



Letter

Development of a brief assessment of activity limitations in children with food allergy

Given the increasing prevalence of food allergies (FA), affecting approximately 8% of children in the United States,¹ and the increasing rates of anaphylaxis due to FA,² parents of children with FA have lowered quality of life (QOL).^{3,4} Many parents report their family QOL is associated with social limitations due to FA,³ and some parents worry so much about allergen avoidance that they significantly restrict their child's school and social activities.⁴ Children's day-to-day social functioning is important for maintaining an acceptable QOL and coping with FA. Thus, engagement in social activities with peers (eg, playdates, sports, summer camp) provides an important developmental context for normative social and emotional development in children.⁵ Because no measure exists to assess social activities in children with FA, we have developed the Social Activity Limitations Inventory (SALI), a 20-item checklist to assess activity limitation due to FA.

The SALI was developed based on review of the relevant FA literature and input from parents of children with FA. Activities included common childhood settings (eg, school) and activities (eg, sports). Parents rated the perceived likelihood of allowing their child to participate in each activity on a 4-point scale, ranging from 0 ("Almost always likely" to allow their child to participate) to 4 ("Never"). Higher scores indicate greater activity limitation.

We recruited, via social media, a sample of 293 parents of children with FA to complete an online survey including demographic and allergy information, measures of parent worry⁶ and burden,⁷ and activity limitations on the newly developed SALI. An exploratory factor analysis measure allows authors to examine whether items intercorrelate in theoretically logical or predicted patterns and to determine the structure of a new measure (ie, number of subscales). Using SPSS version 21 (IBM SPSS, Inc, Armonk, New York) software, an exploratory factor analysis of the SALI indicated that the measure was best characterized in a 2-factor structure, including all 20 items. Table 1 presents all 20 items and their factor loadings, all of which were >0.4 and thus retained. Factor 1 included 11 activities in which the parent may perceive less control over the environment (eg, "How likely are you to allow your child to eat from self-serve food stations?" or "How likely are you to allow your child to participate in activities supervised by other adults?"). Based on the limited opportunity to monitor the child in these activities, this was labeled "Limited Monitoring." Factor 2 included 9 activities in which parents may perceive relatively greater opportunity for closer supervision or monitoring (eg, going on vacation, playing with friends at own house) and thus was labeled "Trusted

Monitoring." Both subscales demonstrated strong internal consistency (Limited Monitoring, $\alpha = .90$; Trusted Monitoring, $\alpha = .89$), suggesting that subscale items are related to one another, an indicator of reliable measurement. The subscales were only moderately correlated ($r = 0.41$) with one another, suggesting discrete constructs, and thus presented 2 distinct areas to assess in FA-affected families.

The SALI was examined for associations with measures of parent worry⁶ and burden⁷ to explore utility as a screening tool in clinical settings. SALI total was weakly associated with parent worry ($r = 0.170$, $P = .016$) and moderately associated with parent burden ($r = 0.333$, $P < .001$), suggesting the SALI captures unique content other measures do not. The Trusted Monitoring subscale was associated with parent worry ($r = 0.201$, $P = .004$) and burden ($r = 0.296$, $P < .001$). These associations indicate that parents who are more worried and burdened by their child's FA were more likely to limit their child's activities, even in situations of increased ability to monitor their child. The Limited Monitoring subscale was associated with parent burden ($r = 0.289$, $P < .001$), indicating that limitation may pose a burden on the family's QOL. The Limited Monitoring subscale was not significantly associated with worry; parents may be intermittently worried as a function of their activity limitation, depending on ability to monitor safety.

Correlation coefficients between SALI subscales and allergy characteristics revealed associations between Limited Monitoring and number of FA ($r = 0.160$, $P = .019$), time to symptom onset ($r = -0.176$, $P = .010$), number of FA-related emergency visits in the last 6 months ($r = -0.191$, $P = .005$), number of FA-related hospitalizations in the last 6 months ($r = -0.236$, $P < .001$), use of injectable epinephrine in the last 6 months ($r = -0.179$, $P = .009$), and anaphylaxis events in the last 6 months ($r = -0.237$, $P < .001$). The Trusted Monitoring subscale was associated with number of emergency department visits in the last 6 months ($r = 0.199$, $P = .004$). These associations suggest that the SALI captures the heightened limitation of social activity associated with several markers of increased allergy severity.

The SALI was developed to assess limitation of developmentally appropriate social experiences, which may be an important component of decreased QOL³ for children with FA and their families. SALI is an efficient, reliable screener of parental limitation of children's developmentally appropriate social activities, both in situations where the parent can monitor the safety of the child and in those where monitoring is limited. Total activity limitations were associated with parent worry and burden, such that these concerns were associated with greater limitation of the child's activities, as might be expected in clinical practice with anxious families. Limited Monitoring was not significantly associated with worry, which may reflect a nonlinear association between these constructs, or a bidirectional association over time. Parents may be less

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Table 1
Factor Loadings for the Social Activity Limitations Inventory (SALI)

	Factor loadings
Factor 1: Limited Monitoring (11 items)	
Eating out at restaurants	0.417
Eating from self-serve food stations (eg, salad bars, frozen yogurt toppings)	0.809
Activities supervised by relatives/extended family members	0.496
Activities supervised by babysitters	0.702
Activities supervised by other parents (eg, playdates at a friend's house)	0.718
Traveling in an airplane	0.523
Attending professional sporting events (eg, major league baseball games)	0.503
Going to a circus/state fair/carnival	0.619
Sleep-overs at a friend's house	0.807
Going to camp (eg, day camp or overnight camp)	0.867
Attending daycare or aftercare	0.662
Factor 2: Trusted Monitoring (9 items)	
Going to movies/shows/concerts	0.606
Going on vacation	0.536
Playing with friends at your house	0.686
Birthday parties	0.573
Attending school (even without a no-nuts policy)	0.559
Attending school parties/social events	0.550
Playing sports (practices, games)	0.804
Attending field trips	0.807
Other extracurricular activities (eg, scouts, clubs)	0.833

Parent respondents were asked to rate the likelihood that they would allow their child to participate in each activity on a scale from 0 ("Almost always likely") to 4 ("Never"), with higher scores indicating greater activity limitations. The complete SALI measure is available from the authors.

likely to endorse worry symptoms in a linear direction with monitoring because the limitation of their child's social activities serves as a protective factor—that is, the "just-right" amount of anxiety helps keep their child safe.⁵

Activity limitation, particularly in settings where parents may perceive limited ability to monitor their child's safety, was associated with children's FA severity, including fewer recent reactions and hospitalizations. Our sample was relatively educated, and these parents may have recognized the need to limit their child's activity if they could not monitor their safety, perhaps resulting in fewer reactions. This association should be tested prospectively in a heterogeneous sample of families over time in a longitudinal study. In addition to relatively higher levels of education, our participants were also relatively anxious parents who self-selected into an online

study. Future studies should investigate a more heterogeneous sample of clinic-recruited families, who may exhibit lower overall rates of anxiety or more variable activity limitation. Family activity restriction may be reinforced when a child has fewer reactions, but the potential sociodevelopmental expense of missed social opportunities remains unclear.

Activity limitations can adversely impact psychological functioning and perception of parental overprotectiveness in children with FA⁸; thus, these findings provide important implications for interdisciplinary teams. A brief, reliable measure of activity limitations that a parent can complete efficiently in a clinic setting, such as the SALI, may foster opportunities for healthcare providers to counsel families on adaptive strategies for FA management across all settings to promote FA management balanced with normative social development. Psychoeducation on social development and autonomy may address the concern that FA families experience by providing tailored education on allergy risk and the "just-right" amount of activity limitation for optimal child development and QOL.

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References

- [1] Gupta RS, Springston EE, Warrier MR, et al. The prevalence, severity, and distribution of childhood food allergy in the United States. *Pediatrics*. 2011;128:204–211.
- [2] Motosue MS, Bellolio MF, Van Houten HK, Shah ND, Campbell RL. Increasing emergency department visits for anaphylaxis 2005–2014. *J Allergy Clin Immunol Pract*. 2017;5:171–175.
- [3] Springston EE, Smith B, Shulruff J, Pongracic J, Holl J, Gupta RS. Variations in quality of life among caregivers of food allergic children. *Ann Allergy Asthma Immunol*. 2010;105:287–294.
- [4] Valentine AZ, Knibb RC. Exploring quality of life in families of children living with and without a severe food allergy. *Appetite*. 2011;57:467–474.
- [5] Warren CM, Otto AK, Walkner MM, Gupta RS. Quality of life among food allergic patients and their caregivers. *Curr Allergy Asthma Rep*. 2016;16:611–614.
- [6] Bonner MJ, Hardy KK, Guill AB, McLaughlin C, Schweltzer H, Carter K. Development and validation of the parent experience of child illness. *J Pediatr Psychol*. 2006;31:310–321.
- [7] Cohen BL, Noone S, Munoz-Furlong A, Sicherer SH. Development of a questionnaire to measure quality of life in families with a child with food allergy. *J Allergy Clin Immunol*. 2004;114:1159–1163.
- [8] Herbert LJ, Dahlquist LM. Perceived history of anaphylaxis and parental overprotection, autonomy, anxiety, and depression in food allergic young adults. *J Clin Psychol Med Settings*. 2008;15:261–269.