Endogenous factors that relate to the eating habits of adolescents

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The aim in this research was to determine how endogenous factors such as gender, intelligence, self-concept, and personality relate to the eating habits of adolescents. An empirical investigation was conducted using 340 secondary school learners, 162 boys and 178 girls. From the results it appeared that girls tend to have more unhealthy eating habits than boys and adolescents with high intelligence are at risk of developing unhealthy eating behaviour. A strong relationship existed between the physical self and eating habits. The most important personality factors associated with eating habits were social boldness and individualism.

Introduction

In *Beeld* (2003:2) the content of a national report on risk behaviour among youth in South-Africa was discussed. The categories of risk behaviour were violence on the school terrain, road safety, suicide, the use of alcohol and drugs, as well as overweight linked with inactivity. A quarter of the girls that were approached were overweight. As much as 52% of all the respondents ate too many chocolates and enjoyed too much frizzy cold drinks. A quarter of the children spent more than three hours per day watching television and 29% did not have any physical training classes at school.

The above situation corresponds with Moreno and Thellen (1995: 171-175) and Gleick (1999:50) who suggest that a large number of adolescents eat junk foods and do not consider a healthy diet to be important. Many adolescents are overweight and do not participate in sport and prefer to diet in order to maintain a slim figure instead of doing exercise to work off calories. According to Cloksin, Watson and Ransdell (2002:259-75) adolescents are increasingly turning to sedentary leisure time activities, which is leading to lower physical activity levels, high-energy food intake, and a high body mass index.

In general adolescents have insufficient knowledge of food composition and healthy nutrition (Brook & Tepper, 1997:284; Chapman, Toma, Tuveson & Jacob, 1997:440; Neyman, Block, Morris & Zidenberg, 2000:57-60). According to the research results of Croll, Nuemark and Story (2001:193-198) some adolescents have a significant amount of knowledge regarding healthy foods but despite this knowledge, they find it difficult to follow healthy eating recommendations and frequently consume foods that they perceive as unhealthy. Due to their lack of knowledge, adolescents tend to skip regular meals and instead of enjoying a balanced meal, consume fast foods during the day resulting in weight gain (DeBate, Sargent & Topping, 2001: 819-813). Many adolescents skip breakfast in particular or eat the wrong kind of breakfast. Samuel (2002:11) points out that adolescents who skip breakfast are missing an opportunity to boost their nutrient intake, which has a negative effect on their learning performance and academic achievement.

Much research has been done on eating disorders in general (Garner, Garfunkel & O'Shaughnessy, 1985:581; Johnson, Conners & Tobin, 1987:668; Humphrey, 1989:206; Rhodes & Kroger, 1992:249; Ferrairi, Merlo & Heinrichs, 1993:95; Frank & Jackson, 1996:55; Canals, 1996:442; Hartley, 1998:133). However, less research has been conducted on the eating habits of adolescents, in particular, and, of this research, a negligible number concern factors relating to unhealthy eating habits.

Eating behaviour of adolescents can be influenced by both exogenous and endogenous factors. The most important exogenous factors are probably parents, peers, and the media. Gender, intellectual ability, self-concept, and personality are among the endogenous factors that may influence the eating behaviour of adolescents.

With regard to gender it appears that girls experience more stress during puberty due to physical and physiological changes and are at a greater risk of developing unhealthy eating behaviour (Merlo, Hein-richs, Menzaghi & Koob, 1993:25; Apfelbaum, Fantino & Apfelbaum, 1993:433). Furthermore it appears that girls are more affected by the media. They read fashion magazines which influence their decision to restrict calories or take diet pills (Thomsen, Weber & Brown, 2002:1-18). Keel, Fulkerson and Leon (1996:213) found that girls have more unhealthy eating habits than boys and they spend more time dieting than boys. This corresponds with the results of McCabe and Ricciardelli (2001:335-347) who found that the most frequent strategy used by boys to change body size or shape was exercise, rather than changing eating patterns as girls tend to do.

In contrast to gender, research results concerning intelligence are less clear. Canals (1996:448) suggests that adolescents with low intelligence are at risk of developing unhealthy eating behaviour, whilst Sanders and Myers (1995:11) suggest that adolescents with high intelligence are at risk of developing unhealthy eating behaviour. It appears that the relationship between eating habits and intelligence as an endogenous factor requires further investigation.

With respect to self-concept, it was found that many adolescents between the ages of 14 and 18 had a negative self-concept with regard to their body image and therefore developed unhealthy eating habits (Brook & Tepper, 1997:284). These findings were confirmed by Hoare and Cosgrove (1998:425) as well as Kim and Douthitt (2003:298-306) who found that a low self-concept with regard to bodily appearance results in unhealthy eating behaviour. No empirical investigations on the self-concept could be found with regard to the personal self, the family self and the social self, although it appears that healthy eating habits of adolescents are associated with a sound relationship with parents (Young & Fors, 2001:483-488; Wade & Lowes 2002:39-45). It is therefore possible that a strong family self and social self may correlate positively with healthy eating habits.

Very little research has been conducted to establish which personality characteristics can be associated with unhealthy eating habits. According to Boskind-White and White (in Carson & Butcher, 1992: 245) the psychological attributes of people with eating disorders involve perfectionism and a preoccupation with pleasing others. Hartley (1998:133) also confirms that perfectionism is a prominent personality characteristic of anorexia and bulimia patients. Jablow (1992:80) identified dependency as a possible personality factor that might be associated with eating habits. Dependent adolescents tend to experience personal freedom as overwhelming, confusing, and stressful and over-eat or under-eat to cope with the situation. It is surprising that the relationship between typical personality factors identified with the High School Personality Questionnaire (HSPQ) and eating habits has not previously been investigated. The HSPQ is often used in a counselling context and if certain personality factors could be linked to eating habits, it would facilitate early identification of unhealthy eating habits.

Over and above the lack of research regarding certain endogenous factors, two other problem areas exist. Firstly, although gender, intellectual ability, self-concept, and personality have been identified as possible endogenous factors that may influence eating habits, it is

difficult to determine which of these factors should be considered the most important. Previous research has not included all the potential factors simultaneously which makes a comparison difficult. Secondly, a suitable measuring instrument is required. Garner (1982) developed the "Eating Attitudes Test" to measure the symptoms and concerns characteristic of eating disorders. However, a suitable measuring instrument that specifically measures the eating habits of adolescents could not be found. In order to assist teachers, parents, and educational psychologists in promoting the development of healthy eating habits among adolescents, a standardised measuring instrument designed specifically for eating habits of adolescents will have to be developed.

Aim of the investigation

From the above it would appear that educationists could benefit from a reliable measuring instrument which identifies bad eating habits. It was also pointed out that a lack of empirical information exists regarding the relationship between certain endogenous factors and the eating habits of adolescents.

The first aim of this investigation centred around the development of an instrument to measure eating habits. Secondly, the aim was to determine how endogenous factors (such as gender, intelligence, self-concept, and personality) related to eating habits of adolescents. The third aim was to determine the most important endogenous factor.

To meet the above aims, the following empirical investigation was carried out.

Method of the empirical investigation
Sample

Two schools were selected at random in Mpumalanga province, one in Nelspruit and one in White River. The school in Nelspruit is a government school and enrols learners from various socio-economic environments. The school in White River is a private college, which enrols learners from a higher socio-economic environment. Learners were randomly selected from class registers.

The final sample consisted of 340 learners, 162 boys and 178 girls. The number of boys and girls in each grade is outlined in Table 1.

Table 1   Number of boys and girls in Grades 8–12

Grade	Boys	Girls	Total
8	33	35	68
9	30	37	67
10	32	33	65
11	33	36	69
12	34	37	71
Total	162	178	340

Measuring instruments
Eating habits

As stated previously, research into the eating habits of adolescents has not yielded a suitable instrument that measures adolescent eating habits. However, previously developed questionnaires were consulted to develop items for a new instrument. Certain items from the "Eating Attitudes Test" (EAT-26) and the "Eating Behaviour Test" (EBT-16) were adapted and used in the newly developed instrument, called the "Eating Habits Questionnaire for Adolescents" (EHQA).

In the EHQA each item has a positive and a negative pole with a scale of 1 to 4 ranging in between. The following numbers and codes were used: 1=Always, 2=Usually, 3=Rarely, 4=Never. The higher the score for the questionnaire as a whole the poorer the eating habits.

The EHQA consists of four sections containing items that reflect features that are typical of the eating behaviour of adolescents.

Section 1: External factors (22 items). The items in this section measure the influence of parents, friends and the media on the adolescent's eating behaviour. Examples of these items include:
- When you eat out with your parents, how often are you free to choose which meal you want to order?
- How often do you feel obliged to eat crisps, sweets, biscuits, etc. offered to you by your friends?
- How often do you raid the kitchen for something to nibble on when food is advertised on television?

Section 2: Emotional aspects (19 items). The items in this section attempt to evaluate the influence of emotions on eating behaviour. An example of one of these items is
- How often do you binge on food when you have negative feelings such as anger, frustration, or sadness?

Section 3: Knowledge of nutrition (15 items). The items in this section attempt to measure the adolescent's knowledge of nutrition and a balanced diet. An example of one of these items is
- How often do you know which vitamins are found in the food that you eat?

Section 4: Behaviour (29 items). The items in this section attempt to measure the adolescent's eating behaviour and participation in physical exercise. Examples of questions are:
- How often do you avoid participating in physical activities?
- How often do you eat diet foods?
- How often do you skip breakfast?

Intelligence

The intelligence quotients (IQ) of the learners were obtained from their Ed-Lab (permanent cumulative record) cards. These IQ scores were obtained by means of the New South African Group Test.(NSAGT).

The NSAGT was designed as a group test to measure intelligence. The aim was to provide a verbal, non-verbal and a total IQ score for each testee. The reliability coefficients (Kuder-Richardson Formula 20) were calculated for consecutive six-month-interval age groups in the norm samples. The reliability coefficients for the non-verbal, verbal and total IQ scores were higher than 0.78, 0.70 and 0.84, respectively, which is an indication of high reliability.

Self-concept

Self-concept was measured by means of the "Adolescent Self-Concept Scale" (ASCS). The ASCS is a test constructed to measure the self-concept of adolescents. It consists of six subtests namely physical self, personal self, family self, social self, moral-ethical self, and self-criticism. An overall self-concept score can also be obtained. The reliability coefficient of the ASCS using the test-retest method was 0.85, which showed that the ASCS is a reliable instrument (Vrey & Venter, 1983).

Personality

The High School Personality Questionnaire (HSPQ) was used to measure the personality of adolescents. The HSPQ measures all major dimensions of the personality of a person aged between 12 and 18 years. The reliability of the HSPQ varies from 0.53 to 0.78 and the reliability coefficients can be regarded as satisfactory for a questionnaire of this nature (Visser, Garbers-Strauss & Prinsloo, 1995:45).

Procedure followed during the empirical investigation

The learners received an eating habit questionnaire (EQHA) and were asked to follow the instructions given to them. It was explained that the questionnaire was not a test and that there were no right or wrong answers. Learners were asked to respond to the items honestly. The learners had one hour to complete the questionnaire. After the questionnaire was administered, IQ information was obtained from the Ed-Lab cards. Learners with unhealthy eating habits and learners with healthy eating habits were identified. Identification was done on the basis of high scores (stanines 7, 8, and 9) and low scores (stanines 1,

2, and 3) obtained on the EHQA. As a result 20 learners with unhealthy eating habits and 20 learners with healthy eating habits were selected at random. These 40 learners answered the Adolescent Self-concept Scale (ASCS) and the High School Personality Questionnaire (HSPQ).

Results of the empirical investigation
Results regarding the psychometric characteristics of the EHQA
In order to conduct an item analysis, the entire questionnaire was considered as one single unit measuring eating habits. The aim of the item analysis was to establish whether each of the items made a contribution to the questionnaire as a whole. For this purpose item-total correla-tions were calculated. If any of these correlations were negative or low (less ten 0.1) the item was omitted. This procedure resulted in 22 items being omitted from the original 86. The final questionnaire consisted of 64 items with an Alpha reliability coefficient of 0.87. Stanines were also calculated in order to identify adolescents with healthy (stanines 1–3) and unhealthy eating habits (stanines 7–9).

Endogenous factors relating to eating habits
From the literature study gender seems to be a possible endogenous factor which relates to the eating habits of adolescents. To test the hypothesis that boys and girls differ with regard to eating habits, the average for boys and girls on the EHQA was calculated and, to determine if the averages differed significantly, the *t* test for independent groups was used. The results appear in Table 2.

Table 2 Difference between the eating habits of boys and girls

	N		s	t	df	p
Boys	162	125.87	16.85			
				5.41	338	$p < 0.01$
Girls	178	136.67	19.66			

According to Table 2 a significant difference between the means exists at the 0.01 confidence level. The average eating habit score of boys is lower than that of girls, indicating that boys tend to have healthier eating habits than girls.

To test the hypothesis that a relationship existed between intelligence and the eating habits of adolescents, a Pearson correlation coefficient was calculated. The value was $r = 0.31$ ($p < 0.05$), indicating a low positive significant correlation. It appears that high intelligence relates to some extent to unhealthy eating habits.

A third hypothesis focused on the relationship between the self-concept and eating habits of adolescents. In order to test the hypothesis, Pearson correlation coefficients were calculated between eating habits and each subtest, as well as the total of the self-concept test. The results appear in Table 3.

Table 3 Correlation between self-concept and eating habits

	Eating habits	
Total self	−0.66	$p < 0.01$
Physical self	−0.73	$p < 0.01$
Personal self	−0.47	$p < 0.01$
Family self	−0.47	$p < 0.01$
Social self	−0.32	$p < 0.05$
Moral self	−0.43	$p < 0.01$
Self-criticism	−0.06	$p < 0.05$

Except for self-criticism, all the subsections of the self-concept showed significant, negative correlations with eating habits indicating that the lower the self-concept, the higher the occurrence of unhealthy eating habits. The physical self showed the strongest relationship with

eating habits followed by the personal self and the family self.

If the items of the physical self are taken into consideration, a person obtaining a high score is one who experiences good health and is seldom sick. Such a person accepts his physical appearance and takes care of his body. A person with a high personal self is satisfied with his life and does not view other people as a threat. Such a person experiences inner calmness, is responsible and in control of his personal life. A high family self is an indication of sound relationships between the person and his family members. He experiences acceptance and enjoys love, trust and support from members in the family.

From the above the conclusion can be reached that unhealthy eating habits might be associated with a person who finds it difficult to accept his physical appearance, who does not seriously nurture his body, who is dissatisfied and not in control of his personal life and who does not enjoy sound relationships with or the support from family members.

To determine which aspect of the self-concept would best distinguish between those with healthy and those with unhealthy eating habits, a stepwise discriminant analysis was performed using physical self, personal self, family self, social self and moral self as independent variables.

The only independent variable to enter the model was physical self, explaining 54% ($R^2 = 0.54$) of the difference between the mean of the group with healthy eating habits and the mean of the group with unhealthy eating habits. This proportion explained by the physical self was significant: $F(1.34) = 39.78$, $p < 0.01$. No other independent variable could explain a significant larger proportion already explained by the physical self.

With regard to personality as an endogenous factor a hypothesis was formulated, stating that significant relationships exist between the personality factors measured by the HSPQ and the eating habits of adolescents. In order to test the hypothesis, Pearson correlation coefficients were calculated between eating habits and each of the personality factors. The results appear in Table 4.

Table 4 Correlation between personality factors and eating habits

Personality factors (HSPQ)		Eating habits (EHQA)
A.	Warmheartedness	−0.29
B.	Abstract thinking	−0.25
C.	Emotional stability	−0.29
D.	Irritability	0.35*
E.	Dominance	−0.08
F.	Carefreeness	−0.14
G.	Conscientiousness	−0.23
H.	Social boldness	−0.69**
I.	Tender mindedness	−0.09
J.	Individualism	0.30*
O.	Guilt proneness	0.42**
Q_2.	Self-sufficiency	0.11
Q_3.	Self-control	−0.02
Q_4.	Tension	0.09

* $p < 0.05$; $p < 0.01$

Significant correlations were found for factor D, H, J, and O. The highest correlation was that between factor H and eating habits. The fact that the correlation was negative, shows that a high score on H related to a low score on the EHQA (indicating healthy eating habits). A high score on H is typical of a person who is jubilant, friendly and socially involved.

The other significant correlations were positive which means that high scores on the factor related to unhealthy eating habits. The factors which were correlated positively with eating habits were according to their strength, O, D, and J. Adolescents with a high O score easily blamed themselves, they were touchy and tended to experience anxiety. Persons with a high score on D were often frustrated whilst persons with a high J score were individualistic and preferred being on their

own. From the information on the personality questionnaire it appears that unhealthy eating habits may be associated with a person who is socially ill at ease, who is touchy and one who experiences anxiety and frustration.

To determine which personality factors best distinguish between those with healthy and those with unhealthy eating habits, a stepwise discriminant analysis was performed using factors H, O, D, and J as independent variables. The results appear in Table 5.

Table 5 Discriminant analysis using certain personality factors as independent variables

Step	Variable		R^2	F	df	p
1	H.	Social boldness	0.42	25.00	(1.34)	$p < 0.01$
2	J.	Individualism	0.53	19.35	(2.33)	$p < 0.01$

As could be predicted, the first independent variable to enter the model was factor H (social boldness) explaining 42% of the difference between the mean of the group with healthy eating habits and the mean of the group with unhealthy eating habits. This proportion explained by Social boldness was significant: $F(1.34) = 25.0$, $p < 0.01$.

The next independent variable to enter was J (individualism) explaining an additional 11% of the difference between the mean of the group with healthy eating habits and the mean of the group with unhealthy eating habits. This additional proportion was significant: $F(2.33) = 19.35$, $p < 0.01$.

No other personality factor entered the model. Irritability(D) and guilt proneness(O) could not explain a larger proportion of the difference, between the groups, already explained by social boldness(H) and individualism(J).

To determine which endogenous factors best distinguish between those with healthy and those with unhealthy eating habits, a stepwise discriminant analysis was performed using gender, IQ, the physical self, social boldness, and individualism as independent variables. The results appear in Table 6.

Table 6 Discriminant analysis using gender, IQ, physical self, and personality factors H and J as independent variables

Step	Variable	R^2	F	df	p
1	Physical self	0.54	39.78	1.34	$p < 0.01$
2	Intelligence	0.65	30.81	2.33	$p < 0.01$
3	Social boldness	0.68	22.90	3.32	$p < 0.01$

The first independent variable to enter the model was physical self, explaining 54% ($R^2 = 0.54$) of the difference between the mean of the group with healthy eating habits and the mean of the group with unhealthy eating habits. This proportion explained by the physical self is significant: $F(1.34) = 39.78$, $p < 0.01$. The next independent variable to enter was IQ explaining an additional 11% of the difference between the groups. This additional proportion was significant: $F(2.33) = 30.81$, $p < 0.01$.

The third independent variable to enter was social boldness explaining 3% more of the difference already explained by the physical self and IQ. This proportion was also significant $F(3.32) = 22.90$, $p < 0.01$.

No other independent variable entered the model. The most important endogenous factors are therefore physical self, IQ, and social boldness. In total these variables explained 68% of the difference between the mean of the group with healthy eating habits and that of the group with unhealthy eating habits.

Discussion of the results and recommendations

The difference between boys and girls with regard to eating habits was expected. A number of previous studies (Merlo *et al.*, 1993:25; Apfel-

baum *et al.*, 1993:433; Keel *et al.*, 1996:213; McCabe & Ricciardelli, 2001:335-347) concluded that girls tend to have more unhealthy eating habits than boys. This could be the result of girls experiencing more stress during puberty due to physical and physiological changes or their belief that they must be thin in order to be popular with boys (Nichter & Vuckovic, 1994:109). Whatever the reason may be, the fact that the results of this study were in accordance with previous research findings, provided construct validity for the newly developed eating habit questionnaire (EHQA).

With regard to intelligence, the results of this study supported the finding of Sanders and Myers (1995:11) who suggest that adolescents with high intelligence are at risk of developing unhealthy eating behaviour. A possible explanation might be that a large percentage of learners with high intelligence have a high socio-economic background. Since an increasing amount of families' budget is spent on food obtained outside the home, as shown by O'Conner's study (2002:14-15), learners from a high socio-economic background have more money available to spend on food not associated with a healthy diet.

The strong relationship between the physical self and eating habits emphasises the importance of the physical self. Certain self-concept tests do not measure a physical self. This must be seen as a disadvantage. The physical self does not only contribute to the general self-concept but can be used as an important variable to identify bad eating habits. Persons with a low physical self who are not worried about their appearance and do not consider a healthy physical development important, will not bother changing undesirable eating habits.

The most important personality factor associated with eating habits was social boldness. It appears that the social aspect of a person's life is a variable that should be taken into account when eating habits are dealt with. Further confirmation for such a statement comes from the significant negative correlation between the social self and eating habits ($r = -0.32$, $p < 0.05$). It shows that a low social self can be linked to unhealthy eating habits.

From the results, the following practical recommendations can be made:

- Adolescents, whether they experience weight problems or not, should receive guidance with regard to healthy eating habits. Teachers can assist but it is primarily parents' task to provide information in this regard. If parents are unsure, a dietician can be approached to plan meals and structure the eating pattern of the whole family.
- Parents need to set an example so that the child can gain insight into the importance of eating correctly. This is even more important in families where children are inclined to be overweight.
- Parents and teachers should encourage adolescents to read nutrition labels before they buy food. A label reading education programme can help in this regard.
- Nutritious food such as fruit and vegetables should be available instead of cake, sweets, cold drinks and so forth.
- Parents should control the amount of money that children are allowed to spend at school and, where possible, guidelines on how it should be spend, ought to be given.
- A tuckshop on the school property could promote healthier eating habits. Healthy foods and drinks should be readily available to learners. For example, soft drinks could be replaced with fruit juices, and a good range of fruit products could be provided. A pricing strategy can even be followed where low-fat foods are offered at lower prices and high-fat foods at higher prices.
- The literature study revealed that many adolescents do not eat breakfast. Since breakfast is considered to be the most important meal of the day, and contributes to the nutritional well-being of the adolescent, a school breakfast programme could be considered in certain schools.
- Children experiencing anxiety or frustration should seek professional help and should not use emotional, social or personality problems as an excuse for bad eating behaviour.
- The importance of sport participation must be emphasized. Not

only is sport a recommended way of losing weight, but the recreation component also has psychological benefits. Furthermore sportsmen and women learn to take care of and develop their bodies, which contribute to a better physical self and heathy eating habits.

Lastly, the investigation aimed to identify the most important endogenous factors which relate to the eating habits of adolescents. According to the results these factors are physical-self, intelligence and social boldness. In total they explain 68% of the difference between learners with healthy and unhealthy eating habits, which is a substantial proportion. Only 32% of the difference remains unexplained. Exogenous factors such as parents, peers and the media could be used in an effort to explain more of the difference in eating behaviour. It is therefore recommended that a future research project should include the most important endogenous factors (identified in this investigation) as well as certain exogenous factors to obtain a better understanding of the adolescent's eating habits.

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