

# Center-Reported Adherence to Nutrition Standards of the Child and Adult Care Food Program

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## Abstract

**Background:** The Child and Adult Care Food Program (CACFP) sets nutrition standards for foods served in participating settings. Licensing regulations in many states, including Connecticut (CT), extend these rules to nonparticipating facilities. This study evaluates the food environment for preschool-age children in CT child care centers and describes center-reported adherence to the CACFP nutrition regulations.

**Methods:** We surveyed directors of licensed CACFP-participating and non-CACFP centers that served meals and/or snacks. Food served, caregiver feeding behavior, nutrition practices and policies, and CACFP knowledge were reported by 256 non-CACFP and 87 CACFP centers. We conducted bivariate analyses to describe adherence to the CACFP regulations as reported by CACFP and nonparticipating centers. Data were collected in 2015–2016 and analyzed in 2017.

**Results:** CACFP centers reported more engagement in recommended feeding and nutrition practices than non-CACFP centers, including serving more fresh fruit and whole grains at snack time, serving low-fat milk for meals/snacks, and use of family style dining and positive caregiver behaviors. No center reported serving soda, only a few had fruit drinks, and the majority prohibited parents from sending in sugary drinks. Despite the licensing regulations about compliance with the CACFP nutrition standards, 52% of non-CACFP centers had never heard of CACFP and only 21% received information about following the CACFP standards and practices.

**Conclusions:** CACFP participation is associated with better center-reported adherence to the CACFP nutrition standards and feeding practices. Poor awareness about CACFP among nonparticipating centers needs to be addressed to improve compliance with the CACFP nutrition standards.

**Keywords:** CACFP; child care; food environment; preschool-age children

## Introduction

For the first time in history, American children face shorter life expectancy than their parents.<sup>1</sup> With excessive consumption of added sugars and saturated fat, and low intake of high-fiber vegetables and whole grains, the diets of most children today fail to meet recommendations of the Dietary Guidelines for Americans (DGAs),<sup>2–4</sup> placing children at risk for developing obesity and diet-related chronic diseases.<sup>5</sup> Early childhood is an ideal time to support the adoption of healthful dietary patterns, as lifelong eating habits are established early. Child care settings provide an important opportunity to influence children's eating habits as about two-third of preschool-age American children receive nonrelative care outside their homes.<sup>6</sup> The child care environment may in-

fluence children's dietary intake by providing healthful food and beverages, implementing feeding practices that encourage healthy choices, and the provision of nutrition education.<sup>7,8</sup>

A large role in supporting child care nutrition belongs to the USDA Child and Adult Care Food Program (CACFP), which provides reimbursements for foods served in child and adult care settings that follow set nutrition standards. All nonprofit child care facilities are eligible to participate, regardless of family income for the enrolled children.<sup>9</sup> For-profit facilities are eligible to participate if at least 25% of children come from low-income families. CACFP reimburses participating facilities at free, reduced-price, or paid rates, targeting benefits to children at risk for food insecurity and poor diet.<sup>9</sup> The program's reach extends far outside of participating programs as many states, including Connecticut

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(CT), require compliance with the CACFP nutrition standards in all licensed child care centers.<sup>10</sup>

On October 1, 2017, USDA implemented new regulations<sup>11</sup> to align the CACFP nutrition standards with the DGAs.<sup>2</sup> Drawing upon the Institute of Medicine recommendations,<sup>12</sup> the updated CACFP standards set limits on juice and added sugar, included more whole grains, introduced fruit and vegetables as separate meal components, and eliminated onsite deep frying as a meal preparation method. Through licensing regulations in many states, these stricter nutrition standards also apply to programs not participating in CACFP.

Prior research has demonstrated that participation in CACFP confers a modest nutritional advantage in terms of the food environment, characteristics of food offerings, and child intake, including higher fruit and vegetable consumption and recommended energy intake.<sup>13–17</sup> For example, CACFP centers are more likely to provide both a fruit and vegetable at lunch and serve milk (and low-fat milk) than non-CACFP centers.<sup>15</sup> CACFP centers are also more likely to embrace recommended practices such as family style serving (defined as having children help themselves to food from communal serving dishes) and teacher modeling of positive mealtime behaviors (such as having staff participate in the meal and eating the same foods as children).<sup>7,8,17</sup>

Much less is known about foods served in programs not participating in CACFP, including how they compare with dietary recommendations and CACFP regulations. Survey data from California showed a significantly greater number of CACFP child care centers reporting nutritionally superior food offerings than in non-CACFP centers.<sup>13</sup> In a nationally representative sample, CACFP participation was associated with higher parent-reported milk and vegetable intake among low-income children and a lower prevalence of overweight and underweight.<sup>14</sup> A Mississippi study found healthier beverage selections, nutrition practices, and more written nutrition policies in CACFP-participating day care homes than in non-CACFP providers.<sup>16</sup> A direct comparison of measured dietary intake among preschool-age children in CT CACFP and non-CACFP child care centers found greater low-fat milk intake and decreased intake of saturated fat among children attending CACFP centers.<sup>17</sup>

This study describes the food environment in a large sample of CT licensed child care centers participating or not in CACFP and compares center adherence to nutrition practices, as defined by CACFP and licensing regulations at the time of data collection (2015–2016) and the new CACFP meal patterns effective since October 2017. Drawing from data collected through an online survey of 343 center directors/administrators, the study compared the food environment in CACFP and non-CACFP child care centers in 2015–2016, including foods served and their adherence to the CACFP meal patterns; how foods were served and practices used by caregivers, and center nutrition policies. The study additionally examined CACFP awareness among non-CACFP centers while par-

ticipating centers were surveyed about the updated CACFP meal patterns.

## Methods

### *Analytic Sample*

The sample was drawn from licensed child care centers in CT that served preschool-age children, had capacity for at least 13 children of any age and were not part of the public school system in October 2015 ( $n=924$  non-CACFP and 181 CACFP centers, CACFP participation status identified from administrative data from the CT State Department of Education). To be eligible, centers had to provide meals and/or snacks rather than serve parent-provided food. Information on food service was collected through phone calls to centers and website searches. We identified 455 non-CACFP centers that served food; most of them provided only snacks and parents had to bring lunch ( $n=368$ ). All CACFP centers offered meals and/or snacks. Centers were surveyed between August 2015 and August 2016. The survey was distributed through e-mail and mail to centers without e-mail, with additional follow-up by phone and mail. A total of 256 non-CACFP and 87 CACFP centers completed the survey (56% response rate for non-CACFP centers and 48% for CACFP centers).

### *Procedures*

The Institutional Review Board approved study procedures and participants provided consent. We adapted the validated Rudd Center Child Care Director's survey<sup>18,19</sup> for this study and online administration. The respondents were instructed to complete the survey by the person overseeing the program (*i.e.*, center director or administrator) and answer questions only as they pertain to preschoolers (3–5-year olds). When answering questions about foods served, participants were instructed to consult their menu for a typical week. They were asked to describe usual practices for preschoolers in the center, excluding potentially atypical periods such as summer. The majority of surveys (88%) were completed online, with other surveys distributed through mail when e-mail was not available. The survey was administered in English. All participants with completed surveys received compensation (a \$20 gift card). The survey is available upon request. Certain data were gathered from public sources, including accreditation by the National Association for the Education of Young Children (NAEYC) and sociodemographic information at the census tract level of the center's location.

### *Analyses*

Chi-square analyses (for frequency data) and *t*-tests (for means) were used to compare adherence with CACFP regulations, teacher feeding behaviors (CACFP-recommended practices but not requirements), and preschool nutrition practices and policies in CACFP and nonparticipating centers. All analyses were conducted in STATA (2017, Stata version 15.1; Stata Corp. LP, College Station, TX) and SPSS (2016, SPSS version 24.0; IBM Corp., Armonk, NY).

## Results

### *General Characteristics, Provider Behavior, and Center Policies*

There were significant differences between CACFP and non-CACFP centers (Table 1), including center capacity (number of children that a center is licensed to enroll), NAEYC accreditation, type of ownership, tuition, and location, all pointing to an expected pattern of CACFP centers serving lower income populations. Certain nutrition policies and feeding practices promoted by CACFP were also different across centers. For example, CACFP centers were more likely than non-CACFP centers to report the use of recommended practices such as family style dining (86.2% vs. 53.9%,  $p < 0.01$ ) and caregiver modeling behaviors such as having staff sit with children and consume the same foods. Non-CACFP centers were less likely to serve food in bowls on the table (50.8% vs. 92.6%,  $p < 0.01$ ), instead they served preplated meals. CACFP centers were also more likely to provide nutrition training for their staff and have policies regulating food/beverages that staff can consume in view of children. There was no difference in how preschoolers were able to access drinking water, with most centers reporting that children could self-serve water at any time.

There were differences in practices and policies related to parent-provided food. As most CACFP centers offered meals and snacks throughout the child's day in care, no food from home or written policies about food from home existed in 64% of CACFP centers. At the same time, 53% of CACFP respondents thought that having center-provided meals/snacks was an important enrollment factor in parental decisions to enroll. In contrast, only 20% of non-CACFP centers thought it was an important enrollment consideration among parents. Most non-CACFP centers had written policies about food brought from home, and 43% of providers said that parents routinely followed the rules. The most common foods that were prohibited from being brought from home were candy, sugary drinks, and peanuts.

### *Foods Served and Adherence to CACFP Standards*

CACFP-participating centers were considerably more likely than non-CACFP centers to provide breakfast ( $p < 0.001$ ) and lunch ( $p < 0.001$ ). Specifically, of 247 non-CACFP centers that completed the "foods served" portion of the survey, 46 served breakfast, 47 lunch, 232 a morning snack, and 210 an afternoon snack. Among the 85 CACFP centers completing this portion of the survey, all served breakfast, 78 served lunch, 5 a morning snack, and 81 an afternoon snack. CACFP centers did not usually serve a morning snack by offering breakfast instead.

Servings of specific types of foods for lunch and afternoon snack, at least once during a typical week, by CACFP participation, are presented in Table 2. Few between-group differences were evident at lunch: CACFP centers were more likely to serve whole fruit (defined as any fruit ex-

cluding juice), and non-CACFP centers are more likely to serve water. Several differences existed for offerings during an afternoon snack: CACFP centers were more likely to serve fresh fruit, any grain and each specific kind of grain (whole or refined grains), meat/meat alternatives, and milk. Soda and sweetened ice tea were reported as never served, and fruit drinks (that are not 100% juice) were rarely served in either group.

Table 3 presents compliance by CACFP status with key CACFP rules governing lunch and food service in general at the time of data collection (2015–2016). The top panel presents the percentage of centers reporting serving each required meal component daily. Fruits and vegetables are presented as serving one or the other (a requirement before October 2017) and serving both (required after October 2017). The fruit component includes 100% juice, as it is a creditable item toward fruit/vegetables servings. The grain component includes the serving of either whole or refined grains (both of which may include grain-based desserts).

The middle and bottom panels indicate reports of center adherence to some of the main changes in the updated CACFP meal patterns for preschool-age children, such as limits on juice servings, no reimbursements for grain-based dessert, and serving at least one whole grain or whole grain-rich product per day. Data for all meals and snacks were included in computation of these values. CACFP centers were more likely to be compliant with the new rules governing frequency of serving 100% juice and whole grains and serving low-fat/fat-free milk, whereas nonparticipating centers were less likely to report serving grain-based desserts.

### *CACFP Knowledge*

Despite the state licensing regulations (Section 19a-79-6a)<sup>20</sup> that require all licensed child care centers serving meals/snacks to follow CACFP nutrition standards, many non-CACFP respondents were not aware of CACFP. Specifically, half (52%) of the surveyed non-CACFP centers reported that they had never heard of CACFP [assessed by the question "Have you ever heard of the Child and Adult Care Food Program (CACFP)? It is a federal food assistance program sometimes referred to as "the food program" that provides reimbursement for foods served if they meet specific meal pattern requirements."] Most non-CACFP centers (84%) reported interest in learning more about the program and stated they would consider participation if eligible. Only several centers reported previous CACFP participation (6%). The most common reasons for not participating in CACFP were having few/no eligible children (20%) and not having enough information about the program (17%). About 21% of the non-CACFP centers acknowledged receiving information from the CT Child Care Licensing Unit (currently at the Office of Early Childhood) about following the CACFP nutrition standards or implementing other CACFP practices.

**Table 1. Characteristics and Food Environment of Connecticut Child Care Centers by CACFP Participation Status**

	CACFP centers (n = 87)	Non-CACFP centers (n = 256)
Center characteristics		
Number of children licensed to enroll, mean (SE)	102.4 (8.2)	79.1 (3.1) <sup>***</sup>
Accredited by NAEYC, %	85.1	36.3 <sup>***</sup>
Privately owned, %	55.9	84.3 <sup>***</sup>
Weekly tuition cost, mean (SE), \$	199.3 (8.9)	257.9 (5.6) <sup>***</sup>
Household median income census tract, mean (SE), \$	45,920 (2454)	88,080 (2603) <sup>***</sup>
Non-Hispanic black population census tract, mean (SE), %	18.2 (2.1)	6.2 (0.6) <sup>***</sup>
Hispanic population census tract, mean (SE), %	26.6 (2.1)	10.1 (0.8) <sup>***</sup>
Center food environment		
Provider behavior and policies, %		
Meeting all three indicators hereunder	81.5	20.0 <sup>***</sup>
1. Setting for lunch described as family style most/all the time	86.2	53.9 <sup>***</sup>
2. Staff sitting with children to eat most/all the time	98.8	89.8 <sup>**</sup>
3. Staff eating the same food as children most/all the time	85.2	32.7 <sup>***</sup>
Staff receive nutrition training at least annually	91.4	55.1 <sup>***</sup>
Center has policies regulating food/beverages for staff such as bringing outside food to consume in view of children	75.3	55.5 <sup>*</sup>
Water availability, %		
Children can self-serve any time	62.9	71.9
Children can self-serve at meals/snacks	2.5	5.1
Provider served upon request	33.3	21.1
Provider served at meals/snacks/breaks	1.2	1.9
Parents interaction and food from home, %		
Meals/snacks are usually/often an important factor in enrollment decisions of parents	53.1	20.3 <sup>***</sup>
Written policies for food brought from home		
Not available	4.9	17.9
Available, but not routinely followed	13.6	27.3
Available and routinely followed	17.3	42.6
Not applicable—no food from home	64.2	12.1
Foods/beverages prohibited to bring from home		
Peanuts	86.2	66.4 <sup>***</sup>
Soft drinks, other sugary beverages	86.2	67.6 <sup>**</sup>
Candy	86.2	70.7 <sup>**</sup>
Chips	65.5	20.3 <sup>***</sup>

Two-sided *p*-values \*\*\**p* < 0.001, \*\**p* < 0.01, \**p* < 0.05.

CACFP, Child and Adult Care Food Program; NAEYC, National Association for the Education of Young Children; SE, standard error.

**Table 2. Percentage of Connecticut Licensed Child Care Centers Serving Food Weekly for Lunch and Snacks**

Foods/beverages served at lunch	CACFP centers	Non-CACFP centers
	n = 78	n = 47
Any whole fruit	100	93.6*
Fresh fruit	82.1	87.2
Frozen or canned fruit	85.9	74.5
Any whole vegetable	98.7	100
Fresh vegetables	92.3	83.0
Frozen or canned vegetables	83.3	80.9
Any grain products	98.7	95.7
Whole grain products	94.9	93.6
Refined grain products	64.1	46.8
Sweetened grained products (e.g., muffins)	6.4	12.8
Any meat or meat alternatives	100	100
Milk	98.7	95.7
Water	59.0	87.2**
100% fruit or vegetable juice	17.9	27.7
Fruit drinks	1.3	4.3
Soda or sweetened iced tea	0	0
Foods/beverages served at snack	n = 81	n = 210
Any fruit	96.3	91.0
Fresh fruit	92.6	83.3*
Frozen or canned fruit	61.7	56.2
Any vegetable	60.5	71.9
Fresh vegetables	59.3	69.5
Frozen or canned vegetables	13.6	13.8
Any grain products	100	84.3***
Whole grain products	95.1	75.7***
Refined grain products	82.7	38.6***
Sweetened grained products (e.g., muffins)	49.4	16.7***
Any meat or meat alternatives	81.5	65.7**
Milk	92.6	66.7***
Water	86.4	86.7
100% fruit or vegetable juice	50.6	49.5
Fruit drinks	2.5	3.3
Soda or sweetened iced tea	0	0

Group differences tested with chi-square tests of independence. Two-sided *p*-values \*\*\**p* < 0.001, \*\**p* < 0.01, \**p* < 0.05.

**Table 3. Reported Adherence to CACFP Meal Patterns and Rules for Preschool-Age Children: Percentage of Connecticut Child Care Centers Meeting Requirements by CACFP**

CACFP meal patterns for lunch		
	CACFP centers (n = 78)	Non-CACFP centers (n = 47)
Meat/meat alternative	100	59.6***
Grain	70.5	40.4**
Fruit	91.0	81.1
Vegetable	88.5	85.1
Fruit or vegetable <sup>a</sup>	98.7	97.9
Fruit and vegetable <sup>b</sup>	82.1	76.6
Milk	96.2	89.4
Additional requirements based on CACFP meal patterns of 2011		
	CACFP centers (n = 81)	Non-CACFP centers (n = 180)
Low-fat/fat-free milk	90.1	43.3***
Additional requirements based on updated CACFP meal patterns of 2017		
	CACFP centers (n = 85)	Non-CACFP centers (n = 247)
Juice limited to once per day	83.5	68.8*
One whole grain per day	90.6	51.4***
No grain-based desserts	34.1	76.9***

Group differences tested with chi-square tests of independence.

Two-sided *p*-values \*\*\**p* < 0.001, \*\**p* < 0.01, \**p* < 0.05.

<sup>a</sup>This was a CACFP requirement during data collection (2015–2016).

<sup>b</sup>This is a new CACFP requirement that went into effect on October 1, 2017.

At the same time, CACFP child care centers reported reasons for program participation, such as ensuring that nutritious food was served (94%), reimbursements (86%), and providing food that children did not receive at home (85%). The majority of CACFP centers (85%) were aware of the updates to the CACFP meal patterns more than a year ahead of their implementation in October 2017. Some providers were optimistic about the likely effects of the update implementation, including 43% of directors who expected improvements in nutrition quality of foods served. At the same time, 38% of CACFP centers reported concerns that food costs would rise, and 17% thought that food waste might increase. Finally, 37% of the centers did

not expect any changes after the update implementation. Only one center mentioned that the revisions might lead them to drop out from the program.

## Discussion

Overall, CACFP child care centers reported more engagement in recommended feeding and nutrition practices than non-CACFP centers, including serving more fruit, whole grains and lower fat milk, use of family style dining, and positive caregiver behaviors. Self-reported data on feeding practices from prior studies also showed that family style service was more prevalent in CACFP than in non-CACFP centers.<sup>21,22</sup> There are multiple reasons why family style service is a recommended practice for feeding young children in child care settings, including improved motor skills and social skills, and better attendance to satiety cues.<sup>7,8</sup> Previous research comparing preplated food service (portioned by caregivers) and family style dining found that children consumed more calories with preplated portions than when they served their own portions.<sup>23</sup> As almost half of non-CACFP centers do not use family style dining, there is substantial room for improvement. Positive caregiver behaviors, such as eating with children the same food and speaking enthusiastically about it, has a beneficial effect on child food acceptance, but silent modeling is not effective.<sup>24</sup> Caregiver training about appropriate meal service behaviors is essential, as evident from the findings on less prevalent use of recommended feeding practices and limited nutrition training of staff in non-CACFP centers.

In this study, CACFP-participating centers reported significantly better adherence to the CACFP nutrition standards than non-CACFP centers, despite state licensing regulations that require the same compliance from both groups. Specifically, non-CACFP centers serving lunch did not appear to always provide four meal components for lunch, as required by CACFP before 2017. Interestingly, based on the self-reported data, non-CACFP centers were out of compliance with respect to grains and meat/meat alternatives rather than fruit or vegetables. To improve compliance with serving all components in non-CACFP centers, further work is needed to understand why certain components were less likely to be included at lunch. Reasons may include lack of awareness about the meal component requirements or cost.

There is considerably more flexibility in the CACFP regulations for serving a snack, which requires that only two out of five components are provided, but not necessarily fruit, vegetables, or milk. It is not surprising that a significant proportion of both CACFP and non-CACFP centers never serve vegetables for a snack, whereas milk does not get served in one-third of non-CACFP centers and fresh fruit in one-fifth of centers. There is potential for improvement in the quality and variety of snack servings in all centers, but particularly in the non-CACFP group. Snack is an important opportunity to serve healthier foods as it is the only food service provided by the majority of non-CACFP centers. Most young children in CT child care centers receive a parent-provided lunch where

CACFP policies do not apply (at least three-fourth of all licensed centers do not serve lunch). Improving the nutrition quality of snacks has potential to reach considerably more children than targeting center meals.

For food service at meals and snacks, this study demonstrated that CACFP centers were significantly more likely than non-CACFP centers to adhere to the CACFP nutrition standards, requiring low-fat/skim milk for preschool-age children. Similar findings were reported in prior research.<sup>17,25,26</sup> Serving low-fat milk may explain why children in CACFP centers were found to have lower saturated fat and total fat intake.<sup>17</sup> Compliance with the CACFP regulations about low-fat milk could be improved without any effect on center costs, which was the most important consideration in determining what to serve in our data. Milk prices in CT are often the same across fat content or cheaper for lower fat products,<sup>27</sup> so a switch to low-fat milk from commonly used reduced-fat milk is unlikely to affect costs and might be accepted by children as the taste is not very different.

Consistent with the dietary guidelines, very few child care centers serve sugary drinks to preschool-age children. Only a few centers reported serving fruit drinks other than 100% juice at lunch or snack and no center reported serving soda. In fact, the majority of both CACFP and non-CACFP centers explicitly prohibited parents from sending in sugary drinks. Although access to water and serving water at snack time were similar across the programs, water offerings at lunch were more common in non-CACFP than in CACFP centers. This may reflect a common belief among CACFP staff that water is not allowed to be served alongside milk at lunch, and that water would compete with and replace milk. To address potential underserving of water, CACFP recently released regulations requiring that water is not only made available, but also offered throughout the day.<sup>28</sup>

Our analysis of the center preparedness for implementation of the updated CACFP nutrition standards suggests that there might be particular challenges replacing grain-based desserts with creditable grains, especially for CACFP centers. For non-CACFP centers, limiting juice servings to once per day and increasing whole grain servings might be a challenge. The 2017 change in separating fruit and vegetables as two components for lunch does not seem to pose a serious threat to compliance for CACFP and non-CACFP centers providing lunch.

To our knowledge, this is the first study to report that many CT non-CACFP centers do not provide lunch or any food at all. Although CACFP is a powerful policy tool for both participating and through licensing nonparticipating centers, these regulations apply only to a small fraction of children in care if many licensed facilities do not serve food. Parent-provided foods are typically outside of government regulation and strict nutrition standards for parent-provided food are extremely challenging to enforce. Future research should focus on understanding barriers to providing food in child care settings. Furthermore, as many non-CACFP centers fail to meet CACFP standards for lunch meal components and serving low-fat milk, program

participation likely matters more for promoting dietary quality than including compliance as a licensing standard, with potentially limited enforcement. This study demonstrated a large gap in awareness about CACFP among non-CACFP centers, which puts in question their familiarity with state licensing regulations. Compliance might have been better if the centers were aware of CACFP and its requirements. Future work should focus on addressing this gap.

This study is subject to limitations that could affect its conclusions. The study was cross-sectional; differences between CACFP and non-CACFP centers cannot be attributed to CACFP status alone due to potential selection bias, which could not be addressed. Furthermore, any observations may not be generalizable outside the state studied. Data were self-reported and subject to a reporting error, including limitations on the directors' knowledge about classroom or kitchen practices that they might not always observe. Future studies can benefit from validating survey data by direct observation, menu review, and procurement data analysis. Finally, the authors acknowledge the potential for family-wise error rate to be  $>0.05$  given the number of tests run; more research is needed to confirm these findings.

In conclusion, CACFP center participation is associated, by multiple metrics, with more nutritious foods and recommended feeding and nutrition practices in CT child care centers. Given the benefits of CACFP participation for children's nutrition, all states might consider expanding access to CACFP as well as requiring compliance with CACFP nutrition standards in all licensed child care settings. At the same time, poor awareness about CACFP among nonparticipating centers needs to be addressed to improve compliance with the CACFP nutrition standards per licensing regulations.

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## Author Disclosure Statement

No competing financial interests exist.

Any opinions, findings, conclusions, or recommendations expressed here are those of the authors and do not

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