Correspondence between self-reported neighbourhood-specific physical activity and accelerometer and global position systems (GPS) monitor captured physical activity

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Background and Purpose: Regular participation in physical activity reduces the risk for a multitude of chronic diseases, therefore finding ways to increase population-levels of physical activity is of significant interest to public health researchers. The neighbourhood built environment enables and limits physical activity, and could contribute to shifts in population-levels of physical activity. Yet to better understand how the built environment influences physical activity, reliable and valid context-specific measures of physical activity are needed. That is, to obtain accurate estimates of the neighbourhood built environments contribution to physical activity, neighbourhood-specific measures of physical activity need to be used. Unfortunately, few context-specific, or neighbourhood specific physical activity tools have been assessed for measurement validity[1-2].

Objectives: The aim of our study was to adapt a widely-used and previously validated self-report physical activity questionnaire (the International Physical Activity Questionnaire: IPAQ) to capture neighbourhood-specific physical activity, then test measurement validity of the adapted self-reported neighbourhood-specific questionnaire against an objective measurement of neighbourhood-specific physical activity in an adult population.

Methods: A convenience sample of n=75 adults (>18 years of age) (Calgary, Canada) were given an accelerometer (ActiGraph – wGT3X-BT) and a GPS (QStarz – BT-Q1000XT) and instructed to wear the two devices on their hip during all waking hours for 7-consecutive days. After the 7-day wear period, participants also self-reported their physical activity using a modified version of the IPAQ. The modified IPAQ captured frequency and minutes of physical activity undertaken during the last 7-days inside their neighbourhood (i.e., walking and bicycling for transportation, walking for leisure, and moderate and vigorous-intensity physical activity). Participant accelerometer and GPS data were date and time merged using the Personal Activity Location Measurement System (PALMS). We estimated Spearman rank (r) correlations between the self-reported neighbourhood physical activities and the accelerometer-determined physical activities (light, moderate, and vigorous intensity; Freedson adult cut-points) undertaken inside the neighbourhood administrative boundary (participant's residential neighbourhood) determined by their GPS location data.

Results: Twelve participants did not have valid wear time (i.e., <10 hours on a day or <2 days) resulting in a final sample of n=63. The sample mean age(SD) was 56(14) years old and included higher proportions of women (65.1%) and those with a university-level education (82%). Minutes/day of both total (Table 1) and neighbourhood-specific (i.e., administrative boundary; Table 2) accelerometer-based moderate-intensity physical activity was significantly (p<.05) correlated with self-reported neighbourhood total walking (r=0.26 and r=0.28, respectively). Minutes/day of both total and neighbourhood-specific accelerometer-based vigorous physical activity also significantly correlated with self-reported minutes/day of neighbourhood vigorous physical activity (r=0.33 and r=0.29, respectively). Moreover, minutes/day of neighbourhood-specific accelerometer-based light-intensity physical activity significantly correlated with self-reported minutes/day of neighbourhood cycling for transportation (r=0.28).

Conclusions: Previous studies have found small (i.e., r=<30) to medium correlations (i.e., r=.30-.59) between IPAQ estimated and accelerometer-determined physical activity[3]. We also found small to medium correlations between our self-reported and accelerometer-determined physical activity for IPAQ items following their modification to capture neighbourhood specific-physical activity. Our findings suggest that self-reported neighbourhood-specific physical activities captured during the last week, specifically administrative boundary defined neighbourhood-based walking and vigorous physical activity are weak-to-moderately associated with accelerometer-determined physical activity. Future studies are needed however, to assess the effect of neighbourhood boundary definitions (e.g., 400m-, 800m-, 1600m-network buffer) on the estimated associations between self-reported and objectively-measured neighbourhood-based physical activity.

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Table 1
Spearman rank correlation coefficients between average minutes a day of accelerometer-based and self-reported neighbourhood physical activity, without objectively restricting by a geographical neighbourhood (n=63)

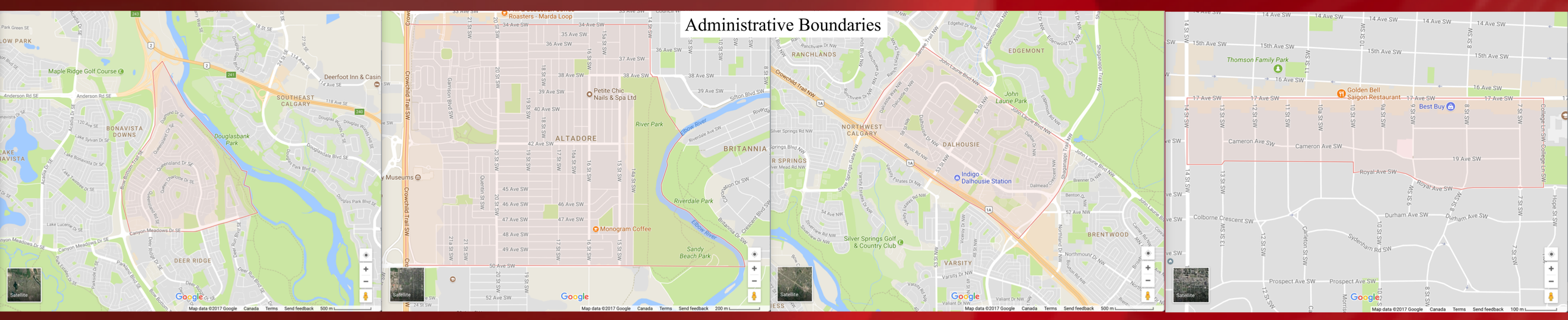
		Accelerometer				
		LPA	MPA	VPA	MVPA	Total PA
N-IPAQ	WT	-0.19	0.08	0.03	0.06	-0.06
	WL	-0.10	0.16	-0.07	0.13	0.00
	WT+WL	0.01	**0.26***	-0.13	**0.21^**	0.14
	BT	-0.12	0.13	-0.01	0.10	-0.04
	MPA	0.14	-0.07	0.06	-0.07	0.05
	VPA	0.00	0.04	**0.33***	0.09	0.02
	MVPA	0.08	-0.01	0.20	0.02	0.03
	Total PA	-0.06	0.06	0.08	0.06	-0.01

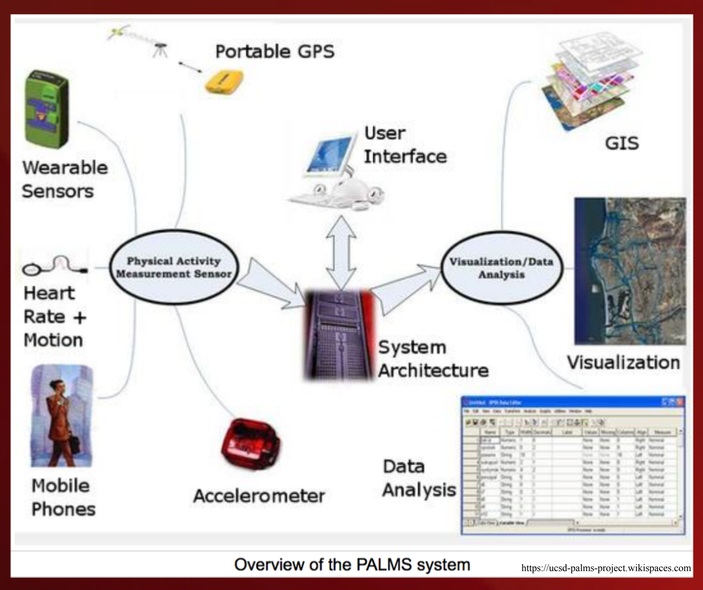
^p<.10, *p<0.05. LPA: light physical activity, MPA: moderate physical activity, MVPA: moderate-to-vigorous physical activity, PA: physical activity, WT: walking for transportation, WL: walking for leisure, BT: bicycling for transportation. N-IPAQ: neighbourhood international physical activity questionnaire.

Table 2
Spearman rank correlation coefficients between average minutes a day of accelerometer-based and self-reported neighbourhood physical activity, using neighbourhood administrative boundary as an objective definition of neighbourhood (n=63)

		Accelerometer				
		LPA	MPA	VPA	MVPA	Total PA
N-IPAQ	WT	-0.01	0.21	0.11	0.20	0.09
	WL	-0.03	**0.21^**	-0.03	0.20	0.09
	WT+WL	-0.05	**0.28***	-0.05	**0.25^**	0.12
	BT	**0.28***	0.21	0.04	0.18	**0.24^**
	MPA	-0.06	-0.06	0.10	-0.06	-0.04
	VPA	0.06	0.00	**0.29***	0.02	0.07
	MVPA	-0.06	0.00	0.20	0.00	0.01
	Total PA	-0.01	0.15	0.14	0.14	0.10

^p<.10, *p<.05. LPA: light physical activity, MPA: moderate physical activity, MVPA: moderate-to-vigorous physical activity, PA: physical activity, WT: walking for transportation, WL: walking for leisure, BT: bicycling for transportation. N-IPAQ: neighbourhood international physical activity questionnaire.





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