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Successful use of a tablet computer mobile app to observe sun protection practices in Australia and the United States

Suzanne Dobbinson,[1] Dave Buller,[2] Ilima Kane,[2] James Shane,[2] and Dallas English[3]

[1]Cancer Council of Victoria, Melbourne, VIC, AU; [2]Klein Buendel, Golden, CO, USA; [3]University of Melbourne, Melbourne, VIC, AU

Abstract. For over 20 years, Cancer Council Victoria has observed the sun protection practices of Australians in public parks. In 2010, as part of a project comparing built shade in passive recreation areas (PRAs) within public parks in Australia and the United States, the protocol for observations was translated into a mobile application (app) for tablet computers. The protocol also assessed the number of individuals using PRAs, social group membership, and activity. A pilot test showed observations could be consistently made on the tablet observation app by trained research assistants (RAs) (kappa=0.77 to 1.0; only neck covering had low kappa=0.48). Similar inter-rater reliability was achieved during the first summer of observations (kappa=0.60 to 1.0; neck covering [0.60] and sleeve length [0.69] had the lowest kappas). The tablet observation application was easily updated, modified, and shared amongst RAs, but sun glare off the screen sometimes reduced readability. Based on this initial success, the tablet-based observation application was used effectively in the recent Australian sun protection observations in public parks and in another trial in outdoor resort venues.

Introduction

Since 1992 Cancer Council Victoria (CCV) has observed people's sun protection behaviours in Melbourne's parks and other public recreation venues. On average 4,000 observations are made annually during weekends in late summer (Dixon et al., 2008) Details of hat-style, clothing, sunglasses, shade used and activity for each person observed are recorded with high inter-rater reliability using a paper form (Lagerlund et al., 2006)

In a separate study, we are investigating the impact of shade in public parks in Australia and the United States. Based on social ecologic models, we are exploring whether use of passive recreation areas (PRAs) changes when shade structures are introduced (see Figures 1 & 2) (McLeroy et al., 1988; Sallis and Owen, 1987). Cross-national comparisons will determine shade's impact in two countries with different histories of sun safety promotion.

A data collection mobile application ("app") running on tablet computers was developed to measure PRA use and sun protection practices by
park visitors. The mobile app was also used to assess

sun protection in the CCV's summer monitoring of skin cancer prevention. A discussion of the development and use of this mobile application is presented below.

Figure 1. Shade structure introduced to a public park in the United States for the purposes of this study.

Figure 2. Shade structure introduced to a public park in Australia for the purposes of this study.

Application Development

In 2011, programmers developed a data collection mobile app designed for open-source platforms, i.e., the Android operating system, on tablet computers. Development included in-house testing in which operational issues of the tablet computers and mobile app were discovered and resolved prior to the app's deployment in June 2011.

The tablet app is programmed to record the number of individuals at PRAs and demographic characteristics, sun protection practices (wearing headwear, clothing, and sunglasses and use of shade), and activity of the park visitors in the PRAs. To aid observers, a visual depiction of headwear, clothing, and sunglass use is provided (see Figure 3). Adults are also clustered into social groups.

To ensure data security, the mobile app creates a unique data output report. It can be exported and stored on the tablet computer's internal memory and in removable memory card. The app provides reminder prompts that prevent data collectors from closing the app without first exporting the data.

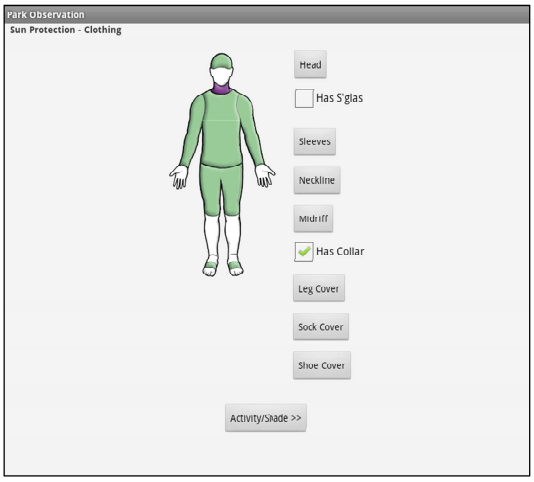

Figure 3. Data collectors input participant's use of headwear, sun protection clothing, and sunglasses choices by electronically dressing the doll.

Use of Application

Project staff trained data collectors to use the mobile app with both hypothetical and real-world observation simulations. They were instructed on strategies and best practices for completing observations as discreetly as possible (see Figure 4) to avoid affecting the behaviour of the park visitors being assessed. Inter-rater reliability checks were conducted throughout training; any areas of significant disagreement were discussed and data collectors were retrained. Once reliabilities consistently achieved 0.70 or higher, data collectors were ready for the field. During data collection, inter-rater reliability checks were conducted monthly to guard against drift. Any areas of significant disagreement were discussed and coders retrained.

Using a mobile app for observational data collection offers many advantages. Security prompts in the app ensured that every data entry field was completed, minimizing missing data. Data sets were easily exported into Excel files that could be readily compiled and prepared for analysis, eliminating time and error of manual data entry. These files contained time stamps for start and finish of each observation, confirming the observation period and permitting analyses by time of day and date, environmental features associated with solar ultraviolet radiation levels. The tablet-based observation app was easily updated, modified, and shared among project staff.

Despite use of glare screens, poor readability from sun glare on the tablet computer screen was the largest limitation of the mobile app. This issue was resolved by changing position relative to the sky. User error can occur by data collectors unaccustomed to tablet computers or apps. Electronic data collection devices inherently risk system malfunction or battery loss. Data collectors were provided paper-based observation forms as a backup against such failures. Production of the app required production time and the cost of tablet computers was a project expense, (although it avoided costs for reprinting paper forms when changes were made). A cost-benefit analysis is needed to ensure that these initial and ongoing costs are balanced by advantages of the computers and app.

Figure 4. Simulated use of tablet-based app for observational data collection.

Conclusion

Based on the initial success of the tablet observation app, the app continued to be employed in both Australia and the United States. The app was also modified for use in another trial evaluating the effect of a sun safety intervention for guests at outdoor resorts in the United States and also in CCV's observation study in parks and other outdoor venues, which demonstrated the applicability and value of mobile aps for future studies.

References

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