Effectiveness of Cell Phones with Digital Picture Capability and MyPyramid Tracker for Measurement of Fruit/Vegetable Consumption

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Introduction

• 17 million deaths globally attributed to low fruit/vegetable (F/V) intake (WHO, 2011)
• Approximately 2/3 of U.S. adults consume less than 3 servings of F/V per day (CDC, 2010)
• Minimum daily servings 5 or more or ≥400 grams F/V daily for health
• 16 million disability adjusted life years linked to inadequate F/V intake (WHO, 2011)
Evidence supports role of increased F/V consumption and decreased incidence of cardiovascular disease, high blood pressure, stroke, Type 2 diabetes (Willet, 2010, CDC, 2010).

An estimated 31% of coronary heart disease and 11% of stroke cases are attributed to inadequate F/V intake (WHO, 2011).

Certain cancers (GI tract, lung) are linked to low F/V intake.
Empirical data on the combined protective effects of F/V consumption are not as strong as projected a decade ago. Evidence from the large European cohort study supports a small, statistically significant preventative effect of approximately 4% of all cancers combined by increasing F/V consumption approximately 2 servings/day (Willett, 2010).
Background

- Increased F/V intake is associated with maintenance of a healthy weight (Mozaffarian, Hao, Rimm, Willett, Hu, 2011)
- In the U.S. 75% of adults are overweight and approximately 1/3 are obese
- Globally, 1.5 billion adults are overweight and at least 500 million of these are obese (CDC, 2011)
- 43 million children worldwide are overweight (WHO, 2011)

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Background

• A variety of methods exist to measure F/V intake (24/recall, FFQ, food records)
• Each method has inherent problems with reliability and validity (Lee & Neiman, 2009)
• Technological methods have enhanced existing traditional methods by decreasing the burden of reporting and analyzing data
• Expansion of mobile technologies  
  (Thompson, Subar, Loria, Reedy & Baranowski, 2010).

• More advanced techniques possible

• Address specific issues with F/V

• Memory is known to be a significant problem

• Need for testing of existing technologies that 
  are affordable, accessible, and acceptable

  (Long, et al, 2010)
Pilot Methods

- Pilot project in 2009
- College students enrolled in ESS program
- One used digital pictures on cell as memory prompt, one used recall only
- Both entered diet record into MyPyramid.gov at the end of the day
Pilot Findings

- Pilot (n=35) college students enrolled in ESS
- Statistical consultation – SAS System
- Mixed model ANOVA
  - Mean F/V intake significantly associated with BMI (F= 4.81, p < 0.03) and prior use of Mypyramid (F=8.02, p < 0.008)
  - Difference in average daily F/V intake of 0.3 servings b/t groups
- Focus group feedback
Methods

Applied for funding – STTI Small Grant

Purpose was to methodologically test:

• The use of digital pictures captured by cell phone, for memory prompt

• In conjunction with MyPyramid.gov (online, interactive dietary self-assessment tool) for effectiveness, feasibility, and usability in estimating self-report F/V consumption in a college population
Methods

- IRB approval
- Repeated measures cross-over design
- Power analysis revealed 64 subjects needed
- Subjects recruited from ESS Department including introductory core courses in which all undergraduate majors could be enrolled
- 30 minutes of training on study protocol and how to use MyPyramid Tracker
Methods

• Convenience sample (n = 69)
• Random assignment to group 1 (cell phone pictures first) group 2 (cell phone second)
• 3 days of data collection with and 3 days without use of cell phone pictures for memory prompt
• Used text message reminders to help retain subjects and obtain full data sets
• Sample Demographics
  • 39% male, 61% female
  • Age (18 – 31), mode 18 years
  • 71% Caucasian, 11% Hispanic, 1.4% African American, 1.4% Asian Pacific
  • BMI (18.5 – 35.1)
    • 45% normal weight, 19% overweight,
    • 4% obese
• Statistical consultation – SAS System
• Mixed model ANOVA
• Controlled for gender, order of cell phone use (training effect), and number of days between time 1 and 2
• Data supported the use of cell phones to enhance short term memory for self reported estimates of F/V consumption
  \( F = 4.64, \ p < 0.04 \)
• 85.9% believed cell phone pictures helped prompt their memory of what they had eaten, was easy to use and accessible
• More conscious of what they were eating
• Still difficulty with portion and serving sizes
• Suggested an App for ease in connecting to MyPyramid & this was subsequently developed
Study findings support cell phone pictures improved the accuracy of short term memory for self reporting of diet in conjunction with the use of MyPyramid Tracker and suggest the ubiquitous cell phone may be an easy, relevant, and accessible means of improving accuracy of fruit/vegetable recall methodology.
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- A manuscript which will report the study in full is in progress.