

Energy distribution patterns in Australia and its relationship to age, gender and BMI among children and adults

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Introduction

In Australia, the prevalence of overweight and obesity has been increasing over the last two decades. The latest survey shows that 53.6% of Australians and 25% of children are overweight or obese. Culturally relevant strategies to facilitate a reduction in energy intake in the overweight and obese, and to maintain weight in normal-weight individuals are needed. Studies show that energy intake distribution may play a role in weight management. Identification of current energy distribution patterns may enable meal-based recommendations to be developed as a tool in obesity prevention.

Aim

To assess daily energy distribution among Australians, provide evidence on the relative importance of eating occasions to overall energy intake (%en), and the relationship of energy intake patterns to age, gender and BMI.

Methods

Dietary data collected via 24-hour recalls during the 1995 National Nutrition Survey (n=10,851 adults) and the 2007 National Children's Nutrition and Physical Activity Survey (n= 4,837 children) were analysed. Number, prevalence and percent of total energy intake (%en) were tabulated according to BMI, age (school-age for children) and gender to report trends and/or differences in energy distribution patterns. 'Breakfast' was defined to occur between 6am and 9am, 'lunch' between 12-2pm, and 'dinner' between 5-8.30pm. Snacks were defined as the eating occasions between main meal times.

Results

Figure 1. Percentage of hourly energy intake by NRV age and gender in children by time of day (n=4,837).

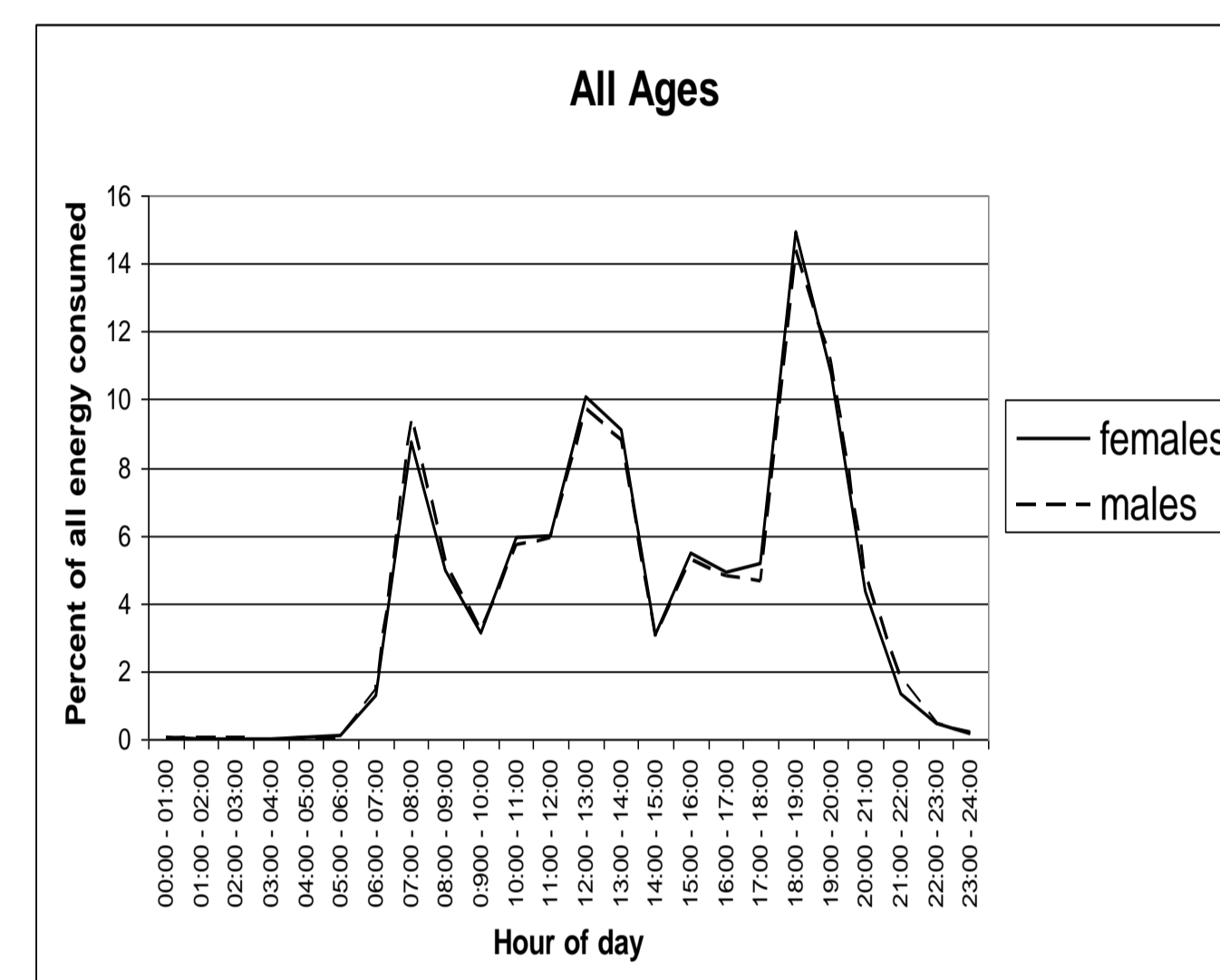


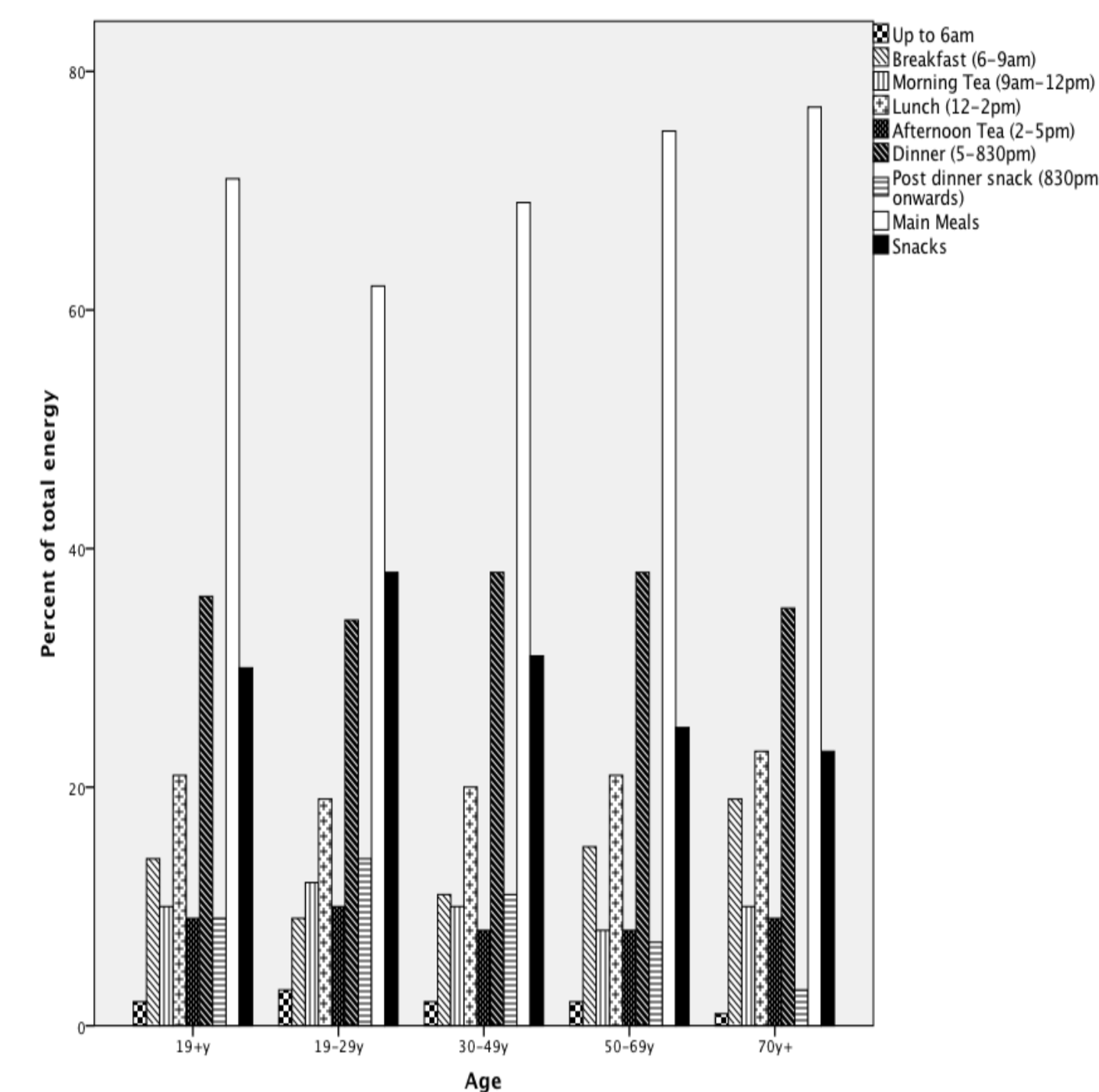
Table 1. Percent of total energy intake by 'meal' type and school stage in children.

'Meal' type and time	Percent of total energy (%en)			
	Pre-school (n=1499)	Primary (n=1691)	Secondary (n=1647)	All (n=4837)
Total up to 6am	0.2	0.1	0.3	0.2
Breakfast (6-9am)	19	17	12	16
Snack (9-12pm)	17	14	15	15
Lunch (12-2pm)	19	20	18	19
Snack (2-5pm)	13	13	13	13
Dinner (5-8.30pm)	29	32	30	30
Snack (8.30pm onwards)	2.8	4.6	11	6.8
In-between meals	33	32	39	35
Main meals	67	68	61	65

❖ Australian children consumed 3 main meals and 2-3 snacks, with the highest energy intake at 'dinner' (Figure 1). The same pattern was observed among adults.

❖ Among children, 'breakfast' accounted for 16% of total energy, 'lunch' 19%, 'dinner' 30% and 'snacks' 35%. Percent from 'breakfast' decreased (19% to 12%) and 'post-dinner snack' increased (3% to 11%), as school stage increased (Table1).

Figure 2. Percent of total energy intake by eating occasions by age category in adults (n=10,851).



❖ No differences in energy distribution throughout the day were observed by gender for both children and adults.

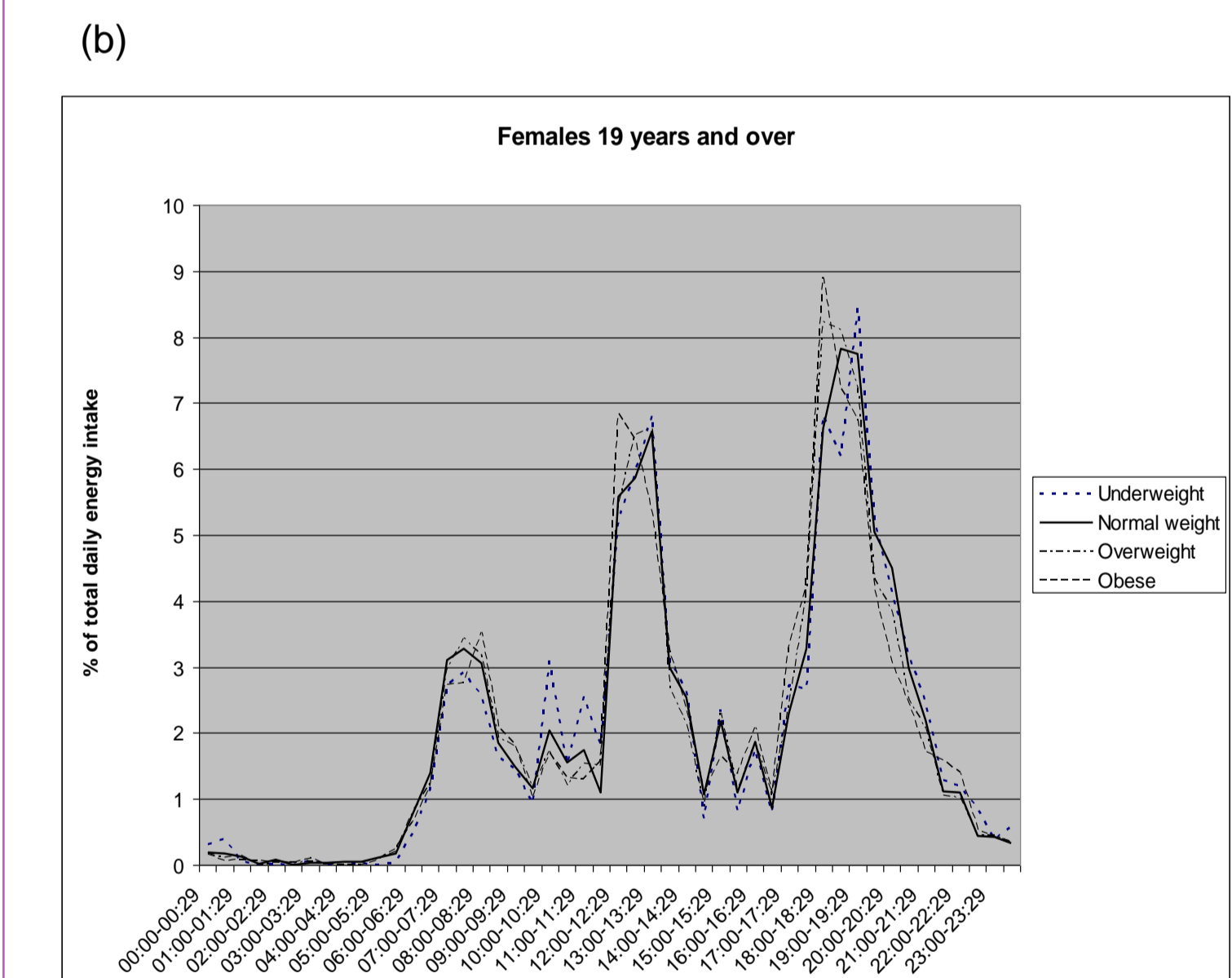
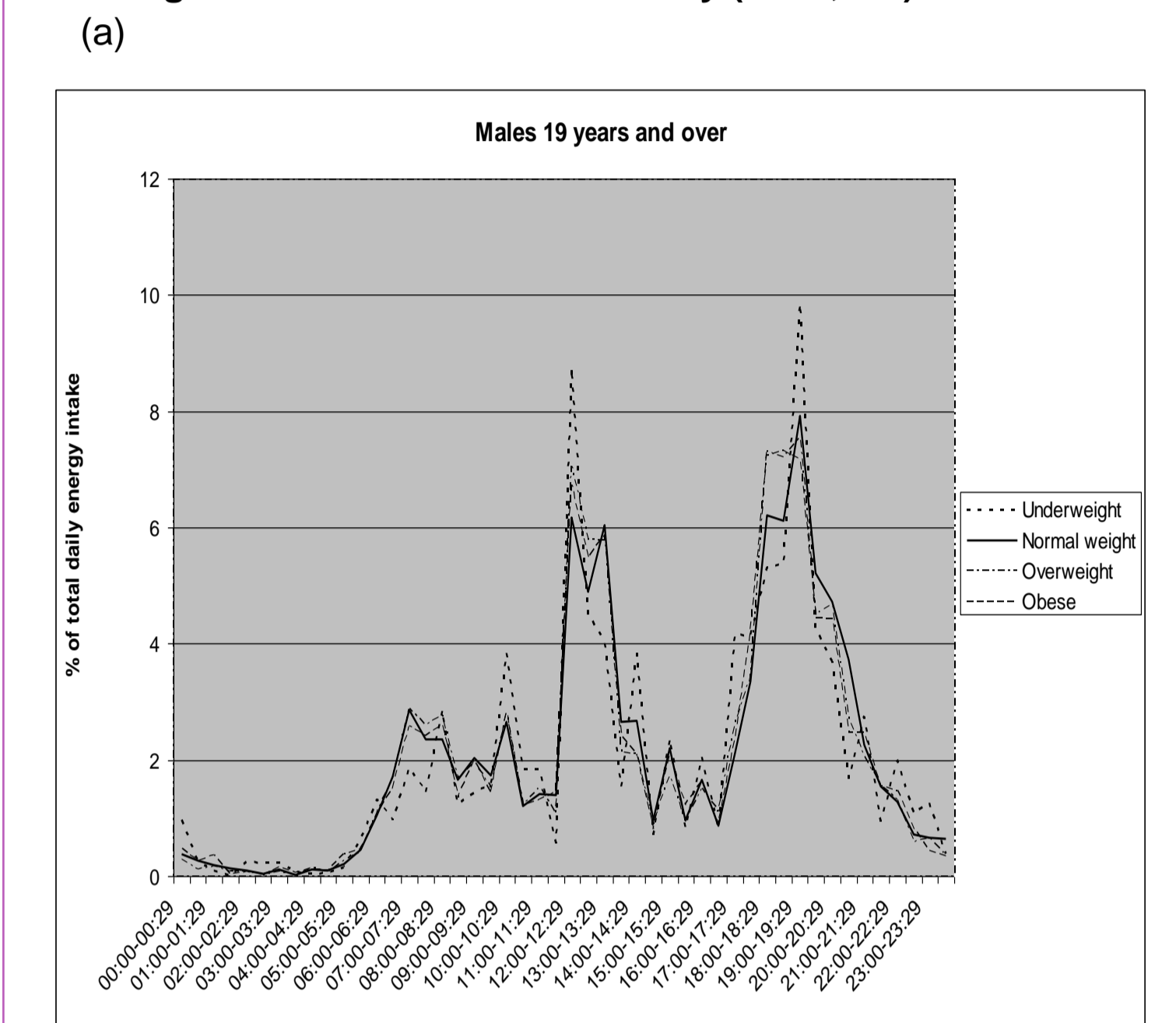
❖ For adults, energy from 'breakfast' was 14%, 'lunch' 21%, 'dinner' 37%, and 'snacks' 28%.

❖ For adults, 'main meals' contributed 72% of energy intake and 'snacks' contributed 28% of total energy intake.

❖ Energy contribution from main meals increased (78% for >70 yr vs. 64% for 19-29 yr) while that from snacks decreased with age (Figure 2).

❖ 'Dinner' and the post-dinner 'snack' contributed approximately 45% of total energy intake.

Figure 3. Percent of total energy intake by weight categories among adult males and females >18y (n=10,851).



❖ No difference in energy distribution was observed by BMI for children.

❖ Inconsistent differences were seen in adult males (Figure 3a) and females (Figure 3b). Underweight males and females had relatively higher %en from snacks (33%) than overweight or obese individuals (29%).

Conclusions

- ❖ Age was the strongest influencer of energy distribution patterns among Australians. Snacks were an important part of energy intake but a high proportion of energy was consumed at 'dinner'.
- ❖ Given relationships between meal patterns and health outcomes reported by other researchers, population health outcomes may benefit by a reduction in energy consumed at the evening meal and increasing that consumed at breakfast.

- ❖ Future recommendations that focus on more even energy distribution patterns may potentially help maximise satiety and positive metabolic benefits

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For further information

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