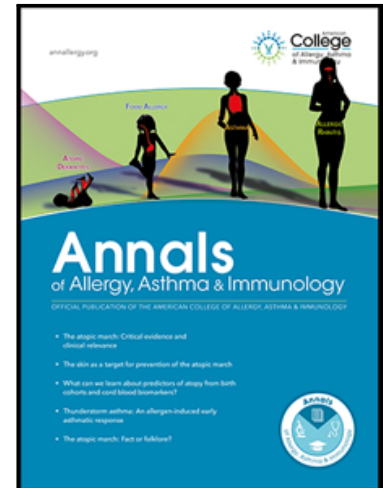


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Social Well-Being Amongst Children With vs. Without Food Allergy Before and During COVID-19

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Conflicts of interest:

KM declares no conflict of interest.

EA is Section Head of Food Allergy and Anaphylaxis, Canadian Society of Allergy and Clinical Immunology; a member of Food Allergy Canada's Medical Advisory Board, and does research with DBV Technologies.

ES declares no conflict of interest.

JP is Section Head of Allied Health, Canadian Society of Allergy and Clinical Immunology; sits on the steering committee for Canada's National Food Allergy Action Plan, does research with DBV Technologies, and reports having accepted consulting fees from Novartis.

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Pre-pandemic studies note high rates of bullying among food allergic children, specifically because of their condition, commonly on school grounds such as on the playground or in the classroom.¹ Additionally, we have recently reported that, amongst mothers of children with food allergy, 44% reported symptoms indicative of clinical anxiety.² Whereas anxiety has increased in children and their families, children who experience bullying at school – such as those with food allergy – may have indirectly experienced a reprieve as a result of pandemic-related physical distancing and public health restrictions. This is the first study to analyze the outcomes of distanced learning and bullying of food allergic children.

This analysis makes use of data from two cohorts on the costs of food allergy, collected in the year prior to the COVID-19 pandemic, and two months during the pandemic (01 May to 30 June 2020) when schools were largely closed to in-person learning. Both cohorts completed similar questionnaires based on the EcoQ questionnaire.³ Each cohort consisted of cases and non-food allergic controls. In the pre-pandemic cohort, cases were recruited from a tertiary pediatric allergy clinic during food allergy-related follow up visits, and controls were recruited via convenience and snowball sampling, and caregivers completed a paper version of the questionnaire. This cohort included participants from the Province of Manitoba, Canada, only. The pandemic cohort was recruited via convenience sampling through email and social media adverts. Cases were defined as the oldest child (age 0-18 years) in the family, and who were reported to have 1+ food allergy. Controls were also defined as the oldest child in the family (as this provided best scenario age-matching with cases), but who did not have reports of food allergy. The pandemic cohort completed an online version of the caregiver-completed questionnaire, with participants recruited from across Canada. Data were described using n/N, %, mean $\pm$ standard deviation (SD), and compared using chi-squared tests, with statistical significance was set at $p < 0.05$, using Stata 15.1 (College Station, TX). Families reporting monthly household income in excess of \$30,000 (i.e. half the annual median household income in Canada) were excluded from the calculations of income to prevent skewing of the data (pre-pandemic cohort: 2 cases, 2 controls; pandemic cohort, 2 cases, 3 controls).⁴ This study was approved by the University of Manitoba Health Research Ethics Board (H2018:319 (HS22066)).

The pre-pandemic cohort included 65 (55.1%) cases and 53 controls (44.9%), with corresponding numbers of 62 (60.8%) and 40 (39.2%) from the pandemic cohort (Table 1). Gender distribution was comparable between the cohorts, although slightly more boys than girls were cases in the pandemic cohort (72.1% vs. 27.9%). The pre-pandemic cohort was approximately 2 years younger than the pandemic cohort [(Pre-pandemic: cases – mean 6.9 [median 6.0] years, controls – mean 7.4 [median 6.0] years); (pandemic: cases – mean 9.2 [median 10.0] years, controls – mean 8.7 [median 7.0] years)]. Monthly household income was comparable between the cohorts, and children were typically part of a 4-person (2 adult, 2 children) household. Amongst cases, the three most common food allergies were, amongst the pre-pandemic cohort: peanut/tree nut (81.5%), egg (29.2%) and fish (21.5%); and, amongst the pandemic cohort: peanut/tree nut (51.6%), milk (32.3%) and egg (27.4%).

Within each cohort, cases and controls had similar frequencies of parent-reported anxiety/depression, bullying, and isolation. At baseline, anxiety was comparable and not statistically different between cases and controls (19.0% vs. 29.4%, respectively; $p < 0.20$). With consideration to the pre-pandemic vs. pandemic cohorts, anxiety was more common amongst both cases (19.0% vs. 67.2%; $p < 0.001$) and controls (29.4% vs. 59.5%; $p < 0.005$) during the pandemic; bullying decreased amongst cases (31.0% vs. 6.9%; $p < 0.008$), but not controls (20.0% vs. 16.2% $p = 0.66$); and social isolation did not change significantly amongst cases (31.0% vs. 51.7%; $p = 0.07$), but did increase amongst controls (19.6% vs. 48.7%; $p < 0.005$).

We demonstrate that the rates of childhood anxiety doubled from the year prior to the pandemic, to the early months of the pandemic, a finding which aligns with reports from previous pandemics.⁵ Whereas children with food allergy had significantly lower rates of bullying during the pandemic, this remained unchanged amongst those without food allergy. This observation suggests that children with food allergy tend to be bullied more significantly

on school grounds, while children without food allergies are bullied outside the school environment. Given that the mean ages of all cohorts were between 7 and 9 years old, it is likely that most participants have similar access to technology. However, if this is not the case, children with more access to online resources such as chat rooms or social media will be subjected to increased cyber-bullying, likely unrelated to food allergy. As ages increase, it is presumable that increased access and comfort with technology, cyber-bullying is likely to increase as well. That being said, our findings underscore an urgent need to address food allergy-related bullying, which abruptly and significantly decreased when the pandemic started. As noted by Brown et al., food-allergic racialized children may experience different kinds of bullying, specifically non-food allergy related.⁶ This study does not provide race-specific data on rates of bullying, which is a limitation of the study. However, previous reporting indicates that it is also of great importance for school staff to pay close attention to racialized students being bullied at school.

Unlike children without food allergy, children with food allergy did not report differences in isolation before vs. during the pandemic. As many social events such as school and extracurriculars have been paused amidst the pandemic, it is likely that this has caused feelings of missing out. One hypothesis as to why children without food allergies would experience this significantly more than children with food allergies, is that the latter feel less pressure at virtual social events, where they feel less food-related pressure.

Due to the COVID-19 pandemic, this study was limited to online sampling, with a reliance on internet and technology to obtain data. Unfortunately, the study was not accessible to participants without internet in their homes, limiting the sample to a specific demographic of people with access to internet. Future research should be done to include families without access to internet. Additionally, further research could be done to focus on students who obtain school-supplied or government-subsidized lunches, as this provides another avenue for bullying at school.

Given that these findings provide evidence to suggest that food-allergic related bullying takes place on school grounds, it is suggested that a zero-tolerance policy for the bullying of food-allergic students to be introduced and enforced while children are on school property, more specifically where food is involved, such as in the lunchroom. Further, given the finding that anxiety increased in both groups of children during the pandemic, caution should be taken with return to school in order to ensure children feel safe on school grounds. As schools slowly re-open, and as we slowly move toward a post-pandemic world, the time to act is now.

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Table 1. Demographic characteristics of the two cohorts

		Prepandemic Cohort				Pandemic Cohort			
		Food allergy		No food allergy		Food allergy		No food allergy	
		(N=65)		(N=53)		(N=62)		(N=40)	
		n	%	n	%	n	%	n	%
Sex									
	Boy	33	50.8	30	56.6	44	72.1	16	40.0
	Girl	32	49.2	23	43.4	17	27.9	24	60.0
Single parent family		3	4.6	2	3.8	5	8.1	4	10.0
		Mean ± SD		Mean ± SD		Mean ± SD		Mean ± SD	
Age (years)		6.9 ± 4.9		7.4 ± 4.8		9.2 ± 5.1		8.7 ± 5.1	
Monthly household income*		6265 ± 2964		6591 ± 4755		8568 ± 9916		7433 ± 8693	
Family size		3.8 ± 0.9		4.1 ± 1.1		3.8 ± 0.7		3.8 ± 0.9	
Followed by a physician for food allergy		65	100	-	-	60	96.8	-	-
Types of food allergy‡									
	Milk	10	15.4	-	-	20	32.3	-	-
	Egg	19	29.2	-	-	17	27.4	-	-
	PN/TN	53	81.5	-	-	32	51.6	-	-
	Fish	14	21.5	-	-	11	17.7	-	-
	Shellfish	8	12.3	-	-	5	8.1	-	-
	Soy	4	6.2	-	-	7	11.3	-	-
	Wheat	4	6.2	-	-	4	6.5	-	-
	Sesame	6	9.2	-	-	8	12.9	-	-
	Sulphites	0	0.0	-	-	1	1.6	-	-
	Other	2	3.1	-	-	12	19.4	-	-
		%		%		%		%	
Social well-being									

Anxiety	19.0	29.4	67.2	59.5
Isolation	31.0	19.6	51.7	48.7
Bullying	31.0	20.0	6.9	16.2

*Restricted to households with a monthly income of \$60000 or less.

†N=24 responded to this question

‡Not mutually exclusive