

Location of School Lunch Salad Bars in Cafeterias: Design and Analysis Issues



To the Editor:

Adams and colleagues¹ described a novel study examining the placement of salad bars within six middle school cafeterias as it relates to students' consumption of fruit and vegetables (F/V). The authors found that students selected and consumed more F/V when salad bars were offered as part of the lunch line as compared to when the salad bars were located outside of the line. While these findings are consistent with both theoretical and empirical evidence,² we are concerned with several aspects of the study design and analysis of data.

The current study has an unbalanced design in terms of the F/V options served on the day of data collection. All three schools with salad bars outside of the line served potatoes and juice. In contrast, only one school with salad bar on the line served potatoes, and no schools with a salad bar as part of the line served juice.

Potatoes and juice are generally not included in public health recommendations because they are already frequently consumed.³ However, they are counted as F/V components of the National School Lunch Program (NSLP).⁴ Given children's preference for these items, they may compete with other F/V options served at school lunch. Ideally, data collection days would be selected *a priori* to balance the F/V options served across schools.

The *posteriori* exclusion of potato and juice as F/V options from the analysis is misleading, as these items are not counterbalanced with the position of

the salad bar. In the text, 20.7% of students (49 of the 237) from schools with the salad bar outside the lunch line consumed any F/V. Yet as shown in the Figure, this is really 91% of the 54 students that self-served any non-potato non-juice F/V. This is similar or possibly significantly higher than the 83% of students that consumed any F/V when the salad bar was inside the lunch line.

In addition, all three schools with the salad bar inside the line had more fruit options and fewer vegetable options. Not counting potatoes and juice, national data show children eating more servings of fruits than vegetables,⁵ probably because of preference for the sweet taste of fruits.⁶ Research has also shown that a variety of options further increase selection.^{7,8} The unbalanced number of fruit vs vegetable options between the two groups further confounds the independent variable.

Since potato and juice items were part of the choice architecture of the lunch line, we suggest the authors re-analyze the selection and consumption data with and without counting them as F/V. If possible, we also suggest analyzing the selection and consumption data for fruits, vegetables, and salad bar options separately, while controlling for the number of options within each category. This would clarify whether students selected and ate more salad bar items (eg, a true positive), differentiating from F/V offered on the standard menu, that are often times pre-plated on lunch trays.

We applaud the authors in their novel inquiry and hope that our concerns are well received.

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Authors' Response:

We thank the readers for their interest in our study. We believe the readers raised concerns that reflect limitations inherent in observational studies and also reflect the realities of working in busy school cafeteria environments.

We aimed to examine how two conditions of salad bars (placed inside vs outside of the service line) impacted the selection, consumption, and waste of fresh and canned fruit and vegetables (F/V) using a comparative cross-sectional design.¹ Cross-sectional designs are observational, and unlike randomized controlled trials, one has limited control over exposures and balancing confounding variables. The reader was correct that the number and type of F/V options differed across schools. Table 1 shows this explicitly, but we should also highlight that our analyses made comparisons between conditions (not schools) on aggregate amounts. Both conditions, salad bars

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