bActive – quantitative analysis

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The *bActive* mobile phone app was developed to show users how much they walked in their everyday lives and used an 'always-on' design that did not require activation by the user. The study used a quasi-randomised controlled experimental design to test two versions of the app: one that only displayed information about the user's own walking and one that also displayed average group-level figures. The study participants were men aged between 22 and 40 who were recruited in Bristol using a free smartphone (the study phone) as an incentive for participation. During the six-week trial, the research team monitored how many steps were taken, how often users opened the app and how long they kept it open. In addition, the 151 participants completed pre- and post-trial surveys and some took part in individual interviews or focus groups. This short paper gives a summary of the research and reports on the analysis of the quantitative data. The analysis shows that those in the two intervention conditions walked on average 64%[1] more than those in the control condition and that the inclusion of social norms information had no significant effect on either step-count or the use of the app.

For further details, see the accompanying paper, *bActive - qualitative analysis* and our working paper with the title, *Walking in the wild – using an always-on smartphone application to increase physical activity*.

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The bActive mobile phone app was developed to measure users' steps throughout the day, rather than focusing, like other apps, on extended periods of walking for fitness. The app counts a user's steps automatically, without having to be activated and without the need for any special equipment.

As shown in Figure 1, the design of bActive included animated avatars, colourful graphics and easy-to-navigate screens that allowed users to switch between daily views and weekly views. The display of step count was accompanied by estimates of calories used and distance travelled.

bActive was tested for six weeks between October and December 2011. Participants were randomly assigned to one of three experimental conditions and each received one of three versions of the app: one that did not provide any feedback (control condition), one that only showed them information about their own walking (individual condition) and one that displayed information about their own walking and the group average of those with the same version of the app (social norms condition). We recruited 22-40 year-old men in Bristol (bActive is most accurate when carried in a front trouser pocket, which is why only males were included). The incentive for taking part was the study phone, which participants were able to keep at the end of the study. Of the sample, 78% were in employment, 14% were students and 8% were unemployed; 59% regularly engaged in sport and 63% owned some form of motorized vehicle.

During the 6-week trial, participants received regular SMS messages that reminded them to keep the phones in their pockets. In addition, those in the feedback conditions received weekly motivational text messages (e.g. 'Walking is one of the best activities for your health. How much are you doing? Check the app!'). At the start and end of the trial, participants completed questionnaires about their walking habits/attitudes and about their experience of the study. Behaviour and survey data were analysed using longitudinal multilevel modelling. The results of this analysis and a description of key features of the data are given below.

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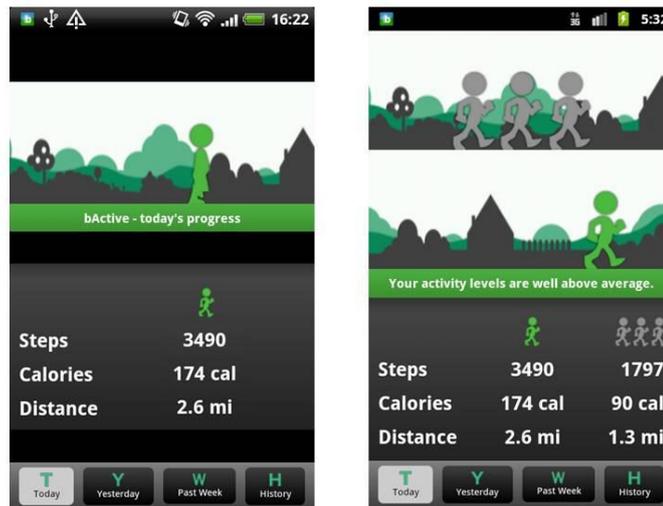[1] Analysis updated 28 February 2013

Figure 1: The Today feedback screens as seen by the participants in (left) the individual feedback condition and (right) the social norms feedback condition

Over the course of the study, those in the two feedback conditions opened the app an average 3.9 times per day; on each occasion keeping it open and visible on the screen for an average of 32.0 seconds. Indeed, only 12% of those in the two feedback conditions used it less than every second day. In the final week of the study, participants from the two feedback conditions were still opening the app on average 2.3 times a day. The survey and interviews suggest that these figures reflect genuine enthusiasm for the app. Of those with one of the feedback versions of the app, 91% reported that the app was "*interesting*", 67% that it was "*fun*" and 73% that they would continue to use the app after the trial.

Use of the app was significantly affected by neither employment nor the presence of children in the household. This is surprising, for men with children and those in employment (especially full-time employment) might be expected to have less time for such activities. This finding therefore suggests that interest in the feedback was sufficient for participants to use it in spite of other, conflicting, calls on their time and attention.

The activity data shows that those in the two intervention conditions walked 64% more than those in the control condition[2]. In the survey, participants attributed increases in walking to two main behaviours: more short walks (43%) and walking instead of driving or public transport (35%). The analysis also shows that step-counts were negatively correlated with ownership of a motorised vehicle and positively correlated with being in employment. There was no significant difference, however between the step-counts of the two feedback conditions.

bActive made it easy and enjoyable for participants to measure the amount of walking they did and, on average, those using the app walked 64% more than those that did not. Although the study did not provide any evidence of the effectiveness of the social norms approach for promoting walking, it does highlight the potential benefits of individual feedback. In summary, this study indicates that an app modelled on bActive could encourage walking and potentially have a significant positive impact on health and fitness.

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[2] Individual vs Control: B = 0.47, $p < 0.05$; Social norms vs Control: B = 0.53, $p < 0.05$