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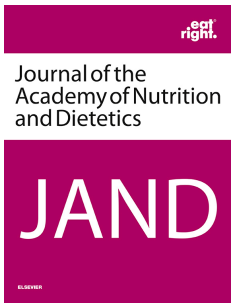

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Ms Lieke Vorage, (MPH), Dr Lisa Vincze, (APD, AEP, PhD), Professor Neil Harris, (PhD)

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Authors: Ms Lieke Vorage, Dr Lisa Vincze, and Professor Neil Harris

Lieke Vorage (MPH)

PhD candidate, School of Medicine and Dentistry, Griffith University

Griffith University, Gold Coast Campus, 58 Parklands Drive, Southport QLD 4215, Australia

lieke.vorage@griffithuni.edu.au

+61 (0)4 5200 4187

ORCID: 0000-0002-5744-189X

Dr Lisa Vincze (APD, AEP, PhD)

Lecturer, School of Health Sciences and Social Work, Griffith University

Griffith University, Gold Coast Campus, 58 Parklands Drive, Southport QLD 4215, Australia

l.vincze@griffith.edu.au

+61 (0)7 5678 7861

ORCID: 0000-0003-0669-7147

Professor Neil Harris (PhD)

Director, Higher Degree Research for the Health Group and Professor of Public Health, School of Medicine and Dentistry, Griffith University

Griffith University, Gold Coast Campus, 58 Parklands Drive, Southport QLD 4215, Australia

n.harris@griffith.edu.au

+61 (0)7 5552 7879

ORCID: 0000-0002-1786-3967

Author contributions: The study design was a collaborative effort among all authors. Lieke Vorage collected and analyzed the data. Lieke Vorage also wrote the initial manuscript. All authors reviewed and commented on subsequent drafts of the manuscript.

Corresponding author: Lieke Vorage

Reprint contact: Lieke Vorage

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Research snapshot

Research question: To what extent do Australian Family Child Care (FCC) educators follow best practices for the nutrition and physical activity environment, and how are their demographic characteristics associated with this environment?

Key findings: A cross-sectional survey of 370 Australian FCC educators assessed aspects of the nutrition and physical activity environment on a 0-3 scale, with higher scores indicating greater adherence to best practices. Mean scores were 2.6 (±0.3) for feeding practices, 2.4 (±0.5) for indoor play environment, 2.4 (±0.5) for physical activity practices, 2.2 (±0.4) for feeding environment, 1.9 (±0.5) for outdoor play environment and 1.7 for both nutrition (±0.6) and physical activity education (±0.7). Better socioeconomic conditions, more years of experience working in the early childhood education and care sector, and the presence of a nutrition or physical activity policy were associated with higher scores, while speaking a language other than English at home was associated with lower scores.

Abstract

Background: The nutrition and physical activity environment in Early Childhood Education and Care (ECEC) services impacts children's diet and physical activity, but this environment is not well understood in Family Child Care (FCC) services.

Objective: This study examined the extent to which Australian FCC educators follow best practices for the nutrition and physical activity environment, including potential associations with their demographic characteristics.

Design: A cross-sectional online survey was conducted between September 2023 and October 2023.

Participants/setting: Data were collected from a convenience sample of 370 Australian FCC educators, who completed demographic questions before being randomly assigned to the nutrition environment (n=210) or physical activity environment (n=160) section of the survey.

Main outcome measures: The Environment and Policy Assessment and Observation–Self Report tool assessed aspects of the nutrition and physical activity environment on a 0-3 scale, with higher scores indicating greater adherence to best practices.

Statistical analyses performed: Descriptive statistics were used to characterize the environment. Multiple linear regressions examined associations with demographic variables, including main language spoken at home, remoteness, socioeconomic status, educational attainment, the presence of written nutrition and physical activity policies at the FCC organization, and years of experience in ECEC.

Results: The mean scores were 2.6 (±0.3) for feeding practices, 2.4 (±0.5) for indoor play environment, 2.4 (±0.5) for physical activity practices, 2.2 (±0.4) for feeding environment, 1.9 (±0.5) for outdoor play environment and 1.7 for both nutrition (±0.6) and physical activity

education (±0.7). Better socioeconomic conditions were associated with improved feeding practices and outdoor play environments. More years of experience working in ECEC was associated with improved nutrition education and outdoor play environments. Having a nutrition or physical activity policy was associated with better education in these areas, while speaking a non-English language at home was associated with poorer feeding practices and outdoor play environments.

Conclusions: Enhancing outdoor play environments, providing educator training, implementing nutrition and physical activity policies, and supporting non-English speaking, low-income and inexperienced FCC educators could create better conditions for promoting healthy eating and physical activity within FCC.

Key words: Family Child Care; Pediatric Obesity; Diet, Healthy; Exercise; Environment Design

Introduction

Optimal nutrition during early childhood is crucial for the physical and cognitive development of children.[1] It supports healthy weight, enhances quality of life, and helps protect against chronic diseases and premature death.[1] Engaging in physical activity and limiting sedentary behavior is also important for a child's health.[2] Regular physical activity supports brain development, strengthens bones, improves muscle control and helps to achieve and maintain a healthy weight.[2]

In Australia, only 28% of 2-3-year-olds and 7% of 4-8-year-olds meet the recommended fruit and vegetable intake.[3] Discretionary foods contribute substantially to the energy intake of Australian children, accounting for 30% in 2-3-year-olds and 38% in 4-8-year-olds.[3] Moreover, a substantial number of Australian children aged 2 to 5 years (39%) fall short of meeting physical activity guidelines.[4] Among Australian children aged 2 to 4 years, 15% are overweight and 10% are obese.[5]

It is well established that health behaviors formed in early childhood track into adulthood.[6,7] Evidence also suggests that obesity established before entering school is difficult to reverse.[8] Therefore, it is important to teach children healthy habits early in life. The World Health Organization recommends the promotion of healthy eating and physical activity in Early Childhood Education and Care (ECEC) services.[9]

In high-income countries, 36% of infants aged 0 to 2 years and 87% of children aged 3 to 5 years are enrolled in ECEC services, where they typically spend 25 to 35 hours per week.[10] The dietary intake of children within ECEC services is shaped by the nutrition environment, encompassing factors such as educators' feeding practices[11-13], the mealtime environment[11,12], and nutrition education provided to children, caregivers, and educators.[14,15] The childcare environment also impacts the physical activity levels of children. Nearly half the variation in

children's physical activity between 9 am and 5 pm can be explained by the childcare facility they attend.[16] This variability is linked to factors such as the indoor and outdoor play environment, educators' physical activity practices, and physical activity education.[16,17]

While the majority of ECEC services provide care within a center, Family Child Care (FCC) stands out as a distinct form of childcare where an educator looks after children in their own home.[18] In Australia, FCC educators are overseen by FCC organizations, who employ coordinators to ensure the provision of high-quality care that is in accordance with national regulations.[19] This study refers to FCC organizations as entities under which multiple FCC educators are registered, and FCC services as individual childcare services run by FCC educators. FCC services look after 11% of Australian children enrolled in approved childcare facilities (excluding Outside School Hours Care), providing care for a total of 100,000 children.[20] Notably, FCC is more likely to be used by low-income households than center-based care.[21] This is an important finding in the context of obesity prevention, as research shows that children from low-income families generally consume a diet of lower quality and engage in less physical activity.[22,23]

Although research has explored the nutrition and physical activity environment in center-based childcare[24,25], there is a gap in the literature concerning these aspects within FCC, especially in the Australian context. A few studies have examined the nutrition[26-29] and physical activity environment within Australian FCC services.[28-30] While these studies have provided valuable insights, they report on regional samples, which limits the generalizability of their findings. To address this research gap, the aim of this study was to 1) evaluate the extent to which Australian FCC educators follow best practices for the nutrition and physical activity environment, and 2) examine associations between aspects of the nutrition and physical activity environment and the demographic characteristics of FCC educators in an Australian-wide sample.

Materials and methods

Study design

A cross-sectional online survey was conducted with Australian FCC educators from September 2023 to October 2023. Ethical approval to conduct the study was obtained from the Griffith University Human Research Ethics Committee (Ref No: 2023/510).

Sample and recruitment

Australian-based FCC educators were eligible to participate in this study. Family Day Care Australia (FDCA), the national peak body for FCC in Australia[31], facilitated recruitment by sending two survey invitations, spaced two weeks apart, to all registered FCC educators. FDCA also emailed all registered FCC organizations, encouraging them to motivate their educators to complete the survey. Currently, there are approximately 9,600 FCC educators across 420 FCC organizations[32], with 97% of educators and 90% of organizations registered with FDCA. Educators were able to directly access the consent form and survey through the email invitation. The survey took approximately 15 minutes to complete. To encourage participation, educators had a chance to win one of three $100 toy store gift vouchers.

Instrument

Data was collected using a modified version of the Environment and Policy Assessment and Observation–Self Report (EPAO-SR) tool[33], which was adapted to ensure appropriate wording for the Australian FCC context and to reduce participant burden by omitting some questions. The questionnaire can be found here: https://data.mendeley.com/datasets/gzvtn5nmyc/1 The EPAO-SR tool is the self-administered version of the researcher-administered EPAO, which was developed to assess the nutrition and physical activity environment in child care centers.[34] However, both the EPAO and the EPAO-SR have also been used in FCC.[16,24] The EPAO-SR has demonstrated reliability and validity, with Intraclass Correlation Coefficients for 93% of

items ranging from 0.41 to 1.0, reflecting fair to substantial reliability.[33,35] Additionally, correlations between self-reported data from educators and observations by trained data collectors ranged from fair (0.3) to very strong (0.9) for 81% of the items.[33,36]

The EPAO-SR tool consists of three questionnaires: the Director Report, the Staff Daily Questionnaire, and the Staff General Questionnaire.[33] For this study, the Staff General Questionnaire was used as it addresses aspects of the nutrition and physical activity environment relevant to the research objectives. In addition, a subset of questions from the Director Report was included to assess nutrition and physical activity education for caregivers in FCC. Although some aspects of the nutrition and physical activity environment are measured through the Staff Daily Questionnaire, this questionnaire requires educators to report their practices over two days. Given the high participant burden, these questions were omitted.

Before launching the survey, a pilot test with six Australian FCC stakeholders confirmed that the questions and their wording were appropriate for the Australian FCC context. Since the EPAO-SR tool was originally designed for childcare centers, it required some adjustments for FCC services. A list of the adjustments made to the EPAO-SR tool can be found here: https://data.mendeley.com/datasets/stjdv5ky5r/1

To limit burden on respondents, the questionnaire was divided into sections. All participants first completed demographic questions, after which they were randomly assigned to complete either the nutrition environment or physical activity environment section using the online survey tool, LimeSurvey. Each participant had a 50% chance of being assigned to either section. The nutrition environment section and the physical activity environment section each included specific domains designed to assess different aspects of the childcare environment. The nutrition section contained three domains: 'feeding practices,' 'feeding environment,' and 'nutrition education and professional development.' The physical activity section included four

domains: 'indoor play environment,' 'outdoor play environment,' 'physical activity practices,' and 'physical activity education and professional development.'

Each domain is made up of several best practice items. The best practice items were developed through a review conducted by the creators of the EPAO-SR tool, examining existing recommendations and research in the United States on healthy nutrition and physical activity environments in center-based childcare. After this review, the items were further evaluated and refined by experts in health and childcare.[33] For example, 'feeding practices', includes best practices such as providing verbal praise during meals, avoiding food as a reward, and not requiring children to remain at the table until they finish. The 'feeding environment' focuses on best practices related to educator behaviors and surroundings, such as role modeling healthy eating and the presence of healthy eating materials like play kitchens, posters and books. 'Nutrition education and professional development' encompasses planned and informal nutrition education for children, nutrition training for educators, and nutrition education for caregivers.

The 'indoor play environment' includes best practices related to space for indoor play, the availability of portable play equipment, and posters and books promoting physical activity. The 'outdoor play environment' includes best practice items such as shaded spaces, available outdoor space, the number of outdoor play spaces, gardens, paths for wheeled toys, and the availability of portable play equipment. 'Physical activity practices' focus on educator behaviors, including avoiding withholding physical activity as punishment, engaging in play with children, and incorporating physical activity into routines. Lastly, 'physical activity education and professional development' consists of planned and informal physical activity education for children, physical activity training for educators and physical activity education for caregivers.

Questions measuring specific best practices were averaged to produce scores ranging from 0 to 3, where 0 indicated no alignment with best practices and 3 indicated perfect alignment. Thus, higher scores reflected better adherence to best practices.[37] The scores for all best practice items within each domain were then averaged to create seven composite scores, one for each domain. Higher scores again indicated better adherence to best practice.[37] The scoring rubric can be found here: https://data.mendeley.com/datasets/jjky2k38kp/1

The questionnaire also collected demographic information from FCC educators, including age, gender, main language spoken at home, educational attainment, the presence of a written nutrition and physical activity policy at the FCC organization, and postcode. Postcodes were used to determine socioeconomic status via the Index of Relative Socio-economic Disadvantage (IRSD).[38] The IRSD ranks areas on a scale from 1 (representing the 10% most disadvantaged areas) to 10 (representing the 10% least disadvantaged areas). Postcodes were also used to classify FCC educators' locations into 'major cities' and 'regional and remote areas'. The Australian Bureau of Statistics defines five remoteness classes based on access to services: 'major cities', 'inner regional', 'outer regional', 'remote', and 'very remote'.[39] Due to the small population sizes in some of these categories, the 'inner regional,' 'outer regional,' 'remote,' and 'very remote' classes were all combined into a single broader category, 'regional and remote areas.' Main language spoken at home was assessed with the question: 'What language do you speak most at home?' Respondents could select from a list of commonly spoken languages in Australia, specify another language, or choose 'Prefer not to say'. Responses were categorized as 'English' or 'Other languages.' Educational attainment was measured with the question: 'What is your highest qualification?' using categories consistent with those used by the Australian Bureau of Statistics: 'Primary School', 'High School (up to Year 10)', 'High School (Year 12 certificate)', 'Certificate I and II', 'Certificate III/IV', 'Advanced Diploma and Diploma', 'Bachelor Degree', 'Graduate Diploma and Graduate Certificate', and 'Postgraduate

Degree'.[40] For analysis, educational attainment was categorized as 'Lower Education' if an educator's highest educational achievement was up to an (Advanced) Diploma and as 'Higher Education' if the educator held a Bachelor diploma or higher. Advanced Diplomas and Diplomas are higher vocational qualifications, comparable to Associate's degrees in the United States. This categorization was based on the distribution of educational attainment among participants, ensuring two groups of approximately equal size. Educators were also asked whether their FCC organization had written nutrition and physical activity policies, with responses categorized as 'Yes' or 'No/Don't know'. Lastly, years of experience in ECEC were measured with the question, 'How many years have you worked in the ECEC sector?' A description was provided that this included time in center-based services, such as long day care or preschool services, as well as FCC.

Data analysis

A power calculation was conducted to estimate the score for each domain with a precision of 0.1 units (two-sided α=0.05), assuming an average standard deviation of 0.5 units.[41] A total of 200 responses were required, with 100 responses for the nutrition section and 100 for the physical activity section. This sample size ensured that the estimated mean for each domain would fall within ±0.1 units of the true population mean, providing a sufficiently precise measure of best practice adherence.

The data were analyzed using SPSS[42], and descriptive statistics (mean, median, percentages, standard deviation [SD], interquartile range [IQR]) were used to calculate domains and best practice items. As noted earlier, domains are composite scores created by averaging the specific best practice items for each of the seven domains. Domains followed a normal distribution, as confirmed by Q-Q plots, and were therefore reported with mean and SD. Best practice items did not follow a normal distribution and were therefore described using the median and IQR.

Both domains and best practice items ranged from 0 to 3, with higher values indicating greater adherence to best practices.

To examine associations between demographic variables and the domains, one linear regression was conducted for each domain. All collected demographic variables were initially considered for each model, except for gender, as 99% of the sample identified as female. Due to strong correlations between 'Born in Australia' and 'Speaks English at home' ($r = 0.619$), and between 'Age' and 'Years of experience' ($r = 0.585$), 'Speaks English at home' was chosen to best represent cultural background, and 'Years of experience' was considered more relevant to the nutrition and physical activity environment.

Univariate analysis was performed for the remaining demographic variables. Demographic variables that were significantly associated with one or more of the domains, as well as those deemed relevant from prior research, were included in all the models. As a result, 'Main language spoken at home', 'Remoteness', 'IRSD', 'Education level', and 'Years of experience in ECEC' were included in all seven models. Additionally, the presence of a written nutrition policy was included in the models for the nutrition-related outcomes, and the presence of a written physical activity policy was included in the models for physical activity outcomes.

Before running the models, outliers were detected using a criterion of ±3 standard deviations, but upon inspection, they did not appear to be incorrect or suspicious and were therefore retained. Multicollinearity was assessed with the Variance Inflation Factor (VIF), and no issues were found (all VIF values < 5).[43] Demographic variables were entered simultaneously into the models. 'Main language spoken at home,' 'Remoteness', 'Education level', 'Nutrition policy', and 'Physical activity policy' were categorical variables, while 'IRSD' and 'Years of experience in ECEC' were continuous variables. The regression coefficients (β), which represent the change in each domain for each unit change in the demographic variable, are reported in the

results section. P-values below 0.05 indicate a significant association between the demographic variable and the domain.

Results

Participants characteristics

A total of 370 educators completed the questionnaire: 210 completed the nutrition section, and 160 completed the physical activity section. Of the 9,600 FCC educators in Australia, 97% are registered with FDCA, and with invites distributed to all FDCA members, the response rate was 4%.

Of the 370 FCC educators who participated in the survey, 99% identified as female, with an average age of 48 ± 10 years. Two-thirds were born in Australia and 84% spoke English at home. Educators born outside Australia came from 33 countries, with the largest representation from India, the United Kingdom, New Zealand, Bangladesh, and China. Approximately one third held a Bachelor's degree or higher. Most worked full-time and cared for an average of 4 ± 1 children per day. On average, educators had 15 ± 10 years of experience in ECEC. Eighty-six percent of educators who answered the nutrition-related questions (n=210) reported having a nutrition policy at their FCC organization, while 14% either indicated its absence or were uncertain about it. Moreover, 74% of the educators that completed the physical activity section of the questionnaire (n=160) reported that their FCC organization had a physical activity policy. Demographic characteristics of the participants can be found in Table 1.

Findings on the nutrition and physical activity environment in FCC

The scores for the domains and their corresponding best practice items are provided in Table 2. The mean scores for FCC educators' practices were as follows: feeding practices, 2.6 (±0.3); feeding environment, 2.2 (±0.4); nutrition education and professional development, 1.7 (±0.6); indoor play environment, 2.4 (±0.5); outdoor play environment, 1.9 (±0.5); physical activity

266 practices, 2.4 (±0.5); and physical activity education and professional development, 1.7 (±0.7).
267 Scores could range from 0 to 3, where 0 indicated no alignment with best practices and 3
268 indicated perfect alignment. Thus, higher scores reflected better adherence to best practices.[37]

269 Table 3 presents the results from the multiple linear regression models. The IRSD was
270 significantly associated with both feeding practices and the outdoor play environment. The
271 IRSD ranks areas on a scale from 1 (representing the 10% most disadvantaged areas) to 10
272 (representing the 10% least disadvantaged areas). Specifically, each additional point on the
273 IRSD scale was associated with a 0.021-point (95% CI: 0.002, 0.040) increase in the feeding
274 practices score and a 0.039-point (95% CI: 0.010, 0.067) increase in the outdoor play
275 environment score. Years of experience in ECEC was significantly associated with both
276 nutrition education and professional development and the outdoor play environment, with each
277 additional year of experience increasing the nutrition education score by 0.010 points (95% CI:
278 0.001, 0.020) and the outdoor play environment score by 0.012 points (95% CI: 0.004, 0.019).
279 Additionally, a written nutrition policy was significantly associated with a 0.323-point (95%
280 CI: 0.075, 0.572) higher nutrition education and professional development score, and having a
281 written physical activity policy was associated with a 0.421-point (95% CI: 0.189, 0.653)
282 higher physical activity education and professional development score.

283 Speaking a non-English language was significantly associated with lower scores in feeding
284 practices (-0.193 points; 95% CI: -0.327, -0.059) and the outdoor play environment (-0.489
285 points; 95% CI: -0.697, -0.282) compared to English speakers. No other statistically significant
286 associations were found.

287 **Discussion**

288 This study examined the alignment of feeding practices, feeding environment, nutrition
289 education and professional development, indoor and outdoor play environments, physical

activity practices, and physical activity education and professional development with best practices among participating Australian FCC educators, as well as associations with their demographic characteristics.

Educators in this study received the highest score for feeding practices, with a mean score of 2.6 out of 3. These findings align with Kerr et al.'s (2022) observational study of 33 Australian FCC services, which found that educators generally avoided negative feeding practices, such as using a child's preferred foods as a reward for eating less favored options.[27] This is an important finding because research indicates that supportive feeding practices in child care improve children's dietary intake.[13]

In this study, FCC educators scored 2.2 out of 3 for the feeding environment. Certain best practices, such as educators eating the same food as children, role modelling healthy eating, and avoiding materials promoting unhealthy eating, received a 2 instead of the highest possible score of 3. This aligns with Kerr et al. (2022), who found that Australian FCC educators did not always eat the same food as children during meals or model healthy eating.[27] The Romp & Chomp intervention aimed to improve the feeding environment in Australian FCC services, specifically nutrition resources and educator behaviors around food, through workshops, media coverage, nutrition resources, and professional development.[29] The intervention successfully improved the feeding environment, as assessed by a questionnaire measuring post-intervention changes in the intervention group compared to a control group, suggesting a promising approach to enhance the feeding environment.[29]

Participants received a score of 2.4 out of 3 for their indoor play environment. While the presence of posters and books promoting physical activity and the availability of portable play equipment received the highest possible score of 3, the space allocated for indoor play received a score of 2, which reduced the overall indoor play environment score. A study conducted in

Australia found that FCC educators often restrict indoor gross motor activities, such as running.[30] To improve the indoor play environment for physical activity, Gans et al. (2022) recommend that future interventions provide technical assistance to reorganize the indoor play environment of FCC services and include suitable indoor physical activities, such as dance parties.[44]

FCC educators in this study received a score of 1.9 out of 3 for the outdoor play environment. Outdoor play is strongly correlated with moderate-to-vigorous physical activity in both FCC services and child care centers.[45,46] Research indicates that children exhibit higher levels of physical activity during outdoor play compared to indoor activities.[47,48] Without a suitable outdoor play environment, children face challenges in engaging in physical activity.[49] Research shows that outdoor play duration and frequency are positively associated with the number of outdoor play areas and frequent educator professional development.[50] Therefore, interventions aimed at helping FCC educators create multiple play spaces, even when outdoor space is limited, and providing educator training, may ensure that children receive adequate outdoor play opportunities. Additionally, only half of Australian FCC educators take their children to a park or playground at least once a week.[30] To increase outdoor play, FCC organizations and local councils could assist educators in identifying suitable parks and playgrounds, offer financial subsidies for travel costs, or partner with community transport services to increase access to play spaces. Ensuring regulations support outdoor excursions could also help educators provide more opportunities for outdoor play.[51]

Among the FCC educators surveyed, the mean score for physical activity practices was 2.4 out of 3. Educators received the highest score of 3 for not using physical activity as punishment. However, their scores were 2 for participating in physically active play and incorporating physical activity into routines. A systematic review evaluating interventions aimed at promoting healthy eating, physical activity, and healthy weight in FCC found that three out of

five interventions assessing changes in physical activity practices showed improvement.[52] However, effective and ineffective interventions shared similar components, requiring further research to identify the best strategies for enhancing physical activity practices among FCC educators.

Of all the domains, nutrition and physical activity education and professional development received the lowest scores, 1.7 out of 3. This is concerning given the research on the critical role of such education in enhancing children's dietary intake and physical activity levels.[45] Research has highlighted limited training opportunities for FCC educators in these areas. In Adelaide, Australia, only 38% of FCC educators had attended nutrition-related courses or workshops.[26] Similarly, a review of the obesogenic attributes of the FCC environment in the U.S. reported that less than half of FCC educators received adequate nutrition and physical activity training at least once a year.[53] Incorporating nutrition and physical activity training into FCC interventions could help address this gap. Various interventions have used different strategies to enhance FCC educators' knowledge and skills in promoting healthy eating and physical activity. In Australia, Munch & Move supported FCC organizations in distributing training and resources to their educators[28], while Romp & Chomp focused on professional development for educators to reinforce healthy eating messages and increase active play.[29] In the United States, the Keys intervention provided workshops, home visits, and follow-up support to help educators improve both their own health and the health environment in their services.[54] These approaches offer valuable examples of how FCC educators' nutrition and physical activity education can be strengthened.

In this study, educators in more socio-economically disadvantaged areas had lower scores for feeding practices. This is consistent with literature suggesting that low-income caregivers are more likely to use coercive feeding practices.[55] In the United States, the federally funded Child and Adult Care Food Program (CACFP) reimburses child care services for providing meals

and snacks to children from low-income households.[56] To receive these reimbursements, staff must complete initial and annual training on nutrition, meal pattern requirements, and recordkeeping.[57] Australia does not have a similar initiative, but introducing funding tied to mandatory training in feeding practices could be beneficial.

Educators in lower socio-economic areas also reported less favorable outdoor play environments. This may be connected to challenges faced by FCC educators in these areas, including smaller outdoor spaces, limited funds for play equipment, and limited vegetation cover in gardens.[58] To address these disparities, providing financial support for play equipment and vegetation could help create more stimulating outdoor environments for FCC educators in low-income areas.

More experience in ECEC was associated with higher scores in nutrition education and professional development and the outdoor play environment. The EPAO-SR tool asks whether educators have received nutrition training but does not specify when. Consequently, more experienced educators are likely to have completed nutrition training at some point in their career, which may explain their higher nutrition education scores. Additionally, research suggests that increased professional development can lead to more outdoor play.[50] Experienced educators, with more practical experience and potentially more training, may be better equipped to create an outdoor play environment that aligns with best practices. Therefore, providing professional development on nutrition and physical activity, particularly for less experienced educators, is crucial to improving the nutrition and physical activity environment.

Educators from FCC organizations with a written nutrition or physical activity policy demonstrated higher scores in both education domains. While Australian FCC organizations are legally required to have a nutrition policy[59], the results suggest that not all educators are aware of this policy. This is concerning, as research has shown that policies are effective tools

for guiding discussions with parents about nutrition.[60] In Australia, the Tooty Fruity Veggie intervention improved lunchbox quality by revising nutrition policies to clearly define appropriate and inappropriate foods, and reinforcing these guidelines through parent workshops and informational posters.[61] This highlights the need for additional support to help educators implement and communicate nutrition policies effectively. Requiring FCC organizations to have a nutrition policy, as is currently the case, may not be enough. FCC educators need additional support to translate policies into practice. Unlike nutrition policies, there is no requirement for FCC organizations to have a physical activity policy.[19] However, the findings suggest that introducing such a policy, along with support for educators to implement and communicate it effectively, could be beneficial.

FCC educators in this study who spoke a non-English language at home had lower scores for both feeding practices and the outdoor play environment, suggesting a potential association with cultural characteristics. Research suggests that acculturation, the process where individuals adapt to the dominant culture, may influence feeding practices. For example, research with Hispanic mothers in the US has shown that those with lower levels of acculturation were more likely to engage in negative feeding practices such as pressuring their child to eat more or using food as a reward.[62] The impact of cultural characteristics on the outdoor play environment in ECEC services is not well understood, and further research is needed to explore this connection. To better support FCC educators from diverse linguistic and cultural backgrounds, culturally sensitive professional development on feeding practices and outdoor play could be beneficial. A review of culturally adapted interventions for obesity-related behaviors in children aged 0-5 found that tailoring interventions to cultural contexts increases their acceptability among families.[63] This suggests that similar cultural adaptations could also benefit FCC educators, making interventions more relevant and effective for educators from diverse linguistic and cultural backgrounds.

Regarding the sample, it closely mirrored the IRSD distribution of all Australian FCC educators, with 48% living in lower socio-economic areas (IRSD 1-5), compared to 54% nationally.[32] The sample had a higher proportion of educators from inner (26% vs. 16%) and outer regional areas (14% vs 7%), and fewer from major cities (59% vs. 75%).[32] Additionally, there was a higher proportion of educators from Western Australia (21% vs. 10%) and fewer from Victoria (14% vs. 30%).[32] Other state distributions were similar to the national data.[32] Gender and experience comparisons were not possible due to the lack of national data on these characteristics.[32]

Study Strengths and Limitations

This study is the first to recruit a nationwide sample of FCC educators in Australia, allowing for a broader examination of the nutrition and physical activity environment compared to previous region-specific studies. However, several methodological limitations should be considered.

The use of self-reported data may have led to an overestimation of educators' performance in the nutrition and physical activity environment. Validity testing of the EPAO-SR showed that self-reported data aligned more closely with observations of healthy practices than unhealthy ones, suggesting a tendency to underreport negative practices.[33] Nevertheless, 81% of the EPAO-SR items showed fair to very strong correlations with observational data.[33] Additionally, modifications to the EPAO-SR, which were not validated, may have affected its reliability.

Although 97% of Australian FCC educators were contacted, the sample was self-selected rather than randomly chosen. This may have introduced sampling bias, as educators interested in nutrition and physical activity might have been more likely to participate, potentially limiting the generalizability of the results.

The sample closely matched the distribution of IRSD scores among Australian FCC educators, but there were some disparities in location. Other comparisons to national datasets, such as gender and years of experience, were not possible due to the lack of available data for these variables across Australian FCC educators. Therefore, the results may not be fully representative for all FCC educators in Australia.

Conclusion

This study suggests that improving outdoor play environments and offering training for educators in FCC settings can better support healthy eating and physical activity. It also highlights opportunities for targeted interventions for non-English speaking educators, those in low-income areas, and those with less experience. Additionally, support to help implement and communicate nutrition and physical activity policies could be beneficial.

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Table 1. Demographic characteristics of Australian Family Child Care educators who completed a modified version of the Environment and Policy Assessment and Observation–Self Report Tool (EPAO-SR)[33], assessing the nutrition (n=210) or physical activity environment (n=160) in Australian Family Child Care Services.[a]

Characteristics	**Total (n=370)**	**Nutrition (n= 210)**	**Physical activity (n=160)**
Gender, n (%)			
Female	365 (99)	207 (99)	158 (99)
Age in years, mean ± SD[b]	48 ± 10	48 ± 10	47 ± 11
Born in Australia, n (%)			
Yes	242 (65)	135 (64)	107 (67)
Speaks English at home, n (%)			
Yes	309 (84)	177 (84)	132 (83)
Highest education level[c]*, n (%)*			
Up to Certificate I and II	17 (5)	9 (4)	8 (5)
Certificate III/IV	90 (24)	50 (24)	40 (25)
Advanced Diploma and Diploma	142 (38)	87 (41)	55 (34)
Bachelor's degree	62 (17)	32 (15)	30 (19)
Graduate Diploma or higher	54 (15)	28 (13)	26 (16)
Prefer not to say	5 (1)	4 (2)	1 (1)
Number of workhours per week, mean ± SD	44 ± 13	44 ± 13	43 ± 13
Number of children per day, mean ± SD	4 ± 1	4 ± 1	4 ± 1
Years of experience in ECEC, mean ± SD	15 ± 10	15 ± 10	15 ± 10

Nutrition policy in FCC organization, n (%)			
Yes	-	181 (86)	-
Physical activity policy in FCC organization, n (%)			
Yes	-	-	118 (74)

[a]All participants first completed demographic questions, after which they were randomly assigned to either the nutrition environment or physical activity environment section of the Environment and Policy Assessment and Observation–Self Report Tool (EPAO-SR)[33] using the online survey tool, LimeSurvey. Each participant had a 50% chance of being assigned to either section. The nutrition section included questions on feeding practices, the feeding environment, and nutrition education and professional development. The physical activity section included questions on the indoor play environment, the outdoor play environment, physical activity practices, and physical activity education and professional development.

[b]SD = Standard Deviation.

[c]Certificates I and II represent basic vocational training. Certificates III and IV represent more advanced vocational certifications. Advanced Diplomas and Diplomas are higher vocational qualifications, comparable to Associate's degrees in the United States. A Bachelor's degree is an undergraduate degree typically awarded after completing a three- to four-year university program. Graduate Diplomas or higher include postgraduate qualifications, such as Graduate Diplomas, Master's degrees, and Doctoral degrees.

Table 2. Scores for the domains and best practice items from Australian Family Child Care educators (n=370), assessed with a modified version of the Environment and Policy Assessment and Observation–Self Report (EPAO-SR) tool.[33]

Domains and corresponding best practice items[a]	**Mean ± SD**[b]	**Median (IQR**[c]**)**
Feeding practices (n=210)	2.6 ± 0.3	
Verbal praise		3 (2-3)
Asking before removing plates		3 (2-3)
Not requiring children to stay at the table until finished		3 (3-3)
Authoritative feeding		3 (3-3)
Not using food as bribes or rewards		3 (2-3)
Not using food to calm or encourage appropriate behavior		3 (2-3)
Feeding environment (n=210)	2.2 ± 0.4	
Educator eats same food as children		2 (1-2)
Educator does not eat unhealthy food		3 (3-3)
Enthusiastic role modelling		2 (2-3)
Presence of healthy eating materials		3 (2-3)
Absence of unhealthy eating materials		2 (2-2)
Nutrition education and professional development (n=210)	1.7 ± 0.6	
Planned nutrition education for children		2 (1-3)
Informal nutrition education for children		2 (2-3)
Educator nutrition training		0 (0-2)
Caregiver nutrition education		2 (0-2)
Indoor play environment (n=160)	2.4 ± 0.5	

Space for indoor play		2 (1-3)
Availability of portable play equipment		3 (2-3)
Posters and books to promote physical activity		3 (1-3)
Outdoor play environment (n=160)	1.9 ± 0.5	
Amount of shaded space		2 (2-3)
Open, outdoor area available		3 (3-3)
Number of outdoor play spaces		2 (1-2)
Garden present		2 (2-3)
Path for wheeled toys		1 (0-3)
Shape of path for wheeled toys		2 (0-1)
Connectivity of path for wheeled toys		0 (0-1)
Outdoor portable play equipment		3 (2-3)
Amount of portable play equipment available outdoors		3 (3-3)
Physical activity practices (n=160)	2.4 ± 0.5	
Physical activity not withheld for more than 5 minutes		3 (3-3)
Educator role during playtime		2 (1-3)
Educator incorporates physical activity in classroom routines and transitions		2 (2-3)
Physical activity education and professional development (n=160)	1.7 ± 0.7	
Planned gross motor lessons for children		3 (2-3)
Informal physical activity education for children		2 (2-3)
Educator physical activity training		0 (0-2)
Caregiver physical activity education		0 (0-2)

[a]Domains are listed with their corresponding best practice items underneath. Questions measuring specific best practices were averaged to produce scores ranging from 0 to 3. The scores for all best practice items within each domain were then averaged to create seven composite scores, one for each domain, also on a 0-3 scale. Higher

scores indicate stronger adherence to best practices. Details on the specific questions measuring each best practice item can be found here: https://data.mendeley.com/datasets/gzvtn5nmyc/1 The scoring syntax can be found here: https://data.mendeley.com/datasets/jjky2k38kp/1

[b]SD = Standard Deviation.

[c]IQR = Interquartile range.

Table 3. Multiple linear regression models examining the association between demographic variables and domains for the nutrition (n=210) and physical activity environment (n=160) among Australian Family Child Care educators, measured with a modified version of the Environment and Policy Assessment and Observation-Self Report (EPAO-SR) tool.[33]

Domains	**Demographic variables**	**β[g] (95% CI)**	**P-value**
Feeding practices (n=210)	Main language[a]	-0.193 (-0.327, -0.059)	0.005
	Remoteness[b]	-0.092 (-0.202, 0.018)	0.102
	IRSD[c]	0.021 (0.002, 0.040)	0.029
	Education level[d]	0.041 (-0.060, 0.143)	0.425
	Nutrition policy[e]	-0.020 (-0.147, 0.108)	0.762
	Years of experience in ECEC[f]	0.001 (-0.004, 0.006)	0.607
Feeding environment (n=210)	Main language	0.142 (-0.029, 0.312)	0.103
	Remoteness	0.032 (-0.108, 0.172)	0.654
	IRSD	0.007 (-0.017, 0.031);	0.561
	Education level	-0.106 (-0.235, 0.023)	0.106
	Nutrition policy	0.026 (-0.137, 0.188)	0.756

	Years of experience in ECEC	-0.003 (-0.009, 0.004)	0.407
Nutrition education and professional development (n=210)	Main language	0.168 (-0.094, 0.430)	0.208
	Remoteness	-0.043 (-0.257, 0.172)	0.694
	IRSD	0.000 (-0.036, 0.037)	0.983
	Education level	-0.198 (-0.395, 0.000)	0.050
	Nutrition policy	0.323 (0.075, 0.572)	0.011
	Years of experience in ECEC	0.010 (0.001, 0.020)	0.030
Indoor play environment (n=160)	Main language	0.187 (-0.131, 0.504)	0.246
	Remoteness	-0.057 (-0.283, 0.168)	0.616
	IRSD	0.009 (-0.031, 0.050)	0.655
	Education level	-0.148 (-0.397, 0.100)	0.239
	Physical activity policy[e]	0.155 (-0.091, 0.401)	0.213
	Years of experience in ECEC	0.005 (-0.007, 0.016)	0.417
Outdoor play environment (n=160)	Main language	-0.489 (-0.697, -0.282)	<0.001
	Remoteness	-0.116 (-0.275, 0.043)	0.151
	IRSD	0.039 (0.010, 0.067)	0.008

	Education level	-0.001 (-0.164, 0.162)	0.994
	Physical activity policy	-0.003 (-0.160, 0.153)	0.965
	Years of experience in ECEC	0.012 (0.004, 0.019)	0.002
Physical activity practices (n=160)	Main language	0.052 (-0.193, 0.298)	0.674
	Remoteness	-0.091 (-0.279, 0.096)	0.337
	IRSD	0.028 (-0.006, 0.061)	0.108
	Education level	0.159 (-0.034, 0.351)	0.106
	Physical activity policy	0.091 (-0.094, 0.276)	0.334
	Years of experience in ECEC	0.003 (-0.005, 0.012)	0.444
Physical activity education and professional development (n=160)	Main language	0.277 (-0.030, 0.584)	0.077
	Remoteness	0.102 (-0.133, 0.337)	0.393
	IRSD	0.001 (-0.041, 0.044)	0.947
	Education level	0.142 (-0.099, 0.384)	0.247
	Physical activity policy	0.421 (0.189, 0.653)	<0.001
	Years of experience in ECEC	0.003 (-0.008, 0.014)	0.570

[a]Main language spoken at home was categorized into ‘English’ (ref) and ‘Other languages.

[b]Remoteness was categorized as 'Regional and remote areas' (ref) and 'Major cities' based on postcode.

[c]IRSD is the Index of Relative Socio-economic Disadvantage. It ranks areas on a scale from 1 (representing the 10% most disadvantaged areas) to 10 (representing the 10% least disadvantaged areas) based on postcode. The IRSD was used to categorize the areas in which educators lived on a scale from 1 (most) to 10 (least disadvantaged).

[d]Education was categorized as 'Lower Education' (ref) if an educator's highest educational achievement was up to an (Advanced) Diploma and as 'Higher Education' if the educator held a bachelor's degree or higher.

[e]Educators were asked about the presence of nutrition or physical activity policies in their FCC organization based on their random assignment to either the nutrition or physical activity section of the questionnaire. Responses were categorized as 'No/Don't know' (ref) or 'Yes'.

[f]Years of experience in Early Childhood Education and Care (ECEC) was measured with the question 'How many years have you worked in the ECEC sector? This includes time in centre-based services, such as long day care or preschool services, as well as family day care'. Responses in this sample ranged from 0 to 54 years.

[g]β = Regression coefficient. The regression coefficients reflects the change in each domain for each unit change in the demographic variable.