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## **The prevalence of mechanisms of dietary change in a community sample**

### **Abstract**

Evidence relating to dietary change is contradictory as some studies document a lack of dietary change while other studies report a degree of success in implementation and maintenance of long-term dietary change. The present cross-sectional survey aimed to explore attributions for weight loss and to establish the prevalence of dietary change in a community sample with a focus on four mechanisms of dietary change: two mechanisms within an *active path* (*accumulation of evidence* and *trigger to action*) and two mechanisms within a *passive path* (*imposed change* and *seamless change*) across participants' lifespan (N=404). The results indicated that minor dietary change occurred frequently in the lives of 99% of participants. Those described as involving the active path illustrated a reliance on different self-regulatory styles. In contrast, the passive path changes reflected participants' flexible adaptation to the external environment and evolving personal health needs. Both, the changes within active and passive path, occurred with almost equal frequency across participants' lifespan. Further, whilst weight loss in the past year tended to be attributed to conscious effort, weight gains were blamed on the obesogenic environment.

**Key words:** diet, dietary change, prevalence, lifespan, obesogenic environment

## **Introduction**

Research concerning eating behaviour has focused on the difficulties that individuals experience both in making initial changes to their diets and in the maintenance of these changes (e.g.: Marlatt and Gordon, 1985; Garner and Wooley, 1991). The existence of unhealthy dietary habits formed in childhood has been indicated as a primary stumbling block that prevents adults making and maintaining changes in their eating behaviour (Steptoe, Pollard and Wardle, 1995). There is evidence, however, to show that adults can change their strongly ingrained eating habits yet, such evidence usually comes from a sample of individuals that has an urgent need to do so, e.g. when their health is at risk due to obesity and diabetes (Wing, Goldstein, Acton et al., 2001) or coronary heart disease (Ornish, Scherwitz, Billings et al., 1998). Substantial evidence indicates that interventions designed to change dietary habits over a long-term are successful in decreasing daily fat and increasing daily fruit, vegetable and fiber consumption (Lanza, 2001, Howard, et al., 2006, Pierce et al., 2007). The success of these interventions is based on the use of intensive intervention techniques including frequent contact with health professionals (Chapman, 2010). However, the evidence provided by the sociological studies demonstrates that people do change their diet across lifespan regardless of their health condition (Devine, 2005) Therefore, it seems that having strong motivation to improve one's health and engaging cognitive effort in behaviour change is not the only mechanism for dietary change. Changing personal circumstances and changing food preferences play a part too. Thus, contrary to social cognition theories such as

transtheoretical model (Prochaska and Di Clemente, 1982), theory of planned behaviour (Ajzen, 1991) and self-regulation framework (Carver and Scheier, 1998) behaviour change can happen without preparation, intention, goal setting and effort and can be easily maintained in the long-term. This type of change can happen unconsciously or consciously but always unintentionally.

Recent qualitative work involved an exploration of changes in diet across the lifespan and developed a model of change which integrated both elements of dietary change: the effortful and the unintentional (Chapman and Ogden 2009). The model was developed following interviews with 20 men and women from diverse occupational background are described how dietary changes occur along an *active* and a *passive path*, with four underlying mechanisms: *accumulation of evidence*, *trigger to action*, *imposed change* and *seamless change*. The diet changes that occur along an active path require individuals' active engagement in their initiation and maintenance. These changes are initiated because an *accumulation of evidence* such as increased weight, health problems or loss of fitness poses a threat to personal self-image, well-being, self-esteem and a sense of self-identity. This state of affairs becomes increasingly uncomfortable to the point that an individual is ready to initiate action. The other mechanism: *trigger* can spur an individual to action abruptly and can be experienced in the form of a shocking visual stimulus (e.g. TV programme), a health scare or more positive event such as getting pregnant and becoming a parent.

Diet changes also occur along a passive path - without an individual's active involvement. Some diet changes are *seamless* and relate to changes influenced by

age, financial circumstances, nutritional Zeitgeist, availability and variety of produce while other changes are *imposed* and occur when a person changes jobs or schools, immigrates to another country, moves in with a partner/spouse or lives through a time of war. Individuals may or may not be aware that their diet has changed. In both cases the dietary changes are accepted as they do not pose a threat to the individuals' physical well-being or self-identity.

The present study aimed to further the investigation of the types of dietary changes by establishing the following:

1. The prevalence of dietary changes in the community sample during *the past year, over the last 5 years and since childhood*;
2. The prevalence of four different mechanisms of change: *accumulation of evidence, trigger to action, imposed change and seamless change*;
3. The prevalence of changes in diet in terms of *food intake, drinks consumption and food preparation*.

## **Method**

### **Design and procedure**

In this *cross-sectional survey* the participants were asked to read an information sheet, sign a consent form and then complete a questionnaire which included demographic details and description of dietary changes. The data was collected in June-August 2008.

### **Participants**

Ethical approval was received from St Mary's Ethical Committee in April 2008. Male and female participants were recruited in the waiting room of a general practice in central London, UK. Almost all of them were patients at the practice, except for the translators, reception staff (did you give ques to staff???) and persons who accompanied the patients (N= 17). Individuals who did not have sufficient command of the English language, who were younger than 18 years and those who had mental impairment were excluded from the study.

461 potential participants were approached with 14.1% excluded from final analysis due to the following: participants younger than 18 (N= 2), patients too ill (N=8), questionnaires not returned by post (N= 3), incomplete questionnaires (N= 8), patients declined to take part due to lack of sufficient English language skills (N=12), self-declared drug users not interested in diet (N=5), patients with an eating disorder (N=2), lack of time (N=2), not interested in taking part due to lack of relevant categories in the questionnaire e.g fibre, fat (N=2) undisclosed reasons (N=13).

Nationals from the following countries took part in the study: Azerbaijan, Canada, Chile, China, Croatia, Eritrea, Finland, France, Gambia, Iran, Iraq, Ireland, Italy, Jamaica, Japan, Lebanon, Morocco, Mozambique, Philippines, Poland, Portugal, Russia, Spain, Sudan, UK, Ukraine and USA.

## **Measures**

The questionnaire was developed on the basis of the Chapman and Ogden's model of dietary change (Chapman and Ogden, 2009). It was designed primarily to measure

the prevalence of four mechanisms of dietary change: accumulation of evidence, trigger to action, imposed change and seamless change. First, the participants were asked whether they made changes in the consumption of selected food items (fruit, vegetables, coffee, alcohol, home cooked meals, etc). If they did, they were asked whether they consumed *less, more or a different kind* of a dietary item. Then, they were asked to tick a box which described why they changed the consumption. If a diet change happened through accumulation of evidence the participants were asked to tick the box titled: ‘Gradually, I realised I needed to make a change’. These changes were mostly relating to becoming conscious of changes in weight, fitness level or general health. If a change happened through trigger to action, they were asked to tick the box titled: ‘I wanted to make a change because something significant happened in my life (e.g. health scare, seeing how animals are reared)’. If a diet change was imposed they were asked to tick the box with: ‘I had no choice, I had to change (e.g. I got married, I changed jobs, I moved to a different country)’. If a change was seamless and they were not sure how it happened, they were asked to tick the box with ‘The change just happened’. The seamless changes also reflected changing taste preferences across lifespan, availability of produce, better financial means, and changes in lifestyle.

In the demographic profile section of the questionnaire, pregnant women or mothers of infants were asked not to report the changes in their weight in the past year.

Three time points were examined: changes in the past year, in the last 5 years and since childhood. The ‘last 5 years’ point was included to capture the changes in mid point in life other than immediate or more general changes across lifespan as it was

assumed that many participant would have gone through a period when their diet changed due to changed circumstances i.e. leaving family home, becoming a parent, acute health problems, losing a partner or moving to a different country.

### **Data analysis**

Statistical software SPSS 15 was used to analyse data. Descriptive statistics were used to describe the participants' profile characteristics, the prevalence of dietary changes in the three time periods (the past year, the last 5 years and since childhood) and the prevalence of mechanisms of dietary change in the three time periods. This needs to be more specific Other results were analysed with one-way repeated measures Anova, one-way between groups Anova, independent samples t-test and hierarchical multiple regression.

## **Results**

### **Participants' demographic variables**

The data provided by 404 participants was included in the statistical analysis. The mean age of participants was 42.6 with a range from 18 to 87 years. Majority of participants were female (N = 264). The UK, 2001 census published online (National Statistics) stated that in England there were 51.32% females and 48.68% males. Within the sample 65.8% of participants described themselves as normal in weight and 30.4% as overweight. The Health Survey for England (2006) stated that in 2003 there were 55.5% overweight and obese women (Body Mass Index >25) and 65.4% of overweight and obese men. In the study sample there were 33.7% of overweight and obese women and 24.3% of overweight and obese men. The majority

of sample was of white ethnic origin with the remainder of 39.6% coming from Indian, Other Asian, Black or Other Ethnic Origin. This number of non-white participants in the sample compared with 9.18% of population in England and 29% in London. The majority of sample reported having higher education (post A levels or post International Baccalaureate) while 25.3% ended their education at 16 years of age or younger. The majority of participants reported living on a lower income than £20,000 per household, per year. A substantial minority (27.0%) reported living on their own compared with 12.52% of general population in England. Only 45.3% of participants were born in the UK as compared with 90.73% in the general population (see Table 1).

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### **Lack of dietary change**

The majority of participants reported making no changes in the consumption of all items. However, there were only 4 participants who reported making no changes at all. The rest of participants (99%) declared making some changes during their lifetime. The number of 'no change' answers were counted and converted into percentages. The means were calculated for each category. The participants indicated 'no change' answers mostly in the past year (62.8%) and mostly in the food preparation method (66.3%). There were more changes recorded in the past 5 years for each category. The most prevalent changes were recorded since childhood, also across all three categories (see Table 2).

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### **Prevalence of dietary change**

In the past year majority of participants indicated making no changes to their diet. In the last 5 years most prevalent changes were reported in the increased intake of fruit, vegetables and water; and in the decreased consumption of chips, meat, fizzy drinks and fried food. Since childhood the majority of participants reported the change in their diets in increasing the consumption of water, coffee, tea, and alcohol and in decreasing the sugar intake. The large minority reported changes since childhood in the increased consumption of fruit, vegetables, takeaways, ready meals and eating out, and decreased consumption of chips, fizzy drinks, meat, eating fried food and eating home cooked food (see Table 3).

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### **Prevalence of mechanisms of dietary change in the past year**

Of the participants who reported changes in their diet in the past year the majority reported changing their diet through the mechanism of Accumulation especially in the consumption of water, fruit, chips, vegetables and sugar. The mechanism of seamless change was most prevalent for the changes in the intake of tea, coffee and alcohol. Imposed change was the most prevalent mechanism for the change in eating out. The changes in the consumption of meat were reported to occur almost equally frequently through the accumulation and the seamless change. The changes in eating home cooked food were also reported to occur with almost equal frequency through two mechanisms: accumulation and imposed change (see Table 4).

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### **Prevalence of mechanisms of dietary change in the last 5 years**

Of the participants who reported changes in their diet in the last 5 years the majority reported changing their diet through the mechanism of accumulation in the consumption of water, fruit, vegetables, chips, sugar fizzy drinks and eating fried food. seamless change was reported as most prevalent in the consumption of tea, coffee, alcohol and eating out. Eating home cooked food and eating takeaways was prone to change though the mechanism of imposed change (see Table 5).

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### **Prevalence of mechanisms of dietary change since childhood**

The most prevalent changes were recorded in the consumption of tea, coffee, alcohol, eating out, eating takeaways, sugar and eating ready meals through the mechanism of seamless change. High prevalence of changes was also reported in the consumption of water and chips through the mechanism of accumulation (see Table 6).

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### **Prevalence of dietary changes in three categories of consumption and through four mechanisms calculated as a sum of three time periods: in the past year, the last 5 years and since childhood**

The number of counts on the questionnaires revealed that across lifespan the changes in the category of food intake were the most prevalent through the mechanism of accumulation (42.9%); in the category of drinks consumption and food preparation method they were most prevalent through seamless change (47.4% and 34.7% respectively). Results are shown in Figure 1.

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### **Prevalence of dietary change within active and passive paths**

The level of prevalence of dietary changes within active and passive path was very similar with 49.28% reported changes for the active Path changes and 50.72% reported changes for the passive Path changes (see Table 7).

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### **Dietary change and age**

The differences in scores for participants who belonged to different age brackets and who reported No Change in their diets across lifespan were found statistically significant at the  $p < .05$  level [ $F(3,400) = 8.061, p = .0001$ ]. The effect size was moderate (eta squared = .05). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for participants who were older than 56 years ( $M = 28.98, SD = 8.31$ ) was significantly different from the participants who were 30 years old and younger ( $M = 22.97, SD = 10.03$ ), who were 31- 39 old ( $M = 24.87, SD = 9.46$ ) and who were 40-56 years old ( $M = 23.80, SD = 9.91$ ). These results

indicate that the participants who were older than 56 years were less likely to make dietary changes than the participant in the other age groups.

### **Dietary change and education level**

The differences in scores for participants who reported different education level and who reported No Change in their diets across lifespan were found statistically significant at the  $p < .05$  level [ $F(3,400) = 4.236, p = .006$ ]. The effect size was small ( $\eta^2 = .03$ ). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for group that reported education level as ending before 15 ( $M = 30.23, SD = 8.99$ ) was significantly different from the groups that reported education ending at 17-18 ( $M = 24.01, SD = 8.95$ ) and education 19+ ( $M = 24.60, SD = 9.84$ ). These results indicate that the participants with lower levels of education were less likely to make changes in their diet across lifespan than the participants with higher levels of education.

### **Dietary change and self reported changes in weight**

The differences in scores for participants who reported weight changes in the past year and dietary change through the mechanism of accumulation were found statistically significant at the  $p < .05$  level [ $F(2,401) = 6.258, p = .002$ ]. The effect size was small ( $\eta^2 = .03$ ). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for group that reported weight changes in the past year as *none* ( $M = 5.33, SD = 5.96$ ) was significantly different only from the group that indicated a decrease in their weight in the past year ( $M = 8.11, SD = 7.51$ ). These results indicate that the participants who reported weight loss in the past year were

more likely to make diet changes through the mechanism of accumulation than the participants who reported their weight being stable in the past year.

The differences in scores for participants who reported weight changes in the past year and dietary change through the mechanism of imposed change were found statistically significant at the  $p < .05$  [ $F(2,401) = 5.507, p = .009$ ]. The effect size was small ( $\eta^2 = .02$ ). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for group that reported weight changes in the past year as *none* ( $M = 2.26, SD = 3.79$ ) was significantly different only from the group that indicated an increase in their weight in the past year ( $M = 4.06, SD = 6.28$ ). These results indicate that the participants who reported weight increase in the past year were more likely to make diet changes through the mechanism of imposed change than the participants who reported their weight being stable in the past year.

## **Discussion**

This study aimed to establish the prevalence of dietary change across the lifespan in a community sample. The results revealed that prevalence of making no changes was higher than that of making changes but only 4 out of 404 participants reported not making a single dietary change across their lifespan. All other participants (99%) reported making at least 3 or 4 small dietary changes some time during their life.

These results demonstrate the fluidity of dietary behaviour and pose the question of why so many studies do not detect dietary change either in general population (e.g. Kumanyika, Bowen, Rolls et al., 2000) or in the control groups in randomized control trials (e.g. Howard, Manson, Stefanick, et al., 2006)? It is possible that

existing dietary measures are not sensitive enough to show the changes. However, changes have been recorded in studies that track dietary behaviour (Macdonald, New, and Reid, 2005; Newby, Weismayer, Åkesson, et al., 2006; Borland, Robinson, Crozier, et al., 2008). These studies suggest that across adult life, individuals are likely to change their diets in terms of food groups i.e. fruit, vegetables, meat, dairy, cereals, etc, but these changes do not seem to impact on the whole food patterns or nutrient intake. Indeed the present study also demonstrated dietary change in terms of food groups.

### **The most prevalent dietary changes**

The most prevalent dietary changes across the lifespan were related to eating more fruit and vegetables; eating less meat, chips and fried food; drinking more water and drinking fewer fizzy drinks. These changes reflect participants' awareness of current guidelines for healthy eating promoted by the UK and US governments (Department of Health; Healthy People 2010). The most prevalent changes since childhood related to eating out more as well as eating more of takeaways and ready meals. The category of 'ready meals' used in the study's questionnaire was chosen to represent a broader category of 'convenience food'. The latter has been defined as food that allows consumer to save time on planning, shopping, preparation and clearing up after a meal (see review: Buckley, Cowan and McCarthy, 2007). The increased trend in eating out in the lives of these participants reflected change in lifestyle generated by the transformation of the cultural and economic context in the UK post Second World War. (e.g. Warde, Martens and Olsen, 1999; Cheng, Olsen, Southerton and Warde, 2007).

### **Active path versus passive path changes**

Both male and female participants regardless of their self-reported weight declared making active dietary changes and experiencing passive dietary changes with an almost equal frequency. However, across all demographic features of the study sample, the most prevalent mechanism of dietary change reported in the time period of the past year was accumulation.

Within the answers that indicated dietary changes across lifespan, a very slight majority of changes (50.7%) were made through the passive path. These results indicate that both passive path and active path changes happen almost in equal measures when all counts of dietary changes across three time points are taken into consideration. It does not mean, however, that each participant reported passive and active changes in equal measure. Indeed, for some participants these changes may have happened mostly along only one of the paths. These differences may imply diversity in self-regulatory styles. The concept of active and passive path could be compared with the concept of the effortful, goal-orientated behaviour (for review see Scheier and Carver, 2003) and habitual behaviour (for review see Wood, Quinn and Kashy, 2002). In this context, the active path changes could be interpreted as denoting the individuals' self-regulatory style that favours conscious effort towards goal attainment, while passive path would include habitual behaviour but also other processes – unintentional behaviour that has been triggered by the internal and external cues. The internal cues would be the changes in personal taste, the ability to digest food satisfactorily and individual's mood. The external cues would come from the changing environment i.e. diversity of available produce, the promotion of ready meals and ubiquity of fast food outlets.

Indeed, this study provided some evidence for the presence of different self-regulatory styles in making dietary changes. In the time period of the past year, the participants who reported weight loss were more likely to make dietary changes through the mechanism of accumulation than those who reported their weight remaining stable. In the same time period, the participants who reported weight increase were more likely to experience imposed changes to their diet than the participant who reported their weight remaining stable. These results implied that the weight changes in the past year seemed to be strongly correlated with a particular mechanism of dietary change. Those who reported accumulation (within active path) as the most prevalent mechanism in their dietary change seemed to be crediting their weight loss to their own efforts while those who gained weight in the past year through the reported mechanism of the imposed change (within passive path) seemed to hold responsible the circumstances in which they found themselves.

### **The prevalence of the four mechanisms of dietary change**

The seamless dietary changes seemed to be most prevalent (36.1%) followed by changes through the mechanism of accumulation (34.1%). There were no significant differences between any of the four of the mechanisms of change and participants' sex, weight, ethnicity, place of birth or 'living with' status. The participants who were older than 56 years, who were in the lowest income group and/or had lowest level of education, were least likely to change their diet as a result of imposed changes. The last result was counter-intuitive as one could easily speculate that those participants who declared low income and low level of education would find that their circumstances imposed changes on their diet.

## **Strengths and Limitations**

This study drew on a large, community based sample of great diversity in terms of the ethnic, educational and socioeconomic background. The results provided a support for the model of dietary change proposed by Chapman and Ogden (2009). The results also confirmed that the participants regardless of their education or income level were aware of the current dietary guidelines and that they were trying to incorporate them in their diets.

The researchers' choice of categories to include in the questionnaire (fruit, vegetables, meat, etc) emerged from the qualitative study (Chapman and Ogden, 2009). The categories for the present study needed to be kept simple for two reasons: to be understood by a diverse population sample, and to make the questionnaire quick to fill in due to limited time available to the participants before their doctor's appointment. This meant that some aspects of dietary changes could not be included. The participants commented that there was no opportunity for them to state that they do not and never had e.g. drunk alcohol, fizzy drinks, ate chips, etc.; that the changes in portion sizes were not included as well as changes in intake of bread, pasta, nut, dairy, probiotic drinks, ice cream, fat, fibre and/or salt.

The intended simplicity of the questionnaire could not accommodate all nuances of dietary changes. The participants' queries concerned the aspects of gradual and sudden change (within active path). For example, for some participants becoming a parent was perceived as a trigger for making healthy dietary changes while for others

it seemed to be a gradual process of realising the scope and importance of new responsibilities that would have to include dietary changes (accumulation). Other difficulties in coding occurred when participants reported that they changed consumption of an item in terms of both quantity ('I eat more/less') and quality ('I eat different kind'). The changes in financial circumstances that impacted on participants' diet could also be coded as an imposed change or seamless change. In these cases, the researcher was striving to establish which of the changes were more significant for a participant and then to code them accordingly.

### **Conclusion**

Dietary change appears to be a frequent occurrence in the lives of both men and women regardless of their socioeconomic or ethnic background. Dietary change reflects individuals' adaptations to the changing environment and their different personal self-regulatory styles. Say something here about the active and passive paths and the different mechanisms ie which were more common The disappointment of a recent weight gain is often seen as caused by the undesirable changes in the external environment or personal circumstances while the success of the recent weight loss is attributed to the personal conscious efforts.

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