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Comparison of salt-related knowledge, attitudes and behaviours between parents and caregivers of children under 18 years of age and other adults who do not care for children under 18 years of age in Victoria, Australia

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ABSTRACT

Background/Aims Salt intake among Australian adults exceeds recommendations, increasing the risk of cardiovascular disease. Knowledge, attitudes and behaviours (KABs) are modifiable factors that may influence salt consumption. It is not known whether salt-related KABs among parents and caregivers of children under 18 years of age differ from other adults who do not care for children under 18 years of age. Therefore, we aimed to determine whether salt-related KABs differed between parents and caregivers and other adults. This information can be used to inform messages included in salt reduction consumer awareness campaigns.

Methods Adults, aged 18–65 years, were recruited from four shopping centres, Facebook and a consumer research panel in the state of Victoria, Australia. Participants indicated if they were a parent or a caregiver of a child/children <18 years ('parents/caregivers') or not ('other adults'). Regression models, adjusted for covariates, assessed differences in KABs between the two groups. Construct scores for KABs were developed, with high scores for knowledge indicative of high salt-related knowledge, for attitude indicative of lower importance of using salt to enhance the taste of food, and for behaviours indicative of higher frequency of engaging in behaviours to reduce salt in the diet.

Results A total of 840 parents/caregivers and 1558 other adults completed the survey. Just over half of the parents/caregivers and other adults were female, with a mean (SD) age of 41.1 (10.3) years and 44.3 (15.3) years, respectively. Mean construct scores for salt-related KABs were similar between the two groups. Parents/caregivers were less likely to be aware of the relationship between salt and sodium (OR=0.73, p=0.002) and more likely to report difficulty in interpreting sodium information displayed on food labels (OR=1.36, p=0.004). Parents/caregivers were more likely to be concerned about a range of food-related issues, including the amount of saturated fat, sugar and salt in food. Parents/caregivers were more likely to report that they were trying to reduce their salt intake (OR=1.27, p=0.012) and more likely to report adding salt at the table (OR=1.28, p=0.008).

Conclusions There were some differences in salt-related KABs between parents/caregivers and other adults. These findings provide insight into particular messages that could be focused on in consumer awareness campaigns that seek to improve parents'/caregivers' KABs related to salt intake. Specifically, messages targeted at parents/caregivers should include practical guidance to reduce table salt and resources to assist in interpreting sodium information on food labels and the relationship of sodium to salt.

INTRODUCTION

Excessive salt intake is a global public health issue. A recent modelling study showed that in 2010, 1.65 million cardiovascular disease (CVD)-related deaths globally were attributed to high sodium consumption above 2 g/day (salt equivalent 5 g/day).[1] Currently, Australian adults consume 8–9 g/day of salt,[2] which is above the suggested dietary target of 5 g/day.[2 3] The proportion of men exceeding the previously recommended upper level for salt (ie, 5.8 g/day) ranged from 83% of those aged 19–30 years to 47% of those aged 70 years and over. For women, this ranged from 46% of those aged 19–30 years to 16% of those aged 70 years and over.[4] There is strong evidence that a diet high in salt is associated with raised blood pressure,[5] a major risk factor for the development and progression of CVD,[6] and several other health outcomes including stroke,[7] kidney disease[8] and stomach cancer.[9] Based on a previous finding, an average of 3 g/day reduction in population salt intake would result in a 13% reduction in stroke and a 10% reduction in ischaemic heart disease.[10] Thus, reducing population salt intake is

considered a cost-effective strategy for the prevention of chronic diseases.[11 12]

In the state of Victoria, Australia, population salt intake remains high (8 g/day).[13] To address this, in 2015, the Victorian Health Promotion Foundation (VicHealth) and the Heart Foundation (Victoria) launched a multifaceted initiative to reduce population salt intake in the state of Victoria.[14] The key components of this initiative include engagement with the food industry, consumer education, research and social marketing strategies.[14 15] This approach is similar to that previously used in the UK and South Africa, whereby multifaceted salt reduction initiatives, combining consumer education, assessed by monitoring changes in salt-related knowledge, attitudes and behaviours (KABs), with food reformulation strategies, successfully reduced salt intake at the population level.[16 17] The target audience for the current consumer awareness campaign in Victoria are parents, who are predominantly female, the primary purchaser of household groceries, aged 35–45 years and with children 0–12 years of age. Parents have been targeted as they play a vital role in constructing the home environment where children have their earliest experiences with food and eating, and from such experiences children expand their knowledge of food and nutrition,[18–21] and for this reason parents are often referred to as the 'nutritional gatekeepers' of the family.[22]

As part of the baseline evaluation of this campaign, we have previously reported on salt-related KABs in the general Victorian population.[23] Furthermore, within a subset of parents and caregivers, we have reported salt-related KABs specific to children and found that certain knowledge and attitudes were related to salt-specific behaviours. For example, parents and caregivers who agreed that eating too much salt during childhood may have harmful effects on children's health and those who reported that limiting the amount of salt their child eats is important, were less likely to report child salt use at the table and adding salt to food prepared for the child.[24] However, it remains unclear whether salt-related KABs among parents and caregivers of children under the age of 18 years differ compared with other adults who do not care for children under the age of 18 years. Understanding this information is important as parents and caregivers of younger children are often viewed as a receptive target for health-related education messages.[25] Collecting data on any differences in salt-related KABs between parents and caregivers and other adults can help to determine whether salt reduction messages targeted at parents and caregivers should differ from other adults. In this analysis, we were particularly interested in parents and caregivers of children under 18 years of age, rather than parents of 'adult' children, because they are the nutritional gatekeepers of the family and have a major influence in determining the dietary behaviour of children.[18–21] Similarly, caregivers have been shown to play a vital role in structuring children's early experiences with food and eating and are important gatekeepers to the social influences around children's eating.[20] Thus, we aimed to determine whether salt-related KABs differed among parents and caregivers of children under 18 years of age compared with other adults who do not care for children under 18 years of age.

METHODOLOGY

Study design and participant recruitment

This was a cross-sectional study completed in a sample of Victorian adults aged 18–65 years. Full details of the methodology have been described elsewhere.[23] In brief, participants were recruited using three strategies: (1) across four shopping centres in Victoria, (2) a Facebook advertisement campaign and (3) an online consumer research panel (Global Market Insite (GMI) Lightspeed), from September through November 2015.[23]

Participants from all recruitment strategies used Qualtrics (Provo, UT; 2018), an online survey software instrument, to complete a questionnaire assessing salt-related KABs. On the questionnaire, participants were asked to indicate if they were parents or caregivers of a child or children <18 years of age. Responses included 'Yes, I'm a parent', 'Yes, I care for a child/children' or 'No'. In this analysis, the sample was stratified into those who responded as 'yes' defined as 'parents/caregivers of children <18 years of age' (termed as parents) or those who responded as 'no' (termed as other adults). Of note, the group of other adults may or may not have children aged 18 years or over. In this analysis we are particularly interested in parents/caregivers of children under 18 years of age, rather than parents/caregivers of 'adult' children, because they are the nutritional gatekeepers of the family and have a major influence in determining the dietary behaviour of children.[18–21]

All participants provided informed consent. Participants were offered a piece of fruit or a chocolate as an incentive for completing the survey.

Shopping centre recruitment and data collection

Data were primarily collected during the hours of 09:00–17:00, Monday to Saturday, from September to October 2015. However, to capture a broad representation of adults, recruitment also occurred on Sundays and during late-night shopping hours (Thursday evenings) at selected sites. To capture a representative spread of participants across different socioeconomic stratum, participants were recruited from shopping centres from geographical areas of varying socioeconomic advantage and disadvantage as indicated by the Socio-Economic Indexes for Areas.[26] Each shopping centre was allocated 5 days for recruitment and data collection. The researchers approached passing shoppers and invited them to participate in the study. Participants completed an intercept survey on an iPad.

Facebook advertisement campaign

An 8-week Facebook advertisement was run from mid-September to mid-November 2015. Advertisements

were displayed to Facebook users who met the inclusion criteria.[23] Clicking on the advertisement redirected the Facebook user to the Qualtrics web page, where after providing consent the participant proceeded to complete the online survey.

GMI consumer research panel

Participants were recruited via an online panel provider, GMI Lightspeed (Warren, USA), during November 2015. The GMI research database comprised individuals who have voluntarily registered themselves with GMI and are contacted periodically by GMI to take part in a variety of online surveys in return for reward points which they can redeem for monetary payments.[23] Participants were emailed a letter containing a URL link to the plain language statement and consent form.[23] Participants were then able to access the survey via the Qualtrics link provided.

Survey instrument

A questionnaire containing 37 questions was developed to assess demographic characteristics and KABs related to dietary salt intake, and included eight questions which specifically assessed salt-related KABs related to children's salt intake which only the parents/caregivers completed (online supplementary file 1).[24] The findings from these eight questions have been reported elsewhere.[24] The current study relates only to the general salt-related KABs, not those specific to parents/caregivers; therefore, the total number of questions is 29. The questions were modelled on those used in previous salt-related surveys.[27–36]

Demographic characteristics

Twelve questions addressed demographic characteristics such as age, sex, level of education, country of birth, language spoken other than English, history of chronic disease, and self-reported height and weight. Body mass index (BMI) was used to categorise participants into weight categories (eg, underweight (BMI <18.5 kg/m^2), healthy weight (BMI 18.5–24.9 kg/m^2), overweight (BMI 25.0–29.9 kg/m^2) and obese (BMI ≥30.0 kg/m^2)).[37] Socioeconomic status (SES) was based on educational attainment, defined as (1) low SES: those with some or no level of high school education; (2) mid-SES: those with a technical/trade certificate or diploma; and (3) high SES: those with a university/tertiary qualification.[23]

Knowledge related to salt intake

Seven questions addressed participants' salt-related knowledge. Four questions related to the relationship between salt and sodium, awareness of current salt intake among adults, main food source of salt in the Australian diet and daily salt intake recommendation. These four knowledge questions were in the form of multiple-choice questions. Two knowledge questions in this section asked participants whether eating too much salt damages health and the health risks associated with excess salt intake, such as high blood pressure, kidney disease, heart disease/heart attack, stroke and stomach cancer. Response options included 'yes', 'no' and 'don't know'. For bivariate analysis, the responses 'no' and 'don't know' were collapsed into one category. Finally, the last question, using a 5-point Likert scale, was related to whether Himalayan salt, pink salt, sea salt and gourmet salts are healthier than regular salt, with response options ranging from 'strongly disagree' to 'strongly agree'. For bivariate analysis, the responses were dichotomised into 'strongly agree/agree' (termed 'agree') and 'strongly disagree/disagree/neither agree nor disagree' (termed 'disagree').

Scoring for knowledge questions

Correct responses for each knowledge question were scored as 1 and incorrect responses (including don't know/not sure) were scored as 0. In the one case where a 5-point Likert scale was used, a score of 2 was assigned for 'strongly disagree', 1 for 'disagree' and 0 for incorrect responses, including 'neither agree nor disagree'. This allowed for the differentiation between lack of knowledge and knowledge held with low levels of confidence.[35] A total knowledge score out of 12 (from 11 individual knowledge items) was derived by summing the scores of each knowledge question. Higher scores indicated a higher level of salt-related knowledge.

Attitudes related to salt intake

Four questions addressed attitudes related to salt intake. The first question related to participants' perception of their own salt intake, that is, 'I eat less salt than recommended', 'I eat more salt than recommended' and so on (online supplementary file 1). The second question used a 5-point Likert scale to assess concern about food-related factors, which included the amount of salt in food, as well as the amount of sugar, fat, saturated fat and kilojoules in food, and healthy eating. These other food-related issues were included to assess concern for salt in relation to other food-related factors. Response options ranged from 'not at all concerned' to 'extremely concerned'. For bivariate analysis, responses were dichotomised into 'not at all concerned/not very concerned' (termed 'not concerned') and 'extremely concerned/very concerned/somewhat concerned' (termed 'concerned').

In the third question, another 5-point Likert scale assessed participants' level of agreement for five salt-related attitude statements. This question included attitude statements such as 'I believe salt needs to be added to food to make it tasty', 'My health would improve if I reduced the amount of salt in my diet', 'It is hard to understand sodium information displayed on food labels' and so on (online supplementary file 1), with response options ranging from 'strongly disagree' to 'strongly agree'. For bivariate analysis, the responses were dichotomised into 'strongly disagree/disagree/neither agree nor disagree' (termed 'disagree') and 'strongly agree/agree' (termed 'agree'). In the final question, participants were asked how responsible particular groups were for salt reduction (eg, yourself, government, food manufacturers, chefs and

so on), with responses ranging from 'not at all responsible' to 'very responsible'; 'don't know' was also an option. For bivariate analysis, the responses were dichotomised into 'responsible/very responsible/somewhat responsible' (termed 'responsible') and 'not at all responsible' (termed 'not responsible'). The response 'don't know' was excluded from analysis due to a low number of participants selecting this option, and is presented in online supplementary table 1.

Scoring for attitude questions

One attitude item from one question was used to reflect the importance of the taste of salt in food ('I believe salt needs to be added to food to make it tasty'). This score was modified from a previously validated salt questionnaire.[35] Response options were scored as 4 for 'strongly agree', 3 for 'agree', 2 'neither agree nor disagree', 1 for 'disagree' and 0 for 'strongly disagree', with a higher score indicative of a stronger attitude towards the importance of salt for taste. No other attitude questions were scored as these questions did not reflect a common construct and used different scales for response options.

Behaviours related to salt intake

Six questions assessed behaviours related to salt intake. A 5-point Likert scale was used for three questions related to discretionary salt use (adding salt during cooking, adding salt at the table and placing a salt shaker on the table at meal times), with response options ranging from 'always' to 'never'. For bivariate analysis, responses were dichotomised into 'always/often/sometimes' and 'rarely/never'.

One question asked participants whether they were trying to reduce salt in their diet. Response options included 'yes', 'no' and 'don't know'. For bivariate analysis, the response option 'don't know' was combined with 'no'. Another behaviour question was a 5-point Likert scale question asking participants to report the frequency of engaging in seven salt reduction-related behaviours in the past month (eg, looked at a food label to check salt/sodium content, avoided eating packaged, ready-to-eat foods, foods from fast food restaurants, used spices/herbs instead of salt when cooking, and so on) (online supplementary file 1), with response options ranging from 'never' to 'always'; 'does not apply to me' was also an option. For bivariate analysis, the responses were dichotomised into 'always/often/sometimes' and 'rarely/never'. The final behaviour question related to the frequency of using the Health Star Rating, a voluntary front-of-pack labelling system used in Australia to choose cereals, cheese and bread. Response options included 'usually', 'sometimes', 'never' and 'don't know', and responses were dichotomised into 'usually/sometimes' and 'never' for bivariate analysis. Behaviour questions which included the response options 'does not apply to me' or 'don't know' were excluded from analysis due to a low number of participants selecting these options, and are presented in online supplementary tables 2 and 3.

Scoring for behaviour questions

Scores assigned for salt-related behaviours were based on the frequency of engaging in the behaviour. Discretionary salt use behaviours, assessed using a 5-point Likert scale, were assigned a score of 4 for 'never', 3 for 'rarely', 2 for 'sometimes', 1 for 'often' and 0 for 'always'. The total score for discretionary salt use was 12 (from 3 individual items), with higher scores indicating lower frequency of discretionary salt use. Any participant who responded 'don't know' to one or more of the discretionary salt use questions were excluded from the total score for discretionary salt use. The salt reductionrelated behaviours were scored in a similar manner, with scores assigned according to the nature of the statements (frequency of engaging in positive salt reduction-related behaviours scored as 4 for 'always', 3 for 'often' and so on, and negative behaviours scored as 0 for 'always', 1 for 'often' and so on) (online supplementary file 1). The total score for the salt reduction-related behaviours was 28 (from 7 individual items). Any participant who responded 'does not apply to me' to one or more of the salt reduction-related behaviour questions was excluded from the total score for salt reduction-related behaviours.

The discretionary salt use and salt reduction-related behaviour scores were summed to derive a total behaviour score out of 40 (from 10 individual behaviour items). Higher scores indicated a higher frequency of engaging in behaviours which seek to reduce the amount of salt in the diet.[35] Participants who responded 'don't know' to the discretionary salt use questions and/or 'does not apply to me' to the salt reduction-related behaviour questions were not included in the final total salt behaviour score.

Data analysis

All data were analysed using Stata/SE V.15.0. Continuous and categorical data were expressed as mean (±SD) or number of participants (n) and percentages, respectively. The normality of the KAB scores was determined using histograms and were deemed normally distributed. To assess differences in the construct scores for KABs between parents/caregivers and other adults, two-sample t-tests (±SEM) were used, followed by linear regression models, which accounted for potential covariates. To assess differences for individual questions which were collapsed into dichotomised responses, logistic regression was used with adjustment for covariates. Difference in demographic characteristics between parents/caregivers and other adults of $p<0.10$ was used as a cut-point for covariate adjustment. On this basis, regression models were adjusted for age, country of birth, language spoken, SES and weight category. In addition, due to the importance of sex as a potential covariate, this was also included in regression models. To determine the difference between the proportion of parents/caregivers and other adults regarding the perception of their own salt intake compared with the recommended amount, for which the response options could not be dichotomised, a χ^2 analysis

was performed. For all analyses, a p value of <0.05 was considered significant.

RESULTS

Demographic characteristics

Out of a total of 2559 participants who agreed to complete the online survey, 46 did not answer any of the questions or did not complete the survey to the end (n=118). Therefore, 2398 adults provided valid responses, out of whom 840 were parents/caregivers (n=726 parents and n=114 caregivers) with at least one child <18 years, and 1558 were other adults who do not care for children <18 years of age. Just over half of all participants were female (table 1). Parents/caregivers were on average 3 years younger than the other adults, and more parents/caregivers were born in Australia compared with other adults (table 1).

Knowledge

There was no difference in the mean total knowledge score of parents/caregivers (6.6±0.06) (±SEM) and other adults (6.5±0.08) (p=0.43). The results remained the same when adjusted for age, sex, country of birth, language spoken, SES and weight category.

For individual knowledge questions, the majority were similar between parents/caregivers and other adults, with the exception of knowledge of the relationship between salt and sodium, whereby parents/caregivers were less likely to be aware of the relationship, adjusted for covariates (table 2). Parents/caregivers were, however, 1.3 times more likely to disagree with the statement 'Himalayan salt, pink salt, sea salt and gourmet salts are healthier than regular salt', adjusted for covariates (table 2). The individual categorical response data for the individual knowledge questions are presented in online supplementary table 4.

Attitudes

There was no difference in the mean attitude score of parents/caregivers (2.9±0.04) and other adults (2.8±0.04) (p=0.12). The results remained the same after adjustment for covariates.

There was no difference between parents/caregivers and other adults in how they perceived their own salt intake compared with recommendations. Approximately two-thirds of all participants believed that their own salt intake was either below or equal to the recommendation, while 15% of parents/caregivers and 17% of other adults did not know how their salt intake compared with the recommendations. Twenty per cent of parents/caregivers and 18% of other adults believed their salt intake to be above the recommendation (p value χ^2=0.686).

Compared with other adults, parents/caregivers were more likely to be concerned about a range of food-related issues (table 3). However, parents/caregivers had a greater odds of being concerned about the amount of sugar, saturated fat and fat in food compared with the amount of salt in food. Parents/caregivers were approximately 1.4 times more likely to agree that sodium information displayed on food labels is difficult to understand (table 3). There was no difference between parents/caregivers and other adults in terms of beliefs surrounding groups responsible for salt reduction (table 3). The individual categorical response data for the individual attitude questions are presented in online supplementary tables 1, 5 and 6.

Behaviours

There was no difference in the mean total behaviour score of parents/caregivers (n=774) (20.6±0.25) and other adults (n=1412) (20.9±0.19) (p=0.30). The results remained the same after adjusting for covariates. Similarly, there was no difference in discretionary salt use scores between parents/caregivers and other adults (6.4±0.11 vs 6.9±0.08, p=0.09) and no difference between scores after adjusting for covariates. There was no difference in mean scores for the salt reduction-related behaviours of parents/caregivers (13.9±0.2) and other adults (13.6±0.15) (p=0.16), and the adjusted values did not differ from unadjusted values.

Overall, for individual questions, salt-related behaviours between parents/caregivers and other adults were similar, with the exception of three behaviours, whereby compared with other adults, parents/caregivers were approximately 1.3 times more likely to be adding salt at the table and report trying to reduce their salt intake. Parents/caregivers were also 1.5 times more likely to ask for their food to be prepared without salt when eating out (all adjusted for covariates) (table 4).

Parents/caregivers were more likely to report using the Health Star Rating to choose breakfast cereals, cheese and bread than other adults (table 5). The individual categorical response data for the individual behaviour questions are presented in online supplementary table 2.

DISCUSSION

This is the first study to compare salt-related KABs among parents/caregivers of children aged <18 years with other adults who do not care for children <18 years of age in Australia. Overall, mean construct scores for KABs between parents/caregivers and the other adults were similar. There were some differences in responses provided by parents/caregivers and other adults for individual salt-related KAB questions. In relation to salt-related knowledge, compared with other adults, parents/caregivers were more likely to be aware that Himalayan salt and pink salt are no healthier than regular salt, but were less likely to be aware of the relationship between salt and sodium. With regard to attitudes, parents/caregivers were more likely to be concerned about all food-related factors, compared with other adults; however, parents/caregivers had a greater odds of being concerned about the amount of sugar, fat and saturated fat in food compared with the amount of salt in food. In addition, parents/caregivers were more likely to agree that sodium information on food

Table 1 Demographic characteristics of parents/caregivers and other adults

Characteristics	Parents of a child/children <18 years of age (n=840) n or mean (% or ±SD)	Other adults (n=1558) n or mean (% or ±SD)	P value*
Gender			
Male	349 (41)	697 (45)	0.123
Female	491 (58)	861 (55)	
Age (years)	41.1 (±10.3)	44.3 (±15.3)	**<0.001**
Age group (years)			
18–34	224 (27)	539 (35)	**<0.001**
35–44	319 (38)	208 (13)	
45–55	211 (25)	303 (19)	
55–65	86 (10)	508 (33)	
Country of birth†			
Australia	688 (82)	1227 (79)	**0.019**
UK	17 (2)	69 (4)	
New Zealand	9 (1)	20 (1)	
Other‡	114 (14)	226 (15)	
Language spoken other than English§			
English only	673 (80)	1296 (84)	0.088
Other¶	159 (19)	250 (16)	
Socioeconomic status**			
High	369 (44)	651 (42)	0.056
Mid	248 (30)	427 (28)	
Low	215 (26)	467 (30)	
BMI (kg/m^2)	27.1 (±6.3)	27.2 (±6.2)	0.156
Weight category††			
Underweight	15 (2)	53 (4)	0.060
Healthy weight	298 (40)	548 (39)	
Overweight	235 (31)	455 (33)	
Obese	202 (27)	330 (24)	
Diagnosed with a CVD-related condition			
Yes	243 (29)	462 (30)	0.847
No	584 (70)	1075 (69)	
Don't know/can't recall	13 (1)	21 (1)	
Reported CVD-related conditions included‡‡			
Heart disease	44	63	0.124
Stroke	40	30	0.103
High blood pressure	179	335	0.266
Heart attack	26	32	0.118
Taking medication to control high blood pressure§§			
Yes	118/179 (66)	267/335 (89)	**<0.001**
No	61/179 (34)	68/335 (21)	
Main grocery shopper			
Yes	639 (76)	1168 (75)	0.272
No	59 (7)	124 (8)	
I share the responsibility	142 (17)	266 (17)	

Continued

Table 1 Continued

Characteristics	Parents of a child/children <18 years of age (n=840) n or mean (% or ±SD)	Other adults (n=1558) n or mean (% or ±SD)	P value*

Bolded values represent significance at p<0.05.
*Comparison of sociodemographic variables between parents/caregivers and other adults who did not care for children <18 years was conducted by χ^2 analyses for categorical variables and independent sample t-test for continuous variables.
†n=2370, as participants who responded 'don't know' (n=2) (parents/caregivers) and 'prefer not to answer' (n=26) (n=10 parents/caregivers and n=16 other adults) were excluded.
‡Includes Italy, Greece, China, Vietnam, Lebanon and others.
§n=2378, as participants who responded 'don't know' (n=1) (parent) and 'prefer not to answer' (n=19) (n=7 parents/caregivers and n=12 other adults) were excluded.
¶Includes Italian, Greek, Cantonese, Mandarin, Arabic, Vietnamese, German, Spanish, Tagalog and others.
**Socioeconomic status (SES) based on educational attainment, defined as the following: high SES: those with a university/tertiary qualification; mid-SES: those with a technical/trade certificate or diploma; and low SES: those with some or no level of high school education. n=2377, as participants who responded 'don't know' (n=3) (n=2 parents/caregivers and n=1 other adults) and 'prefer not to answer' (n=18) (n=6 parents/caregivers and n=12 other adults) were excluded.
††Defined as underweight (BMI <18.5 kg/m^2), healthy weight (BMI 18.5–24.9 kg/m^2), overweight (BMI 25.0–29.9 kg/m^2) and obese (BMI ≥30.0 kg/m^2). n=2136, as participants with missing height or weight data were excluded (n=90 parents/caregivers and n=172 other adults).
‡‡n=289 parents/caregivers and 460 other adults, as participants could select more than one category of CVD-related conditions.
§§Question only presented to those who reported being diagnosed with high blood pressure, that is, n=178 for parents/caregivers and n=335 for other adults.
BMI, body mass index; CVD, cardiovascular disease.

labels is difficult to understand. Parents/caregivers were more likely to report that they were trying to reduce their salt intake. But in general, salt-related behaviours were similar between parents/caregivers and other adults, with the exception that parents/caregivers were more likely to ask to have meal prepared without salt when eating out and more likely to report adding salt to food at the table.

To our knowledge, there are no other studies assessing whether parents/caregivers and other adults differ in regard to KABs related to dietary salt intake or even KABs more broadly related to nutrition. There is, however, some evidence that dietary intake may differ between adults who have children living in the household, compared with those who do not.[38] This was shown in a secondary analysis of the US National Health and Nutrition Examination Survey III, where it was reported that compared with adults without children living in the home, those with children <17 years of age had significantly higher adjusted intake of fat (+4.9 g/day) and saturated fat (+1.7 g/day).[38] Furthermore, adults with children in the home ate high-fat foods more frequently than adults without children, including salty snacks, pizza, cheese, beef, ice cream, cakes/cookies, bacon/sausage/processed meats, and peanuts.[38] Given the scarcity of the literature in this area, further work is required to understand if other aspects of diet quality, including salt intake, differs between parents/caregivers and other adults. There is some evidence to indicate that parents are generally concerned about what their children are consuming. Findings from our previous analysis of this cohort of parents/caregivers showed that the majority (70%) of parents/caregivers deemed limiting the amount of salt that their children eat is important to them.[24] Another Australian study showed that 69% of parents of children aged 2–16 years (n=1202) were concerned about their child's diet, and this concern ranked at the very top or towards the top of their list of general concerns, and 55% were concerned that their child consumed too much junk food (often high in sugar, fat and salt).[25] These findings suggest that parents/caregivers are likely to be an important, receptive target group for dietary interventions.

Currently, only one study conducted in Australia, by the Australian Division of World Action on Salt and Health (AWASH), has assessed salt-related KABs specifically among a group of parents.[39] While this AWASH study did not compare parents with other adults, the AWASH study did report some similar findings. For example, in terms of concern about nutrients in food, salt in the diet was viewed by fewer parents as a concern, compared with the amount of sugar or fat in children's diet.[39] Given that consumers predominantly obtain their health and nutrition information from the media, it is likely that they may have been exposed to information predominantly on dietary sugars[40] and fats.[41]

In general, a number of studies have assessed salt-related KABs in adults, with most of these showing a lack of understanding about the relationship between salt and sodium.[23 31 42–44] In particular, studies conducted in Canadian[27] and Greek[45] adults suggest that only about one-third of participants were aware of the relationship between salt and sodium. It is unclear why in the present study parents/caregivers were less likely to be aware of the relationship between salt and sodium compared with other adults. Nevertheless, our findings may have implications on parents/caregivers' ability to interpret sodium values on food labels in the context of public health promotion campaigns, which frequently use the term 'salt' for dietary recommendations and include messages related to cutting back on salt. Under current labelling regulations in Australia, it is mandatory for the sodium content of the food per serve and per 100 g to be displayed on the nutrition information panel[31 46]; no information on the salt equivalent is displayed. Findings from our study revealed that parents/caregivers found it

Table 2 Comparison of salt-related knowledge between parents/caregivers (n=840) and other adults (n=1558)

Knowledge question (correct response)	Parents/caregivers of a child/children <18 years of age* OR (95% CI)	P value
Salt and sodium relationship (salt contains sodium)	**0.73 (0.60 to 0.91)**	**0.002**
Current salt intake of Australians (far too much/too much)	1.01 (0.78 to 1.32)	0.895
Main source of salt in diet (processed food)	0.88 (0.60 to 1.11)	0.424
Daily salt intake recommendation (5 g/day)	1.13 (0.92 to 1.38)	0.226
Eating too much salt damages health (yes)	1.10 (0.79 to 1.65)	0.786
Himalayan salt, pink salt, sea salt and gourmet salts are healthier than regular salt (disagree)†	**1.35 (1.12 to 1.63)**	**0.002**
Health risks associated with a high salt intake‡		
High blood pressure (yes)	1.08 (0.84 to 1.40)	0.542
Kidney disease (yes)	0.98 (0.81 to 1.89)	0.850
Heart disease/attack (yes)	0.93 (0.75 to 1.17)	0.555
Stroke (yes)	1.14 (0.94 to –1.38)	0.196
Stomach cancer (yes)	1.01 (0.82 to 1.22)	0.947

Bolded values represent significance at p<0.05.
Logistic regression model adjusted for age, sex, country of birth, language spoken, socioeconomic status and weight category.
*Reference group is other adults who do not care for children <18 years of age.
†Includes 'strongly disagree/disagree/neither agree nor disagree'.
‡Participants who responded 'yes' (correct response).

difficult to understand the sodium information displayed on food labels. A systematic review on consumer label use in adults reported that technical terminology on labels is confusing for many consumers; in particular, consumers found the term 'sodium' and the relationship between salt and sodium confusing, whereas they reported a better understanding of the term 'salt'.[47] Parents'/caregivers' lack of knowledge about the relationship between salt and sodium and difficulty understanding sodium information on food labels may impede their ability to select low-salt products for their family. In another sample of Victorian consumers (n=474), it was found that when using a simplified percentage daily intake label, more participants were able to correctly identify the lower salt content of two breakfast cereals than when using the nutrition information panel to rank three breads according to salt content.[31] Thus, a consistent, easy-to-understand label system may be needed to alleviate the current challenges parents/caregivers may be facing in deciphering sodium information displayed on nutrition information panels. However, further research is required to determine parents'/caregivers' receptiveness to such education, as well as the best mode of delivery for such messages to reach and engage parents/caregivers.

Our results indicate that compared with other adults, parents/caregivers were more likely to report that they were trying to reduce their own salt intake, and this may be attributed to parents/caregivers being more concerned about salt and other nutrients in foods. A previous study conducted in Lebanese consumers reported that individuals who were concerned about the amount of salt in their diet were more likely to be trying to reduce their salt intake.[48] With regard to specific salt reduction behaviours, only three of these differed between the two groups. First, parents/caregivers reported that they were more likely to ask to have meal prepared without salt when eating out. Second, parents/caregivers were more likely to report using table salt, a finding which is difficult to explain given the finding that parents/caregivers were more likely to report that they were trying to reduce their salt intake. It is possible that parents/caregivers may be unsure about potential approaches to reduce salt intake, and other considerations such as taste preferences for salt added to food may over-ride this.

Limitations

Compared with the general population, our sample was slightly over-representative of women (58% parents/caregivers and 55% other adults) and those from a higher socioeconomic background (44% parents/caregivers and 42% other adults) (approximately 52% male and 28% higher SES in the general population). As such, our findings cannot be extrapolated to the general population of Australia. In addition, while salt-related KABs were reported by parents/caregivers of children <18 years of age, we acknowledge that the other adults may include parents/caregivers of older adults, that is, >18 years of age, and this may have informed knowledge and attitudes held and behaviours reported by this group. Furthermore, due to the smaller number of caregivers (n=114) compared with parents (n=726), the caregivers were combined with the parent group. Salt-related KABs between the two groups may differ as parents would likely spend more time with the child than a caregiver. As the questionnaire collected self-reported KABs, it is possible that respondents may be susceptible to social desirability bias, which may influence the participants to respond to questions in a way which they believe will be

Table 3 Comparison of salt-related attitudes between parents/caregivers (n=840) and other adults (n=1558)

	Parents/caregivers of a child/children <18 years of age*	P value
	OR (95% CI)	
Concerned† about food-related issues in diet		
Healthy eating	**1.24 (1.10 to 2.11)**	**0.001**
Amount of sugar in food	**2.27 (1.51 to 3.23)**	**<0.001**
Amount of salt in food	**1.41 (1.08 to 1.84)**	**0.011**
Amount of fat in food	**1.78 (1.33 to 2.64)**	**<0.001**
Amount of saturated fat in food	**2.09 (1.48 to 2.96)**	**<0.001**
Amount of kilojoules/calories in food	**1.31 (1.04 to 1.65)**	**0.019**
Agree‡ with salt-related attitude statements		
I believe salt needs to be added to food to make it tasty.	1.12 (0.93 to 1.36)	0.225
My health would improve if I reduced amount of salt in diet.	1.16 (0.96 to 1.40)	0.116
It is hard to understand sodium information displayed on food labels.	**1.36 (1.10 to 1.62)**	**0.004**
Lower salt options not available when I eat out at restaurants/pubs/cafes.	1.03 (0.86 to 1.33)	0.617
Should be laws that limit amount of salt added to manufactured foods.	1.07 (0.89 to 1.29)	0.459
Group responsible§ for reducing the amount of salt Australians eat		
Government	0.98 (0.75 to 1.29)	0.902
Food manufacturers	1.36 (0.89 to 2.10)	0.173
Business (eg, supermarkets, local markets)	1.03 (0.81 to 1.32)	0.764
Chefs preparing foods in restaurants/pubs/cafes	1.37 (0.84 to 2.22)	0.203
Friends/family	1.01 (0.74 to 1.37)	0.963
Yourself	1.18 (0.41 to 3.42)	0.759
Fast food chains	1.11 (0.79 to 1.60)	0.531

Bolded values represent significance at p<0.05.
Logistic regression adjusted for age, sex, country of birth, language spoken, socioeconomic status and weight category.
*Reference group is other adults who do not care for children <18 years of age.
†Includes 'extremely concerned/very concerned/somewhat concerned'.
‡Includes 'responsible/very responsible/somewhat responsible'.
§Includes 'strongly agree/agree'.

viewed favourably by researchers. In addition, we did not measure actual salt intake of participants; hence, it was not possible to determine the accuracy of the self-reported salt-related behaviours or which behaviours in particular were contributing to daily salt intake. It should be noted that, although this study did not use a previously validated questionnaire, the questions included were adapted from published surveys.

Future directions

Findings from the current study provide insight into key content messages that could be trialled in future salt reduction campaigns targeting parents/caregivers. This is particularly the case for the state of Victoria, from where this sample was drawn and where a current salt reduction consumer awareness campaign is under way. It is acknowledged that further studies across different population groups are required to determine if these findings are also applicable to inform salt reduction campaigns more broadly. Our findings indicate that certain salt reduction messages should be specifically tailored towards parents/caregivers. For example, messages regarding how to read labels to choose lower salt options and understanding the relationship between salt and sodium should be considered for future consumer awareness campaigns targeting parents/caregivers. It also appears that there may be an opportunity to raise awareness of why salt in the diet is of concern. Finally, it may be beneficial to incorporate educational messages about ways to reduce salt use in the home, particularly salt use at the table. It is unknown whether parents/caregivers would be receptive to such educational messaging; therefore, further investigation to determine the best methods to disseminate such messages is required. Thus far, the current consumer awareness campaign targeting parents, led by the Heart Foundation (Victoria) and VicHealth, has included two phases focusing on raising salt-related awareness and improving

Table 4 Comparison of salt-related behaviours between parents/caregivers (n=840) and other adults (n=1558)

	Parents/caregivers of a child/children <18 years of age*	
	OR (95% CI)	P value
Salt use at the table†	**1.28 (1.06 to 1.54)**	**0.008**
Salt use during cooking†	1.18 (0.97 to 1.44)	0.102
Placing salt shaker on table at meal times†	1.05 (0.87 to 1.26)	0.600
Trying to reduce salt intake (yes)	**1.27 (1.05 to 1.53)**	**0.012**
Salt reduction-related behaviours†		
Looked at food labels to check sodium content	1.12 (0.93 to 1.34)	0.229
Avoided eating packaged, ready-to-eat foods	0.99 (0.79 to 1.23)	0.927
Used spices and herbs instead of salt when cooking	0.94 (0.74 to 1.20)	0.635
Avoided eating from fast food restaurants	0.95 (0.76 to 1.20)	0.667
Avoided eating from Asian-style restaurants or takeaway store	1.01 (0.83 to 1.23)	0.902
Purchased foods labelled 'no added salt' and 'reduced salt/ sodium'	1.03 (0.84 to 1.25)	0.805
When eating out, asked to have meal prepared without salt	**1.48 (1.19 to 1.83)**	**<0.001**

Bolded values represent significance at p<0.05.
Logistic regression adjusted for age, sex, country of birth, language spoken, socioeconomic status and weight category.
*Reference group is other adults who do not care for children <18 years of age.
†Includes 'always/often/sometimes'.

behaviours[49] . The messages of this campaign have been predominantly disseminated via the Heart Foundation and VicHealth's websites, social media pages and paid advertising in search tools.[50]

CONCLUSION

There is no previous literature assessing differences in salt-related KABs in parents/caregivers and other adults who do not care for children <18 years of age. In our study, mean salt-related KAB construct scores were similar in parents/caregivers and other adults. In addition, while the individual salt-related KABs were generally similar between the two groups, there was some evidence to suggest that certain salt-related KABs messages targeted at parents/caregivers should be different from those targeted at other adults who do not care for children <18 years of age. It is apparent that salt remains a second-order concern as parents/caregivers were less concerned about the amount of salt in food in relation to fat and sugar in food. Although parents/caregivers were more likely to report that they were trying to reduce their salt intake than other adults, it is evident that they appear to need support as they were more likely to be adding salt at the table and found sodium information displayed on food labels difficult to understand. These findings indicate that consumer awareness campaigns targeting parents/caregivers should include practical guidance to reduce table salt and resources to assist in interpreting sodium information on food labels and the relationship of sodium to salt.

Table 5 Comparison of parents/caregivers and other adults checking the Health Star Rating for cereals, cheese and bread

	Parents/caregivers of a child/children <18 years of age*	
	OR (95% CI)	P value
Checking Health Star Rating for		
Cereals†	**1.64 (1.36 to 1.98)**	**<0.001**
Cheese†	**1.43 (1.17 to 1.75)**	**<0.001**
Bread†	**1.33 (1.09 to 1.63)**	**0.004**

Bolded values represent significance at p<0.05.
Logistic regression adjusted for age, sex, country of birth, language spoken, socioeconomic status and weight category.
*Reference group is other adults who do not care for children <18 years of age.
†Includes 'usually/sometimes'.

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