

Research Rundown

Article

Promoting Vegetable Intake in Preschool Children: Independent and Combined Effects of Portion Size and Flavor Enhancement.

What did this study examine?

This study investigated the single and combined effects of serving preschool children a large portion of vegetables and/or enhancing flavor to increase appeal. This study aimed to encourage vegetable consumption while acknowledging that vegetables are the least palatable food group for children.

How were the associations between varying vegetable serving strategies during lunch examined?

Preschool children, aged 3 to 5 years old, participated in a 2-by-2 crossover design. One day a week for four weeks, the participants were served a popular lunch entrée with increasing portions of two familiar vegetables, broccoli and corn. Over the course of the four weeks, the vegetable portions doubled. Vegetable flavors were enhanced by adding butter and salt during the cooking process. Researchers weighed plates before and after each meal service using digital scales to assess accurate vegetable consumption. Parents of participants also completed questionnaires outlining child eating behaviors and parental feeding practices within one week after the final experimental meal.



Portion Size

The outcomes of **portion size** were:

- Vegetable intake at meal service was significantly affected by a larger portion size. Vegetable intake increased by 68% when the portion size was doubled.



Flavor Enhancement

The outcomes of **flavor enhancement** were:

- Non-significant. Flavor enhancement did not modify the effect of the larger portion on vegetable intake.

Key findings:

Providing students with high perceived food fussiness with an increased vegetable portion size **increased energy (kcal)** consumed from vegetables, even though there was also an increase in uneaten vegetables.



- **Energy intake from non-vegetable meal components were unaffected by the different vegetable portion sizes.**
- **Increasing the portion size without enhancing the flavor of broccoli and corn resulted in a significant increase.**

Providing students with high perceived food fussiness with vegetables flavored with butter and salt **did not significantly influence** intake or consumed portion size.



- **Adding a small amount of flavor enhancement as a strategy to improve palatability of vegetables did not encourage consumption.**
- **The addition of butter and salt to broccoli and corn resulted in a p-value of 0.69 and 0.036 respectively. An insignificant value.**

Put it into practice!

- Offer two or more varieties of vegetables during lunch service to bulk up options and enhance intake from students.
- Consider serving the larger portion option (3/4 cup or 1 cup) of vegetables during lunch service to boost increased consumption.
- Rethink adding additional butter or sodium to vegetables! Consider the USDA's final rule, [Transitional Standards for Milk, Whole Grains, and Sodium](#) and keep added sodium to a minimum.

Reference:

Diktas HE, Roe LS, Keller KL, Sanchez CE, Rolls BJ. Promoting vegetable intake in preschool children: Independent and combined effects of portion size and flavor enhancement. *Appetite*. 2021 Sep 1;164:105250. doi: 10.1016/j.appet.2021.105250. Epub 2021 Apr 6. PMID: 33836215; PMCID: PMC8206024.



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