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Measurement design and the apparent inactivity of women in urban Chile

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Abstract

Physical activity surveillance is built around leisure-time exercise, a domain in which women appear less active than men, and largely excludes the unpaid domestic and care work that women perform disproportionately. We asked how much of the observed sex gap is produced by that measurement design. We analysed the Second Chilean National Time Use Survey (2023; analytic n = 28,477, representing 15.1 million urban residents aged 12 and older) and converted time in exercise, unpaid domestic work, caregiving, paid work and travel into metabolic equivalent hours per typical day using the 2024 Adult Compendium, applying recipient-age-specific caregiving values, occupation-specific paid-work values and a sex-specific exercise value from a national sport survey. Complex-survey estimation was applied, and attainment of the World Health Organization aerobic equivalent (at least 8.33 MET-hours per week from activities of at least 3 MET) was computed under three inclusive definitions. Considering exercise alone, women expended less than half as much as men (female-to-male ratio 0.44). Non-labour obligatory expenditure was nearly twice as high in women (ratio 1.91), and total expenditure across all five domains approached parity (16.74 vs 15.02 MET-hours per day, ratio 0.90). The sex gap in aerobic-equivalent attainment fell from 12.1 to 3.6 percentage points as the definition widened, and in the lowest income quintile expenditure was identical by sex (ratio 0.998). Findings were robust to five sensitivity analyses. Exercise-centred metrics overstate the sex gap by omitting unpaid work, materially changing who is classified as sufficiently active in urban populations.

Highlights

• Exercise-only metrics show urban Chilean women expending under half the activity of men.

• Counting unpaid domestic and care work brings total expenditure close to sex parity.

• Including invisible work cuts the gender gap in meeting WHO guidelines by two thirds.

• In the poorest income quintile, men and women expend identical activity energy.

• First linkage of a Latin American time-use survey to the 2024 Adult Compendium.

Introduction

Cities concentrate both the burden of physical inactivity and the policy levers meant to address it, and the international evidence linking urban form to movement rests on measures of walking, cycling and recreation [1]. The most recent pooled analysis of 507 population-based surveys estimated that 31.3 percent of adults did not meet the aerobic recommendation in 2022, consistently more women than men [2]. This female excess is one of the most reproducible findings in physical activity epidemiology, appearing across high-income and low- and middle-income settings alike [2,3], and it is the empirical basis for a large body of sex-targeted intervention research.

Yet the metric that produces this gap measures only part of human movement. Surveillance instruments, and the World Health Organization guidelines they serve, are built around leisure-time exercise and, more recently, active travel [4]. They largely exclude the physical work of running a household: cooking, cleaning, laundry, and the bodily labour of caring for children and dependent adults. Because this work is performed disproportionately by women, an instrument that does not count it will record women as less active whenever their effort is displaced from sport toward the home [5,6]. The asymmetry is large and persistent: in Australian time-diary data, wives averaged 23.28 hours of housework per week against 11.04 for husbands, an imbalance that widened rather than narrowed when wives out-earned their partners [7]. Across four recall instruments in three countries, women spent 28 to 81 percent more time than men in household and care tasks while reporting 3 to 39 percent less moderate-to-vigorous activity [8]. Time is the binding constraint: the same arrangement that raises women's domestic activity compresses the time available for exercise, most severely when children are youngest, when mothers of a child under two average 2 hours 38 minutes of adult leisure per week against 7 hours 43 minutes for fathers [6,9].

This distinction maps onto the difference between elective physical activity and activity obligated by economic or family necessity. The choice-based model underlying most surveillance misrepresents populations for whom much daily movement is required rather than freely chosen [10], and domestic and care work is the paradigmatic case that conventional metrics render invisible.

A practical way to make this activity visible is to link the detailed records of a national time-use survey to the metabolic intensities catalogued in the Compendium of Physical Activities. Tudor-Locke and colleagues pioneered this approach with the American Time Use Survey, assigning MET values to hundreds of daily activities to describe physical activity intensity across all domains rather than exercise alone [11,12], and subsequent work has confirmed its validity against accelerometry [13]. Its central result is consistent across settings: in linked time-use data from the United States, United Kingdom and Poland, more than 90 percent of moderate-to-vigorous activity derived from paid and unpaid work rather than discretionary exercise [14], and domain-level linkage across five countries showed home production to exceed active leisure by an order of magnitude, contributing in Brazil an estimated 36.3 MET-hours per week in 2007 against only 6.5 from active leisure [15]. The Compendium was substantially revised in 2024, with 176 updated MET values and 303 new activity codes [16]. Despite the availability of time-use surveys across Latin America, this linkage has not, to our knowledge, been applied in the region, where inactivity prevalence is among the highest reported worldwide and the gender division of unpaid labour is pronounced [3,17].

Chile is a strategic setting. Conventional instruments place women below men: in the 2023 Time Use Survey, 23.6 percent of men versus 15.6 percent of women reported sport or exercise on a weekday [18], and among university students 88.1 percent of women versus 78.5 percent of men failed to meet the guideline [19]. That survey records time in domestic work, caregiving disaggregated by recipient, travel, paid work, and exercise, making it possible for the first time in Latin America to estimate expenditure across all major domains in an urban population.

We pursued three aims: to estimate total physical activity energy expenditure across five domains by sex, testing whether the gap observed under an exercise-only metric narrows, closes, or reverses when unpaid work is counted; to quantify how the gap in meeting the WHO aerobic equivalent changes as the definition of qualifying activity widens; and to examine active travel by trip purpose, testing whether an apparent aggregate parity conceals a gendered recomposition between productive and reproductive mobility. Throughout, we examined variation across the life course and the income distribution.

Methods

Study design and data sources

We conducted a secondary analysis of the Second Chilean National Time Use Survey (II Encuesta Nacional sobre Uso del Tiempo, ENUT), collected by the National Statistics Institute (INE) in 2023, a nationally representative cross-sectional survey with a complex, stratified, multistage probability design. Our analytic sample comprised all respondents to the Time Use Questionnaire (CUT) with a valid person-level expansion factor (n = 28,477), across 112 strata and 2,162 primary sampling units, representing an estimated 15.1 million urban residents aged 12 years and older. Analyses were restricted to the urban frame, for which the CUT was administered.

Metabolic intensities were assigned from the 2024 Adult Compendium of Physical Activities [16], every value verified against the 2024 master list. Because the ENUT records whether a person exercised but not which sport or at what intensity, we calibrated the exercise MET using the 2024 National Survey of Physical Activity and Sport (ENAFyD; adult microdata, n = 8,653), which enumerates the disciplines practised, solely to derive the relative intensity of the national discipline mix.

Measurement of physical activity domains

We constructed five mutually exclusive domains from the ENUT time-use batteries: (i) unpaid domestic work (cooking, cleaning, laundry, household maintenance, pet and plant care); (ii) direct caregiving (bathing, feeding, dressing, mobilising, teaching); (iii) leisure-time exercise; (iv) travel (all trip batteries linked to work, education, shopping, errands, health, and accompanying others); and (v) paid work.

For each activity we derived a typical-day time value combining weekday and weekend reports as t = (5/7 times weekday time) plus (2/7 times weekend time), reflecting the survey's assignment of reference days and the calibration of expansion factors to the day pair. Non-participants were assigned zero time. Domain-level expenditure was expressed as MET-hours per typical day, the product of typical-day hours and the assigned MET value, summed across component activities.

MET assignment and ENUT to Compendium linkage

Each ENUT activity was mapped to a 2024 Compendium code and MET value; the complete activity-by-activity mapping is provided in the supplementary material.

Where a single ENUT item aggregated activities of differing intensity, we assigned the arithmetic mean of the constituent Compendium values and subjected this to sensitivity analysis. For caregiving we exploited the ENUT's disaggregation of time by care recipient, linking recipients to their ages through a household roster map built over the full person file (n = 48,020, to retain child recipients who did not complete the CUT) and assigning recipient-age-specific values, child-care codes for recipients under 15 years and adult or elder-care codes otherwise. The linkage located 100 percent of recipients, and the median age of recipients of intimate personal care was 2 years. Paid work was assigned a MET value by major occupational group, using the ENUT's CIUO-08.CL classification aggregated into seven groups, following the occupational-MET logic of Tudor-Locke and colleagues; the 737 respondents reporting work time without a coded occupation were assigned 2.0 MET. Exercise MET was calibrated by sex from the ENAFyD discipline distribution, weighting each discipline's Compendium MET by its sex-specific practice prevalence, yielding 6.84 for men and 6.12 for women.

Trip times are recorded door to door and labelled by predominant mode. We applied a declared-mode rule, assigning the full trip time the MET of that mode (walking 3.5; cycling 6.8; public transport 1.3; automobile 2.0; taxi 1.3). This is conservative for active travel, as it does not credit access walking embedded within motorised trips.

Outcome definitions

We report two estimands. The population mean treats non-participation as a genuine zero and is the basis for all between-sex comparisons; the conditional mean, restricted to participants, is reported for comparability with official INE tabulations. Total expenditure was the sum of the five domains; we additionally defined obligatory expenditure (domestic plus caregiving plus paid work), non-labour obligatory expenditure (domestic plus caregiving), and elective expenditure (exercise).

We operationalised the World Health Organization aerobic recommendation as at least 8.33 MET-h per week (500 MET-minutes, that is 150 minutes at 3 MET or more), counting only activities with an assigned intensity of at least 3 MET, and computed attainment under three progressively inclusive definitions: (A) exercise only; (B) exercise plus active travel; and (C) all five domains. Typical-day expenditure was multiplied by seven to obtain weekly values.

Statistical analysis

All estimates incorporated the complex survey design (strata, primary sampling units, and person-level expansion factors) using the survey package in R, with lonely primary sampling units treated as certainty units. Household income quintiles were built from per-capita household income weighted by the household expansion factor and merged to persons. Means and proportions were estimated overall and

by sex, age group (12 to 17, 18 to 29, 30 to 44, 45 to 59, 60 and over), and income quintile, with design-based standard errors. Following INE reliability criteria, cells were reported where the unweighted n was at least 60, degrees of freedom at least 9, and coefficient of variation at most 0.30. All procedures were implemented in reproducible Python and R scripts archived in Zenodo [20]. During manuscript preparation, the authors used a large language model (Anthropic Claude) to assist with code drafting, reference verification, and language editing; all outputs were checked and verified by the authors, who take full responsibility for the content.

Sensitivity analyses

We tested the robustness of the female-to-male ratio of total expenditure to five choices: (i) the MET assigned to the composite domestic item (2.3 and 3.3 versus 2.76); (ii) the MET assigned to the largest and most heterogeneous occupational group (1.8 and 2.3 versus 2.0); (iii) the cycling MET (4.0 versus 6.8); (iv) five minutes of access walking at 3.5 MET added to motorised trips; and (v) proportional rescaling of any typical day exceeding 24 hours of reported activity.

Four features of the data constrain interpretation: trips are captured only when tied to specific reported activities, so the travel domain is a lower bound on total mobility (a trip was recorded for 15.6 percent of respondents); the largest occupational group is intensity-heterogeneous; the sampling frame is urban; and the exercise MET calibration draws on a discipline distribution available by sex but not by age.

Results

All estimates below are population means (non-participants contribute zero) over the 28,477 respondents, incorporate the complex survey design, and met the INE reliability criteria.

Physical activity energy expenditure by domain and sex

Expenditure differed by domain in both magnitude and direction (Table 1, Fig. 1). Two domains were higher in men: paid work (8.81 vs 4.35 MET-h per day, female-to-male ratio 0.49) and leisure-time exercise (2.04 vs 0.89, ratio 0.44). Two were substantially higher in women: unpaid domestic work (3.87 vs 7.11, ratio 1.84) and direct caregiving (0.63 vs 1.46, ratio 2.31). Travel was marginally higher in men (1.39 vs 1.20, ratio 0.86).

Table 1
Physical activity energy expenditure by domain and sex, MET-hours per typical day (population means with standard errors, complex-survey weighted).

Domain	Men (SE)	Women (SE)	Ratio (W/M)
Leisure-time exercise	2.04 (0.056)	0.89 (0.029)	0.44
Paid work	8.81 (0.136)	4.35 (0.078)	0.49
Unpaid domestic work	3.87 (0.056)	7.11 (0.069)	1.84
Direct caregiving	0.63 (0.027)	1.46 (0.041)	2.31
Travel	1.39 (0.022)	1.20 (0.018)	0.86

The domestic difference was one of intensity rather than participation: participation was near universal in both sexes (95.7 percent), and the conditional mean among participants (4.10 in men, 7.28 in women) closely tracked the population mean, so women expend more not because more of them do domestic work but because those who do expend considerably more. Caregiving inequality operated through two channels: a larger share of women than men provided care (32.7 vs 21.0 percent), and among caregivers women also expended more (conditional means 4.49 vs 3.02), the product accounting for the population ratio of 2.31.

From the exercise-only metric to total expenditure

The central result concerns what is captured as the accounting frame widens (Table S1). Considering leisure-time exercise alone, the domain measured by conventional surveillance, women expended less than half as much as men (ratio 0.44). Non-labour obligatory expenditure was nearly twice as high in women (8.58 vs 4.50, ratio 1.91), and with paid work included, obligatory expenditure was essentially at parity (13.31 vs 12.93, ratio 0.97). Across all five domains, total expenditure was 16.74 in men and 15.02 in women, a ratio of 0.90. Figure 1 shows the reversal of direction across domains and the convergence of the totals.

The exercise-only frame therefore overstated the sex gap by a wide margin, and the residual gap is attributable almost entirely to elective exercise, the single domain in which the male advantage is not offset by a corresponding female obligatory burden.

Attainment of the WHO aerobic equivalent

The proportion meeting the WHO aerobic equivalent rose sharply as the definition widened, and the sex gap narrowed at each step (Table 2). Under the exercise-only definition, 29.2 percent of men and 17.1 percent of women met the threshold (gap 12.1 percentage points, ratio 0.59). Adding active travel raised attainment to 37.0 and 28.1 percent (gap 8.9 points, ratio 0.76). Counting all domains, 54.2 percent of men and 50.6 percent of women met the threshold (gap 3.6 points, ratio 0.93).

Table 2
Attainment of the WHO aerobic equivalent (at least 8.33 MET-h per week from activities of at least 3 MET) under three definitions, percent with 95% confidence interval (complex-survey weighted).

Definition	Men % (95% CI)	Women % (95% CI)	Gap (pp)	Ratio (W/M)
A. Exercise only	29.2 (28.0 to 30.5)	17.1 (16.2 to 18.0)	12.1	0.59
B. Exercise + active travel	37.0 (35.7 to 38.3)	28.1 (27.0 to 29.2)	8.9	0.76
C. All five domains	54.2 (52.9 to 55.6)	50.6 (49.4 to 51.7)	3.6	0.93

The gap in guideline attainment thus fell by roughly two thirds depending on which activities were counted: under the conventional metric about one in six women met the threshold, counting unpaid physical work, half did. A substantial share of the population classified as insufficiently active in fact reached the metabolic threshold through work rather than sport.

Active travel by purpose

Aggregate active travel was identical by sex (0.43 MET-h per day in both), but this parity concealed a gendered recomposition by purpose (Table S2). Utilitarian active travel (shopping, errands, health) was higher in women (0.276 vs 0.224, ratio 1.23), whereas travel to work or education was higher in men (0.178 vs 0.110, ratio 0.62). The most unequal category was travel to accompany others (0.022 vs 0.074, ratio 3.31), simultaneously travel and caregiving and almost entirely female. Male active travel was thus predominantly productive and female predominantly reproductive.

Age and income gradients

The convergence in total expenditure tracked the female life-course burden (Table 3). The gap was widest in adolescence (ages 12 to 17, ratio 0.64), when boys already exercise more and household demands have not yet accrued, and narrowest at ages 30 to 44 (ratio 0.93), the stage of combined childrearing and domestic work; ratios at ages 18 to 29, 45 to 59, and 60 and over were 0.89, 0.90, and 0.92.

The income gradient was more striking. In the lowest quintile, men and women expended almost identical amounts (13.80 vs 13.78 MET-h per day, ratio 0.998), whereas a gap emerged only in the middle and upper quintiles (ratios 0.90, 0.88, 0.88, and 0.93 from the second to the fifth). In the poorest households the female domestic burden fully offset the male advantage in paid work and exercise, so the apparent female deficit disappeared entirely.

Sensitivity analyses

The female-to-male ratio of total expenditure was robust to all five choices, remaining between 0.883 and 0.914 across seven non-rescaled scenarios. Concurrent activities were infrequent: only 1.1 percent of typical days exceeded 24 hours of reported activity (median 13.3 hours), and rescaling those days to 24 hours moved the ratio only from 0.898 to 0.896. The convergence was therefore not sensitive to any single MET assignment or to the treatment of simultaneous activities.

Discussion

In urban Chile the sex gap in physical activity depended almost entirely on what was counted: a female-to-male ratio of 0.44 under the exercise-only frame became 0.90 once unpaid domestic and care work were included, the gap in meeting the WHO aerobic equivalent fell from 12.1 to 3.6 percentage points, and in the poorest quintile it disappeared (ratio 0.998), stably across five sensitivity analyses (range 0.88 to 0.91).

The central result quantifies how much of the apparent female deficit is produced by the choice of metric: roughly four fifths of the measured gap reflects unmeasured domains rather than a true difference in physical effort. This extends prior work that widened the lens beyond leisure time. Harms and colleagues[14] found more than 90 percent of moderate-to-vigorous activity comes from paid and unpaid work rather than exercise, and Ng and Popkin[15] showed home production to be among the largest domains across five countries. Direct energy accounting agrees: in the United States National Human Activity Pattern Survey (n = 7,515), household-related activities accounted for 33.3 percent of total energy expenditure in women against 20.1 percent in men, while leisure-time activity contributed about 5 percent [21]. So does objective measurement: employed women accumulated significantly more activity than employed men during the evening second shift (mean log counts 622.84 vs 576.44, p = 0.012) [22]. Our contribution is to show the correction is large enough not merely to narrow the gap but to bring total expenditure to near parity, with a transparent activity-by-activity accounting across the whole population.

The attainment results bear directly on how urban surveillance is interpreted. Under the exercise-only definition, only 17.1 percent of women met the WHO aerobic equivalent; under the all-domain definition, 50.6 percent did. This does not overturn the guideline, which is defined on health-enhancing activity, but it shows that much of the insufficiently active population, especially of women, is already accumulating substantial moderate-intensity physical work. The pattern has been documented repeatedly yet has not changed how surveillance is reported. Among 2,341 British women aged 60 to 79, 66.7 percent (95% CI 64.8 to 68.6) met the recommended level when domestic activities were counted, but only 21.4 percent (95% CI 19.8 to 23.1) when they were excluded [23]. In the 2003 Health Survey for England (n = 14,836), attainment fell from 19.8 to 13.0 percent in women and 24.2 to 17.6 percent in men once domestic activity was removed [24], and in Northern Ireland domestic activity accounted for 34.9 percent of women's moderate-to-vigorous activity against 19.8 percent of men's [25]. Our estimates extend this from attainment counts to a full metabolic accounting in a Latin American urban population. Global inactivity estimates built on the narrower metric, such as the 31.3 percent figure for 2022 [2], therefore describe a deficit of elective exercise rather than of bodily movement.

The gap was widest in adolescence (ratio 0.64) and narrowest at ages 30 to 44 (ratio 0.93), the peak stage of childrearing and household labour, mirroring the accumulation of the female care burden documented in time-use research [6,9] and supporting a reading in which convergence is driven by unpaid work rather than a fixed biological difference. The income gradient sharpens this further. In the

lowest quintile, men and women expended essentially identical energy (13.80 vs 13.78 MET-h per day), whereas a gap of 7 to 12 percent appeared in the middle and upper quintiles. This is the necessity-versus-choice framework made quantitative [10]: where urban households can least afford to outsource domestic labour or purchase leisure, women's physical activity is highest and the sex gap vanishes. The apparent female deficit is, in the poorest districts, a statistical illusion generated by an instrument that counts only the kind of activity the affluent are freest to choose.

Aggregate active-travel parity (0.43 MET-h per day in both sexes) concealed a female-utilitarian and male-commuting recomposition, with accompaniment travel the most female-skewed category (ratio 3.31). This matches a growing literature on gendered urban mobility: women describe multifunctional journeys bundling the school run and shopping into a single trip, whereas men describe linear journeys from home to work [26], and across 19 major cities women were on average 23 percent more likely than men to walk [27]. The Chilean evidence echoes the commuting side: among 1,349 university students, active commuting was nearly twice as common in men as in women (33.8 vs 17.8 percent) [19]. Our contribution is to decompose these differences metabolically and by purpose in a single national urban population.

A necessary caution concerns the physical activity paradox: occupational activity does not confer the cardiovascular benefits associated with leisure-time activity, and may carry harm. A meta-analysis of 23 studies with 655,892 participants found high occupational activity not beneficially associated with cardiovascular mortality [28], and large cohorts in Copenhagen and urban China report similar patterns [29,30]. The same logic plausibly extends to some domestic and care work, which shares long duration, low autonomy, and static postures; high-intensity caregiving is associated with declines in physical health, most strongly among employed women [31], and lack of time is the commonest barrier to leisure exercise among caregivers [32]. Evidence specific to the domestic domain is mixed. Heavy housework was not associated with lower odds of overweight in British women (OR 1.1, 95% CI 0.8 to 1.4) whereas brisk walking was (OR 0.5, 95% CI 0.3 to 0.6) [23], and in England domestic activity showed no favourable association with obesity (OR 1.03 in men, 1.00 in women) whereas brisk walking did (OR 0.55 and 0.30) [24]. Prospective cohorts, however, report survival benefits: heavy housework was associated with lower all-cause (HR 0.71, 95% CI 0.56 to 0.91) and cancer mortality (HR 0.52, 95% CI 0.35 to 0.78) in older Hong Kong men [33], and sustained light housework with lower all-cause mortality in Singaporean women (HR 0.59, 95% CI 0.36 to 0.96) [34]. The health value of unpaid physical work therefore remains unsettled, and we do not claim it delivers the cardiovascular protection of exercise. Our claim is narrower: this work is genuine, often moderate-intensity energy expenditure that surveillance renders invisible, so that women are labelled inactive while performing the bulk of a society's obligatory physical labour. The issue is measurement equity, not equating a mopped floor with a brisk walk.

To our knowledge this is the first linkage of a Latin American national time-use survey to the 2024 Adult Compendium, demonstrating that the Tudor-Locke approach transfers to a Spanish-language context [11,16]. Levels implied by such linkage are accurate at the population scale, matching doubly labelled water estimates (PAL 1.53 to 1.78 across four instruments[8]). Two features add rigour beyond a flat

MET assignment: caregiving intensity assigned by care-recipient age, and paid-work intensity by occupational group.

Two implications follow for urban health. City and national statistics should be understood as measuring elective and transport-related activity, not total physical workload, and reports of a female inactivity gap qualified accordingly. This matters for how the built environment is evaluated: walkability, transit access and park provision are assessed through a metric capturing discretionary movement, so the evidence speaks mainly to domains in which men predominate, while the obligatory workload that dominates women's physical effort remains outside the frame. Where time-use data exist, domain-linked estimates can complement questionnaire-based surveillance at low marginal cost. For equity, recognising the physical labour embedded in unpaid work connects activity measurement to the broader agenda on valuing women's unpaid work; the asymmetry we quantify metabolically mirrors the participation asymmetry documented in urban Brazil, where domestic cleaning was performed by 91.7 percent of women against 59.5 percent of men, with high effort-reward imbalance associated with depression in both sexes (prevalence ratio 2.93 in women, 2.23 in men) [35]. Framing this labour as invisible physical activity cautions against urban interventions that exhort the inactive to move more without acknowledging that many are already at or beyond the moderate-intensity threshold through obligatory labour.

Strengths include the large, nationally representative design, complex-survey estimation, traceable MET mapping, and the recipient-age and occupation-specific refinements. Limitations include the urban sampling frame; the travel domain as a lower bound on mobility (a trip was recorded for 15.6 percent of respondents); intensity heterogeneity of the largest occupational group; calibration of the exercise MET by sex but not age; and the cross-sectional design, which precludes causal claims. As in all Compendium-based work, energy expenditure is modelled from time and standard MET values rather than measured directly, and does not capture cardiorespiratory intensity or health benefit.

Conclusion

In urban Chile, exercise-centred metrics overstate the sex gap in physical activity because they omit the largely female physical labour of unpaid domestic and care work. Counting that invisible activity brings total energy expenditure close to sex parity, cuts the gender gap in meeting the WHO aerobic equivalent by two thirds, and erases it entirely among the poorest. These results argue for interpreting physical activity surveillance as a measure of elective, not total, physical activity, and for recognising unpaid work as a substantial and unequally distributed component of a population's physical effort.

Table 3. Total physical activity energy expenditure by sex, age group, and income quintile, MET-hours per typical day (population means with standard errors, complex-survey weighted).

Stratum	Men (SE)	Women (SE)	Ratio (W/M)
Age 12 to 17	7.92 (0.372)	5.07 (0.179)	0.64
Age 18 to 29	15.38 (0.326)	13.74 (0.271)	0.89
Age 30 to 44	21.20 (0.331)	19.80 (0.225)	0.93
Age 45 to 59	19.46 (0.311)	17.58 (0.218)	0.90
Age 60 and over	12.65 (0.289)	11.67 (0.168)	0.92
Quintile 1 (lowest)	13.80 (0.337)	13.78 (0.224)	0.998
Quintile 2	16.29 (0.376)	14.61 (0.247)	0.90
Quintile 3	17.49 (0.329)	15.46 (0.255)	0.88
Quintile 4	18.77 (0.365)	16.50 (0.284)	0.88
Quintile 5 (highest)	17.59 (0.343)	16.36 (0.310)	0.93

Declarations

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Conflicts of interest / Competing interests. The authors have no competing interests to declare that are relevant to the content of this article.

Ethics approval and consent. This study analysed anonymized public-use microdata from the Second Chilean National Time Use Survey (II ENUT, Instituto Nacional de Estadísticas, Chile); no additional ethical approval or individual consent was required. Consent for publication: not applicable.

Data availability. II ENUT microdata are publicly available from the Instituto Nacional de Estadísticas de Chile. The 2024 National Survey of Physical Activity and Sport (ENAFyD) microdata, used to calibrate the sex-specific exercise MET value, are publicly available from the Chilean Ministry of Sport. Neither dataset is redistributed in the accompanying code repository.

Code availability. The Python and R code used to construct the physical activity domains and perform the survey-weighted statistical analyses is publicly available on Zenodo at https://doi.org/10.5281/zenodo.21480434. The archived code corresponds to version v1.0.0 and is released under the MIT License.

CRediT author contributions.

Conceptualization: JSL, RYS, PVM. Methodology: JSL, CFV. Software: JSL. Formal analysis: JSL, EMN. Investigation: RYS, FGR, CMS, JAA, MPS, AGC, JBC. Data curation: JSL, CMS, JAA. Resources: MPS, AGC.

Visualization: JSL. Validation: CFV, FGR, EMN, JBC, PVM. Writing - original draft: JSL. Writing - review & editing: all authors. Supervision: PVM. Project administration: JSL.

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Figures

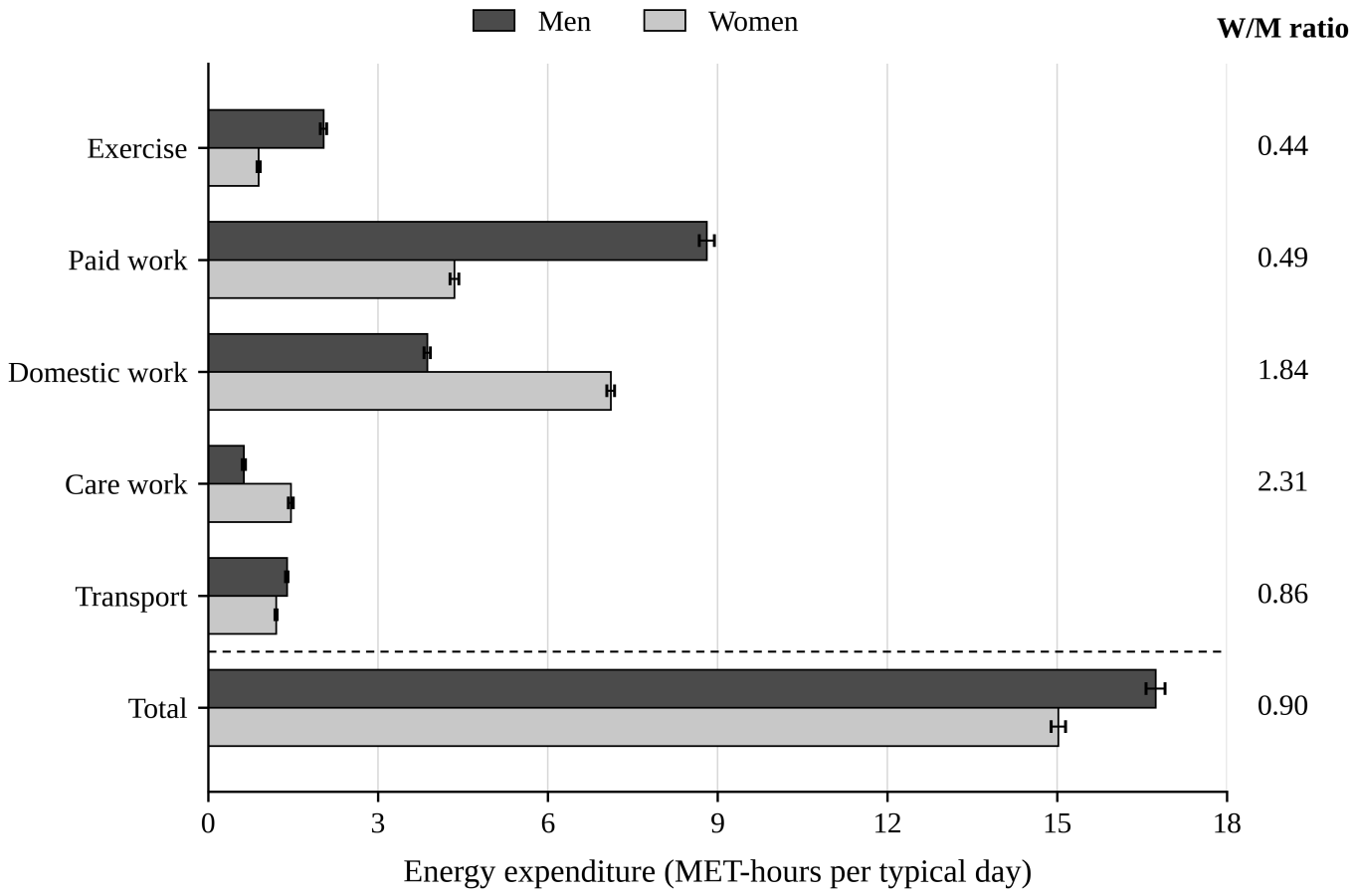


Figure 1

Population-level physical activity energy expenditure by domain and sex, urban Chile, 2023.

Bars show weighted population means in MET-hours per typical day, with standard errors; labels give the female-to-male ratio. The dashed line separates the five domains from the total. Analytic sample n = 28,477, representing 15.1 million urban residents aged 12 and over.

Supplementary Files

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