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## Pedometer reactivity and rehearsal in children

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### Introduction

An important premise underlying the use of pedometers for both measurement of physical activity (PA) and prompting behavioral change is the concept of 'reactivity'. Reactivity, in the context of PA, refers to a change in behavior due to participant awareness of being measured. It is desirable if behavioural change is a goal and the device is left unsealed in order to provide feedback to the wearer. It is undesirable if the device is sealed and used as a measurement tool for habitual PA.

Investigations into pedometer reactivity have presented mixed results with some finding evidence of reactivity (Southard & Southard, 2006), whilst others finding none (Ozdoba, Corbin, & le Masurier, 2004; Rowe, Mahar, Raedeke, & Lore, 2004; Vincent & Pangrazi, 2002). In view of these inconsistencies, the aim of the current study was to investigate pedometer reactivity in children and ask whether an underlying mechanism that might explain individual differences in reactivity is the predisposition to "rehearse or ruminate on emotionally upsetting events" (Roger, 1997). Rehearsal has been evidenced to be related to physiological responses to stress (Roger & Najarian, 1998), trait anxiety (Roger & Najarian, 1989) and health complaints (Lok & Bishop, 1999). Experimental research has also consistently shown that high rehearsers tend to show greater attention bias towards negative information and affect than low rehearsers when subjected to stressors (e.g., Kuehner, Huffziger, & Liebisch, 2009). We therefore expected that high rehearsers would demonstrate greater reactivity when wearing a pedometer than low rehearsers, as they may initially view the monitoring of their PA to be more emotionally taxing.

### Methods

Children were recruited from two local government aided primary schools in Hong Kong (156 students, 80 boys, 76 girls; mean age  $10.14 \pm .73$  years). Informed consent was received from all parents and the methods and procedures utilized were endorsed by the Institutional Ethics Committee for Human Research.

Participants completed the Rehearsal Scale for Children-Chinese (RSC-C), a validated 13-item self-report questionnaire for Chinese children (Ling, Maxwell, Masters & McManus, 2010). They then wore the sealed New Lifestyles NL-800 piezoelectric pedometer on an adjustable nylon belt on the left hip every day for 3-weeks. The pedometer was worn during waking hours except during water sports and bathing for a minimum of 2 days per week. The number of steps taken each day was stored to the device memory and downloaded manually by the researcher every 7 days. A minimum of 2,000 steps/day and a maximum of 30,000 steps/day were necessary for inclusion in the final analyses.

We used one-third cut points to identify participants who

scored low and high on the RSC-C. Mean RSC-C score was  $21.91 \pm 2.46$  for low rehearsers ( $n = 43$ ) and  $33.05 \pm 2.65$  for high rehearsers ( $n = 56$ ). An independent samples t-test showed that the scores were significantly different ( $p < .001$ ). Differences in number of steps between Week 1 and Week 3 were examined for the low and high rehearsers using a two-way ANOVA with repeated measures on the Week factor. Follow-up analyses were carried out using t-tests where appropriate. A p-value of  $<0.05$  was set a priori for all analyses.

### Results

Of the 156 participants, 133 had pedometer data which fit the inclusion criteria. Figure 1 shows the mean number of steps taken by high and low rehearsers in Week 1 and Week 3. A main effect was present for Week ( $F(1, 82) = 25.52, p < .001, \eta^2 = .24$ ), but not for Rehearsal score ( $F(1, 82) = .01, p = .916, \eta^2 = .001$ ). An interaction was evident ( $F(1,82) = 4.40, p = .039, \eta^2 = .052$ ). High rehearsers showed significantly greater change in mean steps from Week 1 to Week 3 than low rehearsers ( $p < .05$ ); however, mean step count was not significantly different between high rehearsers and low rehearsers in Week 1 or Week 3 ( $p$ 's  $> .05$ ).

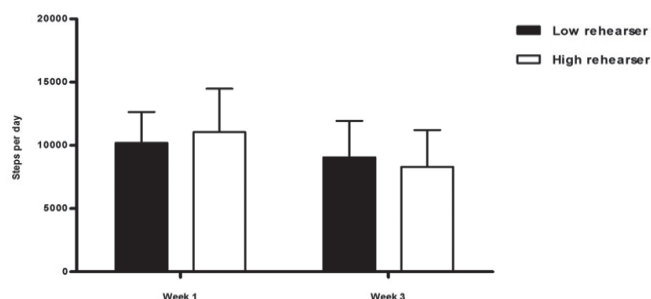


Figure 1. Mean(SD) pedometer steps per week as a function of high and low scores on the RSC-C

### Discussion

Our results suggest that reactivity was present, as shown by an elevation in the steps per day in the first week compared to the third week. The difference between the highest and lowest mean daily step is similar to the previous findings for children (Ozdoba, et al., 2004, Vincent & Pangrazi, 2002), falling between 1500 and 2700 steps per day. Importantly, high rehearsers showed significantly greater reactivity as revealed by larger decreases in step count from Week 1 to Week 3 than low rehearsers, suggesting that the tendency to ruminate on emotional events may play a part in reactivity.

To our knowledge, this study is the first to explore the underlying psychological mechanisms behind reactivity. Our results suggest that for high rehearsers, the recurrent reminder that their PA was being monitored, may

have motivated them to engage in more than usual PA during the first week of wearing a pedometer. Possibly, high rehearsers found the thought of being monitored to be emotionally upsetting because it raised personal concerns about self-perceived low habitual PA level. The lower number of steps of the high rehearsers at Week 3, though not statistically significant, suggests that they may have lower habitual levels of PA than low rehearsers. This finding lends support to numerous studies that have shown a positive association between PA and psychological health (e.g., Holmes, Eisenmann, Ekkekakis, & Gentile, 2008).

One limitation to the study is that the wear time at the weekends was very low with data attrition of approximately 46% for the entire sample, thus no weekend data was included in the analysis. This limitation highlights the unresolved issue of non-compliance in pedometer studies that is more prominent in children than in adults (Trost, 2001).

### Conclusion

This study has shown that reactivity does exist when children use sealed pedometers, and this particularly applies to children with a high propensity to rehearse or ruminate about emotionally upsetting events. Future PA intervention initiatives should take rehearsal tendencies into account.

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