

Development of the PortionSize App for Real-Time Dietary Feedback

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Objectives: We developed the PortionSize™ app (PS app) to provide participants, in real time, an estimate of dietary intake and assistance with following dietary plans and managing body weight. The app provides templates superimposed on user's food images to provide feedback on energy intake (kcal), macronutrients, and food groups. The current pilot study aimed to test the validity of the PS app in a lab-based setting and identify areas for improvement.

Methods: During a lab visit, adults (4 male, 11 female), aged 18–65, BMI 18.5–45 kg/m², majority (93%) White, were trained and used the PS app to assess dietary intake of foods provided, which were also covertly weighed. Participants (n = 14) provided qualitative feedback on PS app usability. Bland-Altman analysis was performed to determine if bias was introduced by increasing energy per food item. Qualitative methods were used to evaluate open-ended responses on PS app desirability.

Results: Across all 69 food items, mean (\pm SD) energy between PS (162 \pm 167 kcal) estimates and weighed food (143 \pm 126 kcal) were

not statistically different ($P = 0.10$). The Bland-Altman plot indicated agreement in energy intake between PS estimates and weighed values for lower energy foods, and the PS app overestimated energy intake for higher energy foods ($\text{Adj } R^2 = 0.20$, $P = < 0.001$). Beverages (soda and tea), condiments (salad dressing and butter), and specific foods items (apples, chicken, pizza, carrots, and cookies) had the largest error (>30% difference in kcal between PS estimated and weighed foods). These foods have previously been identified as problematic in food intake estimation research. The most frequently mentioned difficulties with the PS app were the food search (7/14), food list options (4/14), and difficulties with PS templates (6/14). Consequently, improvements to the PS app included a new feature for estimating weight of packaged food, new methods for volume estimation of beverages, an updated method for manually entering foods not captured in real-time, an improved food search, updates to the PS food database, and changes to app training instructions.

Conclusions: This pilot study demonstrates promise for the PS app to measure average energy intake. Areas of further app development were identified and actioned and are undergoing additional validity testing.

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