

# Impact of COVID-19 pandemic on quality of life for children and adolescents with food allergy

To the Editor,

The 2019 novel coronavirus disease (COVID-19) outbreak has substantially impacted the daily lives of people. The isolation and quarantine measures may also have negatively impacted well-being in individuals with food allergy (FA), who may be more vulnerable in some areas than the general public. For example, food shortages and lock-down policies have required changes in food purchasing habits, potentially limiting food choices<sup>1</sup>; furthermore, it is likely that COVID-19 prevented access to FA-related medical care.

The difficulty of allergen avoidance and fear of accidental exposure affects health-related and FA-related quality of life (HRQL/FAQL).<sup>2</sup> The exogenous shock of COVID-19 and resulting social isolation have imposed additional stressors. To date, there is limited published evidence on the impact of COVID-19 on HRQL/FAQL in this population.<sup>3</sup> This study explored to what extent the COVID-19 pandemic influenced the subjective well-being of children and adolescents with FA in Australia.

An anonymous and voluntary online cross-sectional survey (hosted on Qualtrics) was conducted in Australia from 27 July to 30 September 2020 (hereafter "COVID-19 survey"), during the second wave of the COVID-19 outbreak, during which time relatively restrictive lock-down measures were in place. The targeted respondents were parents/caregivers of children aged 1 to 17 years with a self-reported clinician diagnosis of IgE-mediated FA, responding to the questionnaire with a proxy assessment of impacts on their children. For comparison, data from a comparable cross-sectional survey conducted by the authors from October to December 2019 (hereafter "Pre-COVID-19 survey") was used. For both surveys, respondents were recruited via advertising on the Allergy & Anaphylaxis Australia (A&AA) website, its Facebook page, and by distribution to A&AA members. A&AA is the peak patient and carer advocacy and support group for FA in Australia. The study was approved by the Monash University Human Research Ethics Committee on 20 July 2020 (Reference No. 25548).

The COVID-19 survey comprised four subjective well-being measures, two of which were included in the Pre-COVID-19 survey. The measures included in both surveys were the proxy versions of generic preference-based HRQL instruments, the Assessment of Quality of Life (AQoL)-6D and the Child Health Utility 9D (CHU9D), for children and adolescents (scored based on Australian-specific tariffs).<sup>4,5</sup> The use of preference-based HRQL instruments will

facilitate the calculation of health outcomes that measured on a 0–1 death-full health quality-adjusted life years (QALYs) scale, which will allow for potential comparison of COVID-19 impacts on people with different diseases.

FAQL was assessed in both surveys, but with different versions of the Food Allergy Quality of Life Questionnaire, Parent Form (FAQLQ-PF). In the Pre-COVID survey, the longer (30-item) version was used. In the COVID-19 survey, we employed the validated 10-item version (FAQLQ-PF10).<sup>6,7</sup> The total FAQLQ-PF10 score was calculated as the mean of the 10 items (range 0–6). In the COVID-19 survey, proxy respondents also assessed their child's global life satisfaction and specific life satisfaction (14 life domains from the International Survey of Children's Well-Being [ISCWeB]).<sup>8</sup> The wordings of each item were modified following the Cerebral Palsy Quality of Life (CP QOL) for children/adolescent–primary caregiver questionnaires, which were designed for children aged 4–18 years. An identical 11-point Likert response scale was used for all life satisfaction questions, which ranged from 0 (Very unhappy) to 10 (Very happy). General HRQL and life satisfaction measures were used for children  $\geq 4$  years; higher scores indicating better well-being. FAQLQ-PF10 was used for all children, with higher scores indicating greater FAQL impairment.

Respondents were asked to assess the impact of COVID-19 based on the question: "To which extent have any of the following circumstances in your child's life been affected by the current coronavirus (COVID-19) pandemic over the last few months (since January 2020)," and were offered five options: much worse, somewhat worse, about the same (no influence), somewhat better and much better. For statistical analyses, the perceived negative and positive impacts were combined, that is those who answered "much worse" and "somewhat worse" were combined, as well as "somewhat better" and "much better." Respondents were asked to state to what extent they agreed or disagreed with a series of statements concerning food experiences related to the pandemic. Survey profile questions gathered data on FA history, and children's and proxy respondents' socio-demographic characteristics.

Descriptive statistics were calculated for demographic and clinical data. The subjective well-being outcomes were plotted according to whether respondents reported negative impacts or not due to the COVID-19 pandemic. Given the non-normally distributed outcome variables, the nonparametric Mann-Whitney U test was used to

compare the well-being outcomes between subgroups according to whether a negative influence from COVID-19 was reported. Two-sided *p*-values were reported for all statistical tests, and a *p*-value below .05 was considered to be statistically significant. Statistical analyses were performed using Stata version 16.1 software (StataCorp LP).

A total of 247 respondents participated in the COVID-19 survey. The children with FA had a mean (standard deviation) age of 7.8 (4.6) years (range 1–17 years), 37% were girls and 98% of whom had an allergy specialist confirmed diagnosis of FA. Overall, 13% of parent-proxy respondents reported that COVID-19 pandemic and self-isolation/quarantine measures had prevented their children from receiving medical care related to FA “quite a lot,” “very much” or “extremely.” Out of 200 respondents who reported detailed impacts of COVID-19 on children and adolescents with FA, 28% reported negative impacts, 67.5% no impact and 4.5% reported positive impacts for their life as a whole.

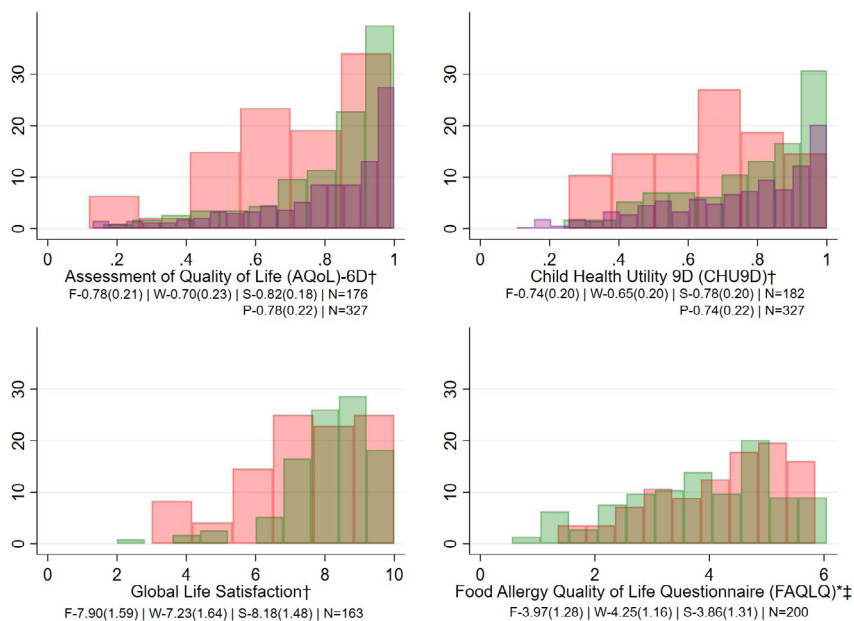
To examine the possibility that during the pandemic, respondents reported HRQL substantially differently from the pre-COVID-19 period, we compared AQL-6D and CHU9D scores in this study with data in the Pre-COVID-19 survey (Figure 1; *N* = 327 in purple; mean age of 9.6 years (range 4–17 years), 40% were girls and 98% of whom had an allergy specialist confirmed diagnosis of FA). For those who reported neutral/positive impacts from COVID-19, similar distributions of generic HRQL scores were obtained with the pre-COVID-19 survey and current results, with no statistically significant difference between mean

### Key Messages

- We surveyed parents of children and adolescents with food allergy before and during the pandemic.
- Parent/carer report of a negative impact was associated with worse quality of life and life satisfaction.
- Difficulties accessing “safe” foods and food allergy-related health services were commonly reported.

scores (AQL-6D: mean difference = 0.033, 95% CI –0.011–0.078, *p* > .1; CHU9D: mean difference = 0.041, 95% CI –0.005–0.087, *p* = .08). In contrast, significant differences in general quality of life and global life satisfaction (all *p* < .05) were evident between those who perceived negative vs neutral/positive influences of COVID-19 (Figure 1).

For FAQL, a trend to worse outcomes (i.e., higher FAQLQ scores) was observed in children with proxy-reported negative impacts from COVID-19 (*p* = .055). After controlling for a number of potential confounders, a similar magnitude on mean health utility decrement of 0.146 or 0.143 on the QALY scale was found when AQL-6D or CHU9D instrument was used; for global life satisfaction, on average, a mean decrement of 0.975 (on a 0–10 scale) was observed; and for FAQLQ, a mean difference of 0.471 was observed (all *p* < .05).



Same/Better (Life as a whole) Pre-COVID-19 survey

Worse (Life as a whole)

Y-axis: %. \* FAQLQ-Parent Form 10.

Mean (standard deviation) reported; <sup>†</sup> *P*<0.05; <sup>‡</sup> *P*=0.055 (Mann-Whitney test: W vs S).

F, full sample (COVID-19 survey, 2020 data); P, Pre-COVID-19 survey (2019 data);

W, worse owing to COVID-19 pandemic (COVID-19 survey);

S, same or better owing to COVID-19 pandemic (COVID-19 survey).

**FIGURE 1** Distribution of quality of life and life satisfaction of children and adolescents with food allergy by proxy-assessed COVID-19 impacts

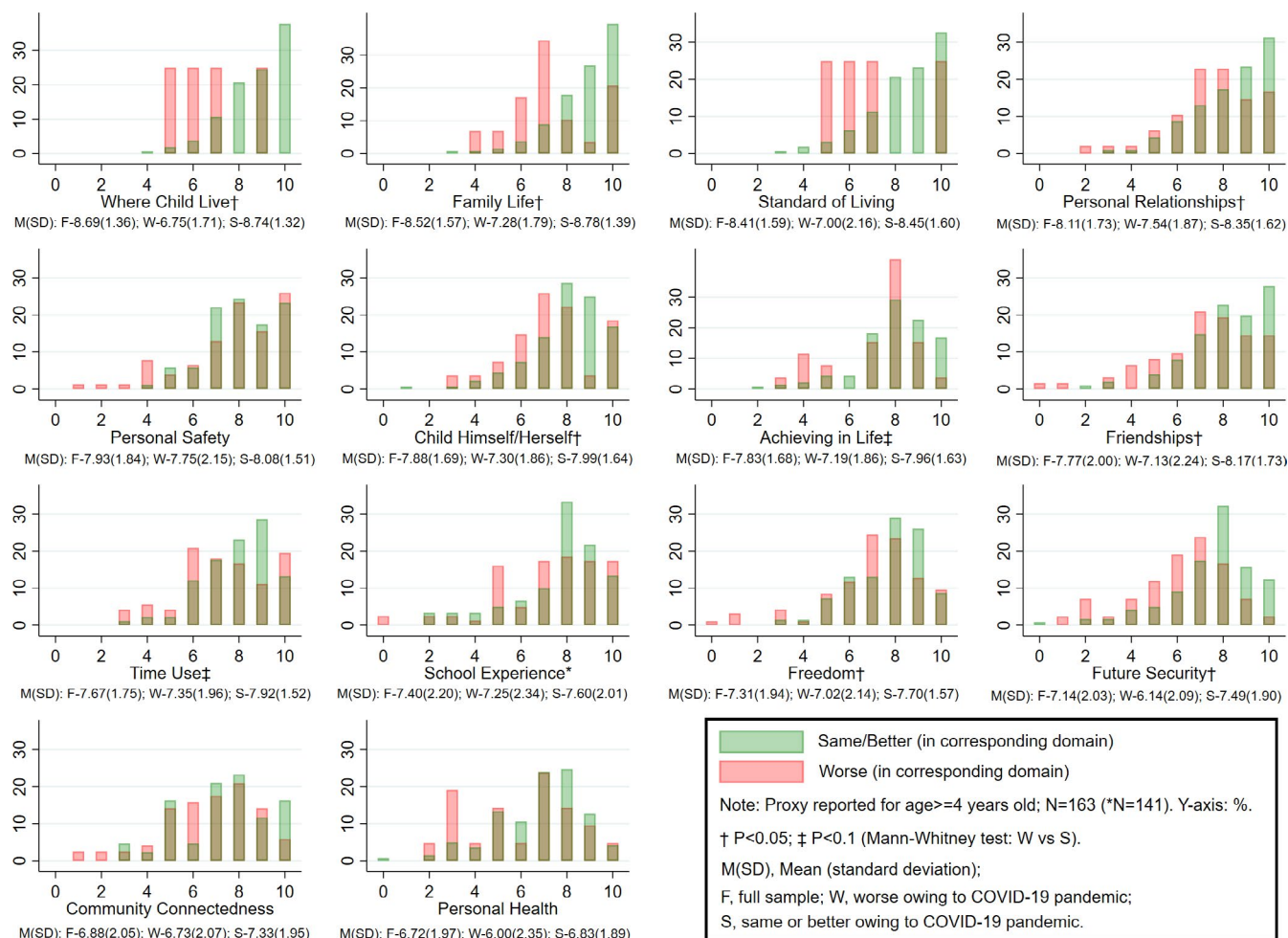
The distribution for life domain satisfaction scores (by perceived COVID-19 impacts on each corresponding domain) is shown in Figure 2. Across 14 life domains, statistically significant differences ( $p < .05$ ) were found for children and adolescents between those with negative and neutral/positive impacts from COVID-19 in seven domains. The most notable were family life (1.51,  $p < .0001$ ), future security (1.34,  $p = .0001$ ), friendship (1.04,  $p = .002$ ) and personal relationships (0.81,  $p = .007$ ).

Additionally, 27% of children and adolescents who sought medical care reported difficulty accessing FA-related health services due to COVID-19. The pandemic was also reported as negatively influenced food experiences, with 26% (50/192) of proxy respondents reporting anxiety about giving their child new foods and 5% reporting an accidental exposure resulting in an allergic reaction, which was attributed to the introduction of new foods due to "staple/safe" food shortages.

There are several limitations of this study. First, it was a voluntary, online survey designed to facilitate participation. It is likely that respondents, especially those who participated in the proxy-reported survey, represent families with a higher-than-average socio-economic band and higher educational attainment level.

Secondly, there could be discrepancy around self-reported versus proxy-reported HRQL/FAQL scores for children and adolescents, yet most disagreements tended to be minor.<sup>9</sup> The decision to focus on the proxy-report approach was to ensure that assessment and comparison could be made for children across a wider age range. This approach also allowed for recruitment via parents online, which would not have been an appropriate way to recruit children directly during the pandemic. Finally, although the cross-sectional nature of the survey prevents drawing a direct causal relationship between any COVID-19 impacts and well-being, the comparison with Pre-COVID-19 survey data, which were collected on a very similar population via the same A&AA network, suggests a possible causal relationship does exist.

This is the first study to reveal a comprehensive picture of how COVID-19 impacted the subjective well-being of children and adolescents with FA using a series of validated well-being measures. Difficulties accessing "safe" foods and FA-related health services were commonly reported. Those children and adolescents whose parent/carers proxy-reported negative impact from the COVID-19 pandemic had significantly poorer subjective well-being overall. Our findings suggest that this subgroup require specific identification



**FIGURE 2** Distribution of life domain satisfaction of children and adolescents with food allergy by proxy-assessed COVID-19 impacts on each life domain

and support and may benefit from targeted well-being programmes at times of COVID-19-like global events. Further research to understand whether such children can be identified pre-event and whether targeted resilience strategies may assist, may be warranted.

## KEYWORDS

COVID-19, food allergy, health state utility, life satisfaction, pediatrics, quality-of-life

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## CONFLICT OF INTEREST

Gang Chen: None declared. Audrey Dunn Galvin has received research grants from Aimmune Therapeutics, National Children's Research Centre Ireland, DBV Technologies, and Food Allergy Research and Resource Program, as well as other research support from SafeFood Ireland and has served as a consultant and/or advisory board member for Aimmune Therapeutics, Atlantia Clinical Trials in Food Ireland, and Anaphylaxis Ireland. Dianne E. Campbell is a part-time employee of DBV-technologies, and during the conduct of the study has received grants from National Health and Medical Research Council of Australia, personal fees from Allergenix and Westmead Fertility Centre, and intuitional research support from Nestle Health Sciences, outside the submitted work.

## AUTHOR CONTRIBUTIONS

Gang Chen involved in conceptualization, survey design, data curation, statistical analysis, funding acquisition, and writing the original draft preparation. Audrey Dunn Galvin involved in survey design and writing the review and editing. Dianne E. Campbell involved in survey design and writing the review and editing.

## ETHICAL APPROVAL

The study was approved by the Monash University Human Research Ethics Committee on 20 July 2020 (Reference No. 25548) and conformed to the principles outlined in the Declaration of Helsinki. All respondents provided informed consent prior to the survey.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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