

# Gender differences in time spent sedentary and in physical activity during leisure: A comparison of data analyzed using a traditional approach and compositional data analysis

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## Abstract

**AIM:** Data analysis in studies of time spent sedentary and in physical activities does not usually consider the fact that these behaviors are expressed in terms of proportions of a finite time and therefore statistically dependent in a compositional fashion. The aim of this study was to describe the extent to which results obtained using traditional (STND) and compositional (CODA) data analysis differ when investigating differences between genders in sedentary behavior and physical activity during leisure. **METHODS:** A total of 692 workers from the transportation, manufacturing and cleaning sectors wore an Actigraph GT3X+ accelerometer on the thigh for 1–4 working days. The occurrence of sedentariness (sit and lie), standing, and physical activities (walk, run, stair climb, and cycle) during leisure time on working days was determined using validated Acti4 software, and later normalized to the total leisure wear time (average =8.81 hours, SD=1.60 hours). Sets of isometric log-ratio (ilr) transforms of occurrences were obtained, with each behavior sequentially playing the role of first part of the composition. This was done to interpret the differences between genders separately for each behavior relative to other behaviors. **RESULTS:** The difference between arithmetic and compositional means (Table 1) for both genders was ~5-7 min for sedentary time, ~3-4 mins for standing and only ~2-3 mins for PA. The results of multivariate analysis of variance (MANOVA) for gender differences were similar for CODA (F=18.19, p=0.00) and STND paradigm (F=18.36, p=0.00) indicating a significant difference between gender for overall behaviors. The univariate analysis of variance within the CODA paradigm indicated that females were spending significantly less time than males in sedentary activities compared to other activities (t=5.67, p=0.00). In contrary, males were spending less time than females in standing (t= -5.14, p=0.00) and in physical activities (t= -2.34, p=0.02) compared to other behaviors. Similar results were also obtained using the traditional analysis, i.e., females spent more time in standing (t= -6.02, p=0.00) and physical activities (t= -2.98, p=0.00) and less time in sedentary behavior (t=5.89, p=0.00) compared to males. **CONCLUSION:** In this dataset, both traditional and compositional data analysis led to the conclusion that the distribution of time spent sedentary and in physical activities was different between males and females at group level. However, we still recommend future studies of time spent sedentary and in physical activities to be based on compositional data analysis, to address statistical violations associated with traditional analysis of non-transformed data.

Table 1. Traditional and compositional descriptive statistics of the percentage of time spent sedentary and in physical activities during leisure.

	Sedentary	Stand	PA
	Total population		
Arithmetic mean [M(SD)]	62.5(11.7)	27.0(9.2)	10.5(4.4)
Compositional mean	63.7	26.3	10.0
	Males		
Arithmetic mean [M(SD)]	64.9(11.2)	25.1(8.7)	10.1(4.4)
Compositional mean	66.2	24.3	9.5
	Females		
Arithmetic mean [M(SD)]	59.7(11.5)	29.2 (9.2)	11.1 (4.3)
Compositional mean	60.7	28.7	10.7

PA= physical activities, SD=standard deviation, M=mean