

# Perceived vulnerability to disease and antifat attitudes in a sample of children and teenagers

Alejandro Magallares<sup>1</sup> · Ignacio Jauregui-Lobera<sup>2</sup> · Rocio Carbonero-Carreño<sup>3</sup> · Inmaculada Ruiz-Prieto<sup>4</sup> · Patricia Bolaños-Ríos<sup>4</sup> · Asuncion Cano-Escoriaza<sup>1</sup>

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## Abstract

**Purpose** Perceived vulnerability to disease (beliefs about personal susceptibility to contracting an infectious disease) is usually related to the expression of prejudice towards different stigmatized groups. In this study, the relationship between this variable and the expression of the prejudice towards obese people was analyzed.

**Method** The sample comprised a total of 137 children and teenagers, aged between 12 and 17 years, from a Spanish high school who fulfilled several scales which measure perceived vulnerability to disease, antifat attitudes and perceived controllability of weight. Additionally, body mass index (BMI) was calculated by means of the participants' height and weight.

**Results** Perceived infectability (one of the factors of the perceived vulnerability to disease scale) was negatively related to controllability of weight, and germ aversion (the second factor of the vulnerability scale), showed a positive relationship with the antipathy towards obese people. Finally, perceived controllability of weight was positively correlated with BMI.

**Conclusions** The implications of these results in the field of the study of the prejudice toward obese people are discussed. To our knowledge, no other studies have investigated the relationship between perceived vulnerability to

disease and antifat attitudes in minors. Additionally, this is the first time that the measured BMI has been used instead of the self-reported one.

**Keywords** Perceived vulnerability to disease · Antifat attitudes · Perceived infectability · Germ aversion · Perceived controllability of the weight · Body mass index

## Introduction

Human beings have mechanisms that allow them to detect and avoid contact with other individuals that are disease carriers [1]. People are especially sensitive to any type of signal, such as wounds or rashes, which could be related to the presence of pathogenic elements. Considering a cognitive level, the perception of visible illness cues activates disease labels associated with different illnesses. With respect to an emotional level that perception activates a negative evaluation of the infected individuals [2]. For example, individuals with birth marks in their faces [3] or with different types of physical disabilities are usually judged very negatively by “healthy” people, even knowing that those individuals are not carriers of an infectious disease [4]. This is especially notorious among people with a high-perceived vulnerability to disease. In other words, the stigmatization that “infected” people suffer is a consequence of the activation of a disease-avoidance system, which is prone to respond to visible signs and labels usually associated to disease [2]. According to different authors, there are some individual differences with respect to the beliefs about the susceptibility to contract infectious illnesses [5]. In this regard, those individuals that feel more vulnerable to be infected report also more negative attitudes toward people who may be a disease carrier [6].

✉ Ignacio Jauregui-Lobera  
ignacio-ja@telefonica.net

<sup>1</sup> Social Psychology Department, Spanish Open University (UNED), Madrid, Spain

<sup>2</sup> Pablo de Olavide University, Carretera de Utrera s/n, 41013 Seville, Spain

<sup>3</sup> IES Atenea, Mairena del Aljarafe, Seville, Spain

<sup>4</sup> Behavioural Sciences Institute, Seville, Spain

In the case of obesity, there is empirical evidence about the fact that social contagion plays a relevant role in the development of this illness [7]. Additionally, a feeling related to the fact that obesity may be transmitted through contact with individuals that have weight problems has been reported [8]. If the mechanism that allows humans to detect pathogenic elements reacts with other type of physical diversions (such as facial marks [3] or disability [4]), in this case obesity could be also related to perceived vulnerability to disease. For example, it has been found that people who are more worried about infectious illnesses have worse antifat attitudes than those individuals that are not concerned about this type of diseases [9]. In this field of study, it has been reported that this mechanism of detecting infectious illnesses is related with a higher rejection to have physical contact with obese people [10]. In other words, obesity may serve as a heuristic cue for pathogen infection [9].

The reviewed literature also describes antifat attitudes as weight stigma, weight bias or antifat prejudice. Summarizing, that means a negative attitude toward, belief about, or behavior against those persons perceived as overweight or obese people [11].

The above-mentioned studies have focused on adult participants, but we consider especially relevant to analyze the relationship between perceived vulnerability to disease and antifat attitudes also among children and teenagers. The existence of prejudice toward children with weight problems has been reported in several studies (e.g., [12]), but as far as we know there are no studies that have analyzed whether antifat attitudes could be explained by possible differences with respect to perceived vulnerability to disease or not. For example, it has been found that the children' prejudice towards obese individuals might be explained by the belief that obesity could produce other associated infectious illnesses [13]. However, there is very little past research presented on antifat attitudes in adolescents regarding perceived vulnerability of disease. Furthermore, experts agree with the fact that in order to improve the understanding of childhood obesity, it would be very important to analyze the social stigma that obese youths face, which is pervasive and might have important consequences for their quality of life [11]. Therefore, we have designed this study with a sample of children and teenagers with the main goal of testing if the relationship between perceived vulnerability to disease and antifat attitudes may be found as in the case of the previous studies conducted with adults populations.

This research also analyzes the role of the perceived controllability of weight and its relation with the perceived vulnerability to disease. Recent investigations have showed that antifat attitudes might be reduced or exacerbated depending on the causal information about obesity

provided to the participants [14] and that one of the strongest predictors of negative attitudes towards people with weight problems is controllability beliefs about obesity [15]. It has been found that perceived vulnerability to disease and willpower attributions had independent effects on antipathy toward obese people [9]. However, in this last study only chronic concerns about pathogens or germ aversion (one of the factors of the perceived vulnerability to disease scale) [5] were measured. It must be noted that the authors who originally developed the mentioned questionnaire [5] also included another dimension related with the perceived susceptibility to infectious diseases called perceived infectability. According to these authors, perceived infectability may be defined as the beliefs about immunological functioning and personal susceptibility to infectious diseases and germ aversion as the aversive affective responses to situations that connote a relatively high likelihood of pathogen transmission [5]. Therefore, perceived infectability is more related with cognitive aspects of perceived vulnerability of disease, while germ aversion would be the emotional response to a possible contagion [5]. For this reason, we suggest that if people think that obesity depends on the willpower of the person, they could not consider this illness as something contagious that, consequently, they could get. In other words, controllability of weight might be positively related to the expression of prejudice towards obese people, but at the same time it might have a negative relation with perceived vulnerability to disease. According to the reviewed literature, the proposed mechanism of disease avoidance [2] suggests that germ aversion might be related to the emotional response towards obese individuals (antifat attitudes) but the cognitive part of this system would be correlated with the beliefs about the causes of obesity (perceived controllability of the weight). Despite up to date there are no studies addressing this issue, we believe that perceived infectability might be negatively related with perceived controllability of weight.

Antifat attitudes have been found not only in normal weight individuals [16], but also in overweight and obese populations [17]. For this reason, the participants' BMI has been assessed in this investigation. As far as we know, the measurement of BMI, instead of the self-reported one, in studies about the relationship between perceived vulnerability to disease and antifat attitudes is a novelty. We believe that it is especially important because it has been reported that children and adolescents may not be aware of their own height and weight [18].

Finally, it is important to remark that gender differences in perceived vulnerability to disease and antifat attitudes have been found in previous studies. According to the reviewed literature, compared to men, women seem to have higher scores on both perceived infectability and germ aversion

factors [5]. Additionally, recent investigations, based on antifat attitudes scales, have reported higher scores in men than in women [19]. For this reason, gender differences were tested in our sample.

Therefore, the main goal of this study was to analyze the relationship between perceived vulnerability to disease, antifat attitudes and perceived controllability of weight in a sample of children and teenagers. According to the reviewed literature, we hypothesized a positive relationship between the germ aversion factor of the perceived vulnerability to disease scale and antifat attitudes [10] and a negative relationship in the case of perceived controllability of the weight and the perceived infectability factor [9]. Additionally, we hypothesized a positive correlation between perceived controllability of the weight and antifat attitudes [15]. Finally, with respect to gender differences in the case of perceived vulnerability to disease [5] and antifat attitudes, we hypothesized that would be higher in men than in women [19].

Furthermore, to examine the predictive ability of the perceived vulnerability to disease variables related to antifat attitudes, a regression analysis was conducted.

## Methods

### Procedure

Before carrying out the study, the project was approved by the Director of the Institute of Behavioural Sciences in Sevilla (Spain), and the Director of the Instituto de Educación Secundaria “Atenea” (IES Atenea). After approving it, it was presented to the student representatives, the high school staff and the association of students’ parents (AMPA), receiving the approval from all of them. After the approval, the project was presented to the city council in Mairena del Aljarafe (Sevilla) and to the responsible for Education at the Local Government in Andalucía to get their approval.

Once all the approvals were obtained, a schedule was planned to collect the data in the high school. In the period of a normal week in March 2014, questionnaires were answered and anthropometric measures, like height and weight, were obtained. A total of 150 students were asked to participate and 13 of them (8.66 %) refused to enroll in the project. In this regard, we have no data to suspect any selection effects on the results. It must be noted that students gave assent to participate and they were informed about the objective of this study.

With the goal of not disturbing the students, the questionnaires were answered during tutorials and in a week when no exams took place.

The anthropometric measures were taken during gym classes.

### Instruments

With respect to the anthropometric measures, weight and height were taken in individual sessions, with the participants in the standing position, barefoot, and in light garments. A stadiometer “Añó-Sayol Atlántida S13” model was used.

To measure perceived vulnerability to disease, the Spanish Version [20] of the scale perceived vulnerability to disease (PVD) was used [5]. The PVD scale contains 15 items in a Likert scale from 1 (completely disagree) to 7 (completely agree). This scale has two subscales: perceived infectability ( $\alpha = 0.73$ ) and germ aversion ( $\alpha = 0.60$ ). The first subscale has 7 items and the second one 8 items. An example of the “Perceived infectability” subscale is “*In general, I am very susceptible to colds, flu and other infectious diseases*”. An example in the case of “Germ aversion” subscale is “*I prefer to clean my hands just after giving my hand to someone’s hand*”. Two scores were computed by averaging the 7 items of the “Perceived infectability” subscale and the 8 items of the “Germ aversion” subscale. Higher scores on perceived infectability reflect greater individuals’ beliefs pertaining to their susceptibility to infectious diseases. Higher scores on germ aversion reflect greater individuals’ discomfort in situations that connote an increased likelihood for the transmission of pathogens.

To measure antifat attitudes, the Spanish version [21] of the “Dislike of obese people” subscale from the “Antifat Attitudes” scale (AFA) was used [16]. The subscale of “Dislike of obese people” contains 7 items ( $\alpha = 0.69$ ). An example of these items is “*I really don’t like fat people much*”. The participants answered with a Likert scale from 1 (completely disagree) to 7 (completely agree). A score was computed by averaging the 7 items of the “Dislike of obese people” subscale. Higher scores on this measure reflect greater antifat attitudes.

Finally, to measure perceived controllability of weight, the Spanish version of the “Beliefs About Obese Persons” scale (BAOP) was used [22]. The BAOP scale contains 8 items ( $\alpha = 0.72$ ). An example of these items is “*Obesity is usually caused by overeating*”. Participants answered with a Likert scale from 1 (completely disagree) to 7 (completely agree). A score was computed by averaging the 8 items of the scale. Higher scores on this measure reflect greater beliefs that obesity is under personal control.

As it was mentioned, the participants’ weight and height were assessed in order to calculate BMI according to standard procedures (weight-kg/height-m<sup>2</sup>).

Finally, participants gave information about some demographic issues relevant for this study such as age and sex. The families' education level and the families' income were obtained from the database of IES "Atenea".

### Data analysis

First of all, to test possible differences between men and women, comparisons were examined by means of the *t* test (after testing that the variables fit a normal distribution).

After having checked if there were differences between male and female participants, means (*M*) and standard deviations (SD) of all the variables of the study were calculated.

The next step was to estimate Pearson's correlations among all the variables of the study.

Finally, to examine the predictive ability of the perceived vulnerability to disease variable, a regression analysis was performed by the successive steps method using antifat attitudes as criterion variable (dependent variable) and germ aversion, perceived infectability, perceived controllability of weight, BMI and age as predictors (independent variables).

The SPSS 19.0 (SPSS 19.0, SPSS Inc, Chicago, IL) was used to conduct all the analyses.

## Results

The sample comprised 137 children and teenagers from the public high school *IES Atenea* (Mairena del Aljarafe, Seville, Spain), including students from 12 to 17 years old. There were 74 boys and 63 girls. The average BMI of the participants was 21.36 (SD = 3.99; range 14.6–35.1). With respect to family education, 12.38 % had fulfilled elementary school, 34.12 % had finished their secondary education and 19.62 % had got a university degree. 33.88 % of the families did not give this information. Regarding the economical status they had moderate incomes (21,000–28,000 €/year).

### Gender differences

The *t* test showed that there were no significant (all  $p > 0.05$ ) differences in the analyzed variables between both groups (see Table 1).

### Exploratory analysis

The next step was to calculate the *M* and SD of all the variables of the study (see Table 2).

**Table 1** Gender differences in the variables of our study

Variables	Men <i>M</i> (SD)	Women <i>M</i> (SD)	<i>t</i> (135)
Perceived infectability	3.23 (1.09)	3.02 (0.82)	1.26
Germ aversion	3.57 (0.93)	3.53 (1.08)	0.25
Antifat attitudes	1.83 (0.83)	2.04 (1.02)	−1.34
Controllability of weight	4.65 (0.76)	4.38 (1.02)	1.77
Age	14.42 (1.76)	14.22 (2.33)	0.56
BMI	21.19 (4.01)	21.16 (4.65)	0.04

**Table 2** Means and standard deviations of the variables of the study

Variables	<i>M</i>	SD
Perceived infectability	3.13	0.98
Germ aversion	3.55	1.01
Antifat attitudes	1.92	0.92
Controllability of weight	4.53	0.90
Age	14.33	2.04
BMI	21.18	4.30

### Correlational analysis

Once the *M* and SD were estimated, Pearson's correlations (*r*) of all the variables of the study were calculated. As it is shown in Table 3, there was a negative and significant correlation between perceived infectability and controllability of weight. Additionally, there was a positive and significant correlation between germ aversion and dislike towards overweight people. We also found that the two subscales of "perceived vulnerability to disease" scale were not statistically related and that controllability of weight was not significantly related with dislike towards obese people. Finally, we found that age was negatively related with antifat attitudes and that perceived controllability of weight was positively correlated with BMI.

### Regression analysis

After the correlational analysis, a regression analysis was conducted with antifat attitudes as the dependent variable and the rest of the variables (germ aversion, perceived infectability, perceived controllability of weight, BMI and age) as independent variables. The model had a  $R^2$  of 0.06 [ $F_{1, 134} = 9.16$ ,  $p < 0.01$ ]. The variable included in the regression model was germ aversion (standardized  $\beta = 0.25$ ,  $t = 3.02$ ,  $p < 0.01$ ).

## Conclusions

The results support our first hypothesis, as we found a positive relation between germ aversion and antifat attitudes and a negative relation in the case of perceived

**Table 3** Correlations among the variables in the study (*r*)

Variables	1	2	3	4	5	6
(1) Perceived infectability						
(2) Germ aversion	0.08					
(3) Antifat attitudes	0.06	0.26**				
(4) Controllability of weight	−0.18*	0.05	0.12			
(5) Age	0.14	−0.04	−0.17*	−0.08		
(6) BMI	0.04	−0.02	−0.04	0.21*	0.11	

\*  $p < 0.05$ , \*\*  $p < 0.01$

controllability of the weight and perceived infectability. On the contrary, the results do not allow us to maintain the second hypothesis of the study since we did not find a positive correlation between perceived controllability of the weight and antifat attitudes. Finally, the third hypothesis is not supported since no gender differences in perceived vulnerability to disease and antifat attitudes were found.

## Discussion

As other authors, our results show that there is a relationship between perceived vulnerability to disease and antifat attitudes [9]. Specifically, we have found that dislike towards obese people is positively related with germ aversion. In other words, people that strongly believe that pathogenic elements found in the environment could cause them illnesses are also the ones that show more prejudice toward obese people.

Additionally, we have found that perceived controllability of weight is negatively related to perceived infectability. In other words, individuals who perceive themselves as more vulnerable to get contagious illnesses also perceive obesity as less controllable.

It must be noted, as it has been said in the introduction section, that the studies about the relationship between obesity and perceived vulnerability to disease have mainly focused on adult populations [9]. This study shows that those variables are also related in the case of children and teenagers. This finding is similar to a previous one with children [13] despite in this case the author did not use the PVD scale [5]. This author, considering the hypothesis that children would find beverages purportedly created by obese children less tasteful and more memorable than beverages created by average weight children, found that the chances of feeling sick were higher, and memory was superior for obese-created drinks than for normal weight children-created drinks.

We have also found that perceived controllability of weight is not related with dislike towards obese people, a typical result in studies about prejudice toward obese people [15]. It has been found the same tendency as in the reviewed literature, a positive correlation, but in this case it is not significant. For example, in a recent investigation it

has been reported that mothers' beliefs about controllability were related to antifat attitudes and this perception was a good predictor of children's negative stereotypes towards overweight peers [23]. These findings seem to remain controversial because some previous studies have found a more clear relationship between perceived controllability of weight and antifat attitudes [24]. It must be noted that different studies with adults have confirmed that negative attitudes to fat people are significantly correlated with perceived controllability of weight [11, 16].

It is also important to mention that there were no gender differences in the case of dislike towards obese people, a result that is usually found in studies with adults [19]. In the case of children populations it has been found that girls usually show stronger antifat attitudes than boys [25], but there are other studies that have observed no gender differences, as we did [26].

Surprisingly, the two subscales of the "Perceived vulnerability" scale (perceived infectability and germ aversion) are not significantly related, which contradicts the results found by the authors who originally developed the scale [5]. The relationship between the two subscales is positive but not significant. Additionally, no gender differences were found in the two subscales.

Age was negatively related with antifat attitudes. This is an expected finding because the reviewed literature shows that negative attitudes towards obese individuals decrease as a function of children's age [27]. Nevertheless, the decrease of explicit antifat attitudes among children and adolescents could be also explained in terms of their social desirability development. In fact, it has been found that explicit negative attitudes toward overweight peers decrease with the age but, however, implicit stereotypes, not controllable negative antifat attitudes, remain stable through primary school years [26].

Finally, it was found that perceived controllability of weight was positively correlated with BMI. Recent studies have reported that people's beliefs about the causes of obesity are related with their BMI [28]. According to these studies, whether a person believes that obesity is caused by overeating or by a lack of exercise predicts his or her actual BMI. For example, it has been reported that people who mentioned the diet as the primary cause of obesity actually

had lower BMIs than those who highlighted a lack of exercise.

Although epidemiological studies have shown the increasing prevalence of obesity [29], this social phenomenon, unfortunately, has not attenuated antifat attitudes in Western industrialized countries. For these reasons, it is well known that obesity is currently a global public health concern [30]. It must be noted that antifat attitudes may produce a great impact on the quality of life of persons who suffer discrimination or exclusion because of their weight [31]. On the one hand, some investigations have showed that antifat attitudes do not help obese people to have a healthy life and it has been found that discrimination experiences were associated with higher caloric intake and lower energy expenditure [32]. On the other hand, many obese individuals who might benefit from weight loss treatment nevertheless do not plan or desire to seek treatment because of the perceived barriers related to weight stigma [33]. In addition, weight stigmatization is an important risk factor for body dissatisfaction [34]. Addressing this important public health issue obeys to an attempt of understanding the mechanisms behind social determinants of health-related quality of life such as prejudice and stigma toward people with weight problems.

We believe that it is important to study those variables, which are related to antifat attitudes, because only through this theoretical knowledge we would be able to improve therapeutic programs aimed to change the self-image that obese people have. In a recent systematic review, different effective approaches to reducing antifat attitudes were proposed [35]. All of these interventions were based on theoretical investigations applied in a context of obesity stigma reduction [36]. As a matter of fact, recently it has been showed that different forms of disease protection attenuate the relationship between concerns about disease and prejudice against stigmatized groups [37].

The current study has some limitations that deserve to be mentioned. First of all, the sample size is quite small. In the future it would be interesting to have access to bigger samples of children and teenagers. Secondly, it is a cross-sectional study and only longitudinal or experimental studies could provide insight into the relationship between perceived vulnerability to disease and antifat attitudes. Third, the correlations found in this study are low. Applying the Bonferroni correction to control error rate [38], some of the results would be classified as non-significant. Another limitation to bear in mind refers to the age difference of the participants. Future studies should be more homogeneous about the age range of the participants. Finally, we consider our work an exploratory research. We believe that future studies should improve the design and make more complex analyses. Despite these limitations, the study provides new data with potential applications.

In the future, we believe that it would be interesting to study the relationship of antifat attitudes with other variables. For example, recent research tries to relate the prejudice toward obese people with disgust [39], a variable that at the same time is related with perceived vulnerability to disease [5]. Additionally, we did not assess the perception of other threats in the environment, such as “Belief in a Dangerous World” [40]. For example, it has been found that beliefs about interpersonal dangers in the world are correlated with overt expressions of prejudice against a variety of stigmatized groups [41].

This study adds some contributions with respect to the previous literature. First of all, to our knowledge, no other study has investigated the relationship between perceived vulnerability to disease and antifat attitudes in minors. Additionally, this is the first time that BMI has been measured directly (instead of using the self-reported one) in studies about the relationship between antifat attitudes and perceived vulnerability to disease. We believe that this article enriches and extends the field of study of antifat attitudes, as it provides a series of approaches that have not been taken into account before. Our focus on understanding how antifat attitudes manifest among children and adolescents fills a gap in current literature on obesity and psychosocial factors that foster prejudice and stigma.

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#### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed involving the participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies performed by any of the authors.

**Informed consent** Informed consent from participants was not required per our IRB.

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