Body Image, Peer Effects and Food Disorders: Evidence from a Sample of European Women

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Working Paper No. 15/2009

First published in November 2009 by:
LSE Health
The London School of Economics and Political Science
Houghton Street
London WC2A 2AE

British Library Cataloguing in Publication Data
A catalogue record for this publication is available from the British Library
ISBN [978-0-85328-008-8]

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The authors express their gratitude to participants at the London Health Economics Group seminar at LSE, FEDEA-Health workshop in Barcelona, and the internal seminar at the Economics Department of City University for helpful comments. Also, support from CESifo Munich Germany is gratefully acknowledged.

Abstract

Excessive preoccupation with self-image has been pinpointed as a factor contributing to the proliferation of food disorders, especially among young women. To provide an economic basis for this argument this paper models how 'self-image' and 'other people's appearance' influence health-related behaviour. Self-image (identity) is claimed to be biased towards anorexic women by social norms and peer pressure, increasing the probability of women experiencing a food disorder. This paper empirically tests this claim using data from a representative, cross-sectional European survey for 2004. A two-step empirical strategy was used. First, the probability was estimated of a woman 'being extremely thin' and at the same time 'seeing herself as too fat'. The findings revealed robust evidence suggesting that (different definitions of) peer effects average out, and that a larger peer body-mass decreases the likelihood of being anorexic. Second, the two processes were estimated separately, using a recursive system, which suggested that self-image was associated with body weight when unobservable variables explaining both processes were controlled for. (These processes were found to be positively and significantly correlated). As expected, several definitions of peers' body mass were found to decrease the likelihood of women being thin or extremely thin, when common unobservable variables were controlled for.

Key words: self-image, identity, body image, eating disorders, anorexia

JEL: I12, Q18.

Content

1. Introduction

It is becoming increasingly clear that standards of physical appearance are important and powerful motivators of human behaviour. However, the content and formation of these ideal-body standards have yet to be explored in economics literature. Case studies of eating disorders constitute a prime example how changes in social attitudes towards physical appearance explain irregular health behaviour such as anorexia and bulimia nervosa among women. These two phenomena are difficult to distinguish from each other because they have similar characteristics, namely *distorted body image* accompanied by an eating obsession, hence they are referred to here as 'eating disorders'. Eating disorders can have damaging, and even devastating and life-threatening effects (American Psychiatric Association [APA] 2000). People who weigh at least 15% less than the normal weight for their height may not have enough body fat to keep their organs and other body parts healthy (APA, 2000). Disordered eating behaviour is a condition that can have long-term physical and social consequences (Hill, 1993). Indeed, about 6% of those who suffer from anorexia nervosa die from it (Birmingham *et al*, 2005). As these disorders tend to be longstanding, the prevalence rates for bulimia nervosa among young adult women have risen and are now at 1%-3% (Hudson *et al*, 2007). Given that the relatively young are more at risk, it becomes especially important to understand how food disorders are engendered.

The reasons for the increasing trend towards food disorders are yet to be fully understood. Goldfarb *et al*. (2009) proposes a model explaining anorexic disorders (low calorie intakes, purging behaviours) that is based on taste variations and on rational choices to be underweight. However, Goldfarb's model does not attempt to include or explain the formation of self-image, which determines individual tradeoffs between desired weight and health behaviour. In social science literature the formation of social identity is seen as a key factor and it is thought that food disorders are probably the result of some 'socially transmitted' standard of 'ideal' body image affecting food intake and exercise.[1] Traditional social psychology literature regards social image as being continually under construction and essential in determining physical, psychological and social equilibrium (Schilder, 1958). When applied to food disorders, this could explain some extreme forms of weight aversion.

[1] Fairburn and Cooper (1984) report on an experiment proving that women have a clear aspiration to be thinner, and that this aspiration is more marked in women with bulimia nervosa.

This is consistent with evidence suggesting that network phenomena appear to be relevant to the biological and behavioural trait of obesity (Christakis and Fowler, 2007). However, this is contested in Cohen-Cole and Fletcher (2008). Trogdon *et al.* (2008) using a sample of adolescents found that mean peer-weight was correlated with individual weight, suggesting that early health behaviour is determined by social influences. However, the specific mechanisms behind peer-pressure are unknown and require careful examination; the fact that members of the peer group have a similar self-identity is a necessary, but not sufficient, condition for the presence of social-multiplier effects. This is precisely because they share common observable and unobservable characteristics and exogenous influences. Economic policy-making in the area of health prevention requires a better understanding of the effects of social identity and self-image on health, and the development of empirical strategies to measure these effects.

Recent contributions to economics literature enable baseline modelling. Akerlof and Kranton (2000) wrote the seminal paper in this area and included an application to gender attitudes. Bodenhorn and Ruebeck (2003) created models for the influence of identity on ethnic preferences. However, there is not much in the literature on the role of social identity as a determinant of health. Blanchflower *et al* 2008 used Eurobarometer data for 29 countries to show that overweight perceptions and dieting were influenced by individual relative body mass index (BMI). Lakdawalla and Philipson (2002) referred to an 'ideal weight', and Etile (2007) examined the role of social norms on obesity and concluded that social norms have an effect on ideal body-weight (for women). Gardner (1996)[2] discussed the role of body-image in behavioural reactions in cases where individuals perceived a large gap between their desired image and the one they actually had[3] suggesting that this gap gave rise to permanently distorted self-perceptions of the body. Altogether, the power exerted by media stereotypes of beauty and the social norms that individuals are immersed in – especially the association between thinness, aesthetic ideals and success (Hill, 1993) – is widely accepted. Further, it has been suggested that the consequent fear of rejection based on physical appearance is behind the increase in the number of persons suffering from eating disorders. Hence, eating disorders are 'socially formed' rather than a personal pathology (Bordo, 2003).

[2] According to Gardner (1996), body image includes two components: a perceptual component, which includes estimations of size and appearance, and an attitudinal component, which includes feelings and attitudes towards one's own body.

[3] Slade (1988) defined body image as 'the picture we have in our mind of the size, outline and shape of our body and the feelings we have about these characteristics and parts that make them up.'

Hutchinson (1982) points out that 'body image' refers not only to the description of the body but to the place 'where body, mind and culture meet'. Accordingly, different cultural backgrounds are likely to exert idiosyncratic influences on the prevalence of food disorders, and these need to be controlled for.

The aim of this paper is to build an economic model of eating disorders, especially anorexia, that relates social and environmental factors to 'self-image' and objective weight. Some of the implications of this model are taken to the data and the effect of underlying determinants is estimated. A representative European data-set on women is used since according to the APA (2000) women account for 90% of all anorexia nervosa. This paper focuses particularly on the effect of 'peer weight' (which is likely to influence self-image [social identity]) on the likelihood of anorexia, and the influence of self-image on individual weight. In a joint-modelling exercise, the paper then estimates the determinants of the probability of a woman being *extremely thin* and, at the same time, *seeing herself as too fat*. It then takes the two processes apart and estimates a recursive probit model of *being extremely thin* and *perceiving one self as being too fat,* finding that the unobserved factors explaining both processes are correlated. This paper supports the hypothesis that social pressure through peer-shape is determinant in explaining anorexia nervosa and distorted self-perception of one's own body. To the author's knowledge, there is no previous study examining anorexia that uses an economic decision-model perspective combining self-image – or self-identity[4] – formation and individual health production.

The structure of the paper is as follows: Section 2 provides some background on the issue of self-image and healthy eating among women. Section 3 proposes an economic model for eating disorders. Section 4 sets out the empirical strategy used, describes the data-set and estimates a reduced-form equation derived from the model. Section 5 presents the estimation results and Section 6 contains a discussion and conclusions.

2. Eating disorders and body image: a summary

Different factors have been suggested as possible determinants of anorexia nervosa. Some of these are related to 'nature', i.e. gender, genes and predisposition. Other factors are related to

[4] Note that self-image and (physical) self-identity are used interchangeably throughout the text.

'nurture' i.e. parental values and socio-cultural influences. However, in the main, these determinants only seem to make individuals more (or less) susceptible to having their food and exercise intake shaped by the strong socio-environmental pressures that define what an ideal body looks like.

Gender and anorexia. Girls who achieve sexual maturity ahead of their peers, with the associated development of breasts, hips, and other physical signs of womanhood, are at increased risk of becoming eating-disordered (Bordo, 2003). These girls often wrongly interpret their new curves as signs of fatness and feel uncomfortable because they no longer look like their peers, who still have childish bodies. A young woman in this group may 'tackle' her body, partly because she wants to take control and 'fix' her insecurity and partly because she is under the influence of a culture that equates success and happiness with thinness. For this group of young women, dieting, bingeing, purging, exercising, and other strange forms of behaviour are not random, but the result of a conscious decision process.

Genes, family and anorexia. There is some evidence indicating that eating disorders may run in families. Parents influence their off-springs' values and priorities, including those towards food. Additionally, it has been suggested that there may be a genetic component to traits such as obsessive behaviour, which include eating disorders. According to recent research (*Archives of General Psychiatry* 2006; 63:305-312) genetic factors account for more than half (56%) of the risk of developing anorexia nervosa and work on the genetics of bulimia and binge-eating is under way. There are suggestions that women who develop anorexia nervosa have excess activity in the brain's dopamine receptors, which regulate pleasure. This may explain why they feel driven to lose weight but receive no pleasure from shedding pounds (Guido Frank, *et al 2005*).

Some people with eating disorders report having felt smothered in overprotective families. Others have felt abandoned, misunderstood and alone. Parents who overvalue physical appearance can unwittingly contribute to an eating disorder, as can parents who make critical comments, even in jest, about their children's bodies. Furthermore, families that include a person with an eating disorder tend to be rigid and ineffective at resolving conflicts. In some such cases mothers are emotionally cool while fathers are physically and/or emotionally absent. At the same time, there are high expectations of achievement and success. Children in this type of family learn not to disclose doubts, fears, anxieties, and imperfections. Instead

they try to solve their problems by manipulating weight and food, in an attempt to achieve the appearance of success, even if they do not feel successful (Bordo, 1993).

People who are vulnerable to eating disorders are, in most cases, going through relationship problems, loneliness in particular. Even those who appear to have normal relationships reveal great fear of the criticism and rejection that would occur if their perceived flaws and shortcomings should become known (Bachar *et al*, 2001).

Socio-environmental factors: the media. Many people believe media stereotyping helps explain why about 90% of people with eating disorders are women and only 10% are men (Thompson and Heinberg, 2002). In westernised countries, characterized by competitive striving for success, women often experience unrealistic cultural demands for thinness. According to *Health* magazine (April 2002), in the United States (US) 32% of female TV-network characters are underweight, while only 5% of the female audience is underweight. Similarly, only 3% of female TV-network characters are obese, while 25% of US women fall into that category. The differences between media images of happy, successful men and women are interesting. While women appear young, beautiful and thin, men are young or old, but strong and powerful in all the areas that matter – physically, in business, and socially. Thin is not desirable in men; power, strength and firmness are.

Despite TV being a dominant media type, some studies have found magazine-reading to be a more consistent predictor than television-viewing (Harrison and Cantor, 2006). Studies of undergraduate women have associated reading fashion magazines with having higher preference for lower weight, having lower confidence on their own body image, feeling frustrated for this reason etc (Turner *et al.*, 1997).

The 'ideal' body image portrayed by the media influences social interaction and this may in turn make it more dominant. This circularity only makes the power of social interactions in shaping people's self-identity more extreme.

To sum up, females of similar age, education and background are likely to have been exposed to similar media and social environments and, accordingly, to have similar ideal self-identities. To measure the strength of such socially transmitted influences on individual behaviour it seems appropriate to use the concept of peer or social-multiplier effect, as

applied in Glaeser et al. (1996) and in Sacerdote (2000). This concept arises not only when women have similar behaviour or representations (self-identity) due to sharing a common environment, but also when they belong to certain unobservable social groups (see Manski, 1993).

3. An economic decision model for eating disorders

Current empirical evidence makes modelling eating disorders difficult, as one of the assumptions of consumer-choice theory is the principle of non-satiation. According to extant literature, food seems to need to be modelled as an economic 'good' up to a certain caloric intake – which is idiosyncratic due to socially influenced self-perception – and as an economic 'bad' thereafter.

In order to model anorexia, the self-identity model of Akerlof and Kranton (2000) was found to be particularly useful and was adapted to the subject of interest. It was assumed that individuals choose food and exercise-related 'actions' in order to maximize an implicit utility function that depends not only on their net caloric intake (food consumption minus what is consumed by exercise), but also on their self-image (or self-identity) and health. Besides these individual factors, the utility function of individuals is conditioned by their peers' net caloric intake - and also their appearance and their characteristics - and by socio-cultural environmental factors. Thus, the utility function can be modelled as:

$$U_j = U_j(a_j, a_{-j}, c_j, SI_j, H_j; z_j, Z_j) \qquad (1)$$

where a_j is *j'*s net caloric intake; a_{-j} is the appearance of the *j'*s group of reference; c_j reflects *j's* other actions – not related to caloric intake; SI_j is *j'*s self-image; H_j is *j*'s health-production function; z_j are *j'*s characteristics; and Z_j the environmental factors in which *j* is immersed. It is assumed that utility depends on the rather abridged concept of 'net caloric intake' because food and exercise are a source of satisfaction beyond the body weight they achieve.

Similarly to Akerlof and Kranton (2000), self-image SI_j depends not only on *j'*s net caloric intake, a_j, but also on others' body-weight-related actions or appearance, a_{-j}; and is conditioned by *j*'s individual characteristics and environmental factors, z_j and Z_j; and by *j'*s

status', s_j - as a person with higher status may have a better self-image than an identical one with lower status.[5] Thus, the equation for self-image[6] is written as:

$$SI_j = I_j(a_j, a_{-j}; s_j, z_j, Z_j) \qquad (2)$$

Finally, a health-production function H_j is added. This depends on *j*'s net caloric intake, a_j; all *j*'s other actions, c_j; *j*'s status', s_j; and any other individual and environmental factors, z_j and Z_j . The health-production equation is written as follows:

$$H_j = H_j(a_j, c_j; s_{j,} z_j, Z_j) \qquad (3)$$

Standard utility maximization subject to a budget constraint under the usual regularity assumptions would lead to an associated first-order condition as follows:

$$\frac{dU_j}{da_j} = \underbrace{\frac{\partial U_j}{\partial a_j}}_{u} + \underbrace{\frac{\partial U_j}{\partial SI_j}\frac{\partial SI_j}{\partial a_j}}_{si} + \underbrace{\frac{\partial U_j}{\partial H_j}\frac{\partial H_j}{\partial a_j}}_{h} - \lambda P_a = 0 \quad (4)$$

where □ is the usual income-multiplier and P_a the monetary price of net caloric intake or the combination of food price and exercise monetary cost including the opportunity cost of the time invested in it.

Equation (4) can be rearranged as follows:

$$\frac{dU_j}{da_j} = \underbrace{\underbrace{\frac{\partial U_j}{\partial a_j}}_{+} + \underbrace{\frac{\partial U_j}{\partial H_j}}_{+}\underbrace{\frac{\partial H_j}{\partial a_j}}_{+}}_{+} + \underbrace{\left[\underbrace{\frac{\partial U_j}{\partial SI_j}}_{+}\underbrace{\frac{\partial SI_j}{\partial a_j}}_{-}\right]}_{-} - \lambda P_a = 0 \quad (4b)$$

[5] Here status can be interpreted as loosely reflecting not only social status but also physical appearance, and other status-determining attributes.

[6] Akerlof and Kranton (2000) also include *j*'s *ideal* identity and the *prescribed* norms associated to *j*'s status but, to avoid unnecessary modelling complications only peer image is used, given the individual's status, characteristics and socio-cultural environmental factors, to capture what is socially normal for *j* in his/her environment.

Even if very simplistically, equation (4b) reflects the fact that the net-caloric-intake-related choices (food and exercise) of a person with eating disorders will in principle take into account the positive effect that net-caloric-intake has on individual utility and on health, but also the effect that it has on utility and health through its impact on self-image.

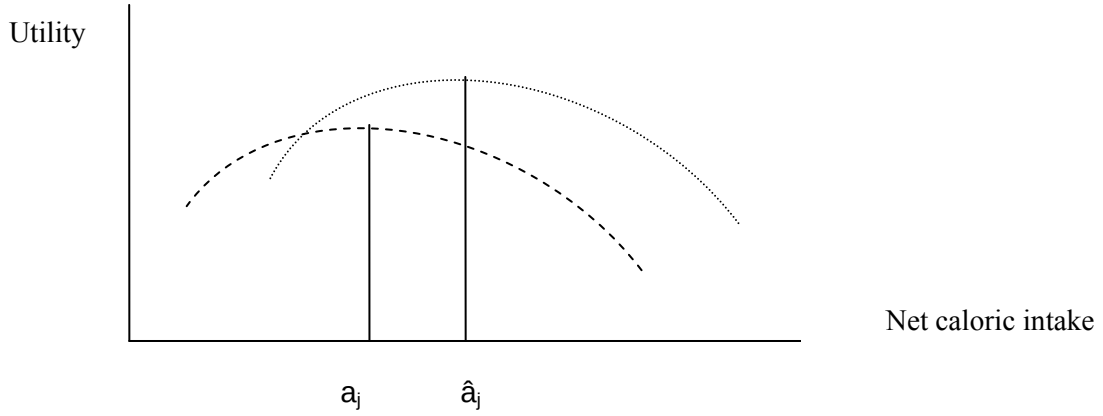
A person without any eating disorder and in a normal range of net-caloric-intake would be expected to receive a positive marginal utility from net-caloric-intake, from health and also from an improved self-image. Also, it is assumed that a normal net-caloric-intake has a positive marginal impact on health, since nutrition is necessary for survival. Thus, the first two summands in equation (4b) are expected to be positive.

In contrast, in general, one can expect a *possibly* negative marginal impact of net caloric intake on self-image after a certain level of net-caloric-intake, which would make the sign of the second term in equation (4b) negative. The net-caloric-intake chosen to optimise overall utility will vary depending on the relative magnitude of the positive and negative signs in equation (4b) above, bearing in mind that both anorexic and non-anorexic women will eventually confront the economic principle of non-satiation. The difference lies in satiation among anorexic women taking place at lower levels of consumption[7]. In other words, the 'bliss point' of food consumption for anorexics is lower, because the negative effect of eating on self-image is greater for them.

Given the empirical evidence, a person with anorexia will have an extraordinarily large negative term associated with the effect of net-caloric-intake on self-image. In this special case the utility of net-caloric-intake would achieve a maximum at a much lower level than for a non-anorexic person (see Figure 1). Note that the sign of the self-image term is idiosyncratic insofar as it depends on the impact on each individual of the societal ideal-body-shape that is in fashion.

[7] Running for 30 minutes is fun, running for 10 hours is not. A house heated to 22 degrees is pleasant, one heated to 42 degrees not so. Equally, the marginal utility of eating and drinking is obviously negative after some point.

Figure 1. Optimal equilibrium with and without anorexia



Thus, an anorexic individual chooses a net-caloric-intake a_j that is under the healthy/optimal net-caloric-intake $\hat{a}_j$ associated with his/her characteristics had that individual not been anorexic. This minimum-necessary net-caloric-intake threshold can be thought of as the one that would keep individual *j* on a body mass index (BMI) considered 'healthy'.

From equation (4b), it is easy to infer an implicit reduced form of net-caloric-intake that depends on individual status, individual characteristics and the social environment, which includes the appearance/net-caloric-intake of others. In particular, under standard normality and linearity assumptions, the likelihood of being anorexic, e.g. the probability that the net-caloric-intake of an individual *j* is below his/her minimal healthy level $\hat{a}_j$ can be expressed as:

$$P(a_j < \hat{a}_j) = \varphi(s_j, z_j, Z_j, a_{-j}) \quad (5)$$

The next section describes how equation (5) is taken to the data.

4. Data and Methods

Data

Two types of variables are used: individual-level variables and socio-environmental variables. The former are taken directly from the answers to the Eurobarometer 59.0 questionnaire, study number 3903. Eurobarometer 59.0 is one of the Eurobarometer Surveys that have been conducted each spring and autumn since autumn 1973, adding countries as the European Union has expanded. The usual sample in standard Eurobarometer Surveys is 1,000

people per country, with the exception of Luxembourg (600) and the United Kingdom (1,000 in Great Britain and 300 in Northern Ireland). Also, since Eurobarometer 34, 2,000 people have been sampled in Germany (1,000 in East Germany and 1,000 in West Germany) in order to monitor the integration of the five new *Länder* into unified Germany and the European Union. In each of the 15 member states, the survey is carried out by national institutes associated with the European Opinion Research Group.[8] A special issue, Eurobarometer 59.0, was carried out in all European Union countries between 15th January and 19th February 2003 on behalf of the European Opinion Research Group. The questions from this Special Eurobarometer centred around attitudes towards life-long learning, health issues, dietary habits and alcohol consumption, safety issues, partnership, household tasks, childcare and family planning. It focussed particularly on the incidence of chronic illness, on long-term treatment, on dental health and, in more depth, on health maintenance (by discussing doctor's visits and various screening tests), on women's health and medical tests relating specifically to women's health, and on general and children's safety.[9]

Given that the mechanisms that give rise to anorexia and bulimia particularly affect women (Hill, 1993) this paper focuses on women's behaviour and thus only evidence on women was selected. This gave a sample of 8,740 valid observations on women above 15 years of age.

The paper scrutinises a set of individual variables ranging from socio-demographic characteristics to biometric measures and behavioural attitudes. This set of variables includes: (self-reported) weight, height, own-body perception, healthiness of eating habits, age, gender, being married, educational level, professional category, political attitudes, and residence in an urban or rural area. Furthermore, to reflect the freedom and quality of the answers, in some of the specifications the number of people present during the interview and the level of cooperation is included.

Women are categorised as anorexic if they are *extremely thin* but at the same time perceive themselves as being *'just fine' or 'too fat'*.[10] For that purpose, an indicator variable called

[8] From Standard Eurobarometer 59 / Spring 2003 - European Opinion Research Group EEIG: http://ec.europa.eu/public_opinion/archives/eb/eb59/eb59_rapport_final_en.pdf

[9] Special Barometer: Health, Food and Alcohol and Safety. Special Eurobarometer 186 / Wave 59.0 - European Opinion Research Group EEIG: http://ec.europa.eu/public_opinion/archives/ebs/ebs_186_en.pdf

[10] DSM-IV, the American Psychiatric Association's manual classifying mental illness, categorises as anorexic a woman who satisfies the following four criteria: 1. She refuses to maintain body weight above a minimal threshold adjusted for age and height. 2. She has an intense fear of gaining weight. 3. She suffers from an undue

'anorexia' was created, which took a value of 1 if a woman had a BMI of less than 17.5[11] and at the same time saw herself as being 'fine' or 'too fat'. A second anorexia indicator variable labelled as 'severe anorexia' was created if the individual also declared herself to be eating adequately. Finally, to identify seeing oneself in the 'right weight range or above it', a variable called 'normal or too fat' was created, which took a value of 1 if the individual declared she saw herself as normal or too fat, and of 0 otherwise.

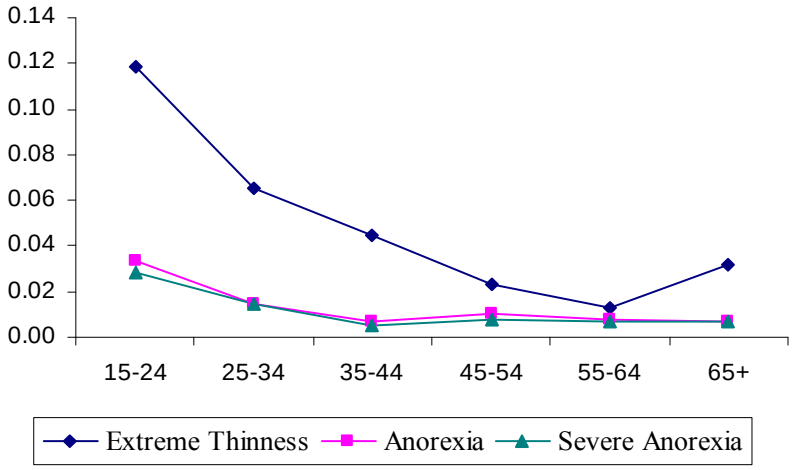
A variable was also created that measured *health consciousness* through the number of declared gynaecological check-ups received during the previous six months (0 to 6).

Figure 2 reports the prevalence of the three variables examined in different age groups. *Extreme thinness* in terms of very low BMI was highest during early youth (age group 15-24) and progressively decreased until 55-64 years of age, increasing slowly again in the late years of life. Anorexia, as defined here, had a prevalence of 3% for women aged between 15 and 24, just slightly higher than severe anorexia. Both conditions followed a decreasing pattern till the age of 35, after which they remained relatively constant at about 1%. The paper found that the prevalence of anorexia is just below 4% for younger age groups and just below 2% among women aged 25-34. Therefore, women below 34 are expected to present a different pattern from women over 34.

influence of body shape on self-esteem or denial of the seriousness of current low body weight. 4. She suffers from amenorrhoea. The Eurobarometer data do not provide information on criteria number 4. However, the definition of anorexia used here covers criteria 1 by including those who are extremely thin, and criteria 2 and 3, by including those who, besides being extremely thin, have a distorted perception of their own body appearance.

[11] Since height and weight are self-reported, the correction suggested by Connor Gober et *al.* (2008) was introduced.

Figure 2: Prevalence of extreme thinness and anorexia among different age groups



The first panel in Table 1 provides some overall statistics for the data. The average age of the women in the sample was 45. Of these, 57% were married, 37.5% were heads of household and 27% lived in a small town or rural area. Roughly 26% had completed primary education, 41% had finished compulsory secondary education, 24% had studied up to 18 years of age, and 9.4% held a university degree. The average value of the variable 'being health conscious' for the full sample was 1.25, indicating the average number of gynaecological screenings received over the previous 6 months.

The second panel in Table 1 shows the descriptive statistics for young women, who had a higher incidence of food disorders. This group included the women between 15 and 34 years of age, with an average age of 25 years. Only 47% were married, 28% were heads of household and 30% lived in a small town or rural area. Eight per cent had completed primary education, 41% compulsory secondary education, 23% had studied until the age of 18, and 27% held a university degree. For this younger group, the average number of gynaecological check-ups during the last half year was 1.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.
All Women			
Age	8,740	45.07	17.91
Married	8,740	56.8%	49.5%
Being head of household	8,740	37.5%	48.4%
Living in rural area	8,740	26.8%	44.3%
Having completed primary education	8,740	26.0%	43.9%
Having completed secondary education	8,740	40.7%	49.1%
Having received education up to 18 years	8,740	23.9%	42.6%
Holding a university degree	8,740	9.4%	29.2%
Being health conscious (using number of gynaecological check-ups)	8,740	1.3	1.5
Women between 15 and 34 years of age			
Age (years)	2,871	25.40	5.59
Married	2,871	46.9%	49.9%
Being head of household	2,871	27.6%	44.7%
Living in rural area	2,871	30.1%	45.9%
Having completed primary education	2,871	8.3%	27.6%
Having completed secondary education	2,871	41.1%	49.2%
Having received education up to 18 years	2,871	23.4%	42.3%
Holding a university degree	2,871	27.3%	44.5%
Being health conscious (using number of gynaecological check-ups)	2,871	1.0	1.3

Source: own using data from Eurobarometer 59.0 study number 3903

In order to reflect the woman's peer effect (pressure felt in terms of acceptable body-shape in her social environment/setting) different variables were created to represent the appearance of others around her. These measures were: the average BMI of women with the same education level, in the same age group (in ten-year groups), living in a similar environment (rural or urban) and in the same immediate region of residence – all estimated using a simultaneous equation modelling approach.[12] Since individual BMI and BMI of the group of reference may be affected by common unobserved factors, an instrument for peer BMI was developed using the average BMI of women meeting the above criteria but from a different generation – i.e. five to ten years older. This strategy can be found in other studies such as Grodner and Kniesner (2006) and Etilé (2007) where ideal BMI is used. In an attempt to reflect social

[12] The paper also calculated the average BMI of: 1. Women that met all these criteria except education. 2. Women that met only the age group and region criteria. 3. Women that were only in the same age group. Region refers to areas within countries and thus there are different regions in the 17 countries studied.

norms and image patterns, a variable called '*women's magazines per capita'* was included, referring to the number of magazines categorized as 'for women.' that were available[13].

Table 2 provides a breakdown of average BMI by country and age-group, the percentage of women with a BMI below 17.5; the percentage of women 'seeing themselves as normal or too fat' while having a BMI below 17.5 (defined here as anorexic); the percentage of women who believed they ate adequately; and finally, the percentage of women with a BMI below 17.5, who saw themselves as normal or too fat and believed they were eating adequately. The last column reports the circulation of women's magazines per 1,000 persons.

The country with the highest prevalence of female anorexia (column 4) was Austria, followed by France, Spain and Northern Ireland. The lowest prevalence was in Germany, Luxembourg and Italy. Almost all countries contained a population that was generally worried about its body weight, ranging from 36% in France to 56% in Northern Ireland. In the younger group of women, Luxembourg and Ireland had the highest percentage with 49%, while Italy had only 22%. Consistently, the lowest percentages of people who declared they ate adequately were found in West Germany (64%) and Austria (79%) and the highest were found in Finland (91%), Luxembourg (90%) and Denmark (93%). Substantial differences were found between the sample of younger women and the sample of women of all ages, suggesting that anorexia is very much a recent phenomenon. Significant differences between younger women and women as a whole were found in Austria, Greece, Northern Ireland and France, where an appallingly high prevalence of anorexia was found among younger women. Interestingly, with hardly any exceptions it was found that self-reported perception of eating adequately was higher among older women that among younger ones (Column 5). Finally, aggregate circulation of women's magazines was particularly high in Northern Ireland and Austria, though it was also high in West Germany and Luxembourg.

[13] *Source*: World Magazine Trends FIPP/ ZenithOptimedia World Magazine Trends

Table 2: Country-specific BMI* average and other measures of thinness and self-image

Countries	(1) Country's average BMI*		(2) BMI*<17.5		(3) Seeing oneself as too fat		(4) BMI*<17.5 & Seeing oneself as normal or too fat		(5) Eating adequately		(6) BMI*<17.5, Seeing oneself as normal or too fat and eating adequately		(7) Circulation of women's magazines per 1000 inhabitants
	All women	Younger women 15-34	All women	Younger women 15-34	All women	Younger women 15-34	All women	Younger women 15-34	All women	Younger women 15-34	All women	Younger women 15-34	All women
Belgium	24.1	24	1.30%	1.70%	48%	47%	0.40%	0.60%	85%	78%	0.40%	0.60%	0.053
Denmark	23.3	23.4	1.20%	2.20%	44%	40%	0.80%	1.50%	93%	82%	0.60%	0.70%	0.042
East Germany	23.2	23.1	0.60%	1.60%	42%	37%	0.20%	0.00%	83%	76%	0.00%	0.00%	0.037
West Germany	24.7	25.3	0.40%	1.20%	51%	38%	0.20%	0.60%	64%	55%	0.00%	0.00%	0.214
Greece	25.3	22.7	1.80%	3.90%	41%	34%	0.80%	2.60%	80%	75%	0.80%	2.60%	0.022
Italy	22.7	23.8	0.60%	0.50%	38%	22%	0.20%	0.50%	89%	90%	0.20%	0.50%	0.025
Spain	23.9	22.3	3.70%	5.10%	48%	40%	1.40%	1.10%	80%	76%	1.00%	0.5%	0.044
France	22.5	23.1	1.80%	3.20%	36%	30%	1.30%	2.70%	88%	88%	1.30%	2.70%	0.037
Ireland	23.2	24.5	1.00%	3.00%	56%	49%	0.40%	1.20%	82%	76%	0.40%	1.10%	0.027
Northern Ireland	24.5	23.3	3.60%	4.70%	48%	40%	1.30%	2.30%	84%	75%	1.30%	2.30%	1.320
Luxembourg	23.1	24.6	0.60%	0.00%	52%	49%	0.00%	0.00%	90%	87%	0.00%	0.5%	1.159
The Netherlands	24.6	24.9	1.20%	2.80%	42%	29%	0.60%	1.10%	84%	86%	0.60%	1.10%	0.069
Portugal	25	24.8	1.20%	2.40%	55%	49%	0.50%	1.00%	83%	76%	0.30%	0.50%	0.019
United Kingdom	24.8	24.6	1.00%	2.90%	46%	34%	0.40%	1.40%	83%	83%	0.40%	1.40%	0.037
Finland	24.7	24.7	1.10%	1.60%	50%	38%	0.50%	0.50%	91%	86%	0.50%	0.50%	0.097
Sweden	23.5	23.4	1.60%	2.50%	50%	38%	0.60%	1.30%	85%	83%	0.40%	0.60%	0.043
Austria	23.2	23	1.70%	5.20%	38%	30%	1.50%	4.60%	79%	77%	1.40%	4.00%	0.052

*Body mass index

Empirical Strategy

The empirical exercises were split into two complementary steps. The first estimated the impact of several relevant variables on the likelihood of being anorexic. The second used a bivariate recursive probit specification to separate the two processes involved in anorexia: extreme thinness and 'seeing one self as too fat'. This made it possible to disentangle the effect of different variables on the two separate processes. For instance, variables such as magazine circulation are expected to correlate with self-image but not with health production, unless channelled through self image.

a) *Being anorexic:*

Given the empirical evidence and the model specification in section 2, it was assumed that an individual's propensity to be anorexic could be modelled as a latent variable A_j^*, which depends on individual and socio-environmental characteristics:

$$A_j^* = \beta w_j + \gamma Z_j + \alpha a_{-j} + \varepsilon_j \quad (6)$$

where w_j are individual-specific controls and determinants of j's status such as gender, age, professional status, political affiliation and education; Z_j refers to the socio-environmental factors that individual j faces - including prevalence of women's magazines, country's access to the internet, trust in the press[14] etc; $a\text{-}_j$ stands for peer appearance; and, as usual, ε_j represents j's unobserved idiosyncratic characteristics.

This paper only observed whether a woman was anorexic or not (based on own definition, see above). It did not attempt to measure a continuing propensity to be anorexic. Thus, what can be obtained from the survey is the value of the dichotomous variable A_j. This variable is 1 if the person can be considered anorexic, and 0 otherwise:

$$A_j = 1_{(A^*>0)} = \begin{cases} 1 & if \quad A_j^* > 0 \\ 0 & otherwise \end{cases}$$

Assuming normality of the error term in equation (6), it is possible to estimate the likelihood of being anorexic in the form of the probit model:

[14] Some of these environmental variables - i.e., circulation of women's magazines – were only available at country level and did not present sufficient variation to be significant. Only country-indicator variables were finally included in the regressions. The remaining environmental variables, although available at the individual level are not finally significant.

$$P(A_j = 1 \mid w_j, Z_j, a_{-j}) = \Phi(\varepsilon_j \leq \beta w_j + \gamma Z_j + \alpha a_{-j}) \quad (7)$$

where Φ is the normal-distribution cumulative-probability function.

b) *Joint estimation of own-body self image and health-production function*

This second empirical exercise investigated how different factors affected the two different processes involved in anorexia according to the paper's own definition: being extremely thin; and having a self-image of being at least in the right weight range or simply too fat.

It is assumed that an own-body image of being at least in the right weight range or simply too fat reflects one's latent (body) 'self-identity' (Akerlof and Kranton, 2000), SI_j^*. Once again, what is being observed here is not a 'propensity' but a dichotomous variable SI_j that takes a value of 1 if the individual declares she sees herself as being in at least in the right weight-range for her height or above it, and of 0 otherwise. In the following tables this indicator variable is defined as 'Seeing oneself as normal or too fat.' In order to simplify the analysis, it was assumed that SI_j had a linear dependence on individual characteristics and status, and on peer appearance.

$$SI_j = \zeta w_j + \vartheta a_{-j} + e_j \quad (8)$$

Similarly, *being extremely thin* (BMI<17.5) may be thought of as a partial representation of the individual's latent health-production function, UW_j^*. As before, what is being observed is the dichotomous variable, UW_j, associated with this process. The variable UW_j takes value 1 when the individual is extremely thin and 0 otherwise.

It was assumed that *being extremely thin* depended linearly on individual characteristics and status, environmental variables, peer appearance, and also – and very importantly – on the individual's own-body perception or self-image, SI_j^*. *Being extremely thin* may also depend on additional (i.e. genetic) factors and is not necessary caused by a personal propensity to having a distorted self-image, x_j.

$$UW_j = \varsigma SI_j + \nu w_j + \lambda Z_j + \rho x_j + \mu_j \quad (9)$$

The system formed by equations (8) and (9) above is estimated on a recursive probit model by assuming that the idiosyncratic terms ε_j and e_j are jointly normally distributed. The identification of parameters in the recursive probit model defined by equations (8) and (9) is satisfied by the inclusion of variables x_j in equation (9) that do not appear in equation (8) and the triangularity created by the fact that a propensity to being underweight is influenced by a distorted own-body self image but not the other way around.

By estimating the recursive probit model above, it was possible to investigate how individual and environmental factors influenced these two processes, while allowing the unobserved factors affecting self-image and extreme thinness to be correlated. Furthermore, cross-country genetic variations in BMI were controlled for by the inclusion of country dummies and standard errors were always clustered.

5. Results and discussion

This section contains the results of estimating the probit model for being anorexic according to the definition outlined above in equation (7). It also displays the results of estimating a recursive probit model formed by equations (8) and (9), which made it possible to correlate not only error terms but also self-image and extreme body-weight (thinness) in line with the theoretical prediction displayed in Figure 1.

Table 3 displays the results of the preliminary strategy, which consisted of estimating a probit model to determine which observable factors could cause a woman to *see herself as normal or too fat* whilst *being extremely thin* (BMI<17.5). These are displayed in column 1 or, if the woman also thought she was eating adequately, in column 2 . One probit model was estimated for the full sample and one for women between 15 and 34 years of age. There were several explanatory variables or potential determinants of such behaviour: marital status; living in a rural setting; being the head of the household; age; education; and a proxy of health-consciousness based on the declared number of gynaecological screenings taken in the last 6 months. Some potential socio-environmental factors were also included: the circulation of women's magazines per capita in the country of residence, and peer BMI – based on the BMI of women in the same age-bracket living in the same region.

For the full sample of women, the estimated marginal effects (see Table 3) showed, as expected, that *the BMI of the group of reference in terms of age, gender and location was*

very significant and negative (-0.0147 for the full sample, -0.0262 for the sample of younger women). Thus, the higher the BMI of the peer group, the lower the probability of suffering from anorexia. For the younger women, the effect of peer BMI was even more marked, in terms of decreasing the probability of being anorexic. Being married as opposed to not (only significant for the full sample and equal to -0.00381), being in the age intervals of 25-34, 35-44 and 45 or above as opposed to being younger, and having secondary education or having been to university all decreased the likelihood of being anorexic or severely anorexic as defined above. The signs of the results for being married, age and education are understandablea and the peer-effect result is in line with the literature on social-multiplier effects (Glaeser *et al*, 1996; Sacerdote, 2000). Nevertheless, this result should be interpreted with caution because only a crude measure of 'peer effect' was used.

Surprisingly, living in a rural setting, being the head of the family, and the measure of women's magazine circulation were not significant for either group. Being in a rural environment was found not to be significant, although urban women were expected to be subject to more social pressure with regards to their appearance than those living in rural settings. However, this might have had to do with other household-related variables such as quality of parenthood, which remained unobservable due to lack of data. The non-significance of being the head of the household could possibly be explained by the inclusion of education, which may be picking up part of the 'being head of the household' variation effect. However, given that what is being studied is a combination of self-image and thinness, it might well be that the effects cancel each other out, and this calls for a separate estimation strategy. The result of non-significance for the women's magazine circulation per capita was quite puzzling as it was not consistent with some specific studies on the subject (Turner *et al.,* 1997). This may be due to the crudeness of the country measure and the possibility that the categories are not comparable across countries; perhaps better quality data was required to measure the effect of environmental or media-related variables.

The effects of these variables on the probability of being severely anorexic were qualitatively very similar but slightly less marked than the ones commented on above.

Table 3. Probit model of the likelihood of suffering from anorexia

	Anorexia (A) §		Severe Anorexia (B) §§	
COEFFICIENT	All women	Younger women 15-34	All women	Younger women 15-34
Peer effects: group BMI	-0.0147***	-0.0262*	-0.00140***	-0.0226
	(-0.00457)	-(0.01)	(-0.0042)	-(0.01)
Women's magazine circulation per capita	0.145	-4.236	0.917	-0.922
	(1.659)	-(5.069)	(1.532)	-(4.644)
Being married	-0.0381*	-0.0370	-0.00459*	-0.00681
	-(0.002)	-(0.006)	-(0.002)	-(0.006)
Living in a rural environment	0.00814	0.0321	0.00903	0.0435
	(0.0143)	(-0.00399)	(0.0143)	(0.04)
Being head of the household	-0.000681	-0.00595	-0.000774	-0.00424
	-(0.001)	-(0.004)	-(0.001)	-(0.004)
Being health conscious†	0.000761**	0.00265	0.000493	0.00162
	(0.000)	(-0.00214)	(0.000)	(0.002)
Between 25 and 34 years old	-0.0327***	-0.0134***	-0.0221**	-0.0752*
	-(0.001)	-(0.005)	-(0.001)	-(0.004)
Between 35 and 44 years old	-0.0487***		-0.0368**	
	-(0.001)		-(0.002)	
More than 45 years of age	-0.0101***		-0.0682***	
	-(0.003)		-(0.002)	
Having completed secondary education	-0.0256**	-0.0539	-0.0182**	-0.0278
	-(0.001)	-(0.004)	-(0.001)	-(0.004)
Having received education up to 18 years	-0.000686	-0.000342	-0.000726	0.000432
	-(0.001)	-(0.005)	-(0.001)	(0.005)
Having a university degree	-0.0247**	-0.0535	-0.0210*	-0.0404
	-(0.001)	-(0.006)	-(0.001)	-(0.005)
Controlled by country of origin	Yes	Yes	Yes	Yes
Number of observations	8012	2654	8012	2654
Psudo R squared	0.0859	0.0484	0.0788	0.0217
LogLikelihood	-275.1	-180.8	-242.5	-145
Number of clusters (countries)	17	17	17	17

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
§ Anorexia A is defined as when the subject is below 17.5 BMI and sees herself as a normal or fat person.
§§ Anorexia B is defined as when the subject is below 17.5 BMI, considers herself normal or fat and also thinks she is eating appropriately.
† Being health conscious is defined as the sum of all gynaecological screenings received in the last 6 months.

Robustness checks for the probability of being anorexic

To test the robustness of the specifications in Table 3, their impact on the peer marginal-effect coefficient was estimated by adding the controls incrementally (see Table 4 below). The results obtained suggested that the peer marginal-effect was robust to these changes, although the introduction of additional covariates progressively decreased the coefficient

from -0.02 to -0.014 for the less restrictive definition of anorexia, and from -0.016 to -0.014 for the strictest definition. This coefficient was slightly more stable for the younger sample. Even when additional controls were introduced; the coefficient decreased from -0.014 to -0.010 for both definitions of anorexia.

Joint estimation of fat self-image and low weight

Table 5 shows the marginal effects of a bivariate recursive probit model (Greene, 1998) of *being extremely thin* and *seeing one self as too fat* separately, but allows the unexplained variation in both processes to be related. Once again, the bivariate model was estimated for the full sample of women first, and then for those in the 15-34 year age range. The identification restrictions were that peer BMI and women's magazine circulation were presumably related to body self-perception but not to own-weight, while *seeing one-self as too fat* (self-identity) was likely to influence the probability of *being extremely thin*.

The estimates in the recursive bivariate probit model, where the two processes involved in the paper's simplistic definition of anorexia were disaggregated, gave rise to some interesting findings. Peer BMI had a positive effect on the probability of *seeing one self as too fat* (0.11 for the full sample, 0.071 for the younger sample). Once again, aggregate women's magazine circulation was found to be statistically non-significant, which clearly suggested that the aggregate nature of this variable might not correspond with individual information-processing[15]. Being married had a positive effect on the probability of *being extremely thin* (0.133) and *seeing one self as too fat* (0.189) but only for the young sample. For the full sample, the effect of *being extremely thin* on *seeing one self as normal or too fat* was significant (0.167). Age had a curvilinear effect on the probability of *being extremely thin* for the full sample but not on the younger sample, probably because of the limited age-variation in that group. Living in a rural area had a positive effect on the likelihood of *seeing one self as too fat* (0.056) but this was not significant for the younger sample. Having been to university had a significant negative effect on *seeing one self as too fat* for both samples (-0.345 and -0.214) but only in the full sample did it negatively affect the probability of *being extremely thin* (-0.169). Surprisingly, neither being head of the household nor being health-conscious were significant.

[15] Other crude measures such as access to the Internet were initially tried but did not display significant effects and were finally discarded.

Table 4: Robustness checks using alternative probit model specifications

	Anorexia (A) §					Severe Anorexia (B) § §				
Anorexia (All women)										
Peer Effects: group BMI	-0.02	-0.017	-0.017	-0.015	-0.014	-0.018	-0.0158	-0.0147	-0.0146	-0.0139
	(0.001)	(0.001)	(0.001)	(0.003)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Personal characteristics	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Age variables	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Education	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Health consciousness	No	No	No	No	Yes	No	No	No	No	Yes
Controlled by country of origin	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Anorexia (Young Women)										
Peer effects: group BMI	-0.014	-0.011	-0.011	-0.010	-0.010	-0.014	-0.011	-0.011	-0.011	-0.010
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Personal Characteristics	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Health consciousness	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Age variables	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Education	No	No	No	No	Yes	No	No	No	No	Yes
Controlled by country of origin	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Seeing oneself as normal or too fat (self-image) had a very negative effect on the probability of *being extremely thin,* as one would expect following the model outlined in Figure 1. This result is particularly important as it provides evidence consistent with the idea that self-image and identity do exert an influence on health-production, at least in the case of anorexia. Finally, the coefficient representing the correlation of the error terms of both processes is positive and highly significant for both samples, corroborating the fact that there are some unobserved factors influencing both women's body identity and extreme thinness that are positively correlated.

Table 5. Recursive-probit models for being extremely thin and seeing oneself as 'normal' or 'too fat'

	All women		Younger women 15-34	
COEFFICIENT	Extreme thinness ‡	Seeing oneself as too fat	Extreme thinness ‡	Seeing oneself as too fat
Peer effects: group BMI		0.113***		0.0714***
		(0.0158)		(0.015)
Women's magazine circulation per capita		24.20		-40.58
		(61.630)		-(25.900)
Being married	-0.00243	0.167***	0.133**	0.189***
	-(0.053)	(0.047)	(0.066)	(0.073)
Being household head	-0.0209	0.0621	0.0411	0.0947
	-(0.048)	(0.038)	(0.069)	(0.068)
Being health conscious†	0.00177	0.00945	0.0159	-0.00895
	(0.014)	(0.009)	(0.021)	-(0.011)
Between 25 and 34 years old		0.180***		0.132***
		(0.036)		(0.039)
Between 35 and 44 years old		0.309***		
		(0.045)		
More than 45 years of age		0.338***		0.0196***
		(0.051)		(0.007)
Age	-0.0173*		0.00456	
	-(0.009)		(0.032)	
Age squared	0.000137*		-0.000273	
	(0.000)		-(0.001)	
Living in a rural area	0.0441	0.0560**	0.0390	0.00927
	(0.035)	(0.023)	(0.052)	(0.036)
Having completed compulsory secondary education	0.0685	0.0368	0.0572	0.0706
	(0.059)	(0.046)	(0.072)	(0.059)
Having received education up to 18 years	0.0968	-0.0254	0.0695	0.00356
	(0.078)	-(0.055)	(0.080)	(0.077)
Having been to university	-0.169*	-0.345***	-0.162	-0.214**
	-(0.095)	-(0.089)	-(0.110)	-(0.098)
Seeing oneself as too fat	-2.793***		-2.690***	
	-(0.162)		-(0.112)	
Constant	0.242*	-3.205***	-0.0281	-2.180***
	(0.146)	-(0.402)	-(0.424)	-(0.343)
Atrho	1.583***		7.564	
	(0.431)		(19.280)	
Controlled by country of origin	Yes		Yes	
Number of observations	8740		2871	
Chi-Square for rho=0	13.48		0.154	
Reject null rho=0	Yes		No	
Degrees of freedom	14		14	
Loglikelihood	-0.845		-0.296	
Number of clusters (countries)	17		17	

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
† Being health conscious is defined as the sum of all gynaecological screenings had in the last 6 months.
‡ Thinness is defined as having a BMI of below 17.5

Robustness checks for the joint estimation of fat self-image and low weight

Table 6 shows that the impact of peer effect on having a normal or fat self-image remained almost constant when additional controls were introduced for both the 'all women' and 'younger women' samples. This confirms the importance of peer effects in the perception of individual weight. Similarly Table 6 shows the recursive effect of 'fat self-image' on extreme thinness and thinness. As expected, the coefficient was negative and robust, revealing that women that see themselves as 'fine' or 'too fat' are 44%-46% less likely to be extremely thin. The instruments employed performed well following traditional Hausman test methods and were theoretically relevant. However, additional factors might still be present. For instance, unobservable variables affecting women of different ages may bias upward the relationship between BMI and peer-average BMI (and thus bias downward the peer effect coefficient). Although differences in the coefficient for peer effects were not statistically significant at the traditional 5% level, it cannot be ruled out that due to unobserved contextual effects, BMI and peer BMI may be positively correlated, biasing upward the peer-effect coefficient in Tables 5 and 6.

Table 6. Robustness checks using alternative estimations

All women	**Being extremely thin**				**Seeing oneself as too fat**			
Peer effects: group BMI	-	-	-	-	0.043	0.044	0.043	0.044
					(0.005)	(0.005)	(0.005)	(0.006)
Seeing oneself as too fat	-0.42	-0.44	-0.44	-0.44	-	-	-	-
	(0.014)	(0.130)	(0.129)	(0.130)				
Personal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Education	No	No	Yes	Yes	No	No	Yes	Yes
Health consciousness	No	No	No	Yes	No	No	No	Yes
Controlled by country of origin	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Young Women 15-34	**Being extremely thin**				**Seeing oneself as too fat**			
Peer effects: group BMI					0.045	0.045	0.03	0.046
					(0.060)	(0.060)	(0.013)	(0.060)
Seeing oneself as too fat	-0.45	-0.44	-0.44	-0.44				
	(0.200)	(0.210)	(0.210)	(0.210)				
Personal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Education	No	No	Yes	Yes	No	No	Yes	Yes
Health consciousness	No	No	No	Yes	No	No	No	Yes
Controlled by country of origin	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

6. Conclusion

This paper aims to be a first attempt to research the economics of anorexia. It presents a simple theoretical framework for female caloric intake that depends not only on other people's body shapes but also on body self-image or perception, motivated by the work of Akerlof and Kranton (2000). It then uses an empirical strategy to identify the determinants of food disorders (anorexia) following both a joint process and a recursive disaggregated process, in which self-image (identity) is found to account for thinness, following the lines of the simple theoretical model. In measuring the underlying social mechanisms through which self-image is formed, it draws upon the effect of different definitions of peer-weight and then adds to the model all the variables found to be relevant in the literature that were available in the cross-country European database.

The empirical evidence was consistent with the assumption that individuals trade off health against self-image. Second, it was found that, consistent with the epidemiological literature, weight-related food disorders happen mostly at younger ages and require attention before they extend to older age groups. Note that the findings showed that anorexia primarily affected women aged between 15 and 34, and that it was primarily socially induced. These results have serious policy implications. They call for urgent action on individual identity, probably while it is still being formed, so as to prevent severe damage to women's health and in order to improve their well-being and that of their families and friends.

Third, the influence of a crude measure of peer effects is significant and robust throughout the samples, indicating that socio-environmental factors play an important role. This result should be corroborated using longitudinal data, but these are not available in Europe at the moment. The paper's findings were the best that could be done with the existing cross-sectional data on Europe. They provide some important results that can act as a basis for future literature. In addition the paper contributes to behaviourial economics by using a model for eating disorders that allows for net-caloric-intake being a 'bad' instead of a 'good' in the consumer utility function above a certain intake.

The results are in line with the Clark and Oswald (1998) model of comparison utility in that deviant behaviour - such as anorexia - may occur when an individual wants to deviate from some social norm and is using own-BMI as a substitute for that norm in the production of

utility. It is important to understand how individuals come to value what they do. In the health arena, this implies understanding how preferences for smoking, eating unhealthy food or avoiding physical activity - with their costs in terms of health and well-being - are incorporated in people's utility maximization. Underlying this debate is the question of time-discount rates and the formation of preferences. The effect of meta-preferences is particularly crucial in determining identity and health behaviour. This has important consequences for health-policy evaluation given that preferences for health-related activities are likely both to be influenced by and to influence health outcomes.

In the light of this study, government intervention to adjust individual biases in self-image would be justified to curb or at least prevent the spread of a potential epidemic of food disorders. The asymmetry of the information in the hands of women with food disorders, as compared to women without, is one of the factors that may prompt governments to take action.

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