

# Multidimensional analysis of food-allergic children and adolescents' self-concept: A comparison with a healthy matched sample

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## Abstract

The study investigated self-concept in food-allergic youths and matched healthy controls. Global and domain-specific self-concepts were assessed in 154 participants (9–19 years) using the Multidimensional Self-Concept Scale. Statistical analysis assessed differences between the two samples and effects of asthma, dermatitis, age, and gender among patients. Significant differences were found for Total Scale score and for Competence and Physical scores. Patients showed clinically problematic self-concepts in Global, Competence, and Family domains. Age was found to be associated with the Total score. Health professionals should consider food-allergic patients' personality development. Further studies could examine disease-specific consequences and interventions.

## Keywords

adolescents, children, food allergy, self-concept

## Introduction

Food allergy is an adverse health effect arising from an immune response to dietary antigens that includes acute, potentially fatal reactions and a variety of symptoms and disorders involving the skin and gastrointestinal and respiratory tracts (Boyce et al., 2010). It is an increasingly common disease, especially in childhood, with a cumulative prevalence of 3–6 percent in Western countries (Sampson, 2004; Sicherer, 2011; Sicherer and Sampson, 2010). A 2013 data brief from the US Centers for Disease Control and Prevention reported that among children aged 0–17 years, the prevalence of food allergies had

increased from 3.4 percent in 1997–1999 to 5.1 percent in 2009–2011 (Jackson et al., 2013). Food allergy is a burden for patients and their families, impacting considerably on their quality

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of life and psychological wellbeing (Cummings et al., 2010b). Research has consistently found significant negative effects on daily family life, school, and extracurricular activities, affecting physical functioning and social life among young patients suffering from food allergy (Bollinger et al., 2006; Marklund et al., 2006; Munoz-Furlong, 2003; Ostblom et al., 2008). The disease also seems to have important implications for the development and construction of children's personality and self-concept, but only a few qualitative studies have considered this issue (DunnGalvin et al., 2009; Marklund et al., 2007). Nevertheless, no comprehensive and quantitative data are available specifically on the relation between food allergy and self-concept.

Self-concept is defined as a relatively stable and measurable self-perception of personal abilities, skills, and overall qualities that guides and/or motivates specific cognitive processes and behaviors (Wiley, 1979). Self-concept has been demonstrated to predict health and wellbeing in a number of samples and domains (Borrego et al., 2005; Juth et al., 2008; Nagyova et al., 2005; Nicolson and Anderson, 2003; Russo et al., 2008; Swaim and Bracken, 1997; Weaver and Narsavage, 1992). Moreover, it has been found that self-perspective and chronic illness either have a direct or indirect effect on one another: chronic diseases may significantly decrease the level of self-perspective among patients (Adams and Weaver, 1986; Bisschop et al., 2004; Juth et al., 2008). On the other hand, negative self-concepts and feelings about oneself have been related to higher restrictions/interferences and negative affect, greater stress severity, and more overall functional difficulties in daily life (Adams and Weaver, 1986; Bisschop et al., 2004; Juth et al., 2008). A Portuguese study reported significantly lower scores among asthmatic children in School Competence, Physical Appearance, Behavior, and Self-concept area (Borrego et al., 2005), in accordance with other published data that demonstrate the importance of the impact of asthmatic diseases on self-concept, particularly on the Physical domain (Margalit, 1982; Padur et al., 1995; Routon and Sherrill, 1989).

Children with food allergies showed lower physical functioning and general health than both children with other atopic conditions and normative controls (Ostblom et al., 2008). Food-allergic patients were found to have poorer emotional, social, and psychological health-related quality of life compared with normative data (Cummings et al., 2010b). Moreover, food allergy significantly impacts on family daily life affecting meal preparation, school attendance, and participation to social activities (e.g. birthday parties, sleepover, eating out) and impacting on parents' stress and anxiety levels (Bollinger et al., 2006; Polloni et al., 2013). Restrictions in such activities may interfere with interpersonal relations and may sometimes even result in bullying (Muraro et al., 2014).

In particular, adolescents tended to feel deprived and frustrated because of their disease, and those at risk of severe food reactions experienced insecurity and fear (Marklund et al., 2007). The identity of food-allergic children is closely tied to the dietary restrictions related to their condition. The majority of teenagers declared that food allergy had a strong impact on who they were; although some felt that this could have a positive effect, the majority experienced negative effects of being food-allergic on the development of their own personality (DunnGalvin et al., 2009).

The aim of this study was to investigate the multidimensional self-concepts of food-allergic young patients as compared to a matched sample of healthy children and adolescents using a theoretically sound, nationally normed instrument. It is generally assumed that each individual's overall self-concept is determined by a combination of self-conceptions concerning separate aspects of self (Wiley, 1989). The Multidimensional Self-Concept Scale (MSCS) offers a multifaceted, context-dependent, hierarchical model with a possible association between global and more specific self-concept measures (Bracken, 1992, 1996). Bracken proposed six fundamental dimensions as the basis of the conceptualization of an all-encompassing global self-concept: Academic, Social, Affect, Competence, Physical, and Family (Bracken, 1996). Indeed, the use of

single unidimensional measures is not sufficient for capturing a particular individual's self-concept deficiency (Bracken, 1992).

Considering that food-allergic young patients display problems in many of the life contexts that are most relevant in childhood and adolescence (Bollinger et al., 2006; Cummings et al., 2010b; DunnGalvin et al., 2009; Marklund et al., 2006, 2007; Munoz-Furlong, 2003; Muraro et al., 2014; Ostblom et al., 2008; Polloni et al., 2013), it is expected that difficulties will be manifested, not only in global but also in domain-specific self-concepts.

## Methods

### Participants

A total of 154 participants between the ages of 9 and 19 years were involved in the study. The sample of food-allergic patients ( $N=77$ ) was recruited sequentially during clinical visits at the Food Allergy Referral Centre for Diagnosis and Treatment, Veneto Region in Padua, Italy, considering the inclusion and exclusion criteria. Inclusion criteria consisted of being confirmed as suffering from IgE-mediated food allergy by an allergist on the basis of a clinical history with positive skin-prick test and/or in vitro-specific IgE and a positive food challenge. Patients were excluded when they suffered from serious comorbid non-allergic disease. Patients with severe chronic conditions such as uncontrolled asthma or atopic dermatitis requiring the regular use of topical or oral corticosteroids were excluded as well. All patients had multiple food allergies, having developed food allergy before early childhood (under 3 years of age) and were provided with self-injectable adrenaline. A total of 44 patients (56%) suffered from mild asthma and 20 (26%) from dermatitis as well; 13 (8%) patients had both.

The healthy control group ( $N=77$ ) was composed of a sample individually matched by age and sex and recruited through family physicians. People with a clinical history of allergy or other disease were excluded.

The median age was 14 years in both groups, each consisting of 44 boys and 33 girls. All

participants were Caucasian, came from the Veneto Region (the North-Eastern area of Italy) and were homogeneous with respect to socioeconomic status; the majority came from middle-income families. All children and adolescents agreed to complete the questionnaire, giving their oral consent or signing directly if 18 years old or older. Informed consent was signed by the parents for younger participants.

The study was performed in accordance with the Italian regulation regarding potential sensitive data and according to the World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects.

### Instruments

The MSCS was employed to assess global and domain-specific self-concepts. The MSCS consists of a 150-item self-report inventory for youth between the ages of 9 and 19 years, inclusive. The instrument provides a Total Scale score, as well as standard scores ( $M=100$ ; standard deviation (SD)=15) for each of six domain-specific scales (Social, Competence, Affect, Academic, Family, and Physical). The Social domain pertains to the social context: in the process of interaction, family members, neighbors, friends, and teachers have a certain influence on an individual's social self-concept. The Competence domain is related to one's perception of their abilities: based on failures and successes experienced in life, people evaluate oneself and make generalizations on their capability. The Affective domain concerns emotions displayed by a person based on the evaluation of the society on reactions in particular situations. The Academic domain is related to personal beliefs on one's own academic abilities based on individual's, teachers', and schoolmates' judgment on school performance. The Family domain refers to the view about oneself as a member of a family; it is related to how much a person feels he or she receives attention, protection, guidance, and care from parents. The Physical domain is concerned with individual reaction toward one's own body as a whole (Bracken, 1992).

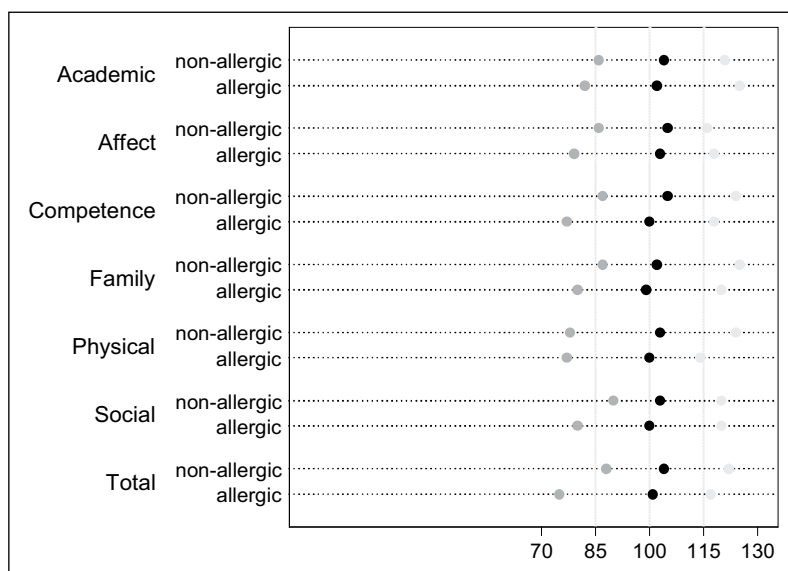


**Figure 1.** Dot graph of MSCS score by domain and allergic status. Circles represent the 5th percentile (dark gray), the median (black), and the 95th percentile (light gray). Vertical dotted lines show the normality range (85–115). Statistically significant differences were found on the 5th percentile for Total self-esteem (95% CI:  $-19.1, -6.9$ ;  $p$  value  $< 0.001$ ), Competence (95% CI:  $-16.8, -3.2$ ;  $p$  value  $= 0.004$ ), and Family domain (95% CI:  $-13.3, -0.7$ ;  $p$  value  $= 0.03$ ) and on the 95th percentile for Physical domain (95% CI:  $1.7, 18.3$ ;  $p$  value  $= 0.02$ ).

Each of the six MSCS subscales comprised 25 items; each scale contributes equally to the total scale. The scores obtained are psychometrically reliable with an acceptable level (0.90) of internal consistency and total scale stability (Bracken, 1992). The Italian version was normed on a national sample of 1062 children (Bracken and Beatrice, 2005). The mean score is interpreted in terms of how many SD units it is away from the mean.

### Statistical analysis

Differences in means of Total MSCS score and domain-specific scores between allergic and non-allergic patients were assessed through paired  $t$ -tests. Quantile regression was performed in order to compare percentiles of MSCS score distribution among allergic and non-allergic participants. Proportions were compared with chi-square test.

A linear regression model was used to investigate the effect of asthma, dermatitis, age, and

gender on Total MSCS score within the subgroup of allergic patients. Stata software was used. The level of significance was set at 5 percent.

### Results

MSCS scores in global as well as in specific domains were generally lower in allergic patients compared to non-allergic participants. Differences were found statistically significant for Total score (allergic  $M = 100.3$ ,  $SD = 13$ ; non-allergic  $M = 103.8$ ,  $SD = 11$ ;  $p$  value  $< 0.04$ ) and with regard to the Competence scale (allergic  $M = 99.6$ ,  $SD = 14$ ; non-allergic  $M = 103.8$ ,  $SD = 12$ ;  $p$  value  $< 0.01$ ) and the Physical scale (allergic  $M = 97.8$ ,  $SD = 13$ ; non-allergic  $M = 101.4$ ,  $SD = 14$ ;  $p$  value  $< 0.05$ ).

As supported by the comparison of percentiles shown in Figure 1, a greater proportion of allergic patients, as compared to non-allergic, fell below the normal range ( $\leq 85$ ). In fact, the 5th percentile of the MSCS score distribution was 13 points lower (95% confidence interval

**Table 1.** Results from linear regression model on Total score in the sample of allergic patients.

|                               | Coefficient | 95% CI         | p value |
|-------------------------------|-------------|----------------|---------|
| Age (continuous)              | -1.08       | (-2.00, -0.15) | 0.02    |
| Gender (male vs female)       | 0.17        | (-5.43, 5.77)  | 0.95    |
| Asthma (yes vs no)            | -0.01       | (-5.18, 5.17)  | 0.99    |
| Atopic dermatitis (yes vs no) | 2.32        | (-4.08, 8.72)  | 0.47    |

(CI): -19.1, -6.9;  $p$  value < 0.001), 10 points lower (95% CI: -16.8, -3.2;  $p$  value = 0.004), and 7 points lower (95% CI: -13.3, -0.7;  $p$  value = 0.03) in allergic patients than in non-allergic participants in global self-concept, Competence, and Family domains, respectively. Focusing on the upper tails of the MSCS score distributions, the 95th percentile in non-allergic participants is above the normal range ( $\geq 115$ ) and 10 points higher (95% CI: 1.7, 18.3;  $p$  value = 0.02) than in allergic patients in the Physical domain.

Overall, the proportion of patients showing impaired self-concept, with a score below the normal range in at least one domain, was 30 and 17 percent (chi-square  $p$  value = 0.057) in the allergic and non-allergic groups, respectively.

Results from linear regression showed that only age was associated with Total score. A 1-year increase in age corresponded to an adjusted mean reduction of -1.08 (95% CI: -2.00, -0.15) on the Total MSCS score (Table 1).

## Discussion

A greater proportion of food-allergic patients as compared to non-allergic participants showed clinically problematic levels of self-concept. The most discriminating domains were the Physical, Competence, and Family self-concept.

Within the food-allergic group, there was an association between age and self-concept: the older the patients were, the more the Total score decreased. The presence of dermatitis and/or asthma, together with gender, did not seem to influence the Total score. Given the high prevalence of comorbid conditions among allergic participants, the study could have been underpowered in detecting the impact of comorbidities.

However, a previous study found that the existence of comorbid conditions such as asthma and atopic dermatitis did not significantly affect the impact of food allergy on daily activities of children and their families (Bollinger et al., 2006). A more recent study on quality of life and anxiety in nut-allergic children and their mothers (Cummings et al., 2010a) confirmed that the presence of atopic comorbidities was not associated with any child or maternal scores apart from children's school-related quality of life. The same research reported no gender difference in allergy-specific quality of life or in emotional, social, psychosocial, or anxiety scores. Anyway data on gender differences in food allergy and quality of life are limited.

To our knowledge, this is the first study with the main aim of evaluating the association between food allergy and self-concept using a multidimensional specific instrument. Several studies highlighted the relevance of self-concept in chronic illness (Adams and Weaver, 1986; Bisschop et al., 2004; Borrego et al., 2005; Juth et al., 2008; Nagyova et al., 2005; Nicolson and Anderson, 2003; Weaver and Narsavage, 1992).

With regard to food allergy, a Swedish study on Quality of Life among children with food hypersensitivity found that patients exhibited significantly low scores on the subscales of Physical Functioning, Role/Social Limitations, and Physical and General Health. Furthermore, the authors reported that children with food-related respiratory symptoms scored low on self-concept, using a generic instrument (Ostblom et al., 2008). A possible link between quality of life and self-concept should be considered and evaluated. These data, overall, although obtained by different instruments and populations, appear to support our finding that

food allergy is associated with the level of self-concept, especially the Physical domain. The direction of any causality remains uncertain, but it seems likely that food allergy could cause a reduced self-concept. A plausible explanation is offered by Marklund et al.'s (2007) qualitative study on adolescents' experiences of being food-hypersensitive. Patients were found to believe that the food-hypersensitive body is "insufficient." They supposed that something was missing or that there is a physical defect, often explained as being genetic. Food-allergic teenagers interpreted the requirement of nutritional supplements, such as extra vitamins or minerals because of food avoidance, as a sign of body insufficiency (Marklund et al., 2007). Therefore, living and growing-up with food allergy can reasonably be thought to alter physical self-concept. The same study also reported that food-allergic adolescents tended to feel constrained because of their disease. Again, this could support the significantly lower score we found concerning the Competence domain. As a matter of fact, suffering from food allergy could bring about a sense of insecurity particularly in new and unknown situations. At the same time, the fear of severe reactions could threaten the personal sense of competence (Marklund et al., 2007). Moreover, overprotection on the part of parents, common among food-allergic families (Herbert and Dahlquist, 2008), could weaken teenagers' self-competence.

This study also found a significantly greater proportion of allergic patients as compared to non-allergic patients showing a clinically problematic self-concept with regard to the Family domain. Previous studies demonstrated that food allergy negatively affects family life, reporting limitations in activities and a considerable impact on parents' stress levels (Bollinger et al., 2006; Cummings et al., 2010b; Marklund et al., 2006; Munoz-Furlong, 2003; Ostblom et al., 2008). Furthermore, in food-allergic patients, the normal developmental process of achieving personal autonomy takes place against a backdrop of anxiety on the part of both children and parents (DunnGalvin et al., 2009). These issues could alter family dynamics, in turn influencing the way in which children consider themselves within the family.

A remarkable result is that age seemed to influence the impact of food allergy on self-concept in an inversely proportional way: this could have important developmental consequences. In fact, DunnGalvin et al. (2009) found that the evolution of a "food-allergic identity" occurs in middle childhood. In growing-up, children tend to describe themselves as "different" (with a negative meaning), and this has consequences on how they perceive themselves and how they feel others perceive them. Over the course of development, from 9 years to the end of adolescence, self-perspective, emotional reactions and cognitive appraisal mechanisms gradually become relatively stable and consistent. Following the transition point of 9 years, children begin to use direct comparative assessments (e.g. "unlike my friends") and begin to speak about how "being different" has psychosocial consequences. In addition, the term "food-allergic" is used more frequently when children are asked "three best words to describe themselves" (DunnGalvin et al., 2009). During adolescence, patients feel that food allergy has become a constructive part of their identity (Marklund et al., 2007). Assuming that self-conceptions are shaped by their experiences of living with food allergy, it is possible that older patients are more conscious of the burden of being food allergic.

Overall, a higher proportion of food-allergic patients showing a clinically relevant impairment of their self-concept, as compared to healthy controls, was found. A positive self-concept is considered to be crucial for healthy development and adaptive psychosocial functioning (Adams and Weaver, 1986; Wiley, 1979).

Lower self-concepts and feelings about oneself have been related to higher restrictions and negative affect, greater stress severity, and more overall functional difficulties in patients' daily life (Adams and Weaver, 1986; Bisschop et al., 2004; Juth et al., 2008). Examining the relation between food allergy and self-concept in food-allergic children and adolescents constitutes an important effort in ensuring patient's wellbeing.

This is the first study specifically investigating self-concept among food-allergic children

and teenagers using an appropriate validated multidimensional instrument. A global and domain-specific influence of the disease was found to increase with the individual's age.

These findings suggest the importance for health professionals and caregivers of evaluating and monitoring personality development in food-allergic young patients. Further studies are needed to define the size of the problem, the disease-specific consequences for health and wellbeing, and proper interventions.

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