


Nutrition Standards For Infants and Young Children can be Implemented by Family Child Care Home Providers

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Abstract

The study evaluated an educational intervention with family child care home (FCCH) providers to implement nutrition standards. A convenience sample of licensed California FCCH providers (n=30) attended a 2-hour, in-person group training in English or Spanish on nutrition standards for infants and children aged 1 to 5 years. Provider surveys and researcher observations during meals/snacks were conducted pre- and 3 months post-intervention. Providers rated the training as excellent (average score of 4.9 on a scale of 1-5). Adherence, assessed by survey and observation and compared over time using paired *t*-tests, increased from an average of 36% pre-intervention to 44% post-intervention ($P=.06$) of providers (n=12) for infant standards and from 59% to 68% ($P<.001$) of providers (n=30) for child standards. One-third (39%) of providers rated infant standards and 19% of providers rated child standards as difficult to implement. Nutrition standards can be implemented by FCCH providers after an educational intervention; a larger study is warranted with a representative group of providers.

Keywords

infant, child, preschool, child care, nutrition policy

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Highlights

What do we already know about this topic?

Improving the nutrition offered in early care and education (ECE) settings is a known childhood obesity prevention strategy as approximately 2 of every 3 children in the United States spend time in non-parental care settings.

How does your research contribute to the field?

This pilot study suggests that nutrition standards for infants and children can be implemented by licensed family child care home providers after they complete a brief educational intervention.

What are your research's implications towards theory, practice, or policy?

The promising results from this study warrant further investigation in a larger, representative group of family child care home providers to inform potential policy and practice.

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Introduction

Obesity prevalence among children 2 to 5 years old in the United States is 16%.¹ By school-age, most children have established dietary habits that can impact long-term weight and health.² Early care and education settings are important for obesity prevention as approximately two-thirds of young children in the United States spend time in non-parental care.³ Family child care homes (FCCH) are of particular interest because few nutrition standards exist in California's FCCH licensing regulations⁴ and few studies have been conducted in this setting.⁵ Yet, there is concern that standards may be costly or difficult for FCCH to implement.⁶ FCCH are independent businesses operated in the homes of providers who often are low-income women with limited time, resources and opportunities to obtain nutrition information.⁷ Because of flexibility, location, and lower fees, FCCH providers tend to care for a high percentage of families from lower-income and non-White racial and ethnic backgrounds.⁸ California has the highest rate of children under 6 years of age living in poverty (23%)⁹ and the largest proportion of Latinx residents (39%).¹⁰ Compared to non-Latinx white residents, the Latinx population suffers from greater health inequities, such as food insecurity, affordability, and access,^{11,12} and prevalence of obesity.^{13,14} The aim of this pilot was to evaluate the feasibility of training English- and Spanish-speaking FCCH providers on nutrition standards with the hypothesis that a training would be well accepted and that providers would improve adherence to nutrition standards after the training.

Materials and Methods

The study was approved by the University of California, Davis Institutional Review Board (IRB#976495-3). Participants received a consent form with the baseline survey, which was mailed to their home address. Consent to participate in the research was indicated by their participation in the surveys and training. Each provider received \$200 for participating in the evaluation.

Standards were previously developed by nutrition and child care experts¹⁵ for infants under 12 months (29 standards; Supplemental Material: Infant Nutrition Standards for Family Child Care Homes) and children 1 to 5 years (35 standards; Supplemental Material: Child Nutrition Standards for Family Child Care Homes). For each age group, the standards were divided into 2 tiers (important for nutrition and health, and relatively easy to implement; less important or more difficult) and 2 categories (*what* to serve; *how* to feed).

In 2017 a convenience sample of licensed FCCH providers was recruited from 3 California counties (San Joaquin, Santa Clara, San Diego). Child Care Resource

and Referral Agencies sent announcements via email, mail, and social media to ~1000 FCCH with a phone number to call to enroll in the study. Inclusion criteria were: licensed ≥ 1 year and planning to continue business ≥ 18 months; providing year-round care for children 0 to 5 years ≥ 20 hours/week; providing ≥ 1 meal and ≥ 1 snack daily; not receiving nutrition education besides that related to the federal Child and Adult Care Food Program (CACFP); and able to read and speak English or Spanish. Of the 94 providers who responded, 48 were screened, 35 were eligible and enrolled, and 30 completed the study. Recruitment was discontinued once the target sample size of 30 was achieved.

The intervention utilized social-cognitive theory as its framework.¹⁶ In addition to content knowledge, the instructor worked to enhance the providers' self-efficacy and set goals, components of social-cognitive interventions associated with health outcomes.¹⁷ The training, developed by pediatric nurses, consisted of an overview of each standard, its importance, and how it could be implemented. The same bilingual nurse educator delivered 2 (English or Spanish) standardized, 2-hour in-person trainings, similar to other state child care provider trainings, via oral presentation with supporting slides at a central location in each county on the weekend. Accompanying written information was provided prior to the training. Providers were also given individualized results on baseline adherence to the standards and asked to select a minimum of 3 to 5 standards as a goal to meet over the next 3 months. At the training's end providers completed a survey to rate 8 training dimensions using a Likert scale (5 = excellent, 1 = poor): registration, written materials, schedule/format, clarity, relevance, quality, facilities, and satisfaction. Post-training technical assistance was not provided.

Before and 3 months after the training, providers completed a written survey (in English or Spanish) modified from an existing tool¹⁸ and had an on-site observation of 1 meal and 1 snack on a single day by a researcher trained to utilize a modified tool of a standardized measure.¹⁹ The baseline survey (Supplemental Materials: Baseline Survey of Family Child Care Providers in English, Baseline Survey of Family Child Care Providers in Spanish) assessed provider and FCCH characteristics. Both surveys assessed the number of servings offered in the previous 5 days of all food and beverages included in the standards. In the follow-up survey (Supplemental Materials: Follow-up Survey of Family Child Care Providers in English, Follow-up Survey of Family Child Care Providers in Spanish), providers rated their experience implementing each tier 1 standard as: easy, hard, already doing (at baseline), or did not implement. Observations (Supplemental Material: Nutrition Standards Implementation Observation Form) assessed practices

Table 1. Characteristics of Family Child Care Home Providers Who Participated in a Pilot Training of Nutrition Standards for Infant and Children (N = 30).^a

Characteristic	N, % or Mean, SD	
	N	%
Race/ethnicity ^b		
Hispanic	19	63
Non-Hispanic White	8	27
Non-Hispanic Black	2	7
Non-Hispanic Asian/Pacific Islander	1	3
Highest level of education		
Less than high school	3	10
High school graduate	6	20
Some college or Associate's Degree	13	43
College degree	8	26
Preferred language		
Spanish	17	57
English	10	33
Other	3	10
Participate in child and adult care food program	25	83
	Mean	SD
Age	48	11
Years in operation	10	6
Number of children in care	8	4
0-11 months	1	1
1-5 years	6	3
6+ years	3	2
Number of children qualifying for child care subsidies	3	3

^aFamily child care home providers were recruited from 3 California counties: San Joaquin, Santa Clara, and San Diego. Sample size varies due to missing values. Totals may not add to 100% due to rounding.

^bAll providers reporting ethnicity as Hispanic were included in the Hispanic category regardless of race selected.

considered by the research team to be difficult to self-report (eg, if children were pressured to “clean their plate”).

Descriptive statistics were generated on provider characteristics, ratings of training satisfaction, and difficulty implementing tier 1 standards. Reported adherence (yes/no) to each standard was determined from pre-post survey responses for 41 standards; observed adherence was determined for 24 standards in which observation results were used solely or in combination with survey responses for standards with multiple components. For standards with multiple components, providers had to follow all components to be rated as adhering. Separately for infant and child standards, the percent of providers compliant was averaged for: tier 1, tier 2, food and beverage (*what* to serve), feeding practices (*how* to feed), and all standards combined. Changes in adherence from baseline to follow-up were examined using paired *t*-test with 2-tailed *P*-value < .05 after adjusting for clustering by county. Data were analyzed using SAS version 9.4 (SAS Institute Inc. Cary, NC, 2013).

Results

FCCH providers were fairly equally distributed across the counties (12 Santa Clara, 9 San Diego, 9 San Joaquin). Approximately two-thirds were Hispanic, preferred to speak Spanish or another language other than English, and had a minimum of some college education (Table 1). All cared for children 1 to 5 years old and 12 cared for infants, with a range of 2 to 14 total children. Approximately one-third of children qualified for child care subsidies for low-income families. Most participated in CACFP (83%). Mean(SD) ratings of the training (5 = excellent) ranged from 4.8 (0.6) for relevance to 5.0 (0.4) for quality; the rating for all 8 dimensions was 4.9 (0.1).

Increases in adherence were statistically significant for 3 tier 1 infant standards: supporting and encouraging breastfeeding; providing adequate refrigerator space for breastmilk; and introducing foods gradually and waiting 3 to 5 days before introducing another new food (Table 2). Standards with the highest adherence (>75% providers) at baseline involved: serving vegetables, infant cereals,

Table 2. Adherence to Infant Nutrition Standards by Family Child Care Home Providers from Baseline to 3 months after Attending a Pilot Training of Nutrition Standards^a (N = 12).

Tier 1—Infants	Baseline Follow-up		Change %	P-value
	(% of providers)			
Food and beverage standards				
1. Pureed, mashed or whole fruit (N=8)	63	63	0	.43
2. Vegetables fresh, frozen or canned (no added salt, fat, sugar) (N=7)	86	86	0	.51
3. Only breastmilk and/or iron-fortified infant formula as beverage (besides water)	8	16	+8	.32
4. No 100% juice, juice drinks or other beverages (N=11)	36	45	+9	.80
5. Proteins such as soft cooked egg, beans, meat, poultry, and fish without bones (N=8)	50	63	+13	.82
6. Pureed, mashed or whole vegetables (N=8)	75	88	+13	.76
7. Iron-fortified infant cereals (N=8)	75	88	+13	.76
8. Fruit fresh, frozen, or canned (no added sugar) (N=7)	71	85	+14	.77
9. No cow's milk, unless a doctor's note (N=11)	50	90	+40	.10
10. Support and encourage breastfeeding	25	75	+50	<.01
Feeding practice standards				
1. Encourage older infants to self-feed with fingers and drink from cup with assistance ^b (N=4)	25	0	-25	.45
2. At 9 months, begin self-feeding with finger foods then transition to table foods as developmentally appropriate	50	50	0	.85
3. Avoid choking hazards ^c	58	58	0	1.00
4. Feed younger infants on demand by recognizing feeding cues ^c	8	16	+8	.17
5. No solids or beverages other than breastmilk/formula in bottle ^c	50	67	+17	.42
6. Ensure infants are guided by own feelings of hunger and satiety and are not pressured to eat all offered ^b (N=4)	75	100	+25	.25
7. Introduce foods one at a time and wait for at least 3 to 5 days to watch for allergic reactions	8	41	+33	.02
8. At ~6 months, introduce developmentally appropriate solid foods in age-appropriate portion sizes	67	100	+33	.07
9. Provide adequate refrigerator space for breastmilk (N=4)	25	75	+50	<.01
Tier 2—Infants				
Food and beverage standards				
1. At 6 to 9 months begin using cup for drinking water	58	41	-17	.79
2. Protein foods with no added salt (N=7)	86	86	0	.51
3. Natural cheese no more than 1 to 2 times/day; choose low-fat or reduced-fat; no cheese food/spread	13	26	+13	.65
4. Yogurt ≤1 time/day with <23 grams sugar per 6 oz (N=9)	11	33	+22	.61
Feeding practice standards				
1. Solid foods at regular meal/snack times (N=8)	88	75	-13	.57
2. Include older infants at family style meals where provider and children eat together ^c (N=11)	0	0	0	1.00
3. Hold infant in arms or sitting in lap while bottle-feeding ^c (N=11)	17	17	0	1.00
4. No bottle-propping or allowing infants to carry, sleep/rest with bottle ^c	17	17	0	.66
5. Minimize distractions at mealtimes (no TV, toys, phones, video games) ^c	42	42	0	.79

^aNutrition standards were developed by experts in nutrition and early care and education and were categorized into tier 1 (rated as important for nutrition and health and relatively easy to implement) and tier 2 (considered either less critical or more difficult to implement) standards. FCCH providers were recruited from 3 California counties: San Joaquin, Santa Clara, and San Diego. N = 12 as not all 30 FCCHs cared for infants. Sample size indicated if standard did not apply due to age of infants or if responses missing at baseline or follow-up. Within category, standards ordered from smallest to largest change from baseline to 3-months follow-up. Changes tested using paired t-tests, adjusting for clustering by county. Due to survey issue, results not presented for: Start with iron-fortified infant cereal or pureed meats, and then pureed.

^bAssessed by observation only.

^cAssessed by observation and survey. Otherwise assessed by survey only.

P-values in boldface font indicates significant at $P < .05$.

and protein foods with no added salt; responding to infant hunger and satiety cues; and providing meals and snacks at regular times. Standards with low adherence at follow-up (<25% providers) included: offering only breastmilk and/or infant formula as beverage besides water; encouraging older infants to self-feed with fingers and drink from a cup with assistance; feeding younger infants on demand; holding infants while bottle-feeding; and not propping bottles or allowing infants to carry or sleep with a bottle. One standard was not implemented at baseline or follow-up by any providers: including older infants at family style meals where the provider and children eat together.

A significant positive change in percent of providers adhering to infant standards from baseline to follow-up was detected for tier 1 (41% vs 59% $P < .01$) and feeding practice (32% vs 42%, $P < .05$) standards. Changes in adherence to tier 2 (32% vs 29%), food and beverage (49% vs 63%), and all combined (36% vs 44%) standards were not significant.

For child standards, increases in adherence were statistically significant for one tier 1 standard: rarely/never offering 100% fruit juice (Table 3). Increases in adherence were significant for eight tier 2 standards: not serving white grains; using only liquid non-tropical vegetable oils instead of solid fats; not serving high-salt foods; offering natural cheese no more than 1 to 2 times/day and never serving cheese food/spread; providing meals and snacks every 2 to 3 hours at regularly scheduled times; minimizing distractions while eating; and offering only healthy items at celebrations. Standards with the highest adherence (>75%) at baseline included: not serving sugar-sweetened beverages; not using foods/beverages for reward, punishment or comfort; allowing enough time to eat; offering dark green/orange/red/deep yellow vegetables ≥ 1 time/day; offering ≥ 2 meals and ≥ 2 snacks for care ≥ 8 hours; and offering only water or unflavored milk at celebrations. Relatively few providers (<25%) were compliant at follow-up with: not pressuring children to eat or clean plate; not focusing mealtime conversation on amount eaten; and serving meals/snacks family style and teaching children to serve themselves. Two standards were not implemented by any providers at baseline or follow-up: ensuring water is easily available for self-serve and actively offered with meals/snacks; and expecting young children to eat a lot at some meals and little at others, not eat everything offered, change likes/dislikes, be messy, and take time to accept new foods.

A significant positive change in percent of providers adhering to child standards from baseline to follow-up was detected for tier 2 (58% vs 69%, $P < .001$), food and beverage (62% vs 74%, $P < .001$), feeding practice

(51% vs 60%, $P < .001$), and all combined (59% vs 68%, $P < .001$) standards. Change in adherence to tier 1 standards (60% vs 67%) was not significant.

For tier 1 infant standards, over half (57%) of providers reported already doing the standard at baseline, 3% said implementation was easy, 39% said implementation was hard, and 2% reported not implementing the standard. The corresponding averages for tier 1 child standards were: 72%, 7%, 19%, and 2%.

Discussion

FCCH providers were highly satisfied with the training and adherence increased for many standards over the 3-month period suggesting that a modest educational intervention is feasible and may improve the nutrition environment in FCCH. Adherence was high at baseline for approximately one-third of standards, suggesting less need for training on these standards. In contrast, additional support may be required to achieve adherence to the other standards.

Adherence at baseline and change in adherence from baseline to follow-up tended to be lower for the infant standards than for the child standards. In addition, a greater proportion of providers reported challenges implementing the tier 1 infant standards (39%) than the tier 1 child standards (19%). Feeding infants, who in general are more dependent on adult care, may be inherently more difficult for FCCH providers than feeding older children. These pilot results are limited because only 12 of the 30 providers in this study cared for infants and because providers were given the option to focus on 3 to 5 standards among any of the infant and child standards combined. Future studies should further explore differences in FCCH provider implementation of nutrition standards for different age groups of children and whether a greater amount of provider support may be needed to implement nutrition standards for infants.

Because FCCHs serve a larger proportion of low-income families of color than childcare centers,⁸ and because children from low-income families experience higher rates of food insecurity, poor diet quality and obesity than children with access to more resources,¹¹⁻¹⁴ FCCHs represent an optimal setting for addressing health disparities. However, the few existing intervention studies involving FCCH have recognized inherent challenges in improving nutrition practices.^{20,21} FCCH providers typically singlehandedly care for multiple children of diverse ages and developmental stages and have little time for preparing food or attending trainings. The training for the pilot was therefore limited to 2 hours on a weekend. In-person trainings are resource intensive, and may impact future scalability. Offering online

Table 3. Adherence to Child Nutrition Standards by Family Child Care Home Providers from Baseline to 3-months after Attending a Pilot Training of Nutrition Standards^a (N = 30).

	Baseline	3-Months	Change %	P-value
Tier 1—Children				
Food and beverage standards				
1. Fruit is fresh, frozen, or canned in water (no added sugar)	47	30	-17	.11
2. Lean protein ≥ 2 times/day	60	50	-10	.07
3. Water easily available for self-serve indoors/outdoors and actively offered ^b with meals/snacks and at other times ^c	0	0	0	1.00
4. Vegetables ≥ 2 times/day for 5 days/week	73	73	0	.84
5. No more than 1 age-appropriate serving/day of 100% fruit juice (N=29)	72	79	+7	.29
6. No deep fried or pre-fried baked vegetables	73	63	+10	.16
7. No sugar-sweetened beverages	83	96	+13	.08
8. Fruit ≥ 2 times/day for 5 days/week	53	67	+14	.14
9. No foods with added sugar/equivalents listed as first or second ingredient or having combination of ≥ 3 kinds of sugar/equivalent ^c (N=29)	66	83	+17	.23
10. No processed meats or deep-fried or pre-fried meats/fish	60	80	+20	.44
11. Rarely/never offer 100% fruit juice	53	80	+27	<.01
Feeding practice standards				
1. Do not use foods/beverages as reward or punishment or for comfort ^d	97	87	-10	.21
2. Allow enough time to eat ^{d,e} (N=27)	100	100	0	1.00
3. Use appropriately sized dishware and utensils ^c	59	66	+7	.79
4. Do not pressure to eat or clean plate; mealtime conversation doesn't focus on amount of food eaten ^c	3	13	+10	.05
Tier 2—Children				
Food and beverage standards				
1. Dark green, orange, red, or deep yellow vegetables ≥ 1 time/day (N=29)	100	100	0	1.00
2. For children 12–24 months unflavored whole milk ≥ 2 times/day (N=29)	79	83	+4	.81
3. No low/non-calorie sweeteners (N=29)	93	100	+7	.15
4. No salt added at table (N=29)	93	100	+7	.07
5. Yogurt ≤ 1 time/day with <23 grams sugar per 6 oz	73	86	+13	.14
6. No white (non-whole) grains or grain-based desserts	20	37	+17	.04
7. For children >24 months unflavored fat-free or 1% milk ≥ 2 times/day	60	80	+20	.44
8. Only liquid non-tropical vegetable oils instead of solid fats (N=28)	47	68	+21	.01
9. No high salt foods (>200 mg sodium per snack item or >480 mg sodium per entrée) ^c (N=29)	76	97	+21	.01
10. Natural cheese no more than 1-2 times/day; low-fat or reduced-fat; no cheese food/spread	17	54	+37	<.01
Feeding practice standards				
1. ≥ 2 meals and 2 snacks for care ≥ 8 hours (N=25)	100	92	-8	.16
2. Expect young children to: eat a lot some meals and very little at others; not eat everything offered; change likes/dislikes; be messy; take months or years to accept new foods ^d	0	0	0	1.00
3. Ask children if full before removing plates and ask if hungry before serving seconds ^d	33	33	0	.68
4. Variety of culturally-relevant items	33	33	0	.77
5. When drink provided at celebrations/fundraisers only water or unflavored milk (N=27)	96	96	0	.47
6. ≥ 1 meal and 1 snack for care <8 hours (N=27)	82	86	+4	.52
7. Serve meals/snacks family style; teach children to serve age-appropriate portion sizes with assistance as needed ^d	7	14	+7	.11
8. At least 1 provider sits with children at table and eats same meals/snacks ^d	17	27	+10	0.16
9. Model healthy eating and no consuming other items in front of children ^d	87	100	+13	.05
10. Meals and snacks every 2-3 hours at regularly scheduled times	53	73	+20	.02
11. Minimize distractions while eating ^d	63	90	+27	<.01
12. When food at celebrations/fundraisers only healthy (N=22)	36	68	+32	<.01

^aNutrition standards were developed by experts in nutrition and early care and education and were categorized into tier 1 (rated as important for nutrition and health and relatively easy to implement) and tier 2 (considered either less critical or more difficult to implement) standards. FCCH providers were recruited from 3 California counties: San Joaquin, Santa Clara, and San Diego. Sample size varied due to missing response at baseline or 3-months follow-up and/or if standard not relevant. Within category, standards ordered from smallest to largest change from baseline to 3-months follow-up. Changes tested using paired t-tests, adjusting for clustering by county.

^bProviders asked if children wanted water or were thirsty while holding a pitcher of water or standing by water dispenser, and/or provider served water to children.

^cAssessed by observation only.

^dAssessed by observation and survey. Otherwise assessed by survey only.

^eProvider did not clear dishes if food remained without asking if children were finished; provider allowed children to eat at different paces and did not end meal/snacktime until child indicated being finished.

P-values in boldface font indicates significant at $P < .05$.

training and downloadable materials, and ongoing technical assistance in English, Spanish and other languages as needed may be viable options for standards difficult to implement.

In order to improve nutrition for young children without unduly burdening providers, the standards were divided into tiers anticipating that future participants could be asked to implement all of the “easier” (tier 1) standards and fewer of the more challenging (tier 2) standards. However, differences in adherence between tiers were relatively small, suggesting that the training and standards could be simplified by eliminating the tiers. Adherence at baseline as well as improvement in adherence on standards related to *what* to serve was slightly higher than for *how* to feed, suggesting that more training time should focus on feeding practices.

A child standard with exceptionally low adherence was making water easily available for self-serve and actively offering water with meals and snacks. Consistent with a prior California study, most providers had water easily available, but few were observed actively offering water.²² Because young children vary in their verbal ability to request water, actively offering water is a relatively new CACFP guideline implemented in October 2017.²³ Few providers may have been aware of this requirement at the time of the pilot.

This study has several limitations. This pilot lacked a control group and had a small sample size, particularly for the infant standards. Findings may have differed had more providers in the sample cared for infants and if providers had been asked to implement all of the nutrition standards rather than select a minimum of 3 to 5. Results could be due to factors aside from the intervention and effect sizes may be under- or over-estimated. Also, use of a convenience sample limits the external validity of results. To achieve a higher response rate and ensure a more representative sample, future studies should engage in more active recruitment strategies than were used in this study. In addition, observations were conducted on a single day, which may not be representative of usual practice, and observation may impact provider behaviors. Survey responses were based on self-report, which may have introduced response bias, and change in provider adherence to nutrition standards was tracked over a relatively short time. Further, impacts on children’s dietary intakes were not assessed. Finally, 3 to 4 (5%) of the statistical tests performed may be significant by chance.

Conclusion

Pilot findings suggest that implementation of nutrition standards was feasible and improved after a brief

training of FCCH providers. A future study with a larger and more rigorous design, implementation over a longer time period, and assessment of dietary intakes is warranted to evaluate potential impacts on young children.

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Author Contributions

LDR, VK, EHV, LEA, AA contributed to conceptualization; LDR contributed to funding acquisition; LDR, LEA, AA contributed to methodology; LDR, VK, DLL, EHV, AA contributed to project administration; LDR, AA contributed to resources; LDR, AA contributed to supervision; LDR, DLL, KG contributed to visualization; LDR, VK, DLL, KG contributed to writing – original draft preparation; LDR, VK, DLL, KG, EHV, AA contributed to writing – review & editing; DLL, KG contributed to data curation, formal analysis, and investigation; KG contributed to software.

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Supplemental Material

Supplemental material for this article is available online.

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