aged adult (40-59 years)				
Underweight	23	24	54	**34**[d]
Normal weight	77	77	89	**81**[b]
Overweight	21	33	77	**44**[a]
Obese	50	31	13	**31**[b]
Average	**43**	**41**	**58**	**47**
Older adult (>60 years)				

Underweight	59	57	64	**60**
Normal weight	98	92	86	**92**[b]
Overweight	59	73	79	**70**[b]
Obese	39	45	55	**46**[b]
Average	**64**	**67**	**71**	**67**

[a] Significant difference between all 3 screens, P<0.001 (Wilcoxon test)

[b] Significant difference between all 3 screens, P<0.05 (Wilcoxon test)

[c] Significant difference between screen 1 - screen 2, and screen 1 - screen 3, P<0.001 (Wilcoxon test)

[d] Significant difference between screen 1 - screen 3, and screen 2 - screen 3, P<0.001 (Wilcoxon test)

Appendix 3

Smoking

One of the important lessons from efforts to reduce smoking and alcohol consumption is the lengthy time tag between obtaining evidence from research for harmful effects, and action taken in terms of behaviour change, or in terms of the public acceptability, of public health interventions. Controls on smoking provide an interesting case study with respect to the acceptability of different types of interventions. Over the last 50 years, policy makers have moved from the basic provision of information and advice, through the facilitation of healthier options (e.g. use of nicotine replacements), active discouragement of the unhealthy behaviour (e.g. taxation, advertising restrictions) and finally to regulatory action (e.g. bans on smoking in public places).

These days on the island of Ireland, the risks of smoking are generally understood by the majority of people and strict tobacco control measures are in place, yet smoking rates remain relatively high at 23.6% in ROI and 26% (140) in NI. Therefore becoming a smoker involves some level of risk denial or rationalisation of cognitive dissonance (an uncomfortable feeling caused by holding two contradictory opinions, beliefs or items of knowledge simultaneously) (141). This is the reason why smoking was chosen as a potential topic which could provide insight into changing bodyweight perception.

Much of the research on interventions to promote smoking cessation focuses on four main approaches. These include; directly addressing motivation e.g. providing rewards contingent on abstinence, maximising self-regulatory capacity or skills e.g. facilitating barrier identification and problem solving, promoting adjuvant activities e.g. advising on stop-smoking medication, and supporting other behaviour change techniques such as building general rapport (142). Some studies have addressed risk denial and risk perception in the context of assessing readiness to quit, those with higher risk denial or lower risk perception being less ready to quit (117, 118).

Others have looked at health adaptation, the ability to psychologically absorb negative health shocks (120). This is also described as the alteration of activities, desires, goals and values in response to changes in health states, and distinguishes adaptation processes both from overcoming initial shocks and horror-related to health state changes, and the increased knowledge that arises from experiencing adverse health conditions (143). This in particular may be relevant to the slow loss of ability experienced by those who chronically gain weight.

Shocking information, that makes the individual fully aware of the mortality risks of long-term smoking, results in reduced smoking. However, the impact is more pronounced if the information is revealed earlier in life. One aspect not studied here is that information shocks may also change an individual's perception of the more observable health effects of smoking, such as shortness of breath, inability to exercise, etc. This effect may take place by reducing adaptation (120).

Willingness to stop smoking because of risk awareness and becoming aware of bodyweight are clearly not entirely comparable. Smoking is an addictive behaviour and viewing it in terms of risk perception or risk denial is somewhat mono-dimensional. Equally, the perception of risk of overweight and obesity is only one aspect of why a person would or would not recognize and address their weight status. However, the insights from smoking would indicate that early information on risks and highlighting loss of activities, desires, goals and values in response to changes in health states may aid behaviour change.

Human Immunodeficiency Virus (HIV)

Despite its importance in raising awareness of HIV risk behaviour and in linking HIV-positive individuals to care and treatment, research findings indicate that the HIV antibody testing rate in African populations, in particular, remains relatively low. Since there is widespread awareness of the risks of HIV, some of the barriers to HIV testing and recognition and measurement of bodyweight status may be comparable. The barriers to HIV testing are explored below.

Studies of barriers to HIV testing reveal a variety of reasons why individuals are reluctant to seek testing. These include personal concerns such as fear and discrimination, economic issues such as the cost of treatment, laws, e.g. named reporting, and counselling and testing strategies, e.g. the dislike of counselling or fear of needles (144). Physical barriers are also important, for example the more accessible and available that HIV testing services become, the more likely these services will be utilised by individuals at highest risk (145). For women in particular, barriers can include fear of partners' reaction, communication between partners, and partners' attitudes towards HIV-1 testing (146). Other barriers to testing included fear of learning one's status (49%), lack of perceived HIV risk (43%), and fear of having to change sexual practices with a positive HIV test (33%) (126). More abstract barriers include conspiracy theories and the belief that HIV is simply being used as a tool to promote condom use (147).

Women, those with higher education, those who visit healthcare settings more frequently and those with inconsistent condom use, have been found to be more likely to get tested (126). Individuals with stigmatising attitudes toward people living with HIV and AIDS were less likely to have been tested or to have heard of routine testing. Compared to people who had been tested, individuals who were not tested for HIV demonstrated significantly greater AIDS related stigmas; ascribing greater shame, guilt, and social disapproval to people living with HIV (135).

While it must be acknowledged that testing for HIV and recognition and measurement of bodyweight status are not directly comparable, several important learnings can be derived from these findings for addressing bodyweight perception. The reduction of fear of discrimination, particularly for parents concerned about their children, and the reduction of stigma of being overweight or obese may be key.

Increased testing among those who visit healthcare setting more often points to primary care as a route for routine testing of bodyweight status. Equally, the issue of stigmatisation means that encouraging home testing may be beneficial. Therefore, distribution strategies, such as ***safe***food's recent campaign where 450,000 tape measures were delivered through pharmacies in the IOI, may prove effective.

While conspiracies around the promotion of HIV awareness as a ruse to promote condom use seem far from relevant for promoting correct bodyweight perception, the basic tenant of the importance of trust in institutions is not. For example, individuals who reject the idea of the importance of bodyweight for health, or who reject state interference as 'Nanny Statism', are unlikely to accept messages relating to awareness of bodyweight status.

Case study: Compulsory testing in Botswana (126)

The Botswana government has implemented a policy of routine or "opt-out" HIV testing in response to the high prevalence of HIV infection (37% of adults).

Researchers conducted a cross-sectional, population-based study of 1,268 adults from five districts in Botswana to assess knowledge of and attitudes toward routine testing, correlates of HIV testing, and barriers and facilitators to testing, 11 months after the introduction of this policy. Most participants (81%) reported being extremely or very much in favour of routine testing. The majority believed that this policy would decrease barriers to testing (89%), HIV-related stigma (60%), and violence toward women (55%), and would increase access to antiretroviral treatment (93%). At the same time, 43 per cent of participants believed that routine testing would lead people to avoid going to the doctor for fear of testing, and 14 per cent believed that this policy could increase gender-based violence related to testing. The prevalence of self-reported HIV testing was 48 per cent.

Alcoholism/Binge drinking

Alcohol is an accepted part of our society. Like food, it is associated with pleasure, relaxation and celebration. Although for a proportion of the population, moderate consumption carries some health benefits in reducing the risk of coronary heart disease, there is increasing evidence of harm from alcohol misuse.

Campaigns relating to alcohol have successfully reset social norms with respect to drinking and driving. However, this has not been accompanied by a decrease in overall alcohol intake. Additional, parallel, broadly based environmental interventions to support and facilitate behaviour change are required. Part of this could be encouraging individuals to assess their level of drinking, particularly binge drinking, in comparison to recommended limits for alcohol consumption. This could be comparable to assessing bodyweight status. Data from Irish students provide an interesting examination of perceived norms. The CLAN Survey suggested that binge drinking (defined as drinking 75 grams of pure alcohol in one sitting) at least once a week was common among both male (61 per cent) and female (44 per cent) students. Out of every 100 drinking occasions, 76 ended in binge drinking for male students and 60 for female students (148).

Delaney *et al.,* (2007) examined students' perceptions of excessive drinking using statistical vignettes based on standard alcohol misuse markers used in the WHO Alcohol Use Disorders Identification Test

(AUDIT) (119). Quantitative analyses revealed stark heterogeneity in students' perceptions of alcohol excess, both in terms of their own self-rated excessiveness and in terms of their general conceptions of excessiveness. Analysis of focus group data with student drinkers revealed four themes mediating perception of excess: perception of normal drinking; perceived indicators of excess; reactions to alcohol guidelines; justifications for excessive alcohol consumption.

Several factors mediated perception of excess for the students including optimism about future drinking trajectories, perceptions of individual differences in tolerance, calendar effects, lack of awareness of health consequences, assumption of shared experience with peers and belief that excessive drinking is part of Irish and student tradition. There appear to be several comparable factors here in relation to bodyweight perception.

College campaigns in the US have used a social norms approach to tackle binge drinking, highlighting that most people don't binge drink, with a view to encouraging heavy drinkers to question their own behaviour. This approach would be unlikely to work in an IOI context where binging is in fact the norm. Likewise, a similar social norms approach might not work for raising awareness of bodyweight status where overweight and obesity are the norm. However, an alternative approach could involve highlighting differences in bodyweight norms between generations as a means to raise awareness of the changes that have occurred over time.

Road safety

Of the approaches utilised in road safety publicity campaigns, shock tactics, which aim to evoke strong fear responses in individuals, feature prominently. These shock-based, fear-arousing threat appeals present individuals with negative outcomes that may be experienced as a result of engaging in the depicted unsafe and/or illegal behaviours. It is expected that the threat will evoke fear at the prospect of experiencing the aversive outcomes, which will in turn motivate the audience to align their attitudes and/or behaviours with those recommended in the message. Of the health issues that have utilised threat appeals, road safety is particularly renowned for its use of physical threats in which drivers and passengers are often shown to be injured and killed as a result of unsafe and/or illegal behaviour. Typically, these advertisements portray a crash scene and victims in a graphically explicit manner.

The fear appeal must describe a threat and suggest a specific plan for reducing or avoiding the threat that is possible to carry out, perceived as effective, and allows the target audience to believe that they are capable of performing the safe behaviour. Without these elements, the campaign may be counterproductive, as individuals may believe that they are unable to protect themselves from the threat, resulting in defensive and maladaptive responses (149).

The literature examining the effectiveness of threat appeals is inconclusive. Some behavioural scientists as well as health promotion professionals and practitioners advocate the use of threat appeals with great caution. In contrast, others have argued that under the correct circumstances the use of fear-arousing communications can be very effective at increasing risk awareness. Given the sensitivity of the issue of

overweight/obesity, the use of a fear campaign may not be appropriate. However, increased fear of the consequences of being overweight may trigger a movement from pre-contemplative to a contemplative stage. The use of threat appeals for the communication of bodyweight perception may therefore warrant further investigation.

Gambling

Failure to acknowledge, or seek help for, pathological gambling has been examined here because of potential similarities with bodyweight misperception. Associated factors may include optimistic bias, risk misperception and consequences such as stigma and shame. Much of the literature relating to gambling intervention focuses on assessing the effectiveness of various treatment approaches including promoting mindfulness, cognitive behavioural therapies, brief, motivational, and self-directed interventions and others (150, 151). From a public health perspective health promotion focuses on communities building their capacity, knowledge and resilience with regard to the attractions of gambling (152).

Barriers to seeking treatment include elevated perceived personal luck (153), (154) pride or alternatively, shame, stigma or embarrassment (155), denial or difficulty acknowledging the problem, a wish to handle the problem by oneself (155) and treatment-related issues (136, 155, 156). Other frequently reported barriers included lack of knowledge about treatment options and practical issues around attending treatment. Younger gamblers and those with more severe problems, higher perception of a gambling problem, and past treatment experience have been found to mention shame and treatment-related issues more frequently. The authors of one review argued that unwillingness to admit to the problem may be even more prevalent than is indicated by the results of barriers studies.(155).

With regard to reasons for seeking help for gambling problems key motivators are largely related to gambling harms including financial and relationship problems and negative emotions. (157, 158). Motivators for self-exclusion from casinos have included harmful effects, evaluation/decision-making and a wish to regain control (157).

While more research is needed on barriers to treatment-seeking experienced by gamblers there is some evidence from that early intervention (before major harmful effects take place) could be beneficial. For example Suurvali *et al.*, showed that gamblers with lower problem severity, no self-perception of a gambling problem, and no history of seeking treatment, more frequently said they would not hesitate to seek help (136). Efforts to promote treatment could include messages to encourage problem gamblers to make changes before harms became too great, which may also be relevant to communications on bodyweight misperceptions.

UVR skin protection

Exposure to ultraviolet radiation (UVR) is the most important known risk factor for skin cancer. The WHO recommends wearing protective clothing, staying in the shade, avoiding the sun in the middle of the day and wearing sunscreen as sun-protection behaviours (159). Other preventative measures include avoiding exposure to sunlamps and tanning booths (sunbeds).

The major predictors of sun protection behaviours are perceived threat of skin cancer, including susceptibility and severity, the benefits and the barriers of different types of sun protection behaviours, social factors and knowledge about skin cancer (160). Other factors associated with more preventative behaviours include having fairer skin, higher education and knowing someone diagnosed with skin cancer (161, 162). Despite widespread awareness of the risks of UVR exposure and the steps to minimise this risk (as outlined above), research findings indicate that few are willing to change their behaviour to reduce their risk. (163) (164) (165).

Gerbert *et al.,* reported that to improve skin cancer prevention, interventions must focus on individuals' attitudes about sun exposure and tackle the barriers related to them. (166)

In general the population has a positive attitude towards sun exposure and knowledge of sun-related issues does not necessarily lead to better sun-protective behaviours (167) (168-172). The major motivational predictor for unprotected sun exposure is the desire for a suntan and findings from numerous studies show that having a suntan is considered to be indicative of both health and beauty.

Use of sun protection is related to peers' sun protection behaviour, parental influence, and parental sun protection behaviour (173). Subjective norms also play a crucial role, where the perceived opinions of others have an important effect on people's sun tanning, and consequently sun protection. Murray *et al.,* found that the continued use of sunbeds was found to be associated with peer pressure; including social comparisons with peers, the positive reinforcement of tanning in the response of others and the negative comments of others when a tan fades (173).

Research has shown that perceived cancer risk predicts preventative behaviour and lack of perceived risk is a barrier to risk reduction (174-176). Beliefs about the outcome of behaviour and perception of individual risk with a behaviour, may represent one major component in predicting behavioural intentions, as suggested by the Theory of Planned Behaviour and the Health Belief Model (177, 178). In the UVR skin protection debate, people who believe that intentional tanning is harmless are less likely to reduce their sunbathing. Several factors related to health promotion behaviour are associated with risk perception. Some of these are the seriousness of the threat, judgement of individual susceptibility, and the effectiveness of preventative actions (179). People who believe skin cancer is a severe disease and who think that they are more susceptible to skin cancer are therefore more likely to use sun protection.

These days on IOI, the risks of UVR are generally understood by the majority yet a high number of people use sunbeds (180). This involves some level of risk denial or rationalisation of cognitive dissonance. For sunbed users the development and maintenance of a tan provides immediate rewards: a ‘healthy tan’,

positive comments from others and a feeling of wellbeing. To them the possible negative consequences of engaging in this behaviour seem psychologically remote and considerably removed in time. (173, 181)

These psychological and attitudinal barriers are the most challenging to overcome. As long as attitudes towards tanning remain positive and perceived lack of susceptibility to skin cancer remains low, the intensity with which people intentionally tan will not change.

While many published studies have shown that there is a reasonable level of knowledge regarding skin cancer, this knowledge does not appear to translate into skin protection behaviours. This mirrors the obesity epidemic where the majority of people are aware of the risks of being overweight or obese yet continue to make unhealthy lifestyle choices.

A goal of skin cancer prevention programmes must be the removal of these specific barriers against sun protective behaviours. Some believe that because skin protection and tanning both have strong social influences, health promotion programmes aiming to promote skin protection should incorporate factors to account for peer pressure, social norms and other social barriers (182).The same can be said for overweight/obesity interventions whereby social influences and a perception of what is the norm do have an effect on what individuals and society view as being “ok” or even “healthy”. We are all embedded in social networks and as a result are influenced by the appearance and behaviours of those around us. It is these social influences which can affect our ideas about what is a healthy size and be associated with overweight being “spread” among close friends and family.

Case Study

Australia’s ‘Slip! Slop! Slap!’ and the ‘Sun Smart’ interventions in Victoria have been referred to as the most successful skin cancer prevention programmes ever reported (183). In many ways, this success has been built on two important foundations: research and evaluation and consistency and continuity. The view was taken that attitude and behaviours change also requires change in social and cultural norms about the value of a suntan. And so it needed what became known as a comprehensive health promotion strategy. A mass-media campaign was important to tackle people beliefs about the healthiness of a tan, inform them of the risks of sun exposure and give them strategies for protecting themselves. Its efforts to alter normative values began a process of broad cultural change that, in turn, applied pressure on other organisations and institutions to change. Results indicate that many inhabitants of Victoria are displaying high levels of knowledge of the dangers of over exposure to the sun. There has also been a shift in attitudes towards suntans. Most importantly, there have also been positive changes in behaviour, with consistent increases in the proportion of people reporting seeking shade, using a hat and sunscreen, covering up and choosing to avoid the mid-day sun (183).

Environmental responsibility awareness

The number of people engaging in ecological behaviour, whereby they direct their actions toward averting damage to the natural environment has been rising dramatically in the past few years (184). Environmental psychology has a long history of research examining how to motivate people to behave in environmentally responsible ways (185). Research suggests that people behave in an environmentally responsible way if their sense of intrinsic motivation or satisfaction is engaged, rather than presenting such behaviour as an altruistic act. Lindsay and Strathman (1997) described how intrinsic motivation to recycle could be aroused by individuals experiencing symptoms of the problem, having experience of the issue, and seeing the issue as an immediate threat. They likened these to the factors which motivate individuals to engage in health-related behaviour.

In a study by Aini *et al.*, (2002) of five motivational factors to recycle, intrinsic satisfaction and individual commitment were more important reasons for recycling than convenience, economic motivation and societal commitment (186). Werner and Makela (1998) looked at the motivations that influenced people to recycle and found that the more knowledge and personal satisfaction people receive from recycling, the more likely they are to do it on a long-term basis (187). The best way to get people to do something was to make the task a fun and positive experience. Hornik *et al.,* (1995) found that the strongest predictors of recycling are internal facilitators followed by external incentives (188). Internal facilitators included people having an awareness of the importance of recycling and knowledge about and commitment to recycling programmes. External incentives included social influence whereby a person is concerned about how relevant others, such as family and friends would react to not recycling. Making the environmentally responsible option the easy option is also important, especially in relation to recycling. Derksen and Gartrell (1993) found, unsurprisingly, that people with access to a recycling programme had higher levels of recycling than people lacking such access (189). In addition, while individual concerns about recycling enhanced the effect of the recycling programme, it did not overcome barriers presented by lack of access.

Various cognitive psychological models such as The Theory of Planned Behaviour (190) and Health Belief Model (184) have been used to gain greater understanding of the determinants of environmentally friendly behaviour. Tonglet *et al.*, (2004) found that pro-recycling attitudes are the major contributor to recycling behaviour and that these attitudes are influenced firstly, by having the appropriate opportunities, facilities and knowledge to recycle and secondly, by not being deterred by the issues of physically recycling (such as space and inconvenience). The researchers found that previous recycling experience and a concern for the community and the consequences of recycling are also significant predictors of recycling behaviour. Using the Health Belief Model, Lindsay and Strathman (2007) found that the perception of difficulty in recycling inhibits individuals from actually performing this behaviour, despite the fact that most people believed that recycling is beneficial to the natural environment.

Community-based social marketing, which merges knowledge from psychology with expertise from social marketing, has been used as a tool to increase environmentally responsible behaviour (191). Social marketing emphasises that effective programme design begins with understanding the barriers people

perceive to engaging in an activity and it underscores the importance of strategically delivering programmes so that they target specific segments of the public and overcome barriers to this segment's engaging in the behaviour. Such an approach has been used successfully in Canada to, for example, encourage composting and efficient water use (191).

The Irish plastic bag levy has been an interesting example of an 'ad hoc effort to influence consumer behaviour by the imposition of product taxes that reflect external costs imposed by such products that are not initially included in the price' (192). In March 2002, the Irish government introduced a levy of €0.15 per plastic bag. The effects of the tax on the use of plastic bags in retail outlets and in the environment have been dramatic, with usage falling by more than 90% (192). This tax has influenced consumer behaviour significantly and also the response of consumers and stakeholders to the tax has been overwhelmingly positive (192). This has largely been due to extensive consultation with stakeholders and also informational campaigns highlighting the environmental impacts and pledging of revenues into an environment fund.

History has provided several examples in which environmental and population level strategies have been used to successfully alter practices in areas of public health significance. One such example as described above is in the area of environmental responsibility. The literature has described various ways in which such awareness has been raised leading to action by people to improve their engagement in environmentally friendly behaviour.

While not directly related to overcoming bodyweight misperception the evidence points to the importance of highlighting resources and supports that can facilitate behaviour change and make the healthy choice appear 'easy'. There may also be some merit in emphasising the personal satisfaction that can be derived from adopting healthy eating and physical activity behaviours. This may help overcome barriers to acknowledging bodyweight status and could inform ways in which the current epidemic of overweight and obesity may be addressed.

Appendix 4

Case studies addressing bodyweight perception - Stop the Spread

Background

Two in three people on the island of Ireland are carrying excess weight, yet only 38 per cent recognise they have a weight problem. That means a great proportion of the population are in denial, putting themselves at increased risk of well-known diseases such as heart disease, diabetes and some cancers. 'Stop the Spread' is an awareness campaign to alert people that being overweight is now the 'norm', has become visually and socially acceptable and that we no longer recognise the fact that we are carrying extra weight. The campaign's call to action is urging people to measure their waist to see if they are overweight.

'Stop the Spread' is a two-year campaign by ***safe***food, the North-South Agency responsible for promoting healthy eating and food safety. The overall aim of the campaign is to raise awareness among the adult population that excess weight is now the norm, not the exception and to encourage people to take action to know their waist size and begin to manage their own weight.

Objectives

To change the public's perception of what is the "norm" for a healthy weight, the public relations campaign had five key objectives:

1. Increase awareness that more and more people have become overweight or obese
2. Encourage the adult population to measure their waist and educate on how to do this correctly
3. Raise awareness among the adult population that a waist size of greater than 32 inches for women and 37 inches for men is an indication of carrying excess weight
4. Raise awareness of the long-term health issues associated with excess weight
5. Promote how to lose weight in a healthy, sustainable way and promote existing ***safe***food supports and resources that can help with this.

Programme planning and strategy

The launch of a major, two-year public health awareness campaign combined heavyweight media relations with advertising and direct marketing. The campaign also used *safe*food's digital and social media channels to further engage with the public and help address the key campaign objectives.

Benchmark research

While population studies have reported on the extent of excess weight in society, new omnibus research on an all-island basis was carried out by Millward Brown Lansdowne pre-campaign. This served as a benchmark for the campaign but also measured:

- The public's attitudes, awareness and perception of the problem of overweight and obesity as well as their own weight and waist status
- What measures the public use to determine what is "a healthy weight"
- What constitutes a healthy waist size and,
- How they would measure their own waist.

The research findings were at the core of the advertising and media relations campaign and reinforced the overall campaign's call to action, urging people to become more aware of their weight and to measure their waist.

Key messages

A key message for public relations was communicating new information to the public on waist sizes for men and women, and how to measure these correctly. These waist measurement numbers are 32 inches for women and 37 inches for men and represent guidelines from the World Health Organisation (WHO) for a healthy waist size. This practical, visual reference for self-diagnosis (simpler than BMI and more credible than weight) was a specific, tangible hook for the message.

Campaign collateral

To help with communicating this information to the public, 1.2 million free measuring tapes were made available through 1,690 pharmacies on the island of Ireland and 1,300 GP surgeries in ROI.

A "How To" video showed the wrong and right ways to measure your waist while an "Infographic" traced the changes in the weight of the population over the past 20 years.

Evaluation

As with all of *safe*food's public health campaigns, 'Stop the Spread' was evaluated to measure the effectiveness of the campaign among the public. Since the campaign launch in May 2011, all-island omnibus research by Millward Brown Lansdowne has revealed a significant increase among adults who now consider themselves to be overweight, up five per cent since the campaign began. Ninety one per cent of adults agree that more and more people are becoming overweight. One in five adults claimed to have measured their waist when the campaign was on air and 40 per cent said the campaign motivated them to start losing weight.

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