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School personnel's self-efficacy in managing food allergy and anaphylaxis.

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Self-efficacy in food allergy management.

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Abstract

Background: Food allergy affects up to 4-7% European schoolchildren. Studies identified important shortcomings on food allergy and anaphylaxis management in schools. In social cognitive theory, personal beliefs in own capabilities influence choices, effort levels, perseverance and performance accomplishments. This study aimed to investigate school personnel's self-efficacy in managing food allergy and anaphylaxis, providing a valid instrument to deeply understand how to support schools to effectively manage students at risk of food reactions.

Methods: 440 schoolteachers and caretakers from Northeast-Italy completed a questionnaire assessing self-efficacy in managing food allergy and anaphylaxis at school. Exploratory factor analysis was performed. Factors' internal consistency was evaluated using Cronbach's alpha. Factors' scores were estimated using Bartlett approach and kernel density estimate of distributions was provided. Descriptive statistics explored school personnel's self-efficacy. A regression model assessed the influence of gender, school, job and previous experience.

Results: Two factors emerged from exploratory factor analysis related to Anaphylaxis Management (AM) and Food Allergy Management (FAM). The two subscales both showed good internal consistency. School personnel showed lower self-efficacy in recognising symptoms, administering drugs and guaranteeing full participation to extracurricular activities to food-allergic students. Participants who previously had food-allergic students showed a significantly increased self-efficacy in AM and a significantly decreased self-efficacy in FAM.

Conclusions: The study supports the use of self-efficacy scale to identify specific areas where teachers' confidence in their ability to care for food-allergic students is especially weak. This would empower the development of training programs specifically tailored to the needs of teachers and caregivers.

Key words: anaphylaxis, education, food allergy, management, school, self-efficacy, teachers, training.

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Introduction

Food allergy is defined as adverse reactions to food in which immunological mechanism have been demonstrated. It can result in considerable morbidity and in some instances results in life-threatening anaphylaxis (1). It affects up to 4-7% primary school children in Europe (2). The lifetime prevalence of parental perceived allergic reactions to food was 10.5% in Italian school-aged children (3). Moreover, it has been estimated that 10% to 18% of food allergy or anaphylactic reactions occur at school (4). In addition to severe reactions, food allergy fatalities have been also reported at school (5). Even though food allergy is a common health issue at school, literature data have identified some major limitations on food allergy and anaphylaxis treatment in the school settings, such as the lack of proper management plans, as well as failures in recognizing and promptly treating reactions with adrenaline (6–8). A substantial number of children with anaphylaxis do not receive adequate therapy, especially adrenaline injection according to current guidelines. Despite a relatively high risk for anaphylactic events to take place during the day, school and kindergarten staff is not sufficiently trained and confident in handling children experiencing anaphylaxis (9). A recent study showed important shortcomings in Italian school personnel knowledge and attitudes on food allergic students' management, emphasizing the need for specific educational interventions (10). Considering the seriousness of potential life-threatening food allergic reactions in school children, attitudes of school personnel is one of the most important factors for ensuring fair and proper treatment of these children (11).

The beliefs people hold about their efficacy to exercise control over events influence the choices they make, their aspirations, levels of effort and perseverance, and performance accomplishments. In social cognitive theory, perceived efficacy is the foundation of human agency. Unless people believe they can produce desired outcomes and prevent undesired ones through their actions, they have little incentive to act or to persevere in their tasks (12,13). Many studies support the role of self-efficacy in different domains of functioning included health management and education (14–18). A recent Japanese study involving

school nurses, teachers and childcare workers found that self-efficacy in anaphylaxis management of school nurses was the highest among the profession groups. Training with practical instruction of school nurses and school personnel involved with children prescribed an adrenaline auto-injector resulted in significant improvement of the self-efficacy (19).

It is worth mentioning that there are no school nurses among school staff in Italy, so the management of food allergic students weighs on lay school personnel. The aim of this study was to investigate school personnel's self-efficacy in managing food allergic students in order to deeply understand how to support schools to effectively manage a severely allergic child.

Methods

Procedure

A total of 440 Italian schoolteachers and school caretakers, who voluntarily attended free courses on food allergy management, took part in the study. School caretakers include support staff in charge of supervising students before and after lessons and during breaks as well as giving assistance during meals in school canteens, in collaboration with teachers. Participants worked in schools in the Veneto Region, from nursery to high school level. Curricular education of school personnel generally includes First Aid courses. However no specific training is provided on food allergy and anaphylaxis management.

A short questionnaire was developed by a multidisciplinary team of experts (a psychologist with expertise in pediatric food allergy and in school issues, three pediatric allergists, a dietician and a pediatric nurse) based on clinical expertise, previous research (10) and Bandura's guidelines for constructing self-efficacy scales (20). First, the questionnaire was given to some representatives of the target group (41 teachers and 28 caretakers) in a pilot project, to test its clearness. Questions are displayed in Table 1. Items concern individual

perceived self-efficacy that refers to personal beliefs in own capabilities to produce given attainments – in this case managing food allergy and anaphylaxis at school. Answers were provided on a scale from 1 “cannot do at all” to 5 “highly certain can do”. Apart from the self-efficacy scale, the questionnaire also contained items concerning the teacher’s demographics and previous experience in food allergy and anaphylaxis.

School personnel were questioned anonymously before attending the course. They were advised that their data would be used for research aims, also explaining the main objective of the study. The study was performed in respect of the Italian regulation regarding potential sensitive data and according to World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects.

Statistical analysis

Descriptive statistics were used on data to explore school personnel’s self-efficacy about managing food allergy and anaphylaxis at school.

Exploratory factor analysis was performed with all items. The factor extraction method was principal axis factoring, which can accommodate non-normal data distributions. Factors were allowed to correlate with each other (‘oblimin’ rotation), based on our conceptual model that all component factors relate to the broader construct of self-efficacy. We followed standard procedures of retaining factors in the emerging model, if the factor explained more variability in scores than a single item would. Items were regarded as being part of a factor if they achieved a factor loading score of at least 0.40, a threshold that is conventionally used in health research (21,22). The factor extraction process identified how many summary scores were needed to adequately reflect the variability measured by these self-efficacy questions. It also identified which items to assign to the different summary scores.

The second step was to determine the degree to which all items assigned to a factor were, in fact, measuring the same underlying construct. Cronbach's alpha, along with 95% confidence interval (95% CI), was used to measure the internal consistency of the factors, with a higher score indicating greater reliability in measuring a common factor.

Factors' scores for the sample were estimated using Bartlett approach and a kernel density estimate of their distributions is provided. Seemingly unrelated regression was used to fit a set of linear structural equations (with Bartlett's factor score for each identified factor as outcome) to assess the influence of gender, type of school, job and previous experience.

Findings were analysed using R statistical software with 'psych' and 'systemfit' packages. The level of significance was set at .05.

Results

Considering the whole sample, 76% of participants are female; 60% are teachers and 40% school caretakers; 27% work in nursery schools, 34% in primary schools and 39% in middle or high schools. 76% previously attended First Aid courses, 66% previously had worked with students with food allergy, and 6% previously had students with anaphylaxis.

Answers to the self-efficacy items are reported in Table 1 as frequencies, mean scores and standard deviations.

For the eight self-efficacy questions, a two-factor model emerged (eigenvalues > 1). The two-factor solution accounted for 52% of the total explained variance of scores. In general, the factors that emerged corresponded conceptually to "Anaphylaxis Management" construct (AM) and "Food Allergy Management" construct (FAM). Table 2 presents the loading scores of items on each of the two factors.

As to internal consistency, the AM scale had a Cronbach's alpha of 0.85 (95% CI: 0.78-0.93). This number was lowered to 0.71 by removal of item 4 about the management of anaphylaxis at school. The FAM scale had a Cronbach's alpha of 0.75 (95%CI: 0.69-0.82), lowered up to 0.68 when item 1 or item 6 was removed.

The kernel density estimates of the distributions of Bartlett's score for AM and FAM are shown in Figure 1. The mean, first quartile, median and third quartile are (0, -2.17, -0.19, 1.78) for AM distribution and (0, -2.08, 0.12, 2.38) for FAM distribution. According to multivariate analysis, participants who previously had worked with students with food allergy showed a decrease of 1.08 in mean AM score (p -value<0.01) and an increase of 0.91 (p -value=0.048) in mean FAM score, both statistically significant. The same contrasting behaviour emerges for school caretakers who showed a significant increase of 1.09 (p -value=0.02) in mean AM and a decrease of 0.96 in mean FAM. This behaviour is nevertheless not statistically significant (p -value=0.07), in comparison to teachers. All other variables did not significantly impact on outcomes.

Discussion

Findings showed that most of participants previously had worked with students with food allergy and a number of them had worked with students with a medical history of anaphylaxis. The prevalence of food allergy in Western countries is such, that most schools are attended by at least one child with food allergy, obliging school personnel to cope with children at risk of severe allergic reactions. According to Bandura's theory (12,13) when trying to accomplish a difficult task, knowledge is not enough, but people with a high self-efficacy will try to engage in instrumental action and will apply strong efforts in pursuit of a solution. The current research firstly presents a brief and easy instrument to assess school personnel's self-efficacy in managing students with food allergy. Two factors emerged from exploratory factor analysis related to AM and FAM. The two scales both revealed good internal consistency.

Analysing participants' answers, it appears that school personnel have a higher self-efficacy in collaborating with other professionals and families in food allergy management at school and in assuring a safe school setting for food allergic students, but they showed a lower self-efficacy when asked to manage anaphylaxis, especially recognise symptoms and administer proper drugs. Evidences highlighted that many fatal cases of anaphylaxis have been later attributed to an initial delay in treatment, often caused by a general failure to recognise early signs of anaphylaxis and/or by reluctance to administer adrenaline auto-injector (4,5,23). School personnel reported lower self-efficacy also in guaranteeing full participation to all school activities to food-allergic students (e.g. attending school trips, or labs). Restriction in school participation can put students with chronic illness, included food allergies, at additional risk of being bullied (24–26). It is crucial that school personnel are guided and supported in planning activities including all their students and paying attention also to health special needs. The European Academy of Allergy and Clinical Immunology (EAACI), in its recent guidelines on food allergy and anaphylaxis, underlined that a comprehensive school policy should include management of school trips and extra-curricular activities (8).

Participants who previously had worked with students with food allergy showed a significantly increased self-efficacy in food allergy management but at the same time, a significantly decreased self-efficacy in anaphylaxis management. Individuals who had a direct experience of caring for students with food allergy might be more confident with food allergy management, but also more conscious of the risks of a severe allergic reaction and of their difficulties or limits in managing possible anaphylaxis. School caretakers surprisingly had a significantly increased self-efficacy in anaphylaxis management and a decreased self-efficacy in managing food allergies, compared to teachers. This could be explained by the fact that in Italian schools the responsibility of managing students' health formally weights more on teachers than on school caretakers. School caretakers have a key role in assuring a safe school setting for food-allergic students while they are less involved in anaphylaxis

management, especially drug administration. It is possible that participants tended to rate self-efficacy with more caution when a task was felt as own responsibility.

When interpreting the results of this study, some limitations have to be discussed. Although preliminary analysis showed good internal consistency of the two subscales, the survey needs further analysis to fully confirm its validity. School personnel were voluntary participants in free courses on food allergy management, so they could be different in some ways from other teachers or school caretakers. National and regional differences in school policy do not allow generalization of findings, however it can be useful to learn about and compare different approaches for managing allergy and anaphylaxis with a view to improving regulations and guidelines for schools.

Results identified important lacks in school personnel's confidence level in caring students with food allergy, especially in recognising and treating anaphylaxis symptoms. The food allergy and anaphylaxis management self-efficacy is crucial to implement health-related behaviours and outcomes for properly care for children and adolescents with food allergy in the school setting. Furthermore, the study supports the use of the self-efficacy scale as a tool for health care professionals to assess the level of food allergy and anaphylaxis management efficacy in the school staff. It also helps identifying specific areas where teachers' confidence in their ability to care for students with food allergy is especially weak. This would empower the development of training programs specifically tailored to the needs of teachers and caregivers. Furthermore the test could be used to assess training effectiveness, measuring differences in self-efficacy before and after courses.

Allergists and pediatricians play an important role in coordinating mutual and critical collaborations within schools that support families and children. They can provide leadership and guidance to both families and schools to safeguard children and adolescents with food allergy (27). As recommended by EAACI, the goals in schools are to create a network of support and a self-sustaining environment of awareness that reduces the likelihood of

reactions and enables staff to recognise and treat emergencies. Early liaison with local referral health service, expertise and patients' organizations is essential to implement a well-informed, comprehensive policy (8).

Competing Interests

No financial support was awarded in relation to this paper. Conflict of interest: nothing to declare.

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Table 1: Participants' answers: frequencies, mean scores and standard deviations

School personnel's self-efficacy in managing food allergy and anaphylaxis at school							
For each statement please rate how certain you are that you can do the things described below							
N=440	1	2	3	4	5	Mean	SD
	Cannot do at all				Highly certain can do	score	
1. Assure a safe school setting for students with food allergy	6%	9%	32%	26%	27%	3.6	1.16
2. Put in place a personalized care plan for the management of students' food allergy	15%	13%	30%	19%	21%	3.2	1.33
3. Manage a student at risk of allergic reactions to food	16%	15%	25%	21%	23%	3.2	1.37
4. Recognise anaphylaxis symptoms	33%	17%	22%	14%	14%	2.6	1.42
5. Co-work with other professional and families in food allergy management at school	2%	2%	8%	16%	72%	4.5	0.88
6. Manage allergens avoidance (e.g. reading labels, avoiding contaminations)	20%	14%	27%	22%	17%	3.0	1.36
7. Guarantee full participation to all school activities to students with food allergy (e.g. attending school trips)	22%	15%	27%	21%	15%	2.9	1.36
8. Administer drugs (e.g. adrenaline autoinjector) to a student having a severe and sudden reaction	46%	18%	20%	9%	6%	2.1	1.26

Table 2: Standardized loadings based upon correlation matrix and designation of items to factors (in bold).

Questions	Factor loadings	
	Factor 1	Factor 2
	(AM)	(FAM)
1. Assure a safe school setting for students with food allergy	-0.05	0.77
2. Put in place a personalized care plan for the management of students' food allergy	0.24	0.38*
3. Manage a student at risk of allergic reactions to food	0.56	0.33
4. Recognise anaphylaxis symptoms	0.95	-0.08
5. Co-work with other professional and families in food allergy management at school	-0.07	0.59
6. Manage allergens avoidance (e.g. reading labels)	0.34	0.48
7. Guarantee full participation to all school activities to students with food allergy (e.g. attending school trips, or labs)	0.23	0.45
8. Administer drugs (e.g. adrenaline autoinjector) to a student having a severe and sudden reaction	0.73	0.10

* Rounded to 0.4 to the purpose of assignment of item 2 to factor 2.

Figure 1. Estimated kernel densities of factor scores according to Bartlett for factor AM and factor FAM.

