Implicit theories of the causes of weight gain in adults

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Abstract

This study sought to explore the range of beliefs about weight gain and whether these beliefs varied according to personal weight management history. A questionnaire specifically designed for the study was completed by 376 participants (94 males, 282 females; mean age 43.65 years, SD=13.24). Principal component analysis identified five causal attribution factors which were interpreted as Lack-of-Self-Control, Lifestyle-Limitations, Psychological, Biological/Medical, and Modern-Living. The level of endorsement for these causal attribution factors suggested an acknowledgement of the multiple causes to weight gain. However, the most highly endorsed factor, Lack-of-Self Control, reflected the "commonsense" view of weight gain being a matter of overeating, under-exercising and lacking in self control. Personal weight management history was found to be associated with variations in beliefs with the more effort one had applied to weight management; the more highly they endorsed causes both within and outside of individual control.

Keywords: implicit theories, causal explanations, weight gain, obesity.

Introduction

Obesity is considered a worldwide epidemic (World Health Organization [WHO], 2000) with over half the adult population in many countries classified as either overweight or obese (Bovbjerg, 2008; Lim, Norman, Clifton, & Noakes, 2008; Thorburn, 2005). Overweight and obesity are widely recognized as being associated with enormous psychological, health, and economic costs, both on individual and national scales (Stroebe, 2008). More recently it has been recognized that such costs occur with any level of weight gain. Increases in body weight of less than five kilograms have been found to be associated with increased disease load, with the associations occurring even within the healthy BMI range (Lim, et al., 2008; WHO, 2000). This has contributed to the WHO's (2000) decision to advocate the prevention of weight gain in adults as the key strategy in managing obesity. This strategy aims to prevent initial weight gain in normal weight adults, as well as preventing further weight gain in those who are already overweight or obese. At an individual level, prevention of weight gain is quantified as gain of less than five kilograms across adulthood (B. A. Swinburn, et al., 2004).

Prevention of weight gain has now become a focus of public discussion and debate, with numerous theories of causes and solutions in the public arena (Faith, Fontaine, Baskin, & Allison, 2007). Individual changes are often asserted as solutions (Lombard, et al., 2009) along with a range of population scale strategies which include education campaigns to raise community awareness about the importance of healthy eating, healthy weight and physical activity; changes to urban design and land use to encourage physical activity; and reshaping the food supply to increase access to healthy food, restrict access to unhealthy foods and a regulation of the sugar, fat, and salt contents of foods (NOTF Obesity Working Group, 2009).

Understanding the beliefs and attitudes regarding weight gain held within the community is extremely important for the acceptance and successful implementation of population-level interventions aimed at reducing weight gain (Lombard et al., 2009). Personal beliefs and attitudes about a psychological problem constitute an implicit theory (or explanatory model). An implicit theory contains the individual's understanding of the causes of the problem, the expected course and prognosis. Implicit theories arise from the individual's personal experiences, but are primarily mediated by the individual's social and cultural environment (Furnham, 1988). Many reasons for exploring implicit theories have been identified, particularly within a public health framework. The theories held by lay people may contain elements that have been previously overlooked by the scientific community. In addition, the experience of lay people may place them in a position to identify flaws and shortcomings in current scientific theories or models (Entwistle, Renfrew, Yearley, Forrester, & Lamont, 1998; Popay & Williams, 1996). Addressing such differences between lay knowledge and scientific research also helps to increase the community's perception of the relevance of research and its resulting policy, and hence the acceptance of interventions (Popay & Williams, 1996).

Various studies have examined the beliefs about obesity amongst lay and professional groups such as doctors, nurses, dieticians, and teachers. These studies have generally found that most people did recognize multiple factors as contributing to obesity, but were more likely to recognize factors within the individual's control. For example, Ogden and Flanagan (2008) in their comparison of general practitioners and lay people found that behavioral causes of obesity (e.g., not enough exercise, eating too much, and too many unhealthy foods) were most strongly endorsed in both groups. Social causes of obesity such as a lack of education, and biological causes, were not strongly endorsed by either group.

Okonkwo and While (2010), in a study involving University students, found reduced physical activity and the promotion and low cost of fast foods to be strongly endorsed, with genetics receiving the lowest endorsement.

However, they found that participants who were overweight and obese were more likely to endorse genetics and the high costs of fruit and vegetables as causes of obesity. This suggests those who have experienced weight gain are more likely to have greater awareness of factors outside of individual control.

Physical inactivity, eating too much of the wrong foods, and mood changes leading to overeating were again found as the most strongly endorsed causes of obesity in a study of beliefs held by British dieticians (Harvey, Summerbell, Kirk, & Hills, 2002), with biological factors again being least endorsed. This study also sought to determine differences in beliefs about obesity compared to overweight. It was found that the dieticians held similar causal beliefs for both overweight and obesity, but that obese people were seen as more responsible for their weight than were overweight people.

These studies provide insight into beliefs about obesity amongst both lay and professional populations. However, obesity is a recognizable medical condition that refers to an excess of body fat (C. L. Ogden, Carroll & Legal, 2003). Obesity has also often been conceptualized as a biological deviation from the 'normal' healthy state (Jutel, 2006). In contrast, weight gain is less visibly recognizable, is susceptible to fluctuations over the lifespan and affects a larger proportion of the population. Furthermore, individuals may fail to recognize their own weight gain over time and fail to recognize their weight problems (Ziebland, Thorogood, Fuller & Muir, 1996). Consequently, implicit theories about weight gain may be different to those of obesity.

One of the few studies to examine the issue of weight gain was conducted by Jackson, Ball & Crawford (2001) who examined the beliefs about the causes of personal weight gain and loss. The causes were assessed through open answer responses. However, categories for response coding were limited so that a full assessment of causal theories was not possible. Despite this, they found that over one third of participants had gained weight over the previous 12 months, and fewer than half of these acknowledged changes in the amount of food or activity alone as a cause of their weight gain. Other causes given were changes in food type, medical conditions, growth, ageing, and "no special reason".

Paxton and Sculthorpe (1999) examined the issues of weight and weight gain by using the Dieting Beliefs and health locus of control scales and found that beliefs about weight varied according to socioeconomic status and weight. They found that the low SES group was more likely to recognize the influence of factors outside the individual's control (e.g., luck, genes) and environmental factors on weight compared to those in high SES. The authors partly attributed this finding to the limited access to resources faced by the low SES group (Paxton & Sculthorpe, 1999). Consistent with Okonkwo and While's (2010) study, overweight participants were more likely to endorse factors outside of the individual's control as well as environmental factors compared to normal weight participants. However, they were also more likely to hold the belief that weight is internally controlled. The authors suggest that this higher endorsement of both internally controlled and externally controlled factors may result from both an increased sensitivity to the individual focus of weight loss campaigns, as well as an unsuccessful dieting history, although long term history was not examined.

The current study sought to conduct a more comprehensive examination of the range of beliefs/attitudes about weight gain in adults by using questionnaire items generated from both the general public and the literature on obesity and weight gain. Previous research have used limited number of items and/or predetermined summed categories/scales imposed by the researchers, thereby limiting the ability of these studies to fully explore causal beliefs held by the general community. The current study also examined whether implicit theories of weight gain differed on the basis of personal weight management history. Studies on weight loss intervention have reported that overweight individuals viewed their weight problem as arising from their own motivation and physical shortcomings or as a response to specific issues or challenges in their lives (Greener et al., 2010).

Method

Participants

The participants (N= 376; 94 males, 282 females; mean age = 43.25, S.D. = 13.64) in the main study were recruited from regional (e.g., Cobar, Dubbo, Parkes,) and metropolitan areas of Australia (e.g., Adelaide, Melbourne, Sydney) through a snowball sampling approach and random distribution of the questionnaire in shopping areas in a major regional centre in central western New South Wales (e.g., Bathurst, Orange).

Materials

The items to be included in the questionnaire were developed from both a pilot study and a literature review. Twenty participants (11 females, 9 males), took part in the pilot study. The age range was 18-74 years, (mean=38.00, SD=14.51), with participants from both regional and metropolitan areas. Each participant was interviewed individually and asked to provide possible causes of weight gain in adults. Any causal belief identified by two or more participants were phrased into a questionnaire item and included in the final questionnaire. The resultant items were supplemented by items drawn from the literature including government publications and policy documents (e.g., NOTF, 2006; NOTF Obesity Working Group, 2009; National Preventative Health Taskforce, 2010; Smith, et al., 2005; WHO, 2000; WHO, 2002); previous studies that have explored beliefs about weight management, weight gain, and obesity (e.g., J. Ogden & Flanagan, 2008; Okonkwo & While, 2010); and current literature that examine scientific theories of weight gain and obesity (e.g., Eby & Colditz, 2008; Faith, et al., 2007; Greener, et al., 2010; Lombard, et

al., 2009; Stroebe, 2008; B. Swinburn & Egger, 2004; B. A. Swinburn, et al., 2004).

The final questionnaire listed 42 causal items of weight gain. Participants were asked to rate the importance of each causal item on a six point scale (not at all important to extremely important). Demographic information regarding gender, age, location, education level, current weight and height were also obtained. Weight gain was defined in the questionnaire as a gain of more than 5kg above the participant's usual body weight. Participants were also asked about unplanned weight gain, years spent on weight management, degree of effort in weight management.

Procedure

Participants recruited using the snow-ball sampling approach were given the choice of paper-based or electronic questionnaires. Envelopes were provided with the option of returning directly to the researcher, or through prepaid post. Participants recruited in shopping areas were given the option of completing the questionnaire at that time or at a later time. Those completing the questionnaire at the shopping area were provided with a sealable envelope to ensure anonymity and confidentiality. Reply-paid envelopes were supplied to shoppers who chose to complete their questionnaire at a later time. Questionnaires were distributed over a three week period across a variety of days and times in an effort to include shoppers from a variety of backgrounds. The questionnaire took approximately 15-20 minutes to complete. Return of the completed questionnaire was taken as indication of consent. The overall return rate of paper-based questionnaires was approximately 47%.

Results

Preliminary analyses.

Participant's postcode and suburb were used to classify participants as located in a major city, inner-regional, or outer-regional/very remote according to the Australian Standard Geographical Areas - Remoteness Structure developed by the Australian Bureau of Statistics (ABS). Socioeconomic status was calculated according to postcode percentile rankings within Australia using the ABS Socioeconomic Indexes for Areas (SEIFA) data cube 2006. Current BMIs were calculated using reported height and weight. The planned tests were quite robust to violations of distribution, however where skewness was severe appropriate transformations were conducted and transformed data used for analyses. No significant differences were obtained between the participants using electronic and paper versions of the questionnaire with regards to mean factor ratings.

Main Analyses.

A principal component analysis was conducted on the ratings of the 42 causal items. A Velicer's minimum average partial test (MAP) (Zwick & Velicer, 1986) was used to determine the number of components to be extracted. Varimax rotation was applied to determine orthogonal factors and enhance interpretability. Only those items with factor loadings greater than 0.30 were included. To further enhance the uniqueness of the factors, items with similar loadings (+/-.20) on multiple factors were excluded from the factors and any further interpretation. Mean factor scores were calculated using a sum of scores by factor divided by the number of items (DiStefano, Zhu, & Mîndrilă, 2009).

A five-factor solution was extracted from the data which accounted for 50.57% of the variance. Fifteen items were excluded from further analysis due to similar loadings on two or more factors (see Table 1). The first factor, labeled *Lack-of-Self-Control* (Cronbach's α=.81), accounting for 12.19% of the variance, consisted of 8 items relating to a lack of control of diet and exercise. Labeled *Lifestyle-Limitations*, the second factor accounted for 11.37% of the variance and included 5 items (Cronbach's α=.76). These items reflect the impact of the higher cost of healthy eating, the influence of long and irregular work hours. This factor also included a lack of awareness of the effects of current lifestyle on weight gain. Explaining 10.63% of the variance, the third factor consisted of 6 items (Cronbach's α=.85). This factor was labeled *Psychological* to reflect the content of the items (i.e., depression, stress and low self-confidence). This component also included the ageing item (i.e., Normal part of growing older). The fourth factor was labeled *Biological/Medical* and its items related to hormonal, metabolic and medication-related causes. Consisting of 4 items (Cronbach's α=.80) it explained 8.27% of the variance. The final factor, explaining 8.11% of the variance, was labeled *Modern-Living* (Cronbach's α =.72). This consisted of 4 items reflecting the reduction in physical activity through the use of cars, modern appliances, and electronic entertainment as well as the recent surge in the "diet" food industry.

Mean factor scores were calculated and are presented in Table 1 with mean item ratings (and standard deviations), the corresponding overall item ranking, and the rotated component loadings. Higher mean scores reflect a greater degree of endorsement in causing weight gain. *Lack-of-Self-Control* was regarded as the most important causal factor with its eight items being the top eight ranked items based on means. Although still acknowledged as important, lower means were found for the other causal attribution factors. Pair-wise comparisons were conducted with a Bonferroni adjustment for the ten possible comparisons resulting in a critical α=.005. The comparisons confirmed that *Lack-of-Self-Control* was rated as significantly more important compared to the remaining factors (all $ts > 20.69$, $p < .0001$). The ratings of the remaining causal attribution factors did not differ from each other (all $ts < 1.92$, $p > .05$).

Mean ratings for each factor were compared according to demographic and weight history. A Bonferroni correction was applied to reduce family-wise error rate across the five causal attribution factors resulting in a critical α=.05/5=.01. Independent samples t-tests showed that females rated the

importance of *Lifestyle-Limitations* higher than did males t(365)=-3.06, p=.002, *d*=0.39. Females also rated the factors of *Psychological* and *Biological/Medical* as more important as causes of weight gain than did males t(372)=-3.56, p<.001, d=0.43; and t(361)=-3.38, p=.001, d=0.41, respectively.

A one-way ANOVA showed an effect for location for the factor of *Modern-Living*[1], F(2, 367)=9.88, p<.001, η^2=.05. A Tukey's post-hoc analysis (adjusted for uneven group sizes–Tukey-Kramer) with a critical α=0.1/3=.003 to adjust for the three possible pair-wise comparisons, showed that those residing in major cities rated *Modern-Living*[1] as significantly less important that did those residing in either inner-regional or outer-regional/remote areas. A significant difference was also found for location for the *Lack-of-Self-Control*[1] component, F(2, 367)=5.75, p=.003, η^2=.03. Post hoc analysis showed that those residing in inner-regional areas rated this factor as being significantly more important than those in major cities.

Correlations (all two tailed) showed that age was weakly associated with *Modern-Living* r(243)=.180, p<.001, R^2=.03; with increasing age reflecting increased importance placed on *Modern-Living* as a cause of weight gain. A greater degree of effort in weight management was related to greater endorsement of the *Lack-of-Self-Control* factor r(304)=.26, p<.001, R^2=.07. Increasing amount of effort was also associated with increasing importance attributed to the *Lifestyle-Limitations* factor; r(300)=.21, p<.001, R^2=.04; and the *Psychological* factor, r(304)=.23, p<.001, R^2=.05. Similarly, the longer the amount of time spent actively managing weight the greater importance attributed to the *Psychological* factor, r(244)=.20, p=.002, R^2=.04.[1]

Discussion

The aim of the current study was to explore the implicit theories held about weight gain and how these vary according to demographics and personal weight management history. Five factors were obtained to explain causes of weight gain. These were *Lack-of-Self-Control, Lifestyle-Limitations, Psychological, Biological/Medical,* and *Modern-Living.* Overall, the level of endorsement for these factors indicated that they were recognized to some degree as being important; however, the *Lack-of-Self-Control* factor was regarded as the most important in causing weight gain. This factor reflects the "commonsense" view of weight gain with its individual focus of eating too much, not exercising enough, and being lazy or lacking in self-control. The high importance attributed to this factor is consistent with obesity studies in which the most endorsed causes are those regarded to be under individual control (Harvey, et al., 2002; J. Ogden & Flanagan, 2008; Okonkwo & While, 2010).

The *Modern-Living* and *Lifestyle-Limitations* factors recognized social and environmental changes that have impacted on current lifestyles. The *Modern-Living* factor incorporated recent increases in the use of technology such as modern appliances, electronic entertainment, and cars as well as the recent increase in availability and consumption of "diet" foods. The *Lifestyle-Limitations* factor acknowledged the contributions to weight gain through time difficulties associated with long and/or irregular working hours, high costs of healthy food relative to unhealthy foods and lack of awareness of the effects of current lifestyle.

The final two factors of the current study reflected individual level causes, but those generally recognized as being outside of individual control. The *Psychological* factor included the effects of emotional issues such as depression and stress, as well as ageing on weight gain. Hormonal and metabolic issues and medication effects were expressed in the *Biological/Medical* factor.

The current study also examined how the beliefs about weight gain varied according to demographics characteristics. Females compared to males, regarded the factors of *Lifestyle-Limitations*, *Psychological*, and *Biological/Medical* as being more important in causing weight gain. Increasing age was found to be associated with increasing endorsement for the *Modern-Living* factor as a cause. Unlike previous studies on obesity, no differences were found according to SES or education level.

Some differences were found in the level of endorsement for the causal attribution factors on the basis of location. Those participants living in major cities rated *Lack-of-Self-Control* as less important compared to those living in inner-regional areas. Those in major cities also rated *Modern-Living* of lower importance than did those living in regional and remote areas. These differences may reflect differences in lifestyle and/or limited resources/options available to those living in regional areas of Australia. For example, limited public transport services and centralization of services in regional areas may have increased the reliance on cars and other technologies leading to a greater awareness of the impact of modern living amongst this population.

The current study also sought to examine whether beliefs about weight gain would be associated with the personal experiences of weight management, with those who have experienced unplanned weight gain and unsuccessful weight management more likely to recognize the role of factors involved in weight management that are outside the individuals control than are those who have not experienced such weight difficulties. However, endorsement of the causal attribution factors did not differ on the basis of whether or not one had experienced unplanned weight gain or on whether one had actively managed their weight. Current BMI was also not associated with the levels of endorsement for any of the causal attribution factors. Instead, this study found that greater time spent (in years)

[1] These factors suffered skewness. These were transformed using logarithms, inverses and SQRT as appropriate for statistical tests with t and F statistics reported for transformed data.

Table 1. Rotated factor item loadings, means, standard deviation and rankings for the five causal attribution factors of weight gain.

Factor labels and items	*Mean*	*SD*	*Rank*	*1*	*2*	*3*	*4*	*5*
(1)**Lack-of-Self-Control** (Cronbach's α=.81)	4.22	0.66						
Eating the wrong types of foods.	4.49	0.87	2	**.68**				
Eating more food than you need	4.50	0.86	1	**.63**				
Not enough physical activity/exercise.	4.42	0.92	3	**.61**				
Lack-of-Self-Control.	4.09	1.07	6	**.59**				
Eating too many convenience foods/take away.	4.13	1.10	5	**.58**				
Enjoying high fat/high sugar "bad" foods.	4.30	1.01	4	**.54**				
Too much snacking.	3.84	1.05	8	**.54**				
Being lazy.	3.97	1.19	7	**.54**				
(2)**Lifestyle-Limitations** (Cronbach's α=.76)	3.12	0.98						
Lack of awareness of problems with current eating/exercise habits.	3.13	1.29	20		**.63**			
Working long hours.	3.16	1.41	19		**.58**			
Low price of high fat/ high sugar foods compared to fruit and vegetables.	3.24	1.35	16		**.57**			
Shift work/irregular working hours.	2.92	1.44	25		**.56**			
High costs of healthy foods (e.g., fruits, vegetables, grains, lean meat).	3.16	1.42	18		**.51**			
(3)**Psychological** (Cronbach's α=.85)	3.20	1.00						
Poor self-confidence	2.94	1.31	24			**.70**		
Loneliness/social isolation.	3.31	1.40	14			**.60**		
Low self-esteem.	3.30	1.32	13			**.59**		
Depression.	3.39	1.40	12			**.58**		
Stress.	3.47	1.27	11			**.57**		
Normal part of growing older (i.e., aging)	2.80	1.25	26			**.53**		
(4)**Biological/Medical** (Cronbach's α=.80)	3.12	1.08						
Medical conditions – e.g. thyroid problems.	3.25	1.43	15				**.75**	
Side effect of medications.	3.05	1.38	22				**.73**	
Hormonal/pregnancy related changes in metabolism.	3.19	1.39	17				**.70**	
Slow metabolism.	3.00	1.28	23				**.60**	
(5)**Modern-Living** (Cronbach's α=.72)	3.19	0.95						
Increased use of modern appliances rather than manual labor e.g. ride on mowers, remote controls	3.11	1.30	21					**.69**
Increased use of cars over walking/cycling.	3.49	1.20	10					**.69**
Increased participation in sedentary leisure activities (e.g. TV, computers & electronic games)	3.67	1.21	9					**.64**
Eating too much of 'diet' 'low fat' 'fat free" foods.	2.50	1.43	27					**.43**

Fifteen items excluded from analysis due to similar loadings on two or more factors:

Emotional 'comfort' eating	Too much soft/fizzy drinks	Too much alcohol
Larger portion sizes.	Increased consumption of refined/processed foods	A lack of nutritional knowledge
Poor family eating habits	Confusing other cues with hunger (e.g., boredom, thirst)	Disruptive life-events (e.g., divorce, grief)
Genetic factors	Giving up smoking	Lack of time for meal planning
Lack of physical activity at work	Advertising and marketing of unhealthy foods	Eating too little of 'diet', 'low' fat, 'fat free' foods

managing weight was associated with more importance being attributed to the *Psychological* factor. Greater effort on weight management was also associated with higher endorsement of the *Lack-of-Self-Control*, *Lifestyle-Limitations*, and *Psychological* factors. This suggests that increased effort in weight management is associated with increased recognition of a wider range of causes to weight gain which can be both within and outside of the individual's control. This is consistent with the findings reported by Paxton and Sculthorpe (1999) in overweight/obese women and by Greener et al. (2010) in participants with an unsuccessful dieting history. Both of these studies reported that these individuals attributed their weight problem to personal short-comings but were also aware of environmental pressures outside of the individual's control. The current finding also suggests that the amount of effort expended on weight management may provide a better account of relevant weight history than actual weight gain or loss.

The current findings suggest that, in general, the community as a whole needs greater levels of education about the contribution of factors outside the control of the individual in causing weight gain. Educating the general public of the multiple contributing factors to weight gain would also lead to greater acceptance of population-level strategies that are not specifically targeted towards those who are already overweight or obese. This is particularly relevant given the consistency between the current findings about weight gain and beliefs about obesity reported in previous studies.

It should be cautioned that the current findings do not reflect causality. Other limitations of the current study include unequal group sizes within the location, SES and education categories which may have impacted on the number of significant differences obtained. For example, only 25% of the sample was male despite the researchers' efforts at recruiting more male participants. This study was also based on self-report, possibly tapping into a social-desirability bias. However, the anonymous nature of the questionnaire should have assisted in reducing this bias.

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