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The development of a questionnaire to assess past year physical activity in a multi-ethnic/racial urban population

Summary

Objectives: Describe the development of a questionnaire to assess past year physical activity, including activities of daily living, in a multi-ethnic/racial cohort. Describe energy expenditure (EE) patterns in the sample used for questionnaire development.

Methods: 24-hour activity recalls were collected from a convenience sample (N = 367) at four New York City health agencies (October 1999–February 2000). EE was determined at the population, subgroup, and individual level. EE distributions were compared.

Results: Activities identified were similar to those on established questionnaires. Subgroup and individual EE differences were noted. Median EE at the Chinese and Puerto Rican sites were lower than those at the Caribbean or Dominican sites. No clear age pattern was apparent. Overall, a greater percentage of daily EE was spent in low intensity activities. The resultant 30-minute interviewer-administered questionnaire ascertains patterns (frequency and duration) of domain-specific (recreational, household, occupational, and transportation) activity. This information combined with published intensity levels provides summary EE measures.

Conclusion: Variation in EE levels requires information on activity type and amount. Summary activity measures can be used to rank individuals analogous to nutrient food frequency measures.

Keywords: Energy expenditure – Physical activity – Cancer – Questionnaire – Multi-ethnic/racial – Cohort.

The epidemiologic evidence linking physical activity to a reduced risk of chronic diseases, such as coronary heart disease, osteoporosis, non-insulin-dependent diabetes mellitus, and several types of cancer is mounting (Pate et al. 1995). Since physical activity is a modifiable behaviour that can be incorporated into most individual's lifestyle, there is great interest in demonstrating that it is associated with a lower cancer risk. A protective effect for cancers of the breast and colon in relation to higher levels of physical activity has been fairly consistently observed (McTiernan et al. 1998). Similarly, physical activity also appears to lower prostate cancer risk, but findings are less clear (McTiernan et al. 1998). Fewer studies, with mixed findings have examined physical activity in relation to other cancers including endometrial, ovarian, testicular, and lung (McTiernan et al. 1998). In general, studies have been conducted in non-Hispanic white populations and have focused on recreational or leisure-time physical activity, though some have also examined occupational activity. Therefore, additional research is necessary to explore whether the protective effect of physical activity on cancer risk extends to: cancers other than breast and colon, other activity types (e.g., household), and to other populations (e.g., African-Americans, Hispanics, Asians).

The New York Cancer Project (NYCP) is a prospective cohort study in the New York tri-state area (New York, New Jersey, and Connecticut) designed to examine the joint relationship of the environment, life-style habits, genetics, and cancer risk. Enrollment of men and women aged 30 to 69 years of age of different racial/ethnic backgrounds (black, Chinese, Caucasians, and Hispanics of Puerto Rican and Dominican descent) is currently underway. Given the large number of individuals targeted for enrollment the only practical means of measuring energy expenditure (EE) is by questionnaire. With EE as a primary exposure of interest in

the multi-ethnic/racial cohort, most existing questionnaires were inadequate for the cohort since, as mentioned above, they were designed to capture recreational and/or occupational physical activity in non-Hispanic white populations. Assessment of EE that does not take into account non-recreational activities may result in misclassification, particularly among women and in populations other than non-Hispanic whites (Ainsworth et al. 1999). Thus, a study was undertaken to develop a questionnaire that would assess household (including self and family care), occupational, transportation-related, and recreational activity EE for the cohort target population, which included both males and females of a wide age-range and of various races and ethnicities (Pereira et al. 1997). The aim was to capture EE for the one-year interval preceding interview.

This paper describes the database methods utilised for developing such a questionnaire. Similar methods, adapted from methodology established for developing food frequency questionnaires (Block et al. 1986), have been used to create an instrument to measure past seven-day activity among a Caucasian population in Switzerland (Bernstein et al. 1998). The objective of the database approach is to identify the activities that contribute the most to absolute EE and that are the best discriminators of EE levels among persons. As part of this presentation we describe the EE patterns in the study sample used to develop the questionnaire. Finally, this paper describes how the questionnaire is structured as well as the questionnaire design considerations of counterbalancing participant burden with the ability to capture sufficient information to estimate EE.

Methods

Study population

To identify potentially relevant activities for inclusion in the questionnaire, 24-hour recall interviews were conducted. Interviewees consisted of a volunteer sample of men and women, predominantly between 30 and 64 years of age (the original age-range of the cohort population) and of various racial-ethnic groups. The participants were affiliated with several health agencies in New York City including Alianza Dominicana, Caribbean Women's Health Association, Chinatown Health Clinic, and the Puerto Rican Family Institute. In-person interviews, conducted in English, Spanish, and Chinese, took place from October 1999 to February 2000. Of the 396 24-hour physical activity recalls conducted, seven were unreliable and 16 were incomplete, leaving 373 interviews available for data analysis. The number of participants varied according to agency: Alianza Dominicana (9 men and

37 women), Caribbean Women's Health Association (45 men and 78 women), Chinatown Health Clinic (41 men and 73 women), and the Puerto Rican Family Institute (28 men and 56 women). For an additional six completed interviews, the participant's sex was not ascertained, and therefore these individuals are excluded from sex-specific data analyses (two at Caribbean Women's Health, three at Alianza, and one at Chinatown). The Mount Sinai institutional review board approved the protocol.

Data collection

A structured questionnaire was administered by a trained interviewer in the primary language of the participant. Individuals provided information concerning all activities performed during the previous 24-hour period, beginning at the time they woke-up the day before the interview. The time of day the activity started and the length of time spent performing the activity were recorded. Additional information collected included the distance covered for activities such as walking, running, or biking and number of flights of stairs climbed. To obtain information on seasonal activities engaged in during other times of the year, subjects were also asked about activities that they often engaged in, specifically during warmer and colder seasons. For these seasonal activities, the number of days per week as well as the amount of time spent performing the activity were collected.

Questionnaire development also consisted of pilot testing drafts of the questionnaire on African-American, Chinese, Caucasian, and Hispanic individuals (10 in total) for comprehension, clarity, and administration time. During this process, the interviewer informally discussed the participants' interpretation of the questionnaire items. Questionnaire refinements based on the pilot testing experience are described below.

Data analysis

Variable definition: Health agency rather than self-identified race/ethnicity was used for analytic purposes so that we could examine if EE differed between Hispanics of different origins (i.e., Puerto Ricans versus Dominicans). This variable indicated whether a participant was Dominican, black, Chinese, or Puerto Rican. Approximately 10% of both males ($n = 14$) and females ($n = 30$) were unwilling to provide age information. These individuals along with those participants whose ages were just outside the original cohort age range (three participants were <30 years of age and four were 65+ years of age) were excluded from the age-specific analyses. Due to the limited number of participants, particularly males, in the 50 to 64 years of age range, age was

collapsed into the following five categories: 30–34, 35–39, 40–44, 45–49, and 50–64.

Calculation of daily energy expenditure: Reported activities were assigned a code from the compendium of activities developed by Ainsworth and colleagues that indicates the type and intensity (defined in metabolic equivalents (METs) as the ratio of activity metabolic rate to the resting metabolic rate) of the activity performed (Ainsworth et al. 1993). Activities not specified in the compendium were assigned the code of a similar activity. To ensure that coding remained uniform among coders, activities that required new codes were immediately added to the compendium.

For the data analysis it was necessary to have a complete record of a 24-hour period for each participant. Since most participants reported approximately, but not exactly, 24 hours of activity, the duration of a person's activity time was adjusted to yield 1440 minutes (or 24 hours) of total daily activity time. To do this, an inflation/deflation factor, defined as the ratio of 24 hours to the total duration of a participant's reported daily activities, was created. This value was then used to adjust each activity's duration accordingly. For instance, the adjustment factor for a participant who reported 1200 minutes of daily activities was 1.16 (1440/1200).

Next, EE in kilocalories per hour (kcal/hr) associated with a given activity (EE_A) for an individual was calculated using the following formula (Ainsworth et al. 1993):

$$EE_A = \frac{D \times M \times W}{60 \text{ minutes}}$$

Where,

- D = Activity duration in minutes
- M = Activity MET intensity in kilocalories
· kilogram of bodyweight⁻¹ · hour⁻¹
- W = Bodyweight in kilograms

The EE_A was used to calculate the overall total daily EE on the following levels: (1) the total population level; (2) subgroup level, i.e., sex, study site, and age; and (3) individual level. Additionally, each activity's EE, e.g., swimming, house cleaning, and eating, were determined for the population, subgroup, and individual level.

Analysis for selection of questionnaire activities: To explore within-sex differences between age groups or study sites, the distribution of EE was examined. Statistical evaluation of variation among groups was performed using the Kruskal-Wallis test, a non-parametric test for comparing medians (Kruskal & Wallis 1952). The contribution of a particular activity's EE to the population's EE was determined by

calculating the percent of overall population daily EE it accounted for. These percent expenditures were ranked for each activity from highest to lowest according to their contribution to population-level EE. This procedure was repeated within subgroups to determine the percent of sex-specific, study site-specific, age-specific, and individual daily EE represented by each activity. To select the activities that contributed the most to absolute EE and were the best discriminators of EE levels among individuals (Bernstein et al. 1998) activities constituting 95% of the total, sex-specific, study site-specific, and age-specific population daily EE as well as any single activity accounting for 10% or more of a participant's daily EE were identified. Additionally, seasonal activities provided by the participants, but not identified in the structured data analyses, were added to the questionnaire. However, no specified criteria were used to select these.

Activities from other sources

Due to time and budgetary constraints, recruitment efforts focused on racial/ethnic groups other than non-Hispanic whites since less physical activity information exists on these groups being recruited into the cohort. Thus, the activity list identified via data analysis was augmented with activities from additional sources including: a Swiss questionnaire developed using almost identical methodology (Bernstein et al. 1998); a questionnaire designed to collect past year physical activity data in breast cancer survivors that was designed similarly to a food frequency questionnaire (Dr. Barbara Sternfeld, personal communication); the Minnesota leisure time questionnaire (Taylor et al. 1978); the Tecumseh occupational questionnaire (Montoye 1971); and the Ainsworth physical activity compendium (Ainsworth et al. 1993).

Results

Descriptive

The median duration of sleep-time was eight hours and the average daily population EE was 2913 kcal/day. As shown in Table 1, men expended significantly more energy per day than women (median expenditure of 2937 kcal/day versus 2582 kcal/day for men and women, respectively). For both genders, the 50 to 64 year olds had lower median EE than those in the youngest age group, though the difference was statistically significant only for males (Wilcoxon p-values = 0.0009 and 0.3848 for males and females, respectively) (Appendix, Tab. A1 and A2). The only other age pair-wise comparisons of median EE that significantly differed from one another were also among men (30–34 year olds had

greater expenditure than 35–39 and 50–64 years olds, while 40–44 year olds had lower expenditure than 45–49 year olds).

Overall, there was less variation in the median level of EE across the various age groups for women than for men (Appendix, Tab. A1 and A2). No clear age-related pattern was apparent for the percent of energy expended in any of the MET activity levels. For both genders, a greater percentage of daily EE was spent in low level activities (3–3.9 MET). The 90th percentile indicates that only a small proportion of individuals engage in 6+ MET level activities; women and men spent at most 3–11 and 7–28% of their respective total EE in 6+ MET level activities. The median number of hours spent sleeping ranged from one to two hours less for women than for men 40–64 years of age.

At each study site, men also expended more energy than women (Tab. 1). Among both men and women, the Chinese and Puerto Rican recruitment sites had similar median daily EE, which was lower than median daily EE observed for the Caribbean and the Dominican sites. However, the median daily EE for Dominican men versus either Puerto Rican or Chinese men was elevated, but did not reach statistical significance, yet the number of men in the groups provided only limited power to make such subgroup comparisons.

Selection of physical activities

Table 2 presents the physical activities in the top 95% of the population, sex-, study site-, and age-specific analyses. Overall, participants' activities were characterised using 154 activity codes, of which 63 were required to account for 95% of the total population daily EE. The high number of activities necessary to reach 95% reflects the fact

that most individual activities account for less than one percent of the population EE. Common activities including daily living activities (sleeping, cooking or food preparation, eating, and showering) and sitting quietly accounted for the highest percentage of EE. Although the activities in the top 95% of the sex-, study site-, and age-specific EE predominantly reflected those in the combined population top 95%, 19 additional activities were identified (see shaded activities listed at the end of Tab. 2). One (15040) was unique to gender, two (02065, 03021) were unique to study site, and four (01020, 03040, 05010, 05145) were unique to age, with the remaining activities identified in at least two group-specific analyses. Of these, 26.3% (5/19) involved household work and 15.8% (3/19) were occupational activities.

Examination of physical activities accounting for 10% or more of an individual's daily EE yielded 95 activity codes. Fourteen of these codes, displayed in Table 3, were not identified in the population or group-specific analyses. In essence, participants reported the activities identified in the individual level analysis less frequently, yet for some participants these activities accounted for a significant amount of their daily EE. Tables 2 and 3 combined contain the physical activities that represent 95% of the population, sex-, site-, and age-specific EE as well as 10% or more of an individual's EE.

General questionnaire design

The format of the questionnaire was adapted from the Minnesota Leisure-Time Physical Activity Questionnaire (Taylor et al. 1978) (see scheme 1–4, pp. 186–89). In general, participants are asked if they engaged in a specified activity during the previous 12 months. If so, the subject is queried

Table 1 Average daily energy expenditure (kcal/day) assessed by 24-hour recall among 123 men and 244 women, by study site, New York City, 1999–2000¹

Characteristic	Men						Women					
	Percentile						Percentile					
	No.	25 th	50 th	75 th	Mean	SD	No.	25 th	50 th	75 th	Mean	SD
Study site ²												
Puerto Rican Family Institute	28	2404	2820 ^a	3528	3176	1306	56	2077	2383 ^{c,d}	2846	2522	800
Caribbean Women's Health Association	45	2873	3339 ^{a,b}	3757	3406	850	78	2541	3029 ^{c,e}	3809	3219	929
Allianza Dominicana	9	2415	3432	4980	3833	2047	37	2254	2790 ^{d,f}	3755	3150	1187
Chinatown Health Clinic	41	2173	2631 ^b	3115	2739	731	73	1991	2357 ^{e,f}	2603	2470	928
Total ³	123	2413	2937	3639	3162	1097	244	2146	2582	3188	2825	1004
p-median = 0.0002												

¹ The sex of the six individuals was not available therefore these individuals are excluded from the data presented in this table.

² Values with the same letter subscripts indicate pair-wise comparisons that were statistically significant ($p < 0.05$).

³ Median values were statistically significantly different ($p < 0.05$).

Table 2 Physical activities accounting for 95% of the population daily energy expenditure among 373 participants, New York City, 1999–2000

Amnworth code	Description of physical activity ²	% of population EP	Rank ³											
			Population	Male	Female	Puerto Rican	Black	Dominican	Chinese	30–34 years	35–39 years	40–44 years	45–49 years	50–64 years
07029	Sleeping – not including napping	18.09	1	1	1	1	1	1	1	1	1	1	1	1
07020	Sitting quietly (riding in a car, listening to a lecture or music, watching television or a movie in a bus/plane/train/theater/church/at the beach, thinking, resting, praying at home)	7.46	2	2	2	2	2	2	2	2	2	2	2	2
05050	Cooking or food preparation-standing or sitting or in general (not broken into stand/walk components), making coffee	5.09	3	6	3	4	2	3	5	3	6	3	3	4
13030	Eating (sitting)/drinking/taking medications, eating and working	4.61	4	4	6	5	5	4	4	4	5	7	9	3
13050	Showering, towel drying (standing)	4.42	5	5	4	3	4	8	8	6	3	11	6	6
11580	Sitting-light office work; in general (chemistry/lab work, light use of handtools, watch repair or micro-assembly, light assembly/repair, checking messages, computer work, closing up, getting ready to work, typing, examining patients)	3.84	6	9	5	7	15	6	3	4	5	5	9	10
16010	Automobile or light truck (not a semi) driving	3.47	7	3	15	6	6	11	15	7	4	4	10	17
17270	Walking, to work/class/elevator/train/bus/car/bank/home/to pick someone (not child) up	3.39	8	8	8	13	9	5	6	8	10	8	7	8
05030	Cleaning, house or cabin; office, general	2.95	9	29	7	15	7	7	12	15	11	12	4	5
11600	Standing; light (bartending, store clerk, assembling, filing, xeroxing, put up the Christmas tree, fixing computer, teaching)	2.78	10	7	11	8	11	35	7	11	8	18	16	7
13040	Sitting or standing-grooming (washing, shaving, brushing teeth, urinating, washing hands, putting on make-up, painting nails, fixing hair)	2.66	11	11	9	9	10	12	9	9	9	14	11	9
09055	Sitting-talking or talking on the phone	1.97	12	12	12	10	12	13	24	12	15	19	14	11
11610	Standing; light/moderate (assembler/repair heavy parts; welding, stocking, auto repair, pack boxes for moving, etc.); patient care (as in nursing)	1.77	13	10	14	12	8	-	44	13	-	6	21	22
05186	Child care; standing-dressing; bathing, grooming, feeding, occasional lifting of child, putting child to bed, waking child-light effort	1.72	14	30	10	29	13	10	17	10	14	13	34	19
13020	Dressing; undressing (standing or sitting); putting on coat, get things together to leave	1.66	15	13	13	11	14	21	26	14	18	17	15	14
17190	Walking, 3.0 mph, level, moderate pace, firm surface	1.32	16	16	19	24	24	26	18	29	21	20	29	16
07010	Lying quietly reclining (watching television), lying quietly in bed-awake	1.26	17	22	17	20	16	18	38	19	19	23	25	21
11585	Sitting-meetings, general, and/or with talking involved; talking with patients, work at church	1.25	18	23	16	21	17	32	20	18	22	16	12	49
05020	Cleaning, heavy or major (e.g., wash car, wash windows, mop, clean garage, clean refrigerator) vigorous effort	1.14	19	14	35	-	20	9	30	16	35	37	26	25
05066	Walking-shopping (non-grocery shopping), running errands, window shopping	1.13	20	21	23	26	18	34	27	21	17	36	18	26
17130	Up stairs, using or climbing up ladder	1.09	21	18	24	19	36	24	19	20	25	35	23	38
05170	Sitting-playing with child(ren), reading to child, helping child with homework – light	1.04	22	38	18	-	19	15	33	17	12	40	27	-
17250	Walking, for pleasure, work break/coffee break, walking the dog, walking in museum, sightseeing, walking on beach/in park	1.03	23	20	27	17	22	33	23	25	27	42	8	27
07030	Sleeping – specifically napping	1.02	24	24	26	16	23	31	31	33	20	22	22	35

05052	Cooking or food preparation-walking	0.89	25	40	20	40	-	16	13	34	39	21	31	13
05041	Wash dishes-standing or in general (not broken into stand/walk components); cleaning dishes from table-walking	0.84	26	-	22	33	32	30	22	31	31	28	30	24
09030	Sitting-reading, book, newspaper, etc.	0.83	27	19	38	-	53	29	14	38	40	26	37	15
09010	Sitting, card playing, playing board games/ video games/computer, watch others play games	0.82	28	17	45	22	25	-	32	51	24	24	24	30
05040	Cleaning, light (dusting, straightening up, vacuuming, changing linen, carrying out trash, watering plants, feeding animals/fish), moderate effort (window seals)	0.79	29	46	25	27	21	-	35	48	42	-	13	20
05055	Putting away groceries (e.g., carrying groceries/supplies; shopping without a grocery cart, shopping cart unknown)	0.76	30	35	31	30	34	-	21	41	36	41	19	36
05185	Child care: sitting/kneeling-dressing, bathing, grooming, feeding, occasional lifting of child-light effort, patient care	0.75	31	-	21	-	27	22	29	47	33	34	33	23
11791	Walking on job, less than 2.0 mph (in office/store or lab area, inspecting something, going to meet someone), very slow	0.74	32	26	34	-	37	-	16	32	29	15	-	29
07040	Standing quietly (standing in a line, on a bus/train, in elevator, waiting for bus/train, looking out/in a window)	0.68	33	31	33	18	46	-	25	27	38	29	17	51
05187	Child care: picking up/taking children to day care/school/babysitter	0.62	34	41	32	42	28	25	-	23	34	25	-	-
11120	Construction, outside, remodelling	0.60	35	15	-	-	-	-	10	-	-	10	-	33
05060	Food shopping, with grocery cart	0.59	36	53	29	-	30	39	34	36	41	-	42	18
09050	Standing-talking or talking on the phone, partying, hanging out outside	0.58	37	34	40	23	45	40	40	43	37	33	28	-
17030	Carrying 74+ pound load, upstairs	0.58	38	-	28	-	-	-	11	-	-	7	-	-
05090	Implied standing-laundry, fold or hang clothes, put clothes in washer or dryer, packing suitcase	0.55	39	-	30	34	29	38	-	-	-	27	20	31
13035	Talking and eating/drinking or eating only (standing)	0.54	40	43	42	25	31	-	-	28	28	43	-	50
05095	Implied walking-putting away clothes, gathering clothes to pack, putting away laundry, looking for something (in the house), taking laundry downstairs to laundry room (laundromat)	0.51	41	44	41	41	50	23	42	49	-	-	32	37
05051	Serving food, setting table-implicit walking or standing	0.50	42	54	36	-	39	17	-	53	26	31	-	44
17160	Walking, 2.0 mph, level, slow pace, firm surface	0.45	43	33	52	31	40	-	51	40	45	-	38	43
17150	Walking, less than 2.0 mph, level ground, strolling, household walking, very slow	0.45	44	36	50	39	-	20	46	39	-	-	-	32
09040	Sitting-writing, desk work (paying bills, writing letter/card, reading mail, doing email)	0.42	45	45	47	28	-	-	39	37	-	-	39	47
05146	Standing-packing/unpacking boxes, occasional lifting of household items, light-moderate effort	0.42	46	-	39	-	26	-	-	24	-	-	41	-
01030	Bicycling, 12-13.9 mph, leisure, moderate effort	0.39	47	-	37	14	-	-	-	-	-	-	-	12
13010	Bathing (sitting)	0.38	48	-	43	32	-	27	53	54	-	30	-	52
09065	Sitting-in class, general, including note-taking or class discussion	0.35	49	-	44	-	38	-	49	-	-	38	35	-
09060	Sitting-studying, general, including reading and/or writing or doing homework	0.33	50	-	49	-	47	41	50	35	-	44	-	-
02030	Callisthenics, home exercise, light or moderate effort, general (example: back exercises), going up & down from floor), hoola hoop	0.32	51	-	46	-	28	37	-	-	-	-	36	39
11766	Truck driving, loading and unloading truck (standing)	0.30	52	25	-	-	44	-	48	-	13	-	-	-
16050	Driving heavy truck, tractor, bus	0.29	53	27	-	-	33	-	33	-	22	-	-	-
03025	Dancing, general	0.28	54	-	48	37	-	14	-	30	-	45	40	-
06140	Laying tile or linoleum	0.25	55	28	-	-	35	-	-	-	-	16	-	-
17070	Downstairs	0.25	56	52	-	44	-	-	-	-	-	44	-	-
17220	Walking, 4.0 mph, level, firm surface, very brisk	0.25	57	-	54	-	48	-	-	46	-	-	-	-

Table 2 Physical activities accounting for 95 % of the population daily energy expenditure among 373 participants, New York City, 1999–2000

Answorth code	Description of physical activity ²	Rank ³												
		% of population EF	Population	Male	Female	Puerto Rican	Black	Dominican	Chinese	30–34 years	35–39 years	40–44 years	45–49 years	50–64 years
03030	Ballroom, fast (disco, folk, square)	0.25	58	—	51	—	52	—	43	—	32	—	—	28
07021	Waking up	0.25	59	—	—	—	—	—	45	—	—	—	—	41
05070	Ironing	0.23	60	—	—	51	—	—	—	57	—	—	—	—
11010	Bakery, general	0.23	61	32	—	—	—	—	28	26	—	—	—	—
17200	Walking, 3.5 mph, level, brisk, firm surface	0.22	62	—	—	—	—	37	—	45	—	—	—	—
17170	Walking, 2.5 mph, firm surface	0.21	63	—	53	—	—	19	—	55	—	—	—	45
01020	Bicycling, 10–11.9 mph, leisure, slow, light effort ^c	—	—	—	—	—	—	—	—	—	—	—	—	—
02020	Calisthenics (e.g., pushups, pullups, situps), heavy, vigorous effort	—	—	48	—	—	—	—	47	—	30	—	—	—
02065	Stair-treadmill ergometer, general ^b	—	—	—	—	—	—	43	—	—	—	—	—	—
03015	Aerobic, general	—	—	—	55	—	41	—	—	—	—	—	—	—
03021	Aerobic, high impact ^b	—	—	—	—	—	—	—	—	—	—	—	—	—
03040	Ballroom, slow (e.g., waltz, foxtrot; slow dancing)	—	—	—	—	—	—	—	—	—	—	—	—	—
05010	Carpet sweeping, sweeping floors ^c	—	—	—	—	—	—	—	—	—	—	—	—	—
05080	Sitting, knitting, sewing, light wrapping (presents)	—	—	—	—	—	—	—	—	—	—	—	—	42
05145	Moving household items; carrying boxes ^c	—	—	—	—	—	—	—	—	—	—	—	—	46
05175	Walk/run-playing with child(ren)-moderate	—	—	—	—	—	—	—	—	—	—	—	—	48
06160	Painting, papering, plastering, scraping, inside house, hanging sheet rock, remodelling, hanging blinds	—	—	—	—	—	—	—	—	—	—	—	—	46
09020	Standing-drawing (writing), casino gambling, playing pool	—	—	42	—	—	—	—	—	—	23	—	—	—
10125	Guitar, rock and roll band (standing)	—	—	—	—	—	—	—	—	—	—	—	—	40
11720	Tailoring, cutting	—	—	51	—	—	—	—	—	—	—	—	—	—
11820	Walking or walk downstairs or standing; carrying objects 25–49 lbs	—	—	—	—	—	—	—	—	—	—	—	—	—
11830	Walking or walk downstairs or standing; carrying objects about 50–74 lbs	—	—	—	—	—	—	—	—	—	—	—	—	—
14020	Sexual activity, general, moderate effort	—	—	—	—	—	—	—	—	—	—	—	—	—
15040	Basketball, game ^a	—	—	—	—	—	—	—	—	—	—	—	—	—
15050	Basketball, nongame, general	—	—	—	—	—	—	—	—	—	—	—	—	—

¹ Italicised codes were newly developed codes for this study (see Methods, data collection).
² Boldface activities were activities reported by participants that were not listed on the compendium of physical activities (Ainsworth et al. 1993) (see Methods, data collection).
³ Shaded boxes indicate physical activities that were not ranked in the top 95 % of the total population daily energy expenditure.
^a Activities unique to gender.
^b Activities unique to study site.
^c Activities unique to age.

Table 3 Physical activities accounting for 10% or more of an individual's daily energy expenditure that were not selected at the population, sex-specific, study site-, or age-specific level, among 373 participants, New York City, 1999–2000

Ainsworth code	Description of physical activity ^a
03020	Aerobic, low impact
05065	Standing-shopping (non-grocery shopping)
05147	Implied walking-putting away household items-moderate effort
05165	Walking-light, noncleaning (ready to leave, shut/lock doors, close windows, etc.), turn on VCR, fixing small items
07050	Recline-writing
09070	Standing-reading or smoking
11130	Electrical work, plumbing
11792	Walking on job, 3.0 mph, in office, moderate speed, not carrying anything
11795	Walking, 2.5 mph, slowly and carrying light objects less than 25 lbs
11850	Walking or walk downstairs or standing, carrying objects 100 lbs and above
17010	Backpacking, general
17025	Carrying load upstairs, general
17040	Climbing hills with 10- to 20-lb load
18240	Swimming laps, freestyle, slow, moderate or light effort

^a Boldface activities were activities reported by participants that were not listed on the compendium of physical activities (Ainsworth et al. 1993) (see Methods, data collection).

about whether they performed the activity at least once a month during each of the past 12 months or in which months they engaged in the activity at least once a month. Finally, information is collected on the frequency (times per week) and duration (time per episode) of activity participation.

Activities are separated into major domains: recreation, household, occupation, and transportation which were then further subdivided e.g., household activity was divided into “activities associated with maintaining the inside of a house”, “care-giving”, “self-care”, and “home maintenance and repair”. Each major domain concludes with a prompted open-ended question that allows for the names and corresponding activity-related details of up to three other activities participated in during the previous 12 months.

Similar types of activities were grouped together to reduce the questionnaire length so that the administration time could be kept reasonable. Each activity or group of activities was assigned a MET level intensity using the compendium of physical activities (Ainsworth et al. 1993). Activities not listed in the compendium were given the MET value of a similar activity. For combined activities the MET value was assigned using the following hierarchical scheme: (1) the general compendium code; (2) the mean MET value of the activity codes listed in the combination; (3) the mean MET value of the most frequently engaged in subset of activities; or (4) the MET value of the most commonly participated in activity. When a “general compendium code” was unavailable, the second method was generally used. Methods three and four took precedence when it was noted that there was unequal participation in the activities comprising a group.

Questionnaire tailoring

Optimising the quality of the physical activity assessment must take into consideration both the amount of time necessary to complete the interview as well as the strain of having to recall very detailed information. In accordance with our pilot testing experience as well as our review of the literature, questionnaire modifications were made to enhance the assessment. Modifications are detailed below.

Occupation: Job titles may not adequately reflect occupational EE, particularly if there is a large degree of variation in activity within a given job title. As a result, previous epidemiologic studies have inquired about occupational activities (Montoye 1971; Pereira et al. 1997). Information about actual job activities is thought to provide a better indication of occupational physical activity level, thereby allowing the EE of those holding the same job to be differentiated. Thus, for the two occupation categories “office, research, or laboratory work including clerical or white-collar jobs” and “food, service, sales, or retail-related work” participants indicate how they spend 50% or more of their usual workday. Respondents select from: “sitting”, “standing”, “walking” “standing, walking, lifting, carrying, or pushing items weighing at least one pound but less than 25 pounds”, “standing, walking, lifting, carrying, or pushing items weighing 25 pounds or more”, or “other (specify)”.

Self-care: Self-care activities such as eating or sleeping are expected to be similar, on average, for any given day. Thus, these activities are assessed for a *usual* day in the previous year.

ACTIVITY	PA1. During the past 12 months, did you (ACTIVITY)?		PA2. Did you do this at least once every month during the past 12 months?		PA3. In which of the past 12 months did you do this at least once? (CHECK ALL THAT APPLY)												PA4. On average, how many times per week did you do this?	PA5. Each time you did this, how long did you usually spend doing it?	Special notes
	NO	YES	NO	YES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC			
<p>I will start by asking you about your recreational or leisure time activities. I will begin with individual or team-affiliated sports.</p> <p><i>Individual or team-affiliated sports</i></p>																			
Bicycle ride including the use of a stationary bike																			
Do sit-ups, push-ups, pull-ups, or other vigorous calisthenics																			
Stretch or do other light to moderate calisthenics, such as yoga or tai chi																			
Do weight lifting including free weights or machines																			
Participate in an aerobics class																			
Dance, including any type, such as disco, ballroom, or latin dance																			
Run or jog including the use of a treadmill or stair-master																			
Play basketball																			
Play football																			
Hike or backpack																			
Play field or ice hockey																			
Do judo, jujitsu, karate, kick boxing, or taekwondo																			
Rollerskate, iceskate, or rollerblade																			
Play soccer																			
Play baseball or softball																			
Play tennis or racketball																			
Swim laps																			
Walk specifically for exercise or pleasure																	1 When you walk for exercise or pleasure, would you describe your usual pace as slow, moderate, or brisk?		
<p>Now I will ask you about some other activities in which you may participate during your leisure time. Please do not include time spent doing these activities during your job or transportation because we will ask you about your job and transportation-related activities separately. For instance, attending a lecture during work hours or reading a book while on the train should not be reported. Also, if you usually participate in any of these sedentary activities simultaneously, that is at the same time, only report the time for the first activity that you are asked about.</p>																			
Play a musical instrument																			
Listen to music, watch television or a videotape																			
Play board, card, video or computer games																			
Read newspapers, magazines, or books																			
Talk on the telephone																			
Do arts and crafts, such as needle work (sewing, knitting, crocheting, quilting), model building, drawing, or painting																			
Attend class or a lecture																			
Study or do homework																			
Do desk or computer-related work, such as writing, paying bills, office-work, or searching the internet -- do not include time previously reported studying or doing homework																			
Attend religious services, social or service club meetings																			
Attend sporting events, concerts, movies or theater																			
Socialize or visit with friends or family members																			
Sit outdoors in the park, by a pool, or on the beach																			
Shop for non-grocery items, including window shopping																			
Participate in any other recreational or leisure time activities?																	2 If yes, skip to prompted open-ended questions. Else, skip to household related activities.		
What is the name of the first recreational activity that you participated in during the past 12 months (specify)?																			
What is the name of the next recreational activity that you participated in during the past 12 months (specify)?																			
What is the name of the next recreational activity that you participated in during the past 12 months (specify)?																			

Scheme 1

ACTIVITY	PA1. During the past 12 months, did you (ACTIVELY)?		PA2. Did you do this at least once every month during the past 12 months?		PA3. In which of the past 12 months did you do this at least once? (CHECK ALL THAT APPLY)												PA4. On average, how many times per week did you do this?		PA5. Each time you did this, how long did you usually spend doing it?		Special notes
	NO	YES	NO	YES	1	2	3	4	5	6	7	8	9	10	11	12	1	2			
<p>Now, I am going to ask you about your household-related activities. This includes chores such as cleaning and cooking, as well as care-giving, self care, and home maintenance or repair. We will start with activities associated with maintaining the inside of a house such as cleaning, laundry, grocery shopping, and cooking.</p> <p><i>Activities associated with maintaining the inside of a house (cleaning, laundry, grocery shopping, cooking)</i></p>																					
Do laundry or ironing																					
Grocery shop or put away groceries (do not include transporting groceries home)																					
Prepare meals, including setting the table or serving food																					
Clean-up from meals or wash dishes																					
Do light cleaning, such as dusting, straightening up, putting away things, sweeping, vacuuming, changing bed linens, carrying out trash, watering indoor plants, or cleaning sinks and counters																					
Do heavy or major cleaning, such as washing windows or a car, mopping or scrubbing floors, or cleaning a garage																					
<i>Care-giving</i>																					
Care for elderly or disabled people																					
Care for infants, toddlers, or children less than 6 years of age, including dressing, bathing, feeding, or holding																					
Spend time with children while sitting or standing-still, such as reading, helping with homework, or watching at the park																					
Engage in active play with children that involved movement, such as walking or running																					
<p>Now, I am going to ask you about a few self-care activities. I am interested in knowing about how long, on average, you did each of these activities on a USUAL day over the past 12 months.</p> <p><i>Self-care (bathing, grooming, and eating)</i></p>																					
Eating meals and snacks																					
Grooming, including showering or bathing, dressing or undressing, shaving, brushing teeth, putting on make-up, or fixing hair																					
Napping or resting awake in bed, while not doing other activities																					
Time go to sleep																					
Time wake-up or finish sleeping																					
<i>Home maintenance and repair (including indoor and outdoor projects, yard-work, and snow removal)</i>																					
Perform indoor decorating or remodelling activities, such as painting, wall-papering, or plastering																					
Participate in any other household-related activities? Do not forget activities such as home repair projects, yard-work, or snow removal.																					
What is the name of the first household-related activity that you participated in during the past 12 months (specify)?																					
What is the name of the next household-related activity that you participated in during the past 12 months (specify)?																					
What is the name of the next household-related activity that you participated in during the past 12 months (specify)?																					

Scheme 2

ACTIVITY	P1: During the past 12 months, did you (ACTIVITY)?		P2: Did you do this at least once every month during the past 12 months?		P3: In which of the past 12 months did you do this at least once? (CHECK ALL THAT APPLY)												P4: On average, how many times per week did you do this?		P5: Each time you did this, how long did you usually spend doing it?		Special notes	
	NO	YES	NO	YES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	PER	WEEK	MIN	SEC		
<p>Now, I'd like to ask you about your job or work-related activities. Please consider every job, part-time or full-time, paid or unpaid, which you held during the past 12 months.</p>																						
Were you employed during the past 12 months?																						2 If yes, continue with next row in occupation grid, else skip to transportation-related activities.
Perform office, research, or laboratory work including clerical or white-collar jobs																						1 In a usual day at work, did you spend at least half of your work day sitting; standing; walking; standing/walking/lifting/carrying/pushing items weighing more than one pound, but less than 25 pounds (or more than 1/2 kilogram, but less than 11 kilograms); standing/walking/lifting/carrying/pushing items weighing 25 pounds (or 11 kilograms) or more; or other (specify)? (Up to two responses can be circled, assuming a respondent reports doing two of these - each for 50% of their day)
Perform food, service, sales, or retail-related work																						1 In a usual day at work, did you spend at least half of your work day sitting; standing; walking; standing/walking/lifting/carrying/pushing items weighing more than one pound, but less than 25 pounds (or more than 1/2 kilogram, but less than 11 kilograms); standing/walking/lifting/carrying/pushing items weighing 25 pounds (or 11 kilograms) or more; or other (specify)? (Up to two responses can be circled, assuming a respondent reports doing two of these - each for 50% of their day)
Work in a dry cleaners, laundromat, linen service or other laundry-related industry																						
Do carpentry, locksmith, electrical, or plumbing-related work																						
Do construction, shoveling, outdoor remodeling, or masonry work																						
Do tailoring																						
Do housekeeping, janitorial, chambermaid, or other cleaning-related work																						
Teach in a school or other environment																						
Care for children as a job (do not include teaching previously reported)																						
Perform indoor decorating or remodeling activities, such as painting, wall-papering, or plastering																						
Cook or bake																						
Drive a car or light truck																						
Drive a heavy truck, tractor, or bus																						
Load or unload a truck																						
Participate in any other job or job-related activities? Remember to consider every job, part-time or full-time, paid or unpaid.																						2 If yes, skip to prompted open-ended questions. Else, skip to transportation-related activities.
What is the name of the first job-related activity that you participated in during the past 12 months (specify)?																						
What is the name of the next job-related activity that you participated in during the past 12 months (specify)?																						
What is the name of the next job-related activity that you participated in during the past 12 months (specify)?																						

Scheme 3

Walking: Walking activities are inquired about separately for recreation and transportation and the MET value for these is assigned based on a follow-up question about usual walking pace, which can be characterised as “slow”, “moderate”, or “brisk” by the participant.

Transportation: New Yorkers use public transportation more than individuals residing in other United States’ geographic locations. Capturing transportation-related activity, which may be an important source of EE in this population, is more

complex in this population. Furthermore, similar to other populations, transportation activities differ for week versus weekend days. To capture this difference in a manner that is easy for respondents, the number of days per week that a given mode of transportation is used is collected. This question, along with the total duration per day for a given type of transportation, avoids confusion over whether a round-trip (i.e., going to and from a location) counts as one or two separate times.

ACTIVITY	PA1: During the past 12 months, did you (ACTIVITY)?		PA2: Did you do this at least once every 7 months during the past 12 months?		PA3: In which months did you do this at least once? (CHECK ALL THAT APPLY)												PA4: On average, how long did you spend per day doing this?	PA5: On average, how long did you spend per week doing this?	Special notes
	NO	YES	NO	YES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC			
<p>Finally, if you like to ask you about your activity, related to transportation. Please consider all the modes of transportation you use to get from one place to another such as walking, biking, using public transportation, or a car. Remember to report how you get to and from public transportation.</p>																			
Ride a bus, subway, or train																			
Drive or ride in a car, cab, light truck or motorcycle																			
Walk or use public transportation to take children to or from school or child-care																			
Walk without carrying anything heavier than a briefcase (do not count walking already reported)																			
Walk while carrying items, such as groceries or packages, weighing more than a briefcase but less than 25 pounds or approximately 11 kilograms																			
Walk while carrying items 25 pounds (approximately 11 kilograms) or more																			
Walk up a flight of stairs (1 flight is about 10 stairs)																			
Participate in any transportation-related activities?																			
What is the name of the first transportation-related activity that you participated in during the past 12 months (specify)?																			
What is the name of the next transportation-related activity that you participated in during the past 12 months (specify)?																			
What is the name of the next transportation-related activity that you participated in during the past 12 months (specify)?																			

¹ If respondent reports participation in activity, ask this follow-up question.

² Special skip pattern instructions.

³ Instead of using the wording provided in PA1, ask the question as worded in the special notes section.

Scheme 4

Stairs: Stair-related EE is based on flights of stairs ascended, since little energy is expended descending stairs. The stair-related question is similar to that used on other questionnaires (Montoye 1971). Stair use is inquired about for a usual day, since like self-care activities, this activity is expected to be similar on most days of the year.

Discussion

As a first step in the development of a physical activity questionnaire for use in the NYCP cohort, a study was conducted in a multi-racial/ethnic population (Hispanics of Puerto Rican and Dominican descent, Chinese, and blacks) to collect 24-hour EE information. The data collected, along with pre-existing information on EE, based primarily on non-Hispanic whites, were used to develop a questionnaire that will measure usual, overall and domain-specific (recreational, household, occupational, and transportation) EE for the year preceding interview. Both the frequency, allowing for seasonal variation, and the duration of activities are also assessed with the new questionnaire. Activities not specifically listed on the instrument are captured by a prompted open-ended question asked at the conclusion of each EE domain. Collected information is used in conjunction with a pre-assigned MET level of intensity to determine summary measures of EE.

The questionnaire is designed to be interviewer-administered since the literacy of the proposed cohort population is not yet established. Pilot-testing administration took approximately 30 minutes. Currently, a computer-assisted interface is under development. The rationale for creating a computerised questionnaire includes shortening the administration time (i.e., skip patterns will be automated, "other, specify" responses will be easily recorded using look-up tables) as well as eliminating post-interview coding and data entry. The EE section is only one of many questionnaire components; thus a "streamlined" module to capture such exposure is critical for minimising participant burden.

Although the 24-hour recall participants were comprised of a convenience sample, care was taken to ensure that the participants reflected the sex-, age-, and the race-ethnicity distribution of the targeted cohort members for whom less information on EE patterns existed. Furthermore, the 24-hour recall participants were selected from similar health facilities as the cohort members. The urban environment in New York City is distinct from most other regions of the United States, particularly with respect to the widespread use of public transportation. Despite the use of a convenience sample, the activities selected from the 24-hour recalls were similar to those activities found on other ques-

tionnaires (Bernstein et al. 1998; Montoye 1971; Taylor et al. 1978) and a questionnaire designed to collect past year physical activity data in breast cancer survivors (Dr. Barbara Sternfeld, personal communication). This, in conjunction with the supplementation of activities from items on other pre-existing questionnaires, indicates that the developed instrument may be appropriate for capturing EE in other populations.

Interestingly, group specific analyses (i.e., age, sex, or health agency) revealed only 19 activity codes not included in the top 95% of the total population daily EE codes. Identification of a list of activities that is common across subgroups and/or individuals results in a questionnaire of reasonable length. Activities important at the subgroup or individual level can be obtained via an open-ended question. Despite the similarities in the *types* of activities, group/individual differences in *total* EE were observed. To capture this variation in EE levels it is critical to quantify the *amount* of participation in various activities.

Information on total daily EE is not widely available primarily due to the fact that non-recreational sources of EE are rarely assessed. In comparison to the EE levels observed in a population-based Swiss study, the median EE levels among women in each age category in our population was higher but the median EE levels for men across age categories were lower. Our observations that males as well as younger aged individuals expend more energy than women or older age individuals, respectively, were similar to those found in the Swiss study of 425 men and 494 women (Bernstein et al. 1998; Bernstein et al. 2001). Both our study and the Swiss study observed a fairly stable EE for women across age groups, while only the latter study found a fairly consistent decline in EE with age among men. Furthermore, unlike this other study, in which the percent of energy spent in 4+ basal metabolism rate activities decreased with age for both males and females, our data did not reveal any clear age-related patterns for any of the MET activity levels. Sleep patterns among women were similar however, U.S. men reported more hours of sleep than the Swiss men. Clearly, the smaller sample size in our study may not only have influenced the precision of our estimates, particularly among men, but also may account for a portion of the study finding differences. In addition, we also noted variation in total EE by racial/ethnic group. To our knowledge, the lower EE observed among Chinese and Puerto Ricans when compared to either Caribbean or Dominicans has not been previously reported. These data collectively suggest that total EE may not be consistent across population subgroups (e.g., sex, age, race/ethnicity). Observations on leisure time activity in the United States support this notion of subgroup variation in EE.

Specifically, a higher prevalence of leisure time activity has been observed among: 1) males, particularly for activities in the high-intensity range; 2) younger adults; 3) more-educated individuals; and 4) whites (U.S. Department of Health and Human Services 1996). Interestingly, these patterns of leisure time activity may not be consistent across the activity domains and as a result total EE patterns may also not reflect those of leisure time activity (Ainsworth et al. 1999). For instance, a study of women found that demographic characteristics are non-uniformly associated with the various activity domains (Sternfeld et al. 1999). For example, age was positively associated with household activity yet inversely associated with recreational activity, and lower education was positively associated with occupational activity but inversely associated with less recreational activity.

It is likely that both warm weather and weekend activities, potentially important contributors to EE, went undetected with the 24-hour recalls because they were conducted primarily on weekdays during cold weather months. In fact, the data we collected indicate the presence of seasonal variation in recreational and transportation-related activities. This observation is not surprising in light of the fact that considerable seasonal variation in physical activity has been observed in other studies (Stephens & Caspersen 1994), including geographic locales with year-round warmer climates (Leslie Bernstein, personal communication). The infrequency of occupational and household activities as responses to the supplemental questions can be viewed as evidence that these activities are, in fact, less seasonally dependent. An alternative interpretation could be that the participants misunderstood the questions to be inquiring about recreational and transportation-related activities only; no information is available to determine whether this occurred, however all interviewers underwent structured training on the administration of the questionnaire. To compensate for seasonal variation in activity, other established questionnaires were used to supplement the list of activities.

Intra-individual variability in EE makes it difficult to assess EE via questionnaire. Despite the flexible features (seasonal variation, frequency, duration, and prompted open-ended questions) of this newly designed questionnaire, it is more likely to capture routine rather than episodic patterns of activity. Thus, the EE calculated from the questionnaire is intended to represent the average, usual, EE rather than absolute EE. The purpose of this measure is to rank individuals so that they can be grouped into EE categories (e.g., quartiles) for the purpose of examining etiologic hypotheses in epidemiologic research. This is analogous to the primary use of nutrient measures obtained from a food frequency questionnaire (Willett W. 1998).

Based on research in other chronic diseases, it is believed that EE operates via different pathways to influence disease risk. For instance, it has long been established that cardiovascular disease risk decreases with increased aerobic exercise (U.S. Department of Health and Human Services 1996), whereas bone-loading activities are protective against osteoporosis (U.S. Department of Health and Human Services 1996). A variety of biological mechanisms linking physical activity with cancer risk have been proposed and are discussed in detail elsewhere (McTiernan et al. 1998). In brief, physical activity might alter cancer risk for a number of sites by influencing body mass, metabolic hormones, growth factors, hematologic factors and immune function. Site-specific mechanisms such as changes in bowel transit time and prostaglandin production have been proposed for colon cancer. Likewise, physical activity might alter breast cancer risk through its influence on menstrual characteristics that can modify sex hormone concentrations. The questionnaire was designed to allow for the joint consideration of different aspects (e.g., bone-loading versus aerobic exercise) and sources of EE to be examined in relation to cancer outcomes. Furthermore, it is important that sedentary activity information is also collected so that it can be examined in relation to cancer risk given that physical inactivity has been linked to many other health problems such as cardiovascular disease (U.S. Department of Health and Human Services 1996).

To our knowledge, the detailed EE information being ascertained in the NYCP has never been collected at baseline in a prospective cohort study. This comprehensive questionnaire will allow for in-depth investigations of the relation between EE and subsequent cancer incidence. With the emerging evidence that physical activity may reduce cancer risk at some sites, the public health importance of elucidating this relationship needs greater recognition since it provides a potential means for the primary prevention of cancer.

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Zusammenfassung**Entwicklung eines Fragebogens zur Erhebung der körperlichen Aktivität während des vergangenen Jahres in einer städtischen multiethnischen Bevölkerung**

Ziele: Beschreibung der Entwicklung eines Fragebogens zur Erhebung der körperlichen Aktivität, einschliesslich Alltagsaktivitäten, während der letzten 12 Monate in einer multiethnischen Kohorte. Beschreibung der Energieverbrauchsprofile in der zur Entwicklung des Fragebogens verwendeten Stichprobe.

Methoden: 24-Stunden-Aktivitäts-Erinnerungsprotokolle wurden für eine Gelegenheitsstichprobe (N = 367) aus vier Gesundheitszentren von New York City erhoben (Oktober 1999–Februar 2000). Der Energieverbrauch wurde für die Gesamtpopulation, Untergruppen und die einzelnen Individuen bestimmt.

Resultate: Die identifizierten Aktivitäten sind mit jenen bereits existierender Fragebogen vergleichbar. Für Untergruppen und auf individuellem Niveau wurden Unterschiede im Energieverbrauch festgestellt. In den chinesischen und porto-ricanischen Zentren war der mediane Energieverbrauch geringer als in den karibischen und dominikanischen Zentren. Es wurden keine klaren Unterschiede zwischen verschiedenen Altersgruppen festgestellt. Im Allgemeinen wurde täglich prozentual mehr Energie mit Aktivitäten geringer Intensität verbraucht. Der auf Grundlage dieser Resultate entwickelte Fragebogen wird in einem persönlichen Interview von ca. 30 Minuten Dauer angewendet und erfasst Muster (Häufigkeit und Dauer) spezifischer Aktivitäten aus den Bereichen Freizeit, Haushalt, Beruf und Transport. Eine Kombination der so erhobenen Information mit publizierten Intensitätsniveaus liefert Gesamtwerte des Energieverbrauchs.

Schlussfolgerung: Aufgrund der Variationen im Niveau des Energieverbrauchs sind Angaben zu Art und Dauer der Aktivitäten notwendig. Die Gesamtwerte des Energieverbrauchs eignen sich zur Rangierung der Individuen, wie dies für Verzehrdaten bei Food-Frequency-Fragebogen üblich ist.

Résumé**Développement d'un questionnaire pour évaluer l'activité physique de l'année précédente dans une population urbaine multiethnique**

Objectifs: Décrire le développement d'un questionnaire évaluant l'activité physique de l'année précédente et inclure les activités de la vie quotidienne dans une cohorte multiethnique. Décrire les profils de dépense énergétique dans l'échantillon utilisé pour développer le questionnaire.

Méthodes: Les rappels de l'activité de 24 heures ont été récoltés dans un échantillon de convenance (N = 367) dans quatre centres de santé de la ville de New York (octobre 1999 à février 2000). La dépense énergétique a été déterminée au niveau de la population, du sous-groupe et de l'individu.

Résultats: Les activités identifiées sont semblables à celles d'autres questionnaires. Il y avait des différences de dépense énergétique au niveau individuel et de sous-groupe. La dépense énergétique médiane dans les sites chinois et portoricains était inférieure à celle des sites caribéens et dominicains. Il n'y avait pas de changements apparents liés à l'âge. En général, un fort pourcentage de la dépense énergétique quotidienne résulte d'activités de faible intensité. Le questionnaire qui a été développé à partir de ces résultats est administré par un interviewer, dure 30 minutes et identifie les modes (fréquence et durée) d'activités dans des domaines spécifiques (loisirs, domicile, professionnel et transports). Cette information, combinée à des niveaux d'intensité publiés dans la littérature, permet d'obtenir une mesure synthétique de l'énergie dépensée.

Conclusions: La variation de la dépense énergétique requiert une information sur le type et la quantité d'activité. Les mesures synthétiques peuvent être utilisées pour classer les individus selon la dépense énergétique comme on le fait pour l'apport énergétique avec les questionnaires de fréquence alimentaire.

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Appendix

Table A1. Physical activity in men (n = 123), New York City, 1999–2000^{a, b}

	Age (years)	N	Percentile (P)					Mean	(SD)
			P10	P25	P50	P75	P90		
Total Energy Expenditure (kcal/day)	30–34	31	2379	2702	3432	3966	4980	3574	1241
	35–39	27	2170	2422	2914	3497	4132	3102	900
	40–44	13	2292	2503	3339	4725	5139	3532	1178
	45–49	11	2631	2723	2779	3162	3649	2971	601
	50–64	25	2073	2118	2667	3187	3639	2700	657
3 to 3.9 MET (%)	30–34	31	0	1	4	18	48	13	19
	35–39	27	0	0	3	8	11	5	8
	40–44	13	0	0	0	8	23	6	9
	45–49	11	1	3	6	13	29	10	10
	50–64	25	0	0	3	6	22	6	10
4 to 5.9 MET (%)	30–34	31	3	6	9	14	21	12	13
	35–39	27	0	4	8	19	32	13	15
	40–44	13	0	5	9	14	62	16	22
	45–49	11	0	0	7	9	19	7	7
	50–64	25	2	4	8	14	49	13	16
≥6 MET (%)	30–34	31	0	0	0	6	13	5	9
	35–39	27	0	0	0	6	28	6	11
	40–44	13	0	0	0	2	8	2	3
	45–49	11	0	0	0	3	7	2	4
	50–64	25	0	0	0	2	8	2	6
Sleep time (hours)	30–34	31	4	6	8	9	11	7	3
	35–39	27	6	7	8	10	11	8	3
	40–44	13	6	8	10	10	12	9	3
	45–49	11	5	6	9	10	10	8	2
	50–64	25	5	7	9	10	12	9	3

^a The sex of the six individuals was not available therefore these individuals are excluded from the data presented in this table.^b Individuals that were <30 or >64 years of age and those for whom age information is missing are excluded from the data presented in this table.Table A2. Physical activity in women (n = 244), New York City, 1999–2000^{a, b}

	Age (years)	N	Percentile (P)					Mean	(SD)
			P10	P25	P50	P75	P90		
Total Energy Expenditure (kcal/day)	30–34	60	1818	2302	2676	3249	3814	2805	814
	35–39	33	1911	2081	2486	2760	3136	2506	593
	40–44	44	1988	2146	2473	3145	6159	2975	1483
	45–49	28	1968	2206	2660	3519	4207	2925	960
	50–64	44	1961	2131	2534	3543	4354	2874	1015
3 to 3.9 MET (%)	30–34	60	0	2	9	18	31	12	14
	35–39	33	0	0	5	17	26	10	11
	40–44	44	0	2	7	17	28	13	16
	45–49	28	0	2	6	20	40	13	15
	50–64	44	0	1	12	29	39	16	16
4 to 5.9 MET (%)	30–34	60	2	7	10	17	27	13	11
	35–39	33	3	6	9	14	22	11	8
	40–44	44	0	3	7	14	22	10	9
	45–49	28	0	4	9	16	25	11	9
	50–64	44	2	4	7	14	20	10	11
≥6 MET (%)	30–34	60	0	0	1	3	7	3	5
	35–39	33	0	0	0	3	7	2	4
	40–44	44	0	0	0	2	3	3	12
	45–49	28	0	0	1	3	9	3	5
	50–64	44	0	0	0	2	11	3	11
Sleep time (hours)	30–34	60	5	6	8	9	12	8	3
	35–39	33	7	7	9	11	15	9	3
	40–44	44	6	7	8	11	15	9	4
	45–49	28	5	8	8	10	11	8	2
	50–64	44	5	6	7	10	13	8	3

^a The sex of the six individuals was not available therefore these individuals are excluded from the data presented in this table.^b Individuals that were <30 or >64 years of age and those for whom age information is missing are excluded from the data presented in this table.