

## Original Article

# Family food environments of 5–6-year-old-children: Does socioeconomic status make a difference?

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## Introduction

Dietary data from throughout Western society support the notion that children's diets are not consistent with dietary recommendations of health authorities.<sup>1–3</sup> Dietary patterns of concern range from low intakes of water<sup>4</sup> to high intakes of soft drinks<sup>5</sup> and from low intakes and variety of fruits and vegetables<sup>1,2,6</sup> to the over-consumption of discretionary snacks that are high in energy and fat.<sup>6</sup> As such, children's diets are likely to have negative consequences for their health in both the short and longer terms. There is also evidence that the nutritional quality of a child's diet is influenced by their socioeconomic status (SES).<sup>7–9</sup> For example, Gliksman *et al.*<sup>7</sup> report, in a survey of 9000 7–15 years old Australian children, that those in the highest SES groups had lower total energy intakes, with dietary fat more likely to be polyunsaturated and representing a smaller proportion of energy intake. In addition, this group had more favourable cardiovascular risk factor profiles. US data show similar results. For example, Crawford *et al.*<sup>8</sup> report from analysis of the NHLBI National Health and Growth Study, that the percentage of kilocalories from fat was inversely related to parental education and family income levels. Similarly, UK data showed that 7–8 years olds in the lowest SES groups had higher percent energy as fat intakes than their higher SES peers.<sup>10</sup>

There is little consistency regarding the most appropriate ways in which to characterize socioeconomic status, and few studies seek to tease out the relative importance of those aspects of an individual's social circumstances, such as income, education, occupational prestige, and family background, that may be related to a particular feature such as dietary intake, or the development of obesity.<sup>11</sup> However, parental education, one indicator of a family's SES, appears to be an important determinant of dietary intake. For example, Martinez<sup>12</sup> reports that maternal education determines the choice of an infant-feeding method, with those with more

education being more likely to breast-feed. The association between maternal education and dietary intake is further highlighted by the work of North<sup>13</sup> who assessed frequency of consumption of a range of food items for 10 139 3 year-olds (Avon Longitudinal Study of Pregnancy and Childhood). That study found that socio-demographic factors relating to the mother had an influence on the early eating patterns of children, with children of the most educated mothers having 'healthful' diets and children of the least educated and younger mothers having diets based on convenience foods. Further, Lowry *et al.*<sup>14</sup> found that consumption of fruit and vegetables was more likely among 6321 adolescents (Youth Risk Behaviour Survey), as the educational level of the responsible adult increased.

While differences in children's diets across SES have been described, and the role of maternal education highlighted, there are few studies that describe the environments in which children's eating is learnt and supported, or how this might differ across SES. An understanding of such differences might enable us to explain variations in dietary intake. A range of studies provide important insights regarding those aspects of a child's family environment that are likely to shape their food intake. For example, there is evidence that food preferences are influenced by food availability and accessibility<sup>15–22</sup> by access to media<sup>23–25</sup> by child-parent feeding relationships<sup>15,26–30</sup> and by opportunities for parental modelling of food intake and food related behaviours.<sup>31–34</sup> However, most available data regarding family food environments are based on small-scale

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experimental studies or are derived from homogenous populations within the USA.<sup>6</sup>

Currently there is little information that allows us to characterize children's eating behaviours in the family environment, nor to understand the factors influencing these behaviours. The notable exceptions are the recent data highlighting the impact of child feeding practices on food intake<sup>30,35</sup> on body composition<sup>36</sup> and the relationship between parental eating attitudes and the development of obesity in children.<sup>37</sup> While a small number of studies have considered some aspect of the differences in family environments across SES<sup>38–40</sup> there remains a need to better understand these environments in order to identify opportunities to target nutrition interventions for those most at risk of nutrition related disease. The aim of this study is to describe family food environments of 5–6-year-old-children and to examine how they vary by maternal education.

## Methods

### Procedure

The sampling frame for this study consisted of families of 5–6-year-old-children in their first year of primary school. State run schools in metropolitan Melbourne and Geelong (Australia), were classified into one of three groups (low, medium and high), using the Australian Bureau of Statistics Socioeconomic Index for Areas (SEIFA), Index of Relative Disadvantage<sup>41</sup> and were then randomly selected for inclusion. The SEIFA Index of Relative Disadvantage is an area-based measure of socioeconomic disparity.

In all, 28 schools (11 of 12 low, nine of 13 middle and eight of 14 high SEIFA) consented to participate. In these schools all parents/carers of children in their first year of school ( $n = 600$  in low, 559 in medium and 500 in high SEIFA schools) were sent a package including a letter of introduction, a plain language statement, a self-completion questionnaire, a consent form and a replied paid envelope. These packages were sent home on a day corresponding with the distribution of the school newsletter, in which the school Principal had inserted an editorial about the study and about the significance of children's eating habits for health (provided by the authors). Reminder letters were sent to all participants after 1 week and again in the following fortnight and these corresponded with further school newsletter information.

The parents who was mostly responsible for feeding their 5–6-year-old child were asked to complete a questionnaire that included a number of measures of the family food environment. These measures were developed after a review of the literature<sup>6</sup> and qualitative interviews with 18 parents. The questionnaire was pilot tested for comprehensibility and clarity with a convenience sample of 20 families recruited via non-participating school communities and minor amendments were made.

### Measures

The measures included in the questionnaire that are reported in this paper are briefly described below:

**Profile of respondents.** Questions sought details of parental age, education, employment status, hours of work undertaken, occupation, country of birth and marital status, as well as details of family structure (e.g., number, ages of children, living arrangements). Parental education was assessed by self-report of highest level of schooling undertaken. Response categories included 'Never attended school', 'Primary school', 'Some high school', 'Completed high school', 'Technical or trade school certificate/apprenticeship' and 'University or tertiary qualification'. Given the associations between maternal education and childhood diet, maternal education was used in this study as the descriptor of SES.

**Family meal structures.** As far as the authors are aware, there are no existing measures of the ways in which family meals are eaten and thus what opportunities exist for parents to model food/eating behaviours. As previously described, the existing literature and qualitative interviews were used to inform the development of questions and prompted the development of an instrument to assess attitudes and behaviours regarding where food is eaten, with whom and with what additional stimulation. Family meal structure was assessed using seven items (shown in Table 1) with a five-point Likert scale that ranged from strongly agree to strongly disagree. Item examples include 'Adult work schedules often make it difficult to have the evening meal together' and 'In our family it is OK for the children to eat dinner separately from the adults'.

**Parental views on meal preparation.** As for measures of family meal structures, the authors are not aware of existing measures of attitudes and practices regarding activities related to meal preparation such as the planning of meals and the enjoyment and confidence regarding cooking. Again, the existing literature and qualitative interviews informed the development of these measures. Five items were included to assess this construct (Table 2). Item examples include 'It is difficult to find time to cook the evening meal' and 'I feel confident to cook a wide range of meals'.

**Parental meal preparation practices:** Existing literature and qualitative interviews informed the development of a seven item scale to reflect meal preparation practices (see Table 3), including use of takeaways and prepared dishes, and the extent to which children are involved in food preparation. Items were assessed using a frequency scale ranging from 'never' to greater than or equal to 4 times a week.

**Food availability.** Existing literature and qualitative interviews suggested a range of factors that were likely to influence the availability of food in the home. These included external factors such as the cost, quality (condition), available variety, and the ease of purchase, as well as factors within the family such as family food preferences. In all, eight items were used to assess this domain (Table 4). Items examples include 'It is easy to buy food in my area' and 'I do not buy many fruits because they cost too much'.

**Media exposure.** Three questions assessed the attitudes and practices of television during meal times (not included in Tables). Items include 'Adults in the family want the

**Table 1.** Respondent's views regarding family meal structure

|   | Agree/Strongly agree | Neutral | Disagree/Strongly disagree | Total | Correlation with maternal education |
|---|----------------------|---------|----------------------------|-------|-------------------------------------|
| Adult work schedules often make it difficult to have breakfast together ( <i>n</i> = 556)               | 54.3                 | 10.1    | 35.7                       | 100   | NS                                  |
| Adult work schedules often make it difficult to have the evening meal together ( <i>n</i> = 545)        | 35.8                 | 10.4    | 53.8                       | 100   | <i>P</i> < 0.000                    |
| The evening meal is usually a pleasant time for the family ( <i>n</i> = 560)                            | 70.3                 | 23.0    | 6.6                        | 100   | NS                                  |
| The evening meal is usually a time when our family connects and talks with each other ( <i>n</i> = 558) | 70.3                 | 19.7    | 9.7                        | 100   | NS                                  |
| In our family it is OK for the children to eat dinner separately from the adults ( <i>n</i> = 559)      | 30.8                 | 19.5    | 49.7                       | 100   | NS                                  |
| I am satisfied with how often my family eats the evening meal together ( <i>n</i> = 545)                | 70.3                 | 9.4     | 20.3                       | 100   | <i>P</i> = 0.023                    |
| In our family we have a rule against answering the phone during the evening meal ( <i>n</i> = 558)      | 11.1                 | 25.1    | 63.8                       | 100   | NS                                  |

NS, not significant.

**Table 2.** Respondent's views regarding meal preparation

|   | Agree/Strongly agree | Neutral | Disagree/Strongly disagree | Total | Correlation with maternal education |
|---|----------------------|---------|----------------------------|-------|-------------------------------------|
| I plan the evening meal well in advance ( <i>n</i> = 559)                   | 35.8                 | 28.1    | 36.1                       | 100   | NS                                  |
| I enjoy cooking for the family ( <i>n</i> = 559)                            | 56.9                 | 28.5    | 14.6                       | 100   | NS                                  |
| I feel confident to cook a wide range of meals ( <i>n</i> = 560)            | 71.8                 | 15.1    | 13.1                       | 100   | NS                                  |
| I feel confident cooking new dishes ( <i>n</i> = 560)                       | 65.3                 | 17.5    | 17.2                       | 100   | NS                                  |
| It is difficult to find the time to cook the evening meal ( <i>n</i> = 545) | 27.4                 | 22.4    | 50.3                       | 100   | <i>P</i> < 0.000                    |

NS, not significant.

television on during meal time', 'What my child sees advertised on the television has a strong influence on his/her eating habits', and 'How often is the television on during the evening meal?' Data management and analysis

All data were checked for completeness and consistency, before data entry. The data were analysed using SPSS-PC.<sup>42</sup> Data regarding parental food skills, family meal structures, food availability and television viewing were examined using descriptive statistics. Univariate analyses were performed to examine the distribution of each of the demographic/background variables and the family environment variables. Cross-tabulations were used to examine associations between family environment variables and maternal education. Maternal education was collapsed to form three groups 'Up to some high school', 'Completed high or trade/tech' and 'Tertiary educated'.

## Results

### Response rate and profile of respondents

Of the 1659 families invited to participate in this survey, 560 (33.7%) returned a completed questionnaire. However, return rates differed according to SEIFA index category, with those schools located in areas with a low SEIFA index category returning 30.5%; those in the middle SEIFA index category returning 22.9%; and those in an area with a high SEIFA index having a 46.5% response rate. Respondents were usually mothers of the child (91.9%), with the remaining 8.1% being the child's father (all of whom lived with the mother of the child). Eighty three percent of all mothers were aged between 31 and 45 years, with the majority of their partners (70.8%) falling in this age range also. Three quarters of the respondents were Australian born and for the majority of the sample (92.6%), English was the language

**Table 3.** Respondent's views regarding meal preparation practices

|  | Never | ≤ once a month | 2-3 times/month | 1-3 times/week | ≥ 4times/week | Total | Association with maternal education |
|--|-------|----------------|-----------------|----------------|---------------|-------|-------------------------------------|
| How often would you cook an evening meal? ( <i>n</i> = 556)  | 0.4   |                | 0.5             | 5.9            | 93.2          | 100   | NS                                  |
| How often does your 5–6 year old child help to prepare the evening meal? ( <i>n</i> = 552)                                     | 25.6  | 19.4           | 25.4            | 26.3           | 3.3           | 100   | NS                                  |
| How often does your 5–6 year old child come food shopping with you? ( <i>n</i> = 555)  | 3.3   | 22.5           | 42.3            | 26.7           | 5.2           | 100   | NS                                  |
| How often would you use pre-prepared dishes (eg. crumbed meat or fish, oven fries, pre-prepared vegetables)? ( <i>n</i> = 554) | 16.6  | 20.8           | 29.2            | 29.6           | 3.8           | 100   | NS                                  |
| How often would you use ready-made sauces or marinades (eg Chicken Tonight, Pasta Partners)? ( <i>n</i> = 555)                 | 34.8  | 24.1           | 22.5            | 17.7           | 0.9           | 100   | NS                                  |
| How often would your child have take-aways for lunch? ( <i>n</i> = 553)  | 28.9  | 31.3           | 23.3            | 15.6           | 0.9           | 100   | NS                                  |
| How often would you buy takeaways for the evening meal? ( <i>n</i> = 549)  | 29.8  | –              | 57.7            | 11.0           | 1.4           | 100   | <i>P</i> = 0.001                    |

NS, not significant.

usually spoken at home. In considering maternal education levels, 43.6% of mothers were tertiary educated, 34.6% had completed high school and or trade, and 21.8% had completed some high school. Maternal education was significantly associated with the SEIFA index attributed to their child's school ( $P < 0.000$ ).

#### **Family meal structures**

Respondents' reports of family meal structures are presented in Table 1. Around half of all parents reported that work commitments made it difficult to breakfast as a family, and one-third of respondents nominated that work commitments made having the evening meal together difficult. The majority of respondents (70.3%) reported that the evening meal-time was a pleasant time with 6.6% reporting they did not find it to so. Further, the majority of respondents (70.6%) considered that the evening meal was a time for family connection and discussion, although around one in 10 disagreed with this notion. Half of all respondents disagreed with the proposition that it is acceptable for children to eat the evening meal separately from their parents, however, around 30% agreed with this and a further 20% were neutral. While 70% of respondents reported that they were satisfied with the frequency with which the whole family ate the evening meal together, 20.3% were dissatisfied. Data not presented in the Table show that 63% of respondents ate the evening meal together '4 or more times a week', around 30% did so '1–3 times a week' while approximately 7% did so 'never', or 'less than 2–3 times a month'. Further information regarding the integrity of the evening mealtime showed interruptions by the telephone were accepted by the majority of respond-

ents (63.8%), with just 11.1% having rules that the phone was not to be answered during meal times.

As shown in Table 5, a number of aspects regarding the evening meal were associated with maternal education status. Nearly half the most educated group of mothers reported adult work schedules as an impediment to eating together, compared to just over one quarter of the least educated group of mothers. Furthermore, the frequency of families eating the evening meal together differed by maternal education, with fewer families in the highest maternal education group reporting eating together four or more times a week. This trend is further reflected in respondents' satisfaction with the frequency with which they eat together, with just 62% of most educated maternal group reporting satisfaction. Around 60% of least-educated mothers agreed that the evening meal is a time for family connectedness, while nearly 80% of the middle-educated and around 70% of the most-educated supported this notion. The least-educated mothers were the most equivocal about this. Finally, disagreements about eating during the evening meal also varied by maternal education, with those mothers in the least educated group being about twice as likely to report disagreements than those mothers with higher education levels.

#### **Parental views on meal preparation**

Table 5 shows that approximately one-third of respondents reported that they plan the evening meal well in advance. Over half of respondents reported that they enjoy cooking for their families, with a further 14.6% disagreeing with this statement and nearly one third remaining neutral about it. Approximately seven in 10 parents felt confident to cook a wide range of meals, and slightly fewer reported that they

**Table 4.** Food availability and maternal education status

|  |          | Total | Maternal education status   |                |                   | P value |
|--|----------|-------|-----------------------------|----------------|-------------------|---------|
|  |          |       | Up to some high /trade/tech | Completed high | Tertiary educated |         |
| At the shop where I buy groceries, the variety of fresh fruits and vegetables is limited ( <i>n</i> = 543)   | Agree    | 9.0   | 18.5                        | 7.5            | 5.5               | <0.0001 |
|  | Neutral  | 6.8   | 7.6                         | 6.3            | 6.8               |         |
|  | Disagree | 84.2  | 74.0                        | 86.3           | 87.8              |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| At the shop where I buy my groceries, the condition of fresh fruits and vegetables is poor ( <i>n</i> = 546) | Agree    | 7.8   | 14.3                        | 7.4            | 4.6               | <0.0001 |
|  | Neutral  | 10.5  | 18.5                        | 10.5           | 6.7               |         |
|  | Disagree | 81.7  | 67.2                        | 82.1           | 88.7              |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| I do not buy many fruits because they cost too much ( <i>n</i> = 545)  | Agree    | 7.7   | 10.1                        | 8.5            | 5.4               | <0.052  |
|  | Neutral  | 7.5   | 10.9                        | 9.5            | 4.7               |         |
|  | Disagree | 84.8  | 79.0                        | 82.0           | 89.9              |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| I do not buy many vegetables because they cost too much ( <i>n</i> = 543)                                    | Agree    | 3.2   | 5.0                         | 3.2            | 2.1               | 0.122   |
|  | Neutral  | 7.2   | 6.8                         | 10.7           | 5.1               |         |
|  | Disagree | 89.6  | 88.2                        | 86.1           | 92.8              |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| The fresh produce in my area is usually of a high quality ( <i>n</i> = 545)                                  | Agree    | 76.1  | 57.1                        | 72.3           | 88.2              | <0.0001 |
|  | Neutral  | 19.1  | 35.3                        | 23.4           | 7.6               |         |
|  | Disagree | 4.8   | 7.6                         | 4.3            | 4.2               |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| It is easy to buy food in my area ( <i>n</i> = 546)  | Agree    | 93.3  | 94.2                        | 94.2           | 97.1              | 0.370   |
|  | Neutral  | 5.9   | 5.3                         | 5.3            | 2.1               |         |
|  | Disagree | 0.8   | 0.5                         | 0.5            | 0.8               |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| I do not buy many fruits because my family doesn't like them ( <i>n</i> = 544)                               | Agree    | 7.3   | 11.9                        | 9.5            | 5.1               | 0.013   |
|  | Neutral  | 8.1   | 11.0                        | 6.9            | 7.6               |         |
|  | Disagree | 83.7  | 77.1                        | 83.6           | 87.3              |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |
| I do not buy many vegetables because my family doesn't like them ( <i>n</i> = 545)                           | Agree    | 7.1   | 6.7                         | 9.1            | 5.9               | 0.43    |
|  | Neutral  | 7.9   | 10.9                        | 6.4            | 7.1               |         |
|  | Disagree | 85.0  | 82.4                        | 84.5           | 87.0              |         |
|  | Total    | 100   | 100                         | 100            | 100               |         |

felt confident cooking new dishes. Over one quarter of respondents agreed that it is difficult to find time to cook the evening meal; however, approximately half disagreed with this notion. Respondents in the most educated group were more likely to report that they found it difficult to find time to cook the evening meal (35.1% of most educated respondents, compared with 17.5% and 23.5% of middle and least educated groups, respectively; data not shown in Table).

#### **Parental meal preparation practices**

Table 3 shows that nearly all respondents (93.2%) reported that they cooked the evening meal more than four times a week. For 70% of respondents, this involved their 5–6-year-old-child less than once a week. Around one-quarter of respondents reported that they take their children food shopping never or less than once a month, while around two-fifths of the children shop for food with a parent less than

2–3 times a month, one-quarter do so 1–3 times a week and 5% do so 4 or more times a week. A large proportion of respondents never or rarely used preprepared dishes, with 16.6% reporting no use, and 20.8% reporting that they use these products once or less per month. Around one third reported that they used preprepared dishes less than 2–3 times a month, one third used them 1–3 times a week and only 3.8% reported using them 4 or more times a week. Ready-made sauces and marinades were used less often, with the majority (81.4%) reporting that they were used less than 2–3 times a month. A very small proportion of parents (<1%) reported that their child had takeaways for lunch more than four times a week, while 15.6% had them 1–3 times a week, and around four-fifths had takeaways for lunch less than 2–3 times a month. One-third of respondents reported no takeaway meals, around 60% consumed them 2–3 times a month, 11% 1–3 times a week, and 1.4% bought

takeaway meals more than 4 times a week. Respondents in the least educated group were twice as likely to report buying takeaway meals two or more times a week (21.4% of most educated respondents, compared with 10.2% and 9.5% of middle and least educated groups, respectively; data not shown in Table).

### Food availability

Respondent's views regarding factors that influence the availability of food are presented in Table 5. The vast majority of respondents (over 80%) disagreed with the proposition that the variety of fresh fruits and vegetables at their shop was limited or that the condition of fresh fruits and vegetables at their shop was poor. In considering cost of fruits and vegetables, the overwhelming majority of respondents disagreed with the statements 'I don't buy many fruits because they cost too much' (84.8%), and 'I don't buy many vegetables because they cost too much' (84.1%). There was strong agreement with the notion that the quality of fresh produce in the respondent's area was of high quality, with approximately three-quarters of people agreeing with this statement. The support for the proposition that it is easy to buy food was stronger still, with 93.3% agreeing. Less than one in 10 respondents agreed that they do not buy many fruits and vegetables because family members did not like them.

However, views regarding food availability were strongly associated with maternal education. As Table 4 shows, those respondents with the least education were

most likely to report that the quality of fresh produce in their area was poor, and that the variety of fruits and vegetables available at their local shop was limited. These trends by maternal education were repeated when the condition of fresh fruits and vegetables was considered, with the least educated group more often reporting the condition was poor. Around 12% of least educated respondents reported their family's dislike of fruits limited their purchase (compared with 5.0% of most educated group).

### Media exposure

One-third of respondents reported that their families viewed the television more than four times a week while eating the evening meal. A further 21.8% reported doing so 1–3 times a week, and 44.4% reported this activity occurred less than 2–3 times a month. Paralleling the practice of viewing television while eating was the desire of adults in the family to have the television on during mealtime, with 53.2% disagreeing with the statement 'adults in the family want the television on during meal time', 26.6% agreeing with this, and the remainder (20.2%), having no strong feelings about it. The majority of respondents (54.2%) disagreed with the proposition that food advertising had an influence on their child's eating habits, while one quarter believed it did have an effect on their children's eating and around one fifth (21.7%) had no strong feelings.

Television viewing at mealtimes differed by maternal education. Nearly twice as many of the least educated respondents (cf. the most educated), reported that adults in

**Table 5.** Family meal structures by maternal education status

|  |             | Maternal education status |                           |                   | P value |
|--|-------------|---------------------------|---------------------------|-------------------|---------|
|  |             | Up to some high           | Completed high/trade/tech | Tertiary educated |         |
| Adult work schedules often make it difficult to have the evening meal together ( <i>n</i> = 545)         | Agree       | 28.8                      | 26.9                      | 46.7              | <0.000  |
|  | Neutral     | 17.9                      | 9.5                       | 7.1               |         |
|  | Disagree    | 53.3                      | 63.6                      | 46.2              |         |
|  | Total       | 100                       | 100                       | 100               |         |
| How often does your whole family sit down for an evening meal? ( <i>n</i> = 540)                         | < 2–3/month | 8.4                       | 4.3                       | 7.7               | 0.0013  |
|  | 1–3/week    | 27.7                      | 21.8                      | 36.5              |         |
|  | ≥4/week     | 63.9                      | 73.9                      | 55.8              |         |
|  | Total       | 100                       | 100                       | 100               |         |
| I am satisfied with how often my family eats the evening meal together ( <i>n</i> = 545)                 | Agree       | 69.8                      | 80.9                      | 61.8              | 0.01    |
|  | Neutral     | 12.6                      | 7.4                       | 10.1              |         |
|  | Disagree    | 17.6                      | 11.7                      | 28.1              |         |
|  | Total       | 100                       | 100                       | 100               |         |
| The evening meal is usually a time when our family connects and talks together ( <i>n</i> = 558)         | Agree       | 60.2                      | 78.8                      | 69.6              | 0.006   |
|  | Neutral     | 29.7                      | 13.2                      | 19.8              |         |
|  | Disagree    | 10.2                      | 7.9                       | 10.5              |         |
|  | Total       | 100                       | 100                       | 100               |         |
| How often would you say that disagreements about eating occur during the evening meal? ( <i>n</i> = 538) | <2–3/month  | 47.4                      | 58.3                      | 63.5              | 0.007   |
|  | 1–3/week    | 29.7                      | 28.9                      | 24.9              |         |
|  | ≥4/week     | 22.9                      | 12.8                      | 11.6              |         |
|  | Total       | 100                       | 100                       | 100               |         |

the family wanted to view television while eating the evening meal (40.2% vs. 20.6%;  $P < 0.001$ ). Further, more than half (55.1%) of those in the least educated group reported viewing television more than four times a week (during the evening meal), compared to 23.4% in the most educated group ( $P < 0.001$ ).

### Discussion

This study is unique in its description of family food environments of 5–6-year-old-children, and how these environments are influenced by maternal education. The opportunities within families to model food and food related behaviours provides an important example of this influence. This study showed a complex picture of the evening meal, with families with most educated mothers reporting that they eat the evening meal together less often and feel dissatisfied about this. Eating the evening meal together was more common among those families with middle and least educated mothers, suggesting that children in these families have greater opportunities to learn eating behaviours in this milieu. Previous research suggest that direct modelling of behaviour by parents, plays a major role in the development of health related knowledge, attitudes and behaviours of children and adolescents.<sup>31,43</sup> In the eating domain, Epstein *et al.*<sup>44</sup> have demonstrated the power of parental role modelling in the promotion and maintenance of weight loss, and suggests that parent participation and modelling of behaviour change is instrumental in promoting eating and activity management skills acquisition by children. Further work<sup>33</sup> provides evidence that in an older age group, eating with parent(s) may be important for dietary intake. In that study Gillman *et al.* examined the associations between frequency of families eating their evening meal together and several measures of diet quality in a large national sample of nine to 14-year-old children. Results showed that eating family dinner together was associated with healthful dietary intake patterns, including more fruits and vegetables, less fried food and soda, less saturated and *trans* fat, lower glycemic load, and more fibre and micronutrients from food.

However, while families with middle and least educated mothers ate together more often, this opportunity was complicated by the findings that these families were also more likely to watch television while eating the evening meal, a behaviour that may actually limit the opportunities originally suggested. Television viewing during the evening meal was particularly prevalent in those families with least educated mothers. For example, Taras<sup>45</sup> reports that watching television while eating may decrease family interactions and is associated with poorer eating choices. Further, Coon *et al.*<sup>46</sup> found significant differences between that the dietary patterns of children aged 9–12 years from families in which television viewing is a normal part of meal routines ( $n = 41$  parent-child pairs), and of children from families in which television viewing and eating are separate activities ( $n = 50$  parent-child pairs). Coon *et al.* reports that overall, children who normally viewed television during meals ate fewer fruits and vegetables, and more pizzas, snack foods, and soft

drink than children who did not. Further, televisions were more likely to be on during meals in households with least educated mothers. Finally, it is interesting to note that despite the differences in the use of television by maternal education, there was a consistent belief that food advertising did not have a strong influence on children's eating habits, with just one-quarter of respondents agreeing with this notion. This finding is at odds with US research which has found that children aged 2–6 years, who are exposed to videotape with embedded commercials were significantly more likely to choose the advertised items than children who saw the same videotape without commercials.<sup>47</sup>

The purchase of take-away food for the evening meal was also associated (negatively) with maternal education, with those mothers in the least educated group being twice as likely to report buying takeaway meals two or more times a week (21.4% of least educated respondents, compared with 10.2% and 9.5% of middle and most educated groups, respectively). The increased purchase and consumption of takeaway foods did not relate to the number of hours that mother's worked, nor to perceptions of food skills. The higher use of takeaway foods in the least educated group may be related to the tendency of lower SES families to use fast-food chains rather than restaurants as an opportunity for eating out.<sup>48</sup> It may also reflect the local food environment. For example, Reidpath<sup>49</sup> has recently described a dose-response relationship between SES and the density of fast food outlets, with people living in areas from the lowest SES category having 2.5 times the exposure of people in the highest category. This is an interesting finding in light of studies that show disproportionate advertising of tobacco<sup>50</sup> in lower SES suburbs in the US. At a minimum, Reidpath's study provides a further example of the ways in which SES may determine food access, availability and hence consumption.

With the exception of the increased use of takeaway foods discussed above, the opportunities for parental modelling of food related behaviours such as cooking and shopping for food did not differ significantly by maternal education. Overall it is of interest that opportunities for modelling food preparation were low, with just one-quarter of children involved in preparing food for the evening meal one to three times a week, one quarter involved less than two to three times a month, and 45% being involved never or less than once a month.

The significant differences described regarding the physical food environment, that is the availability of high quality and affordable fresh fruits and vegetables, provide a further important example of the differences seen across families by maternal education. For example, we found that nearly one fifth of participants in the least educated group reported that the variety of fruits and vegetables available to them was limited; that around 15% reported that the condition of fruits and vegetables available to them was poor; and that cost limited purchase of vegetables (5%), and fruit (10%). Family food preferences were an additional factor that limited the purchase of fruits and vegetables (and thus the availability of

these foods in the home), with around 12% of the least educated mothers reporting that they were likely to limit their purchase of fruits because the family did not like them. These findings are consistent with international research<sup>51–53</sup> however, to our knowledge, this is the first Australian study to highlight disparity of food environments in non-rural settings.

It is important to consider the limitations of this study. In this study we had a disproportionately large number of tertiary educated women (43.7%), and it is expected that respondents were more likely to be those who have an interest in children's nutrition. However, while tertiary educated women were over represented in our sample, to our knowledge, this is the largest study of family food environments reported. Further, it is understood that the most disadvantaged in society are unlikely to participate in survey based research<sup>54</sup> which suggests that the differences described across SES are likely to be even stronger than reported. Finally we acknowledge that this is a cross-sectional survey and thus, that no causal attributions can be made.

### Conclusion

The environment in which a child learns to eat is complex and differs across SES. This study highlights a number of differences in aspects of a child's family food environment that are likely to impact on a child's dietary patterns and thus risk for nutrition related disease. Consideration of the opportunities for the modelling of healthy eating, the use of takeaway meals, and the differences in reported food availability, affordability and quality, provide important examples of areas that need to be considered in the design of nutrition promotion strategies targeting families and their children.

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