

Early Childhood Feeding Practices Improved after Short-Term Pilot Intervention with Pediatricians and Parents

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Abstract

Background: During the first 5 years of a child's life, parents navigate numerous, and challenging transitions in child feeding. We designed and evaluated an intervention in which parents and their pediatric healthcare providers learned about early childhood feeding practices based on the Division of Responsibility model.

Methods: Santa Clara County Public Health Department and a community-based child care organization, Choices For Children, partnered with County pediatric clinics, managed-care plans, Supplemental Food Program for Women, Infants, and Children (WIC), FIRST 5, and others to implement a pilot program to promote best feeding practices to low-income parents with young children. Pediatric healthcare providers were instructed in how to give anticipatory guidance based on best practices and how to refer patients to a parenting class. Parents were referred to a free 2-hr parenting class where they received feeding information consistent with that provided by their pediatric healthcare provider. A pre-post test evaluation design was used with a 2-mo follow-up assessment.

Results: Pediatric healthcare providers significantly improved their knowledge and self-efficacy in addressing issues of feeding and weight and reported fewer barriers to taking action with early childhood feeding and weight issues. Parents reported a significant increase in knowledge from pretest to posttest and positive behavior change at follow-up.

Conclusions: The intervention produced significant improvements in following child feeding best practices among pediatric healthcare providers and parents, and provides the rationale for future research on whether consistent provision of a best-practice feeding model can prevent and intervene with feeding problems in early childhood.

Introduction

Early childhood is the ideal time to provide parent intervention to improve child-feeding practices and prevent eating behaviors that may increase risk of obesity.^{1,2} The ability to self-regulate intake is established in early childhood² and is influenced by parenting behaviors.^{3,4} Throughout early childhood, dietary quality progressively deteriorates as children transition from a milk-based diet to adult foods.^{5,6} Parents may alter their child feeding behaviors as a result of perceived problems, such as pickiness and child weight.⁷⁻⁹ Children are frequently encouraged to eat more or less than they want to¹⁰ and are pressured to eat certain foods.¹¹ Such pressure to eat has been linked in laboratory studies to childhood overeating.^{4,12} In addition to obesity, poor feeding prac-

tics and feeding problems in early childhood may lead to other preventable conditions such as anemia, dental caries, and nonorganic failure to thrive.¹³⁻¹⁶

The pediatric well-child visit provides an opportunity for providers to intervene early with parents on child feeding practices. The American Academy of Pediatrics¹⁷ recommends that children receive 15 well-child visits during the first 5 years of life. A component of well-child visits is anticipatory guidance, in which the pediatric healthcare provider helps the parent prepare for upcoming developmental transitions, including feeding. However, pediatricians report low proficiency and interest in more training in providing guidance in parenting techniques.¹⁸

The Division of Responsibility (DOR),¹⁹ as formalized by Ellyn Satter, is widely recognized as a best-practice feeding model.^{17,20,21} The DOR, first defined by Satter in 1986,²² has

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been referred to widely in the literature and implemented in publicly funded programs such as the Supplemental Food Program for Women, Infants, and Children (WIC) and Head Start. The American Academy of Pediatrics directs pediatricians to deliver DOR-based feeding guidance during well-child visits.^{17,23,24} In stipulating both taking leadership and giving autonomy with respect to feeding, the DOR promotes an authoritative style of parenting in which parents are responsible for what is fed and when and where feeding occurs; the child is responsible for how much and whether or not to eat within those structural guidelines. Individual DOR domains, such as the child's responsibility for how much to eat, have been related to child eating behavior in cross-sectional studies.^{2,25} In an earlier study, we reported on the effectiveness on attitudes, practices, and knowledge of a DOR implementation with child-care providers.²⁶ Although the efficacy of the DOR as a disease prevention model has not been studied in randomized, controlled intervention trials,²⁷ parenting style is implicated in the development of obesity.²⁸⁻³⁰ The DOR supports parenting behaviors that lower risk of obesity in children.^{4,19}

To our knowledge, this is the first study to evaluate whether an intervention teaching pediatric healthcare providers and parents the DOR is effective in improving their best-practices awareness and behaviors. We hypothesized that the intervention would increase pediatric healthcare providers' average confidence and frequency with which feeding and weight issues were addressed and decrease the barriers associated with discussing these issues with parents. We hypothesized that the intervention would result in parents' adoption of at least one new behavior consistent with DOR-based feeding guidance.

Methods

The study was designed and implemented by the Childhood Feeding Collaborative (CFC). The CFC promotes and coordinates countywide provision of consistent, DOR-based feeding guidance to parents with very young children. The CFC is a partnership of Santa Clara County organizations: Public Health Department, County pediatric clinics, community-based pediatric healthcare providers, Pediatric Healthy Lifestyle Center (a County Health and Hospital System treatment program for overweight children that teaches DOR), MediCal managed care plans, WIC, community organizations, and FIRST 5 Santa Clara County. The target population of pediatric healthcare providers was 32 County primary care pediatricians and other pediatric specialists, allied pediatric healthcare providers, and community pediatric healthcare providers who attended the two CFC trainings. The target population of parents was those whose children aged 6 mo through 5 yr were seen for a well-child visit by a trained pediatric healthcare provider during the study period. CFC is jointly administered by the Santa Clara County Public Health Department and Choices For Children, a not-for-profit community-based child-care organization.

Study Design

A pre-post test evaluation design with a follow-up assessment was used to assess the impact of the intervention. The 7-mo-long intervention (November, 2007, to June, 2008) was conducted in two phases—first with pediatric healthcare providers and second with parents referred by these providers. The study was approved by the San Jose State University Institutional Review Board.

Intervention

In the first phase of the intervention, County and community-based pediatric healthcare providers received a total of 2 hr of continuing medical education training by a public health nutritionist during two consecutive weekly trainings. Two reinforcement trainings were provided during the 7-mo study period at pediatric staff meetings. Training topics included: How to give anticipatory guidance consistent with the DOR during the 6-mo through 5-yr well-child visits; how to address specific issues of feeding and weight using the DOR model; how to refer target parents to the free parenting class on DOR-based feeding guidance; and how to refer obese 2–5 yr olds to the Pediatric Healthy Lifestyle Center for early intervention. Pediatric healthcare providers were provided with 13 different DOR-based handouts to provide to parents of children 6 mo to 5 yr of age. The handouts had been pilot tested previously for acceptability with low-income audiences.³¹ The second phase of the intervention involved partnering with the county's largest MediCal insurer and a community-based child-care organization, Choices For Children, to offer a free health education class to families referred by pediatric healthcare providers who had been recipients of our provider training. Parents were taught DOR basics, shown child-feeding video vignettes demonstrating positive and negative feeding interactions,³² and were given the opportunity to solve their individual feeding problems during class discussion. Classes were located in libraries, elementary schools, and community and child-care centers; they were offered in both English and Spanish languages and met in the evening. Free child care and a light supper were provided.

A Choices For Children Registered Dietitian and three public health nutritionists collaborated to design the "5 Keys to Raising a Healthy, Happy Eater" class, a 2-hr DOR-based curriculum for the parent intervention. Class instructors were Registered Dietitians with expertise in the DOR. Choices For Children held quarterly meetings with the instructors to assure quality control. The curriculum and evaluation instruments were piloted in Spanish and in English, using a convenience sample of parents referred by their pediatric healthcare provider to the class.

Evaluation

Pediatric healthcare providers. Pediatric healthcare providers were assessed by a self-administered online survey before and after the two-session training and then 3–6 mo later after the on-site training reinforcement at clinic

staff meetings. The surveys were developed specifically to evaluate this study and were pretested on 2 pediatricians who received the intervention prior to the start of the study. SurveyMonkey, a web-based questionnaire-generating service, was used to administer the survey. Pediatric healthcare providers were sent an e-mail link to the surveys and received several reminder e-mails. Unique identifying numbers were imbedded in the link to allow for longitudinal analysis.

Before the initial two-session training and immediately afterward, pediatric healthcare providers were presented with nine true or false statements designed to measure knowledge of the DOR model. Follow-up assessment 3–6 mo later evaluated the effects of knowledge learned in the Grand Rounds and at the follow-up reinforcement training. Respondents were asked to indicate their confidence in dealing with five feeding and weight issues with families using a 5-point Likert scaling ranging from Not Confident (1) to Confident (5). Using a 5-point Likert scaling ranging from Never (1) to Always (5), pediatric healthcare providers were also asked four questions about how often they addressed feeding and weight problems with families, how frequently they handed out the provided feeding materials, and finally how frequently five specific barriers prevented problem solving about weight and feeding issues with parents. Responses were averaged to create a total score for each set of questions.

Parents of Young Children. Parents of children 6 mo through 5 yr of age who were referred by a trained pediatric healthcare provider to the “5 Keys to Raising a Healthy, Happy Eater” class constituted the targeted sample. The class provider, Choices For Children, also enrolled an uncounted number of parents who self-referred to the class through the WIC program and various community organizations who partner with the CFC. These parents are not differentiated in the results.

Parents were assessed at the beginning and end of the “5 Keys to Raising a Healthy, Happy Eater” class and then by phone 6 wk to 2 mo later. The parent surveys were based on nonvalidated surveys of child-feeding practices^{33,34} and included additional demographic information unique to Santa Clara County.

At the start and end of class, a pretest and posttest self-completed assessment was given, designed to measure knowledge of the DOR, and consisted of 13 true or false statements, with the total number correct used as the outcome measure. Telephone follow-up assessment evaluated adoption of new behaviors based on the DOR and frequency of feeding guideline behaviors. At pretest and at follow-up, parents were presented with 16 common feeding situations with DOR-consistent solutions and asked whether or not they chose those solutions. Nine of the 16 questions were reverse scored. Parents were also asked about the frequency of 11 typical feeding behaviors: (1) How often do you allow your child to choose the foods he or she wants to eat from the foods you have prepared?; (2) How often do you make your child eat all that

is on his or her plate?; (3) If your child doesn’t like what is being served at a meal, how often do you make a different meal for him or her?; (4) How often do you make sure your child’s meals and snacks are at about the same time each day?; (5) How often does your child eat while watching TV?; (6) How often does your child eat off and on throughout the day?; (7) How often do you allow your child to eat less than you think he or she should?; (8) How often do you let your child choose whether or not to eat the foods that are offered?; (9) How often do you do or say something to make your child to eat more?; (10) How often does your child eat meals or snacks with a parent or other adult?; and (11) How often do you allow your child to eat more than you think he or she should? Responses ranged from 1 (always) to 5 (never) and the average across all 11 behaviors was used as the outcome measure.

Statistical Analysis

Paired *t*-tests were used to compare responses between pretest and posttest, and pretest and follow-up. One-way analysis of variance (ANOVA) (continuous measures), chi-squared statistics (dichotomous measures), and Spearman correlations were used to compare samples and to determine the relationship between respondent characteristics and change in knowledge, behaviors, and efficacy. SAS 9.2 was used as the statistical software for all analysis. Significance level was set at 0.05 (two-tailed).

Results

Pediatric Healthcare Providers

A total of 96 pediatric healthcare professionals attended the two trainings. Twenty-two of the 32 targeted county pediatricians attended both trainings. Forty-three (46%) of the pediatric healthcare professionals completed the pretest. Three respondents were excluded in the analysis sample because they were not currently practicing medicine locally. Twenty-nine (67%) of the pretest sample completed the posttest and 22 (51%) were part of the follow-up sample, defined as having both posttest and follow-up assessment. Table 1 presents descriptive information on the pediatric healthcare professionals completing the posttest. No statistical difference was noted between the pretest sample and follow-up sample on the measured demographic variables (data not shown).

At posttest, 97% of pediatric healthcare providers had been made aware of the DOR as the best-practice model for child-feeding practice compared to 38% at pretest. Table 2 compares the results of the posttest and follow-up pediatric healthcare provider surveys to the pretest survey. There was a significant increase in knowledge of DOR feeding guidelines after the two-session training. At posttest, 59% of the sample correctly answered all questions, compared to 18% at pretest ($\chi^2 = 10.5$; $p = 0.001$). Over 90% of the sample correctly answered six questions about

Table 1. Demographics of Pediatric Healthcare Providers, Childhood Feeding Collaborative, Santa Clara County, California 2007–2008

Demographic characteristics of pediatric healthcare providers	Post-test sample <i>n</i> = 29		Follow-up sample <i>n</i> = 22	
	Number	Percent	Number	Percent
Type of pediatric healthcare provider				
Primary care pediatrician	21	73%	19	86%
Specialty pediatrician	6	20%	2	9%
Allied pediatric health provider	2	7%	1	5%
Gender				
Male	10	34%	5	23%
Female	19	66%	17	77%
	Mean	Standard deviation	Mean	Standard deviation
Average number hours worked per week	38.8	9.2	38.4	8.6
Average number of years in practice	14.2	10.0	12.5	8.0

Table 2. Pediatric Healthcare Provider Responses at Pretest, Posttest, and Follow-Up, Childhood Feeding Collaborative, Santa Clara County, California 2007–2008

Pediatric health care provider response	Pretest		Posttest		Follow-up	
	Number	Percent	Number	Percent	Number	Percent
Number and percent answering 100% correct on knowledge test* (<i>n</i> = 29)	5	18%	17	59%	NA	NA
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Confidence in addressing weight and feeding problems with the families of patients under age 6 (1 = Not confident, 5 = Confident)** (<i>n</i> = 22)	4.2	0.7	NA	NA	4.4	0.5
Frequency of addressing weight and feeding problems with the families of patients under age 6 (1 = Never, 5 = Always) (<i>n</i> = 22)	3.9	0.8	NA	NA	4.0	0.7
Barriers to effective problem solving about weight and feeding problems with the families of patients under age 6 (1 = Never, 5 = Always)*** (<i>n</i> = 19)	3.3	0.6	NA	NA	3.0	0.7

Knowledge questions were asked at pretest and posttest. Behavioral questions were asked at pretest and follow-up.

* $\chi^2 = 10.5$; $p = 0.001$. ** $t(21) = 2.5$; $p = 0.02$. *** $t(19) = 2.5$; $p = 0.02$.

NA, Not applicable.

parent feeding responsibilities at both pretest and posttest. Questions regarding child responsibilities had a lower percentage of correct responses at pretest, but showed increases following the training. Change in knowledge was not related to gender, hours worked, or years of practice.

Although overall pretest confidence was high, there was a significant increase [from 4.2 ± 0.7 to 4.4 ± 0.5 , $t(21) = 2.5$; $p = 0.02$] by follow-up. All questions showed an increase in confidence. Although no pediatric healthcare providers endorsed the Not Confident or Somewhat Not Confident options at follow-up, only about 50% answered Confident on any of the individual issues.

Frequency of addressing feeding or weight problems in children was high at pretest, with over 50% endorsing the

Always option, leaving little room for significant change by follow-up. Respondents showed a slight increase in addressing the issues of picky eaters. Although there was an increase in the frequency of handing out the provided feeding materials, 18% of the follow-up responses indicated Never or Rarely and only 4% indicated Always.

No demographic measures were related to change in confidence. An increase in knowledge at posttest was correlated with increased confidence in addressing feeding and weight issues at follow-up ($r = 0.49$; $p = 0.02$). Neither knowledge nor an increase in confidence was correlated with an increased frequency in addressing these issues.

At pretest, pediatric healthcare provider assessment of lack of parent adherence was the most frequently men-

tioned barrier to effective problem solving (3.9 ± 0.6). Lack of support services (3.4 ± 1.3), ineffectiveness of interventions (3.4 ± 0.7) and lack of materials (3.1 ± 1.0) were also cited as frequent barriers at pretest. At follow-up, the frequency of barriers was reduced [3.3 ± 0.6 to 3.0 ± 0.7 , $t(19) = 2.5$; $p = 0.02$] (Table 2). Lack of clinician knowledge showed the largest reduction. Seventy-eight percent endorsed the Never or Rarely categories, compared to 30% at pretest, indicating increased recognition of DOR topics. There was also a decrease in the number of pediatric healthcare providers citing ineffectiveness of interventions as a barrier. Concern about parent adherence remained high; 73% of pediatric healthcare providers reported it was Often or Always a barrier at follow-up.

Parents of Young Children

During the study period, 1340 parents were referred to the class by the pediatric healthcare provider. Of these 450 (34%) attended the 2-hr “5 Keys to Raising a Healthy, Happy Eater” class between November, 2007, and June, 2008. A total of 254 parents completed both the pretest and posttest. If both parents attended the class, only one completed the survey. A description of the parent sample is shown in Table 3.

In all, 147 (58% of those completing the pretest and posttest) completed the follow-up survey. The follow-up sample was more likely than other parents who completed the pretest to have attended the County obesity treatment program, Pediatric Healthy Lifestyle Center $\chi^2(2) = 8.3$; $p = 0.02$], more likely to be WIC participants $\chi^2(2) = 8.7$; $p = 0.01$], and less likely to have been in a Spanish-speaking class $\chi^2(1) = 5.2$; $p = 0.02$].

Table 4 presents the results from the parent evaluation. At pretest, the mean of correct responses on the knowledge test was 61.6%. Females scored higher than males ($r = 0.16$; $p = 0.01$). There was a significant increase in knowledge at posttest [$t(247) = 13.3$; $p < 0.001$] where the mean was 77.7%. Improvement in posttest scores was associated with educational level ($r = 0.23$; $p = 0.005$) and being in a Spanish class ($r = 0.18$; $p = 0.02$).

At follow-up, 88% of the parents completing the survey had attempted at least one new behavior consistent with the DOR. Table 5 presents the percent of families changing specific feeding behaviors. Most commonly

Table 3. Description of the Parent Sample, Childhood Feeding Collaborative, Santa Clara County, California 2007–2008

Demographic characteristics of parent sample	Posttest sample (N = 254)	
	Number	Percent
Gender		
Male	44	17%
Female	186	73%
Declined to state	24	10%
Ethnicity		
Asian	31	12%
Black	3	1%
Hispanic	195	77%
Pacific Islander	0	0%
White	12	5%
Mixed	4	2%
Declined to state	9	4%
Parental education		
No high school diploma	72	28%
High school diploma	54	21%
Some college	55	22%
College degree	32	13%
Declined to state	41	16%
Ages of children*		
Less than 6 months	19	7%
6 months to 5 years	196	77%
6 years to 10 years	78	31%
Over 10 years	48	19%
WIC participation	134	53%
Attended Pediatric Healthy Lifestyle Center	40	16%
Spanish speaking class	95	37%

A total of 147 parents responded at follow-up; there were no differences in demographic characteristics compared to the larger group that attended class.

*Totals add to more than 100% because parents could report more than 1 child.

WIC, Supplemental Food Program for Women, Infants and Children.

Table 4. Parent Responses at Pretest, Posttest, and Follow-Up, Childhood Feeding Collaborative, Santa Clara County, California 2007–2008

Response of parents	Pretest		Posttest		Follow-up	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Percent correct on knowledge test* (n = 248)	61.6	7.7	77.7	8.5	NA	NA
Frequency of parents attempting feeding behaviors** (1 = Always, 2 = Often, 3 = Sometimes, 4 = Rarely, 5 = Never) (n = 144)	2.8	0.4	NA	NA	2.6	0.4

* $t(247) = 13.3$; $p < 0.001$. ** $t(143) = 4.4$; $p < 0.001$.

Table 5. Parent Attempts at New Behaviors at Follow-Up, Childhood Feeding Collaborative, Santa Clara County, California 2007–2008

Parent attempts at new behavior	Pretest	Follow-up
Parent questions (answers are provided)	Percent engaging in behavior	Percent attempting as new behavior
I let my child eat wherever he or she wants ^a	82%	100%
We eat dinner together as a family ^b	59%	20%
I serve my child the same food as the rest of the family ^b	90%	64%
I make my child eat foods I think are good for him or her ^a	22%	10%
I let my child decide whether he or she wants a second helping ^b	79%	77%
I only cook food I know my child will like ^a	36%	16%
I insist on my child finishing their food before he or she leaves the table ^a	54%	55%
I let my child eat whenever he or she wants ^a	70%	55%
I leave food out on the table so my child can finish later on ^a	84%	52%
I let my child decide how much he or she should eat ^b	65%	56%
I encourage my child to eat what I think he or she should ^a	8%	5%
I make my child finish all his or her dinner before he or she can have dessert ^a	41%	33%
I let my child choose foods that he or she wants from what is served at a meal ^b	54%	43%
I let my child eat snacks whenever he or she wants ^a	73%	59%
I serve meals at about the same time every day ^b	86%	58%
I turn off the TV during meal time ^b	71%	66%
Percent trying at least one new behavior		88%
^a Correct answer is "No."		
^b Correct answer is "Yes."		

attempted behaviors included parents taking control of where the child eats, letting the child decide if he or she wants a second helping, turning off the TV at mealtime, and serving the same food as the rest of the family. In contrast, parents were less likely to let go of control over their child's eating or not eating certain foods. Attempting a new behavior was inversely related to education ($r = -0.20$; $p = 0.03$). Parents reported a significant increase in the average frequency of desired best-practice behaviors after attending the intervention class [$t(143) = 4.4$; $p < 0.001$]. No demographic characteristics were associated with this change.

Discussion

This study demonstrated that it was possible to implement a brief intervention that teaches DOR-based feeding to pediatric healthcare providers and parents. The intervention was successful in reaching its targeted County pediatric healthcare providers, with 31/32 attending at least one training. Twenty-two attended both CFC trainings. At follow-up, pediatric healthcare providers were more confident in addressing issues of feeding and weight and reported fewer barriers to addressing feeding and weight issues. More importantly, 97% of pediatricians were made aware of the DOR as the best-practice model

for child feeding, compared to 38% at pretest. Years of experience was correlated with an increase in the frequency of addressing weight and feeding problems indicating that healthcare providers with less experience might be more apt to change their behavior.

Parents showed significant increases in knowledge of the DOR in feeding at posttest, and at 6–8 weeks follow-up 88% had made one or more positive behavior changes. Only 34% of the referred parents attended the parenting class. There is no way of knowing whether this self-selected study group differs from the population of 1340 who were referred.

Study limitations included the use of a convenience sample to pilot-test the intervention, the lack of control groups, and the necessarily brief follow-up intervals for both pediatric healthcare providers and parents given the short length of interventions. A further limitation was the use of nonvalidated surveys to evaluate the five DOR domains. At the time of this study, there were no validated child-feeding surveys that adequately assessed all five domains of the DOR. Validated surveys were limited to those testing only parental control of child eating³⁵ or providing only very limited assessment of the three parent responsibilities.²⁸ The results of the pediatric healthcare provider intervention must be treated with some caution due to the small number of participants and response rate and the relatively short length of the intervention.

Response depended on the cooperation of the pediatric healthcare provider who voluntarily replied to the surveys. There is no way to determine completely how representative this sample was of the more than 300 pediatric healthcare providers who provide care within Santa Clara County. Pediatric healthcare providers showed little improvement in the frequency of addressing issues of feeding and weight. However, the survey questions did not address qualitative changes in practice. Improvements in perceived barriers to and confidence in taking action on issues of feeding and weight may have been moderated by the provider's initial lack of expertise in the intervention at pretest and the better awareness of the intricacies of implementation at follow-up. Both providers and parents were more knowledgeable of parent responsibilities than child responsibilities at pretest.

A randomized, controlled trial is needed to gain more definitive results over a longer period of time, and to test whether changes in physician and parent knowledge and practices influence child food intake. The impact of receiving a consistent message on parent outcomes, and the identification of the problems and barriers that parents and pediatric healthcare providers encounter when attempting to implement DOR principles are future areas of investigation.

This study has implications for public health in that a partnership of a county public health department with healthcare and community organizations successfully made systematic changes so that families could receive consistent best-practice feeding messages. The short intervention was effective, its implementation relied upon existing systems, an accepted best practice was promoted, and consistent messages were given to parents. Furthermore, prior to intervention, our study pediatric healthcare providers were unaware of the best-practice early childhood feeding model. This is surprising given reference to DOR in many practice guidelines and reports.

Conclusions

Results suggest that DOR is a relevant and beneficial model to teach pediatric healthcare providers and culturally diverse groups of low-income parents. However, the lack of awareness of the model by both parent and pediatric healthcare provider groups in this study demonstrates the need for more effective DOR dissemination so that parents of young children receive consistent best-practice feeding guidance. For parents, a curriculum that is parent centered and/or provides follow-up classes for problem solving may be a more effective way to facilitate behavior change.

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Author Disclosure Statement

No competing financial interests exist for all authors.

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