



Effects of bread roll unit size on bread and energy intake in children

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Background

The consumption of whole grain foods has various health benefits. Yet, many adults and children do not consume sufficient amounts of whole grains. An important source of whole grain in the diet is whole grain bread. Dutch children consume less bread than the recommended intake (Rossum et al., 2011). Moreover they prefer white bread over whole grain bread (van Kleef et al, 2014).

Objective

Although people tend to eat more when food is served in larger units (unit size effect), children often prefer food served in smaller units as they look more appealing. Whether unit size of bread rolls can be used to encourage children's intake of whole wheat bread is unclear. Objective: To determine the effect of unit size of bread rolls on lunch energy and bread intake during a school lunch.

Methods

A within-subject cross-over design with 81 children from 3 groups at one school (mean age 11.6, SD=0.5; 42 girls) who lunched four times with bread rolls, toppings and drinks. Children were free to choose the type and number of rolls to eat. Two factors were manipulated: unit size of whole wheat and of white bread rolls (small (30g) vs large (60g)). Bread choice was noted and leftovers of toppings and bread were weighed individually. Children filled in questionnaires each day. Data analysis was done with linear mixed models with treatment as fixed effects and groups and individual participants as random effects.

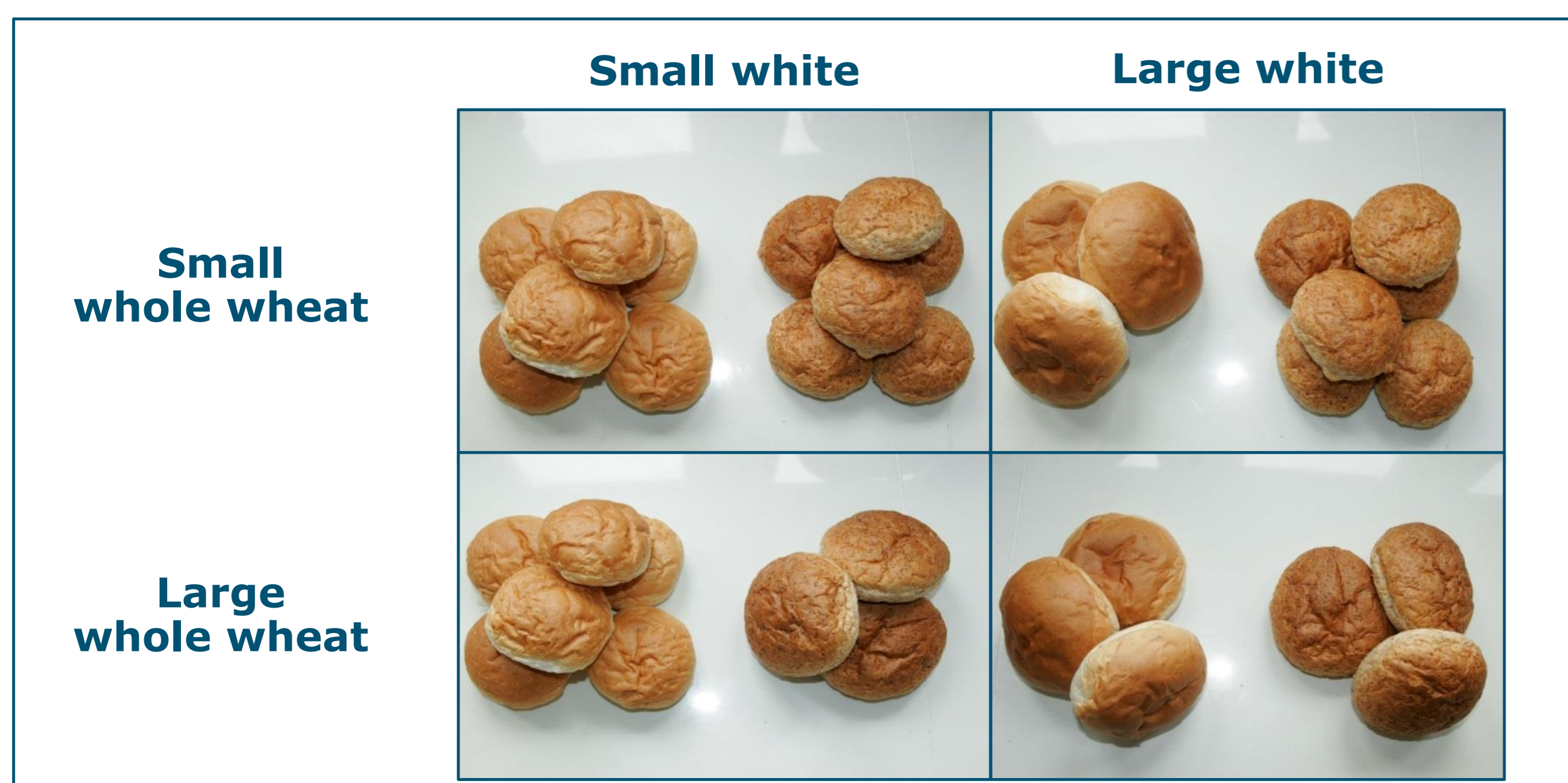


Figure 1. Overview of the design



Figure 2. Pictures of the study: bread rolls; toppings; analysing left overs; questionnaire

Results

Bread choice

- The average number of consumed bread rolls was 4.2 (SD=1.9).
- White bread rolls were favourite: the first chosen bread roll was usually white (89%) regardless of size of offered rolls. 81% of total bread consumption was white.
- Children ate more bread in grams when white rolls were larger-sized ($P_s < 0.001$).

Energy intake

- On average, children consumed 660 (SD=258) calories during lunch, which was not affected by unit size of bread rolls ($P_s = ns$).
- The relative contribution of toppings in total energy intake was significantly lower when white rolls were larger-sized ($P < 0.001$).

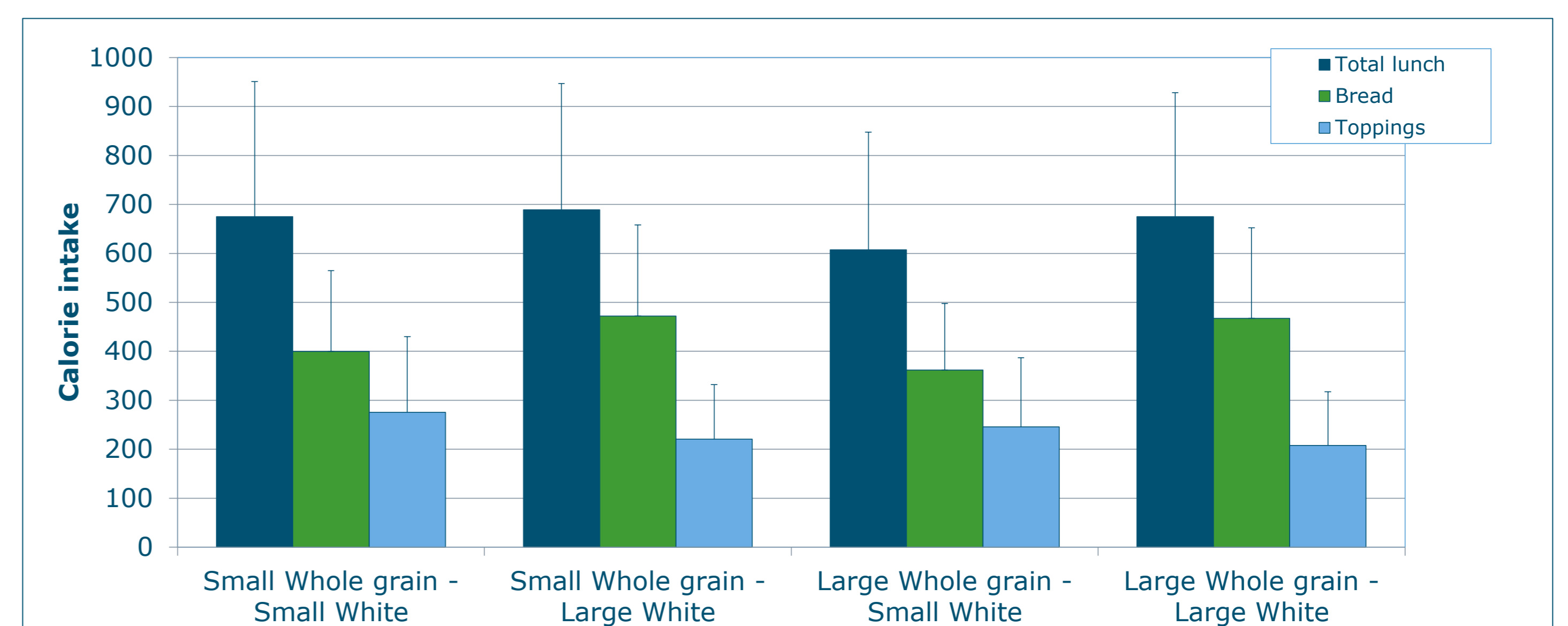


Figure 3. Energy intake (in calories) from the different lunches (mean, SD)

Questionnaire

- The attractiveness of the bread rolls did not show differences across conditions. Also, feelings of fullness after lunch did not differ across conditions (all $P_s = ns$). Children considered it most fun to pick a bread roll when both white and whole wheat bread rolls were small-sized (interaction $P = 0.01$).

Conclusions

Although small whole wheat bread rolls were ineffective in shifting children's bread choices toward whole wheat bread, adapting unit size of bread (e.g. thicker slices) might be a viable strategy to reduce consumption from (less healthy) toppings and increase consumption from healthier basic foods such as whole wheat bread.

References

- Rossum, C.T.M.; Fransen, H.P.; Verkaik-Kloosterman, J.; Buurma-Rethans, E.J.M.; Ocké, M.C. (2011). Dutch National Food Consumption Survey 2007-2010: Diet of children and adults aged 7 to 69 years.
- Van Kleef, E.; Vrijhof, M.N.; Polet, I.A.; Vingerhoeds, M.H.; Wijk, R.A. de (2014) Nudging children towards whole wheat bread: a field experiment on the influence of fun bread roll shape on breakfast consumption. BMC Public Health 14:906

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