Health Promotion Journal of Australia **28**(3), 178–184.
doi: 10.1071/HE16107_AC
© AHPA 2017

Supplementary material

Are motivational signs to increase stair use a thing of the past? A multi-building study

Lina Engelen[A,B,C], *Joanne Gale*[A], *Josephine Y. Chau*[A,B], *Adrian Bauman*[A,B]

[A]Prevention Research Collaboration, School of Public Health, Level 6, The Hub, University of Sydney, NSW 2006, Australia.

[B]Charles Perkins Centre, Level 6, The Hub, University of Sydney, NSW 2006, Australia

[C]Corresponding author. Email: lina.engelen@sydney.edu.au

Validation of digital counts measured by infra-red counters

The aim of the study was to validate infra-red counters in this type of stair promotion intervention study by comparing counts of infra-red counters to manual observations.

Methods: Manual observations were performed during 1 hour segments, at 9–10; 12–13; and 16–17 at each location, once during baseline and once during post-test, at the same day of the week for the two time points in order to minimise variation due to variations within a week. The observers positioned themselves in a location where they could easily view the stairs and elevators simultaneously and noted the information on a pre-printed data collection sheet.

Analysis: For comparison between manual and digital observations, digital counts corresponding to the date and time and location of the manual counts were extracted. Manual data was matched with digital data for the same date, time and location. Male and female observed data were combined. The agreement between digital and manual counts was assessed three ways by: (a) regression models that modelled manual counts as the dependent variable and digital counts as an exploratory variable; (b) calculating the intra class correlation (ICC) between the two measures; and (c) Bland-Altman plots to check the limits of agreements between the count data from the two modes of collection. The regression models provide information about the relationship between counts produced by the counters and the average of the counts produced via manual observations. While they are useful in looking at the relationship between the two modes of collecting count data, they do not provide detailed

information about whether the methods produce close to identical results. Agreement between the two ways of collecting count data can be more specifically assessed using the limits of agreement methods described by Bland and Altman (1986) or by calculating the intra class correlation (Shrout and Fleiss 1979).

Models regressing manual counts on digital counts and controlling for building showed a strong association between the two modes of counting people on stairs and lifts ($F(1,29)=194.4$, $P < 0.0001$, $R^2 = 0.98$ and $F(1,17)=8.41$ $P = 0.01$, $R^2 =0.79$ respectively). For counts of people using stairs, the Bland-Altman plot (Fig. S1) showed a slight systematic bias between the two counts methods, i.e. manual counts tended on average to be about 5 more per hour than the digital counts and the differences between the two modes became greater the larger the number of people using the stairs per hour. For the lift count data (Fig. S2) the Bland-Altman plots showed systematic bias in the other direction, and while all pairs of counts fell within the limits of agreement, the limits were relatively wide. The ICCs for the stair and lift counts are 0.98 and 0.82 respectively, which indicate good to excellent agreement. The inconsistency of the results of the Bland-Altman analysis suggest that the two counting methods are not completely interchangeable although the sample sizes for these comparisons are small ($n = 30$ for stairs and $n = 18$ for lifts). At the very least, count differences between using the stairs and lifts should be analysed separately for digital and manual counts.

In spite of lack of contextual data, infra-red counters have the benefit of being able to gather large amounts of data points at any time of the day, enabling the opportunity to study temporal patterns of traffic in the areas of interest. It is also independent on an observer being present with the associated costs, hence infra-red measurement is a relatively cheap measure. Another benefit is the opportunity to monitor traffic over long periods of time, in close to real-time by accessing the cloud platform output.

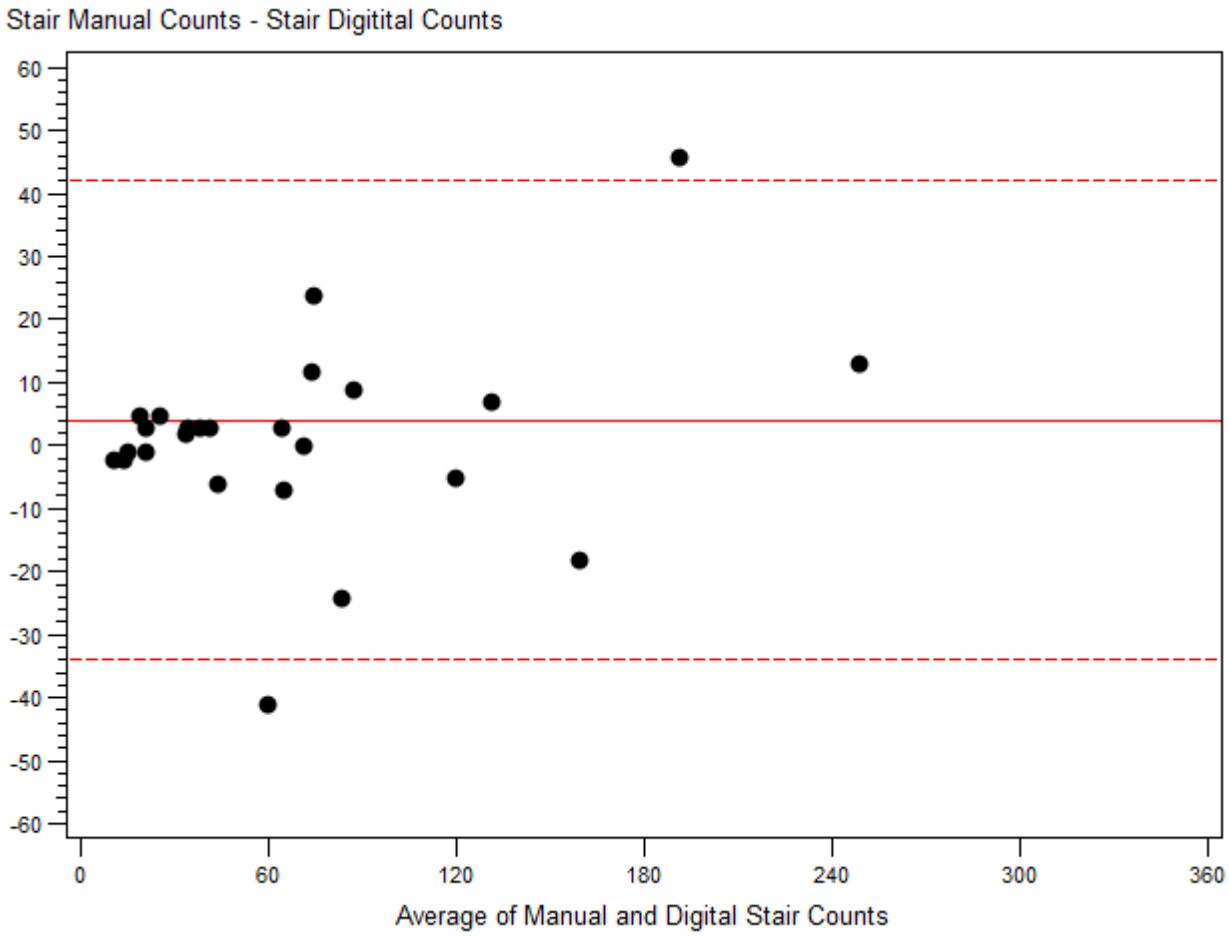

Fig. S1. Bland-Altman plot of the difference and average in digital and manual stair counts. The solid line is the mean of the difference scores between manual and digital stair counts. The dotted lines are the limits of agreement (mean ± 1.96 x SD, where SD is the standard deviation of the difference scores).

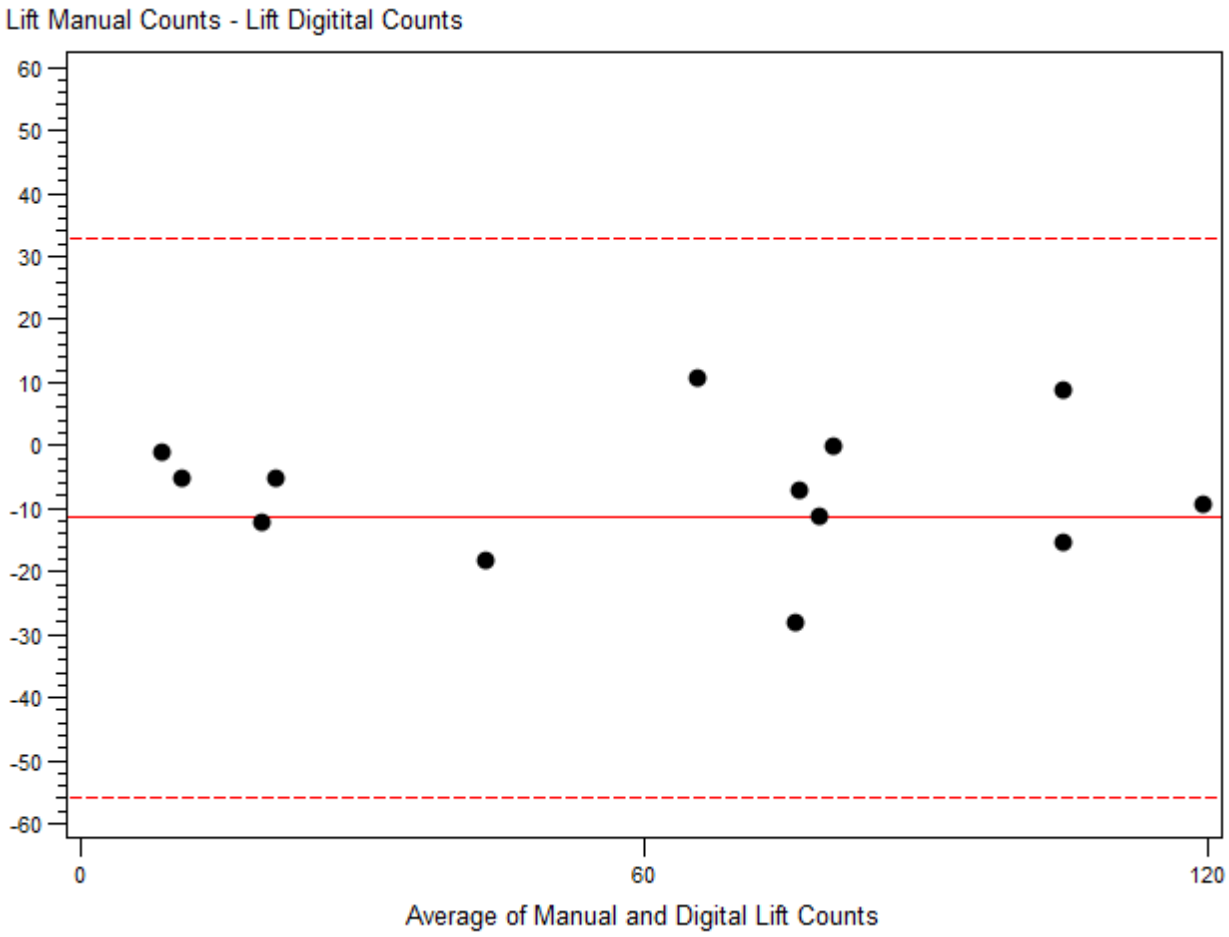

Fig. S2. Bland-Altman plot of the difference and average in digital and manual elevator counts. The solid line is the mean of the difference scores between manual and digital elevator counts. The dotted lines are the limits of agreement (mean ± 1.96 × SD, where SD is the standard deviation of the difference scores).

Supplementary references

Bland JM, Altman DG (1986) Statistical methods for assessing agreement between two methods of clinical measurements. *Lancet* **327**, 307–310. doi: 10.1016/S0140-6736(86)90837-8

Shrout P, Fleiss J (1979) Intraclass correlations: uses in assessing rater reliability. *Psychological Bulletin* **86**, 420–428. Available at http://www.aliquote.org/cours/2012_biomed/biblio/Shrout1979.pdf [Verified 7 February 2017]