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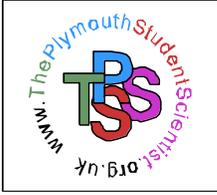
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# **An Analysis of Dieting Methods, Fruit and Vegetable Intake, Weight Perceptions and Family Meals, in Female Adolescents**

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## **Abstract**

**OBJECTIVES:** The overall aim of the study was to examine relationships between dieting, ethnic origin and fruit and vegetable intake in adolescent girls, and to determine any difference in fruit and vegetable intake and eating with the family during the week and at weekends.

**SUBJECTS:** A total of 823 female subjects participated in the study. The age range was between 12 – 16 years. 52.7% were White, 9.8% were Mixed race, 18.5% were Asian, 15.6% were Black and 2.1% were of another (Other) ethnic origin. All subjects attended low-income group schools in London and Coventry.

**METHODS:** Two separate visits by Investigators were made to the schools and subjects completed two questionnaires. The 'Healthy Eating Questionnaire' assessed subjects' personal details, meal patterns and fruit and vegetable intake. The 'Diet Questionnaire' was completed on the second visit and assessed self-perceptions of body weight, current dieting and methods of weight loss.

**RESULTS:** White girls had a higher vegetable intake than Black girls ( $p<0.001$ ) and Mixed race girls had a higher vegetable intake than Asian girls ( $p=0.036$ ) and Black girls ( $p<0.001$ ). A significant difference ( $p<0.05$ ) was found between both daily fruit and vegetable intake and eating with the family during the week. A significant difference was also apparent between daily vegetable intake and eating with the family at weekends.

**CONCLUSIONS:** The research highlights that adolescent females could be lacking in adequate nutritional intake, during a period when nutrient needs are high and when eating patterns for adulthood are being established. Research has demonstrated that children as young as 12 are restricting their energy intake. Results showed differences between ethnic origin groups and estimated vegetable intake. Eating meals with the family is strongly associated with an increase in fruit and vegetable intake in female adolescents.

**Keywords:** Dieting, nutritional intake.

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## Introduction

A slim physique is at the forefront of media related beauty. The diet industry in the USA had annual revenue in 1990 of over \$30 billion (Marketdata Enterprise Incorporated 2006). Adolescent females are particularly conscious of their body image and appearance which is significantly influenced by the media (Mooney et al. 2004). A study by Wong and Huang (1999) of female students found that 51.4% perceived themselves as being overweight or obese, when the actual figure was only 16.2%; this highlights concerns regarding unnecessary dieting, energy restriction and the risk of inadequate nutritional intake (Bashour 2004).

As well as body image, the increase in prevalence of obesity amongst children and adolescents has fuelled interest in dieting to lose weight. The Health Survey for England (2004) state that from 1995 to 2004, obesity in boys increased from 14% to 24% and 15% to 26% for girls. Approximately, one in four 11 to 15 year olds was classified as obese (The Health Survey for England 2004). Childhood obesity in the USA is highest in some ethnic minority groups (Figure 1) and evidence is supporting this fact in Europe (Reilly and Wilson 2006). Research has also shown that children born in to low-income families are more at risk of being overweight (British Medical Association (BMA) 1999).

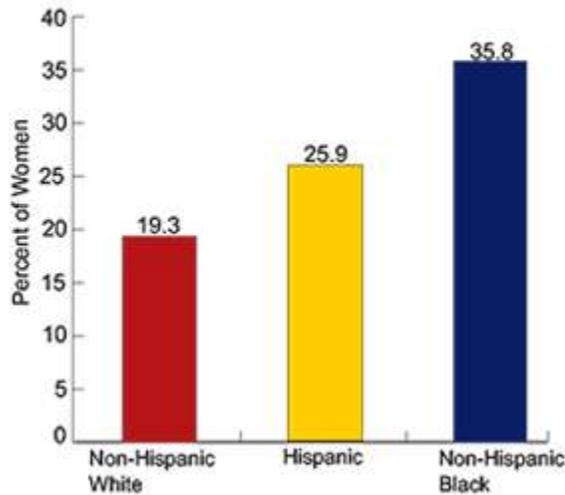
Despite reoccurring evidence that adherence to diets is low and may even instigate weight gain in the long term, dieting remains common amongst females

(Field et al. 2003; Wardle 1996). A study by Malinauskas et al. (2006) found 83% of subjects studied used dieting for weight loss. Commercial weight loss programmes appear attractive to adolescents as a quick fix to losing weight (Daee et al. 2002), although data on their comparative effectiveness is limited (Freedman et al. 2001). Malinauskas et al. (2006) found the two most common commercial diets were Atkins and WeightWatchers; Dr Atkins, 'New Diet Revolution' book has sold more than 10 million copies (Atkins 1999) and WeightWatchers has approximately one million members (Truby et al 2006). Low-carbohydrate/high-protein/high-fat diets (Atkins Diet) are popular as they exclude hunger and promote increased initial weight loss (Daee et al. 2002), however despite the amount of fat and protein foods consumed, a state of dietary ketosis is achieved (Daee et al. 2002). Daee et al. (2002) reviewed the prevalence of weight loss and weight loss methods in adolescents, although each category of weight loss method was very broad, making exact prevalence of individual methods indefinable.

**Figure 1. Prevalence of Obesity in different ethnic origins**

**Self-Reported Prevalence of Obesity Among Women Aged 20 Years and Older, by Race and Hispanic Origin, 2000 (Age-Adjusted)**

Source (11.9): National Health Interview Survey



*\*Age-sex-race/ethnicity adjusted to the 1990 U.S. population.*

Source: Health Status. Obesity.

Dieting to lose weight amongst adolescent females is most prevalent at 13-14 years of age through to adulthood (Huon and Lim 2000). Adolescents who diet may have delayed linear growth, delayed pubarche (Pugliese et al. 1983) and an increased risk of obesity later in life (Stice et al. 1999). Dietary frequency in adolescents has been associated with negative body image, emotional stress and behaviour problems (French et al. 1995). Female adolescents who have moderately dieted are five times more likely to develop eating disorders than non-dieters (Malinauskas et al. 2006). A significant negative correlation in adult females, between bone mineral density content and frequency of dieting was

found in a study by Bacon et al. (2004). Daee et al. (2002) found 10%-27% of adolescents used unhealthy and possibly dangerous methods of weight loss. The promotion of healthy eating following the Health Education Authority 'Balance of Good Health' guide (2001) provides the opportunity to develop healthy eating habits, which is better than restricting diets (Edmunds et al. 2001). Most adolescents do not consider the long-term consequences of poor dietary habits but believe they can make changes later in life (Gregory et al. 2000, The National Diet and Nutrition Survey NDNS).

An increase in consumption of fast foods, sweetened drinks and sugary foods in children and adolescents is also apparent; on average, children in the UK are eating over the recommended levels of sugars, fats and salt per day (BMA 1999). The NDNS (Gregory et al. 2000) found that adolescent girls have low intakes of iron, copper and iodine and children's intake of fibre, fruit and vegetables is very low. Only 15% of adolescents in the USA have a fat intake of less than 30% of total energy and only 7% have less than 10% of total energy from saturated fat (Centers for Disease Control & Prevention 1994). Studies worldwide support the evidence that adolescents are not consuming at least five servings of fruits and vegetables per day (Bashour 2004 (Syrian Arab Republic); Grunbaum et al. 2004 (USA); Xie et al. 2002 (USA); a national study in the USA found that 53% of adolescent girls were consuming less than one serving of fruit a day (Cleveland et al. 1997). A study in the USA by Larson et al. (2007) found

that the average daily intake of fruit and vegetables decreased from early to late adolescence.

A high intake of fruit and vegetables has been associated with a decreased risk of cardiovascular disease, some cancers, diabetes, stroke, obesity, diverticulosis and cataracts (Quan et al. 2000). Significant differences in nutrient intakes between ethnic backgrounds and social economic status exist (Xie et al. 2002). A cohort study by Xie et al. (2002) on adolescents aged 11-20 years found non-Hispanic Whites had the lowest intakes of fruit and Blacks and Asians had significantly higher intakes of vegetables. A higher family income has been associated with higher intakes of polyunsaturated fat, protein, folate, calcium and iron (Xie et al. 2002). Studies have also found a link between perception of weight and fruit and vegetable intake. Adolescent girls who perceive themselves as overweight have a reduced intake of fruit and vegetables (Nystrom et al. 2005).

A national longitudinal study in the USA conducted by Videon and Manning (2003) found that adolescents who eat four or five family meals per week had a higher consumption of fruits, vegetables and dairy foods, than adolescents who did not eat with the family. Gillman et al. (2000) found similar findings; adolescents who ate dinner with their families every day consumed 0.8 more

servings of fruits and vegetables than those who never or rarely ate family dinners.

Developing a greater understanding and identification of current eating habits among adolescents will help identify target populations, for the development of interventions and healthy eating programmes. There is a distinct lack of research in the UK; with most studies being conducted in the USA, especially in relationship to differing ethnic minorities and low income families. The strong female media focus on weight is encouraging adolescents to use dieting to lose weight; identification of current dieting methods in adolescents, will give Health Professionals and schools a clearer understanding of educational and intervention requirements.

The overall aim of the study was to examine relationships between dieting, ethnic origin and fruit and vegetable intake in adolescent girls. The objectives of the study were: 1) to determine whether there was any difference in dieting with age or ethnic origin; 2) to determine whether adolescent girls are meeting the Department of Health (2000) recommendations of at least 5 portions of fruit and vegetables a day; 3) to determine any difference in fruit and vegetable intake with age, ethnic origin, dieting or weight perception; 4) to determine any difference in fruit and vegetable intake and eating with the family during the week and at weekends.

## **METHOD**

### **Subjects**

Subject recruitment was based on ethnic minority and low-income group schools in London and Coventry. Initial contact was an explanatory letter outlining the study and commitment required. This was followed-up with a telephone call to assess which schools were interested in taking part in the study. Eleven schools agreed to take part. However, one school dropped out due to subject unavailability at the required study times and two schools were excluded from the study, due to poor quality data and high drop-out rates. Eight schools participated, 5 based in London and 3 based in Coventry. Four were girls-only schools and 4 were mixed schools; data collected from boys was excluded from the assessment.

Consent for the study was gained through letters to all subject parents outlining the study objectives. A tear-off slip was provided to be returned to school if the parent or subject objected to taking part; allowing students to be excluded. Subjects were verbally briefed at the start of the study and all participating subjects were required to sign a consent form. Ethnical approval was granted by East London Research Ethics Committee and London Metropolitan University.

## **Research Design**

Subjects were required to complete two questionnaires. The investigators visited the schools; a 'Healthy Eating Questionnaire' (Appendix 1) was completed on the first visit. This questionnaire was constructed according to results of an initial questionnaire study and focus groups, stage 1 and 2 of the project. Important factors were identified in these stages which influenced the criteria of the questionnaire designs. The 'Healthy Eating Questionnaire' (Appendix 1) assessed subjects' personal details, meal patterns and fruit and vegetable intake. Data on fruit and vegetable intake was recorded on an estimate of the number of portions consumed in the previous 3 days; this was then divided by 3, to give a daily portion intake.

A 'Diet Questionnaire' (Appendix 2) was completed on the second visit (visits were conducted on various days of the week according to the access granted by the schools). The 'Diet Questionnaire' assessed eating patterns, self-perceptions of body weight, whether the subject was currently on a diet and methods of weight loss.

Subjects were given verbal and written instructions on how to complete the questionnaires and emphasise was placed on the importance of specific information; assistance was provided by the investigators if required.

### **Statistical Analysis**

Data was analysed using SPSS and Microsoft Excel. Descriptive analysis used frequency, means, standard deviation and percentages to assess dieting methods, age, ethnic origin, weight perception and fruit and vegetable intake. Significance tests for data counts, was conducted using the Pearson Chi-Square test, which used the harmonic mean of the group sizes. Significance tests for fruit and vegetable portion intake and mean comparisons between groups were conducted using one-way ANOVA, Post-Hoc Scheffe or Independent T-Test. Field (2005) stated that the Scheffe test method is the most conservative with respect to Type I error. A significance level of 0.05 was used for statistical analysis.

## **RESULTS**

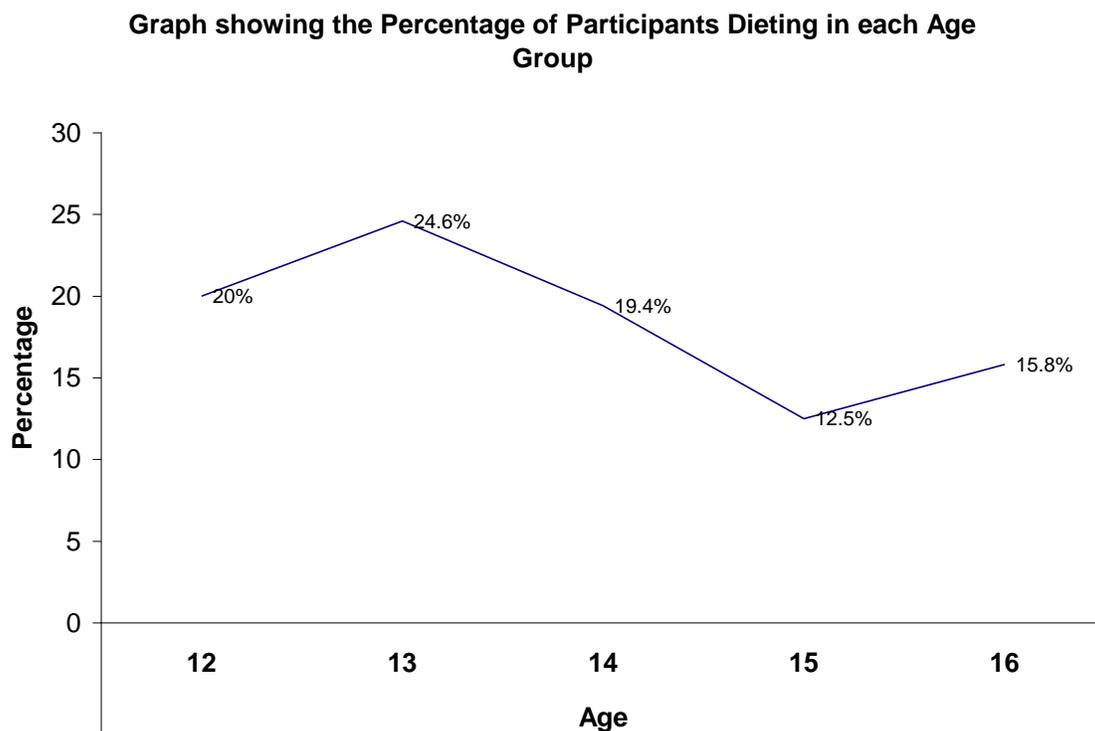
A total of 823 female subjects participated in the study. The age range of the subjects was between 12 – 16 years, with a mean average age of 13.7 years. Among these subjects 52.7% were White, 9.8% were Mixed race, 18.5% were Asian, 15.6% were Black and 2.1% were of another (Other) ethnic origin. All

subjects attended low-income group schools in London and Coventry. The total number of subjects varied according to data completed within the questionnaires.

### **Age and Dieting**

679 girls indicated their age and whether they were dieting at present. The percentage of girls on a diet was 20.3%. Two cells contained too few subjects to be analysed. The data on age and dieting is shown in Figure 2. There was no significant difference ( $p>0.05$ ) between the proportion of participants dieting in each age group (using Pearson Chi-Square).

**Figure 2 Data on Age and Dieting**

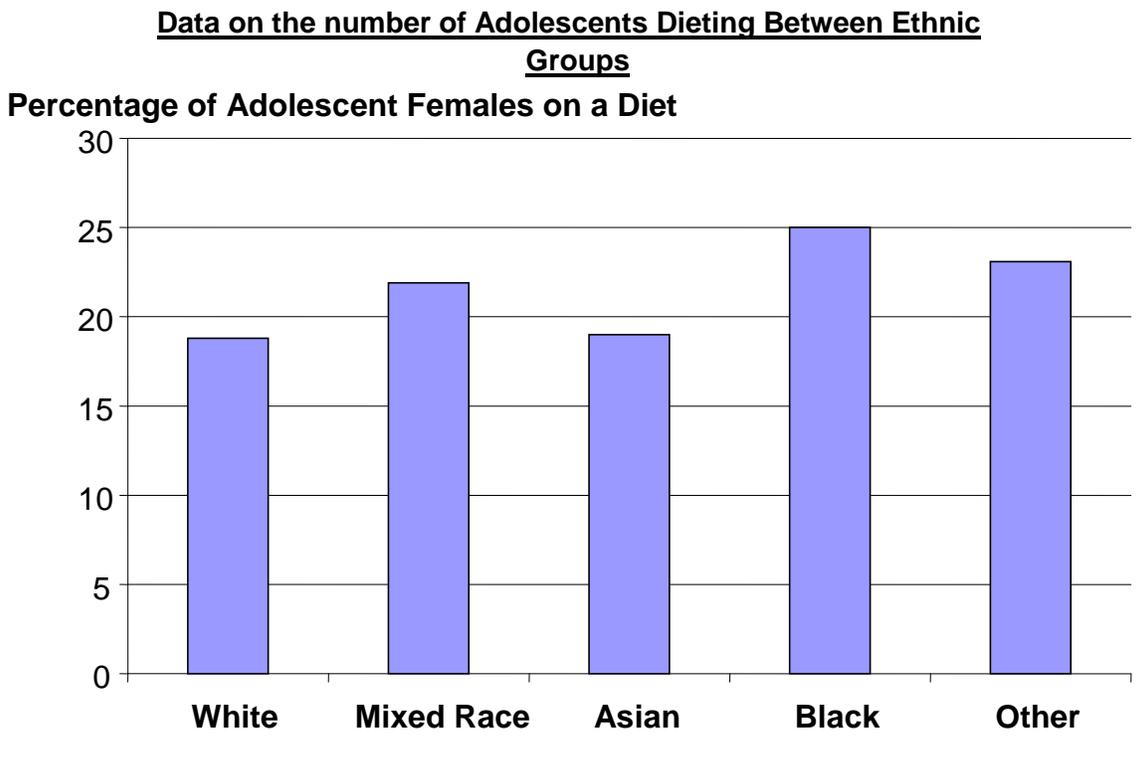


**Test of significant ( $p=0.073$ )**

### **Ethnic Origin and Dieting**

680 girls answered the questionnaires on dieting (Appendix 2, Q16) and ethnic origin (Appendix 1, Q3). The percentage of subjects on a diet was 20.1%. One cell contained too few subjects to be analyzed. The data on ethnic origin and dieting is shown in figure 3. There was no significant difference ( $p>0.05$ ) (using Pearson Chi-Square) in the number of girls dieting between ethnic groups.

**Figure 3 Bar Chart showing data on the number of Adolescents Dieting between Ethnic Groups**

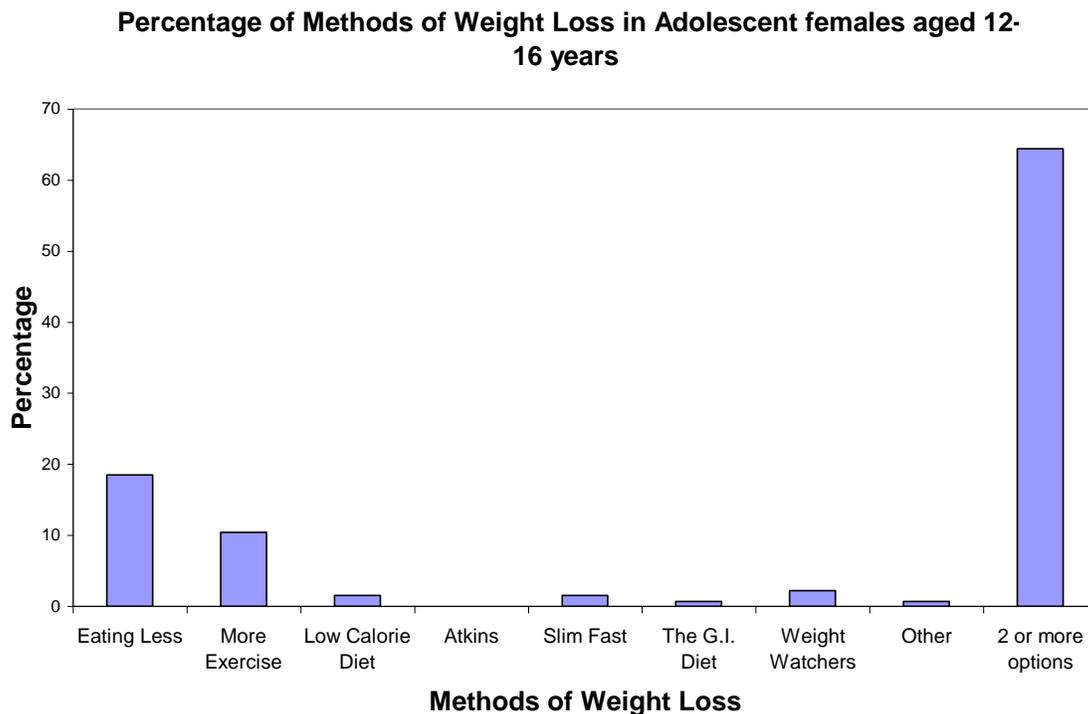


Test of significant ( $p=0.690$ )

## Method of Dieting

Data on the method of dieting was collected from 135 subjects who were on a diet at present, using the Diet Questionnaire (Appendix 2, Q16 and Q17). The most common method of dieting was combining two or more options of weight loss (64.4%). Other dieting methods were, eating less (18.5%), more exercise (10.4%), Weight Watchers (2.2%), a low calorie diet (1.5%), a low fat diet (Slim Fast) (1.5%), a low sugar diet (The G.I. Diet) (0.7%) and Other (0.7%) (Figure 4).

**Figure 4. Bar Chart showing Weight Loss Methods in Adolescent Females**



## **Fruit and Vegetable Intake**

A total of 812 subjects estimated their fruit and vegetable intake for the proceeding 3 days (Appendix 1, Q4). Results were divided by 3 to give an estimated daily intake. The average fruit and vegetable intake was 1.48 portions per day (Tables 1 & 2).

## **Age and Fruit and Vegetable Intake**

The average fruit intake at age 16 years was slightly lower than the other age groups, at 1.31 portions per day (Table 1). The highest average fruit intake was 1.54 portions per day, age 13 years. The lowest average vegetable intake was 1.44 portions per day, age 14 years, and the highest average vegetable intake was 1.65 portions per day, age 16 years. There was no significant difference using one-way ANOVA, between fruit and vegetable intake ( $p>0.05$ ) and age (Table 1).

**Table 1. Age and Intake of Fruit and Vegetables (number of portions)**

	Age in Years	N	Mean	Std. Deviation	Std. Error	Significance
<b>DAILY FRUIT INTAKE</b>	12	19	1.51	1.28	0.29	
	13	342	1.54	1.08	0.06	
	14	262	1.44	1.16	0.07	
	15	148	1.45	1.15	0.09	
	16	33	1.31	0.92	0.16	
	Total		804	1.48	1.12	0.04
<b>DAILY VEGETABLE INTAKE</b>	12	19	1.60	1.29	0.30	
	13	339	1.47	1.12	0.06	
	14	261	1.44	1.18	0.07	
	15	148	1.52	1.04	0.09	
	16	32	1.65	1.38	0.24	
	Total		799	1.48	1.14	0.04

### **Ethnic Origin and Fruit and Vegetable Intake**

Results showed that Black subjects had the lowest fruit and vegetable intake, 1.27 and 1.08 portions per day respectively (Table 2). Subjects of 'Other' ethnic origin had the highest fruit and vegetable intake, 1.86 and 1.96 portions per day respectively (Table 2). There was a significant difference using one-way ANOVA, between daily vegetable portion intake and ethnic origin ( $p < 0.05$ ) (Table 2) but no significant difference between daily fruit portion intake and ethnic origin ( $p > 0.05$ ).

**Table 2. Ethnic Origin and Intake of Fruit and Vegetables (number of portions)**

	<b>Ethnic Group</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Std. Error</b>	<b>Significance</b>
<b>DAILY VEGETABLE INTAKE</b>	White	425	1.58	1.14	0.06	<b>0.00</b>
	Mixed	79	1.78	1.24	0.14	
	Asian	151	1.29	1.01	0.08	
	Black	125	1.08	1.06	0.09	
	Other	17	1.96	1.02	0.25	
	Total	797	1.48	1.13	0.04	
<b>DAILY FRUIT INTAKE</b>	White	430	1.51	1.11	0.05	<b>0.31</b>
	Mixed	78	1.70	1.20	0.14	
	Asian	151	1.40	1.03	0.08	
	Black	127	1.27	1.11	0.10	
	Other	17	1.86	1.23	0.30	
	Total	803	1.48	1.11	0.04	

An ANOVA Post Hoc test (Scheffe) was performed (Table 3). White girls had a higher vegetable intake than Black girls ( $p < 0.001$ ) and Mixed race girls had a higher intake than Asian girls ( $p = 0.036$ ) and Black girls ( $p < 0.001$ ) (Table 3).

**Table 3 Post Hoc Test – Ethnic Origin and Vegetable Intake**

<b>Multiple Comparisons</b>					
<b>Scheffe</b>					
<b>Dependent Variable</b>	<b>Ethnic Origin</b>	<b>Ethnic Origin</b>	<b>Mean Difference</b>	<b>Std. Error</b>	<b>Significance</b>
<b>DAILY VEGETABLE INTAKE</b>	White	Mixed	-0.20	0.14	0.707
		Asian	0.30	0.11	0.095
		Black	0.50	0.11	0.001
		Other	-0.38	0.28	0.760
	Mixed	White	0.20	0.14	0.707
		Asian	0.50	0.15	0.036
		Black	0.70	0.16	0.001
		Other	-0.18	0.30	0.986
	Asian	White	-0.30	0.11	0.095
		Mixed	-0.50	0.15	0.036
		Black	0.20	0.13	0.681
		Other	-0.67	0.28	0.233
	Black	White	-0.50	0.11	0.001
		Mixed	-0.70	0.16	0.001
		Asian	-0.20	0.13	0.681
		Other	-0.88	0.29	0.055
	Other	White	0.38	0.28	0.760
		Mixed	0.18	0.30	0.986
		Asian	0.67	0.28	0.233
		Black	0.88	0.29	0.055

\* The mean difference is significant at the .05 level.

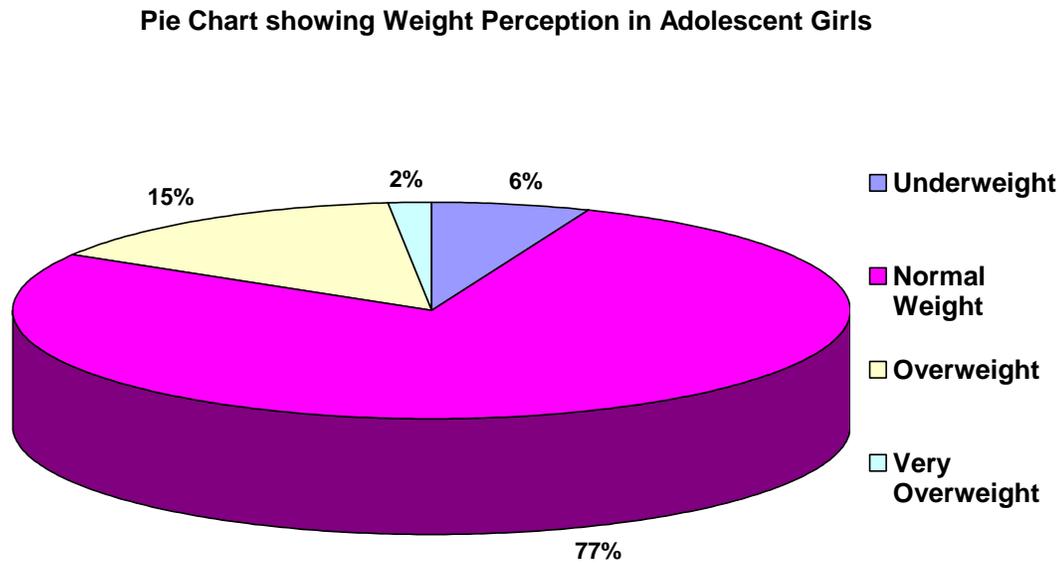
## **Dieting and Fruit and Vegetable Intake**

679 girls indicated whether they were dieting and estimated their daily fruit intake, of these (20%) were on a diet. There was no significant difference between daily fruit intake and girls who claimed they were on a diet or not on a diet ( $p=0.533$ ). 674 girls indicated whether they were dieting and estimated their daily vegetable intake; 21% were on a diet. No significant difference was found between vegetable intake and girls who were dieting or not ( $p=0.988$ ).

## **Weight Perception**

A total of 667 subjects completed the Diet Questionnaire (Appendix 2, Q14) on how they perceived themselves according to height and weight. The number of subjects who perceived themselves as underweight was 6%, normal weight 77.5%, overweight 14.7% and very overweight 1.8% (Figure 5).

**Figure 5 Pie Chart demonstrating Percentages of Weight Loss Perception in Adolescent Girls.**



**Fruit and Vegetable Intake according to weight perception**

No significant difference was found between fruit and vegetable intake per day and weight perception ( $p > 0.05$ ) (Table 4) using one-way ANOVA.

**Table 4. Weight Perception and Intake of Fruit and Vegetables (number of portions)**

	<b>Weight Perception</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Std. Error</b>	<b>Significance</b>
<b>DAILY FRUIT INTAKE</b>	Underweight	40.00	1.51	1.35	0.21	<b>0.433</b>
	Normal	511.00	1.50	1.10	0.05	
	Overweight	97.00	1.30	1.00	0.10	
	Very Overweight	12.00	1.33	1.45	0.42	
	Total	660.00	1.47	1.11	0.04	
<b>DAILY VEGETABLE INTAKE</b>	Underweight	40.00	1.53	1.37	0.22	<b>0.540</b>
	Normal	507.00	1.47	1.11	0.05	
	Overweight	96.00	1.31	0.85	0.09	
	Very Overweight	11.00	1.30	1.42	0.43	
	Total	654.00	1.44	1.10	0.04	

### **Eating with the Family**

Results showed that 68% of subjects eat with their family during the week and 62% eat with their family at weekends.

### **Eating with the Family during the week and Intake of Fruit and Vegetables**

Adolescent girls who eat with their family during the week had a significantly higher vegetable intake (1.6 portions a day) than those who did not eat with their family during the week (1.1 portions a day) ( $p < 0.001$ ). The mean intake of fruit in

adolescents who claim to eat with the family during the week was significantly higher 1.53 portions per day compared to 1.2 portions a day in those who did not eat with their family during the week ( $p=0.003$ ).

### **Eating with the Family at weekends and Intake of Fruit and Vegetables**

Adolescents who eat with their family at weekends had a significantly higher mean vegetable intake (1.58 portions per day) compared to those who did not eat with their family at weekends (1.09 portions per day) ( $p<0.001$ ). No significant difference was found between fruit intake and eating with the family at weekends ( $p=0.44$ ).

## **DISCUSSION**

### ***Dieting***

The present study found no significant difference between the proportions of adolescents dieting in each group, but supports the findings by Abraham and O'Dea (2001) that females as young as 12 years old are dieting to lose weight. Due to the health risks associated with adolescent dieting and the increased risk of developing eating disorders (Malinauskas et al. 2006), Health Professionals whilst promoting interventions to reduce overweight, need to ensure adolescents within the younger age range, who may have no experience of weight loss behaviour, are not unintentionally introduced to the concept of dieting as being

'safe', especially during the adolescent maturation phase when emotions and body awareness are developing. The results also indicate that education in 'healthy eating' should start during childhood in order to equip pre-adolescents with the knowledge necessary to make healthy choices themselves.

The present study investigated the most common dieting methods in female adolescents aged 12 to 16 years. The findings of this study indicated that combining two or more options of weight loss (64.4%) was the most common method of dieting, followed by eating less (18.5%) and more exercise (10.4%). This was in contrast to a study by Malinauskas et al. (2006), which found Atkins and Weight Watchers to be the most popular methods of dieting, although the age range was higher between 18-24 years. In the present study, Weight Watchers, Slim Fast, Atkins and The G.I. Diet had a low percentage of subject uptakes, suggesting that commercial diets may not be having a major impact on the method of weight loss in adolescents between 12 – 16 years.

### ***Ethnic Origin and dieting***

The present study found no significant difference in the numbers of girls dieting between ethnic groups. A cross-sectional survey in East London of adolescents aged 11-14 years, found a history of dieting was less likely among Pakistani girls than white British teenagers (Viner et al. 2006). Research findings between dieting and ethnic origin was limited, although more research was available on

the relationship between eating disorders and ethnic origin groups. A study by Malinauskas et al. (2006) found 83% of subjects studied used dieting for weight loss; as well as the health risks associated with dieting (Pugliese et al. 1983), girls who have moderately dieted are five times more likely to develop eating disorders (Malinauskas et al. 2006), highlighting the importance of recognising higher risk groups. This study identifies an important area for further research.

### ***Fruit and Vegetable Intake***

This study contributes to the findings that the average fruit and vegetable intake for adolescent females is below the Department of Health (2000) recommendations of at least 5 portions of fruit and vegetables a day (Bashour 2004; Xie et al. 2002; Cleveland et al. 1997; Grunbaum et al. 2004; Striegel-Moore et al. 2006). The research highlights that adolescents could be lacking in adequate nutritional intake, during a period when nutrient needs are high to support rapid growth, and when eating patterns for adulthood are being established.

### ***Age and Fruit and Vegetable Intake***

A study by Striegel-Moore et al. (2006) found an increase in the mean average of fruit and vegetable intake as girls grew older, however the Project EAT (Larson et

al. 2007) found a decline in average daily fruit and vegetable intake in adolescents with age.

The present study found no significant difference between fruit and vegetable intake and age. The contrasting results provide a basis for further research into age and fruit and vegetable intake, which would allow Health Professionals to develop target specific age group interventions. The discrepancies between findings may be due to the method of data collection; Larson et al. (2007) used in-class surveys on the same subjects in 1999 and 2004, and then used mixed linear regression models to estimate longitudinal trends, subjects may have estimated their fruit and vegetable intake on the present day consumption, whilst Striegel-Moore et al. (2006) assessed girls in 10 annual visits by using 3-day food diary records. Food Diaries and surveys rely on honesty in reporting correct amounts and food types and adolescents may 'adjust' their diets to simplify recording of data (Stanton, 2006).

### ***Ethnic Origin and Fruit and Vegetable Intake***

#### ***Fruit Intake***

Striegel-Moore et al. (2006) found White girls had a significantly higher intake of fruit servings per day than Black girls ( $p < 0.0001$ ). Xie et al. (2002) found Non-Hispanic whites had significantly lower intakes of fruit than Hispanic Whites,

Blacks and Asian ethnic groups. The present study found contrasting results; no significant difference was found between fruit intake and ethnic groups ( $p=0.31$ ).

### ***Vegetable Intake***

Xie et al. (2002) found significant differences ( $p<0.05$ ) in all nutrient intakes among different ethnic groups (Non-Hispanic White, Hispanic White, Black, Asian and Other); Hispanic Whites had significantly lower intakes of vegetables. Striegel-Moore et al. (2006) found no significant difference ( $p>0.056$ ) between race and servings of vegetables consumed per day. The present study established contrasting results; White girls had a higher vegetable intake than Black girls ( $p<0.001$ ) and Mixed race girls had a higher intake than Asian girls ( $p=0.036$ ) and Black girls ( $p<0.001$ ). Due to the increasing prevalence of obesity in Black and Asian compared to White ethnic origins (Wardle et al. 2002) and the association between obesity and fruit and vegetable intake (Quan et al. 2000), the lack of conclusive evidence points to the need for further research, with a large subject sample to verify results. Research on reasoning's between any significant differences in ethnic origin and fruit and vegetable intake requires consideration, as factors such as low-income families are also associated with a lower intake of fruit and vegetables (Xie et al. 2002).

### ***Dieting and Fruit and Vegetable Intake***

The present study found no significant difference between dieting and fruit and vegetable intake in female adolescents. However, French et al. (1995) found moderate dieters had increased fruit and vegetable intake compared to non-dieting and extreme-dieting adolescents. Adequate nutritional intake is essential, especially if adolescents are restricting their energy intake. Eating behaviour patterns are best established during childhood and research has indicated that obesity in childhood continues to track into adulthood (Dietz and Gortmaker, 2001).

### ***Weight Perception and Fruit and Vegetable Intake***

Adolescents have been shown to perceive themselves at a higher weight than their actual weight (Wong and Huang 1999). This leads to a major risk factor in relation to unnecessary energy restriction and the development of eating disorders. Nystrom et al. (2005) found that adolescent girls who perceive themselves as overweight had a significantly reduced intake of fruit and vegetables, compared to girls who perceive themselves as normal weight. A similar finding by MacDonald et al. (1983) reported that adolescent girls with the poorest diets perceived themselves to be more overweight. However, this present study found no significant difference between weight perception and daily fruit and vegetable portion intake. There is a distinct lack of research in this area and the present study gives a basis for further research. Research in this

area will help in the development and identification of psychological interventions for weight perceptions, lifestyle and weight loss changes.

### ***Eating with the Family and Fruit and Vegetable Intake***

In the present study, over half (68%), of subjects eat with their family during the week and at weekends (62%), this correlates well with a study by Videon and Manning (2003) which found almost half of subjects studied (18,177 adolescents) eat six or seven meals with their family per week. Several studies (Videon and Manning 2003; Gillman et al. 2000; Neumark-Sztainer et al. 1996) have shown a relationship between eating with the family and an increased intake of fruit and vegetables. The present study supports existing literature and gives a breakdown between eating with the family at weekends and during the week.

A significant difference was found between daily vegetable intakes and eating with the family during the week and at weekends. A significant difference was also found between daily fruit intake and eating with the family during the week, but no significant difference was found in fruit intake and eating with the family at weekends. Methods of data collection were similar between the present study, the study by Gillman et al. (2000) and Neumark-Sztainer et al. (1996). However, Videon and Manning (2003) used interviews in the subjects' home to collect data. The differing methods of data collect and corresponding results highlight the strong relationship between fruit and vegetable intake and family meals.

Previous studies have been conducted in the USA, the present study highlights that findings may be similar in the UK. Further UK research with a larger subject sample is needed to validate the current findings. Research in this area will highlight to Health Professionals, the need to target healthy eating strategies to include the family.

### **Limitations**

Limitations of the present study include a low number of subjects for the type of analysis performed, and an unequal number of subjects in ethnic origin groups and age groups; with some groups having a very low percentage of subjects. Two groups (age 12 and 16) were excluded from the data analysis on age and dieting and one group (Other), was excluded from the data analysis on ethnic origin and dieting, due to small group numbers (<5). The present study used self-reported dietary questionnaires, asking the frequency of fruit and vegetables consumed; these have been found to overestimate intakes (Stanton 2006). Daily fruit and vegetable intake was estimated over a short period of time (3 days). Subjects' stature and body mass was not measured to give a comparison of actual weight and perceived weight and those of normal weight who may have been dieting.

Another limitation is that although the number of subjects eating with their family was analysed in co-ordination with fruit and vegetable intake, the study is unable to determine whether fruit and vegetables are eaten during the family meal.

Strength of the study was that fruit and vegetable intake was measured according to portion intake and not limited to whether the subject met the current recommendations of greater than or equal to five servings of fruit and vegetables per day.

## **CONCLUSIONS**

Adolescent females are especially vulnerable to inadequate fruit and vegetable intake during a period of increased growth and maturation. Research has demonstrated that children as young as 12 are restricting their energy intake and education in 'healthy eating' is recommended during childhood to avoid the health risks associated with poor diet later in life. Although media focus on weight loss is high, commercial diets have not been shown to be having a major impact on adolescents who are dieting. Family meals are strongly associated with an increase in fruit and vegetable intake in adolescent females and specific target intervention strategies that influence the eating habits of adolescents and their families need to be assessed.

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