



Gender, time-use, and health: A scoping review

Review

Kanika Sharma¹, Ramila Bisht²

¹Department of Sociology, Emory University, Atlanta, U.S.A; ²Centre of Social Medicine and Community Health, School of Social Sciences, Jawaharlal Nehru University, New Delhi, India

Corresponding author: K. Sharma (Kanika.sharma@emory.edu)

ABSTRACT

Introduction: Time-use research is a useful approach to examine the health impacts of how people spend their time and the factors that influence their time. One such factor is gender. **Aim:** This study undertakes a scoping review to map and synthesize recent research done on the interrelationships among gender, time-use, and health. **Design:** Web of Science and PubMed electronic databases were searched to identify research published between 2015 and 2020. Forty-four studies that met the eligibility criteria were selected. **Results:** Most studies on the topic are quantitative in nature, focus on developed country contexts, and have mental health and nutrition as thematic health focus. There is diversity in the kinds of population being studied, with an increasing focus on children and adolescent populations. Conceptual findings reveal multi-directional and life-course aspects of the relationship; point that the relationship between time-use and health varies by the stage of the epidemiological and the nutrition transition; and highlight the need to study the health and well-being impacts of gendered caregiving. **Conclusion:** This review highlights the need to conduct qualitative studies, give attention to health outcomes such as chronic illnesses, occupational health issues, and physical pain, and increase research focus on developing country contexts where gender inequality in time-use and health is severe.

KEYWORDS

Gender, Health, Scoping Review, Time-Use

INTRODUCTION

Time-use research is gaining much-deserved recognition as a useful approach in public health (Chau et al. 2019). As Bauman et al. (2019:1) note, “public health researchers are becoming interested in the behaviors and attributes that can be measured across the 24 h day, and in the interrelationships of health-enhancing and health-compromising behavior across a temporal spectrum”. Time-use research, which looks at how people spend their time over a specific period, can be effectively used to study these behaviors. Moreover, it can shed light on the important factors that impact people’s time and thus their health (Hirway, 2000).

One such crucial factor is gender. A large global body of literature shows that gender influences the way everyone spends their time and the kind, extent,

and intensity of activities they engage in (Connelly & Kongar 2017). While there has been a substantial focus on gender and time-use, relatively less attention has been paid to the subsequent health consequences of gender inequality’s relationship with time-use. This scoping review on interrelationships among gender, time-use, and health attempts to fill the gap.

The interdisciplinary and heterogeneous nature of the topic lends itself well to a scoping review (Peters et al. 2015). In addition, a general lack of time-use data from developing country contexts necessitates an exploratory approach (Rubiano-Matulevich & Kashiwase 2018). Therefore, this scoping review aims to systematically map the recent global research on



this topic. More specifically, we ask the following research questions: what is the nature of the last five years of research on interrelationships among gender, time-use, and health? What conceptual findings are emerging in the recent research on interrelationships between gender, time-use, and health? Additionally, we ask a sub-question: what health themes or concerns have been covered in recent literature on interrelationships between gender, time-use, and health?

Prior scholarship looking at these interrelationships has largely been sociological in nature. Bird and Fremont (1991) conceptualized that the amount of time spent by a person is tied with their gendered social role, and that gendered social roles have a direct relationship with health outcomes. Similarly, Glass and Fujimoto (1994) found that time spent in gendered “role overload” (i.e., men doing more paid work and women doing more household work) was associated with the occurrence of depression. They also reported that the time spent on housework was universally associated with increased depression. Researchers have also found that the stress created by gendered time-use patterns among women was associated with unhealthy coping strategies, alcohol use, overeating, lack of rest or leisure, and reduced time in exercise (Nomaguchi & Bianchi 2004).

In more recent work, Offer and Schneider (2011) revisit the gender gap in time-use and report that mothers spent more time multitasking (particularly tasks related to housework and childcare) than fathers. This increased multitasking was associated with increased negative emotions and stress. Studies have also shown that gendered time-use not only impacted an individual’s health but also the health of their family members such as children. Cawley and Liu (2012) found that working mothers were able to spend less time in activities related to the child’s diet and exercise than non-working mothers, leading to an increase in childhood obesity.

Much of this prior literature focused on mental and emotional health and nutrition health outcomes. However, other health issues and concerns, specifically chronic illnesses were hard to find. Research on the impact of gendered caregiving activities on health was also scarce. Most studies were about adult and married populations, and thus

little was known about gendered time use patterns and health impacts of adolescents and younger populations, especially adolescent girls who may be involved in household activities in developing country contexts. Finally, developing country contexts have been underrepresented in this global scholarship, partly due to the lack of large-scale and representative time-use data in these countries.

STUDY AIM

Given these broad limitations of the previous scholarship, it is useful to assess the current state of research on gender, time-use, and health. This scoping review aims to examine the last five years of global research in the areas of social sciences and public health disciplines.

METHODS

Design

Following the scoping review methodological framework (Arksey and O’Malley 2005), this paper adopts an expansive and iterative review process. Guided by the PRISMA extension for scoping reviews (Tricco et al. 2018), we report all the applicable items and discuss their rationale in the following sections.

Eligibility criteria

Although a protocol was not drafted before the review began, we used the following eligibility criteria for inclusion and exclusion for potential papers: i) must be a research paper published between 2015-2020 (to ensure focus on recent patterns before COVID-19’s impact on research); ii) must focus substantially on all three concepts and their interrelationships; iii) should use time-use research approach and/or time-use data; iv) should be a research paper reporting findings of a primary or secondary study (as opposed to commentary/protocol/ or review papers); v) must be published in a peer-reviewed journal (i.e., not a book chapter, conference proceedings, or dissertation); and vi) should be written in English. For inclusion, papers could be focused on any human population (any genders, patient-types, or communities), any health outcome, any research method (qualitative, quantitative, or mixed), and any context or part of the world. The eligibility criteria were kept broad yet



specific to capture both the breadth and the depth of the research literature. Both the authors worked collaboratively in developing the eligibility criteria.

Information sources and search

To identify relevant papers, Web of Science and PubMed databases were searched. Web of Science is a social sciences oriented bibliographic database, while PubMed is health oriented. These databases, therefore, are representative of the social sciences and public health research that this review aims to assess. Since the aim was to look at published academic research, we did not search for any sources of gray literature. To keep the search broad and maximize coverage, we used a basic search strategy (as opposed to advanced or Boolean search) in both the databases. The final strategy for both databases is shown in [Figure 1](#). To ensure comprehensive coverage, the first step of the database search was conducted multiple times, with the last search for both databases being executed on December 10th, 2020, to achieve the most recent information.

Selection of evidence

The results yielded by the search strategy were screened at multiple stages. After removing the duplicates, the first stage of screening took place where titles and abstracts were reviewed. At this stage, several papers that did not have a relevant focus on the topic were excluded. In the second stage, full-text of the papers were reviewed for eligibility criteria, and exclusions were made most for papers that: i) did not report findings of a primary or secondary study (i.e., were reviews) ii) did not have a substantial focus on all three concepts and/or their interrelationships, or iii) did not use time-use research approach. After the last stage of screening, articles were selected for analysis and synthesis. The original PRISMA flow diagram template served as a guide for the screening process.

Data charting and synthesis of results

We used an iterative process to create a data charting form in excel to extract relevant data items from the selected studies. At first, the form contained general characteristics of the paper (paper title, author name, journal name, year of publication, study type, method, and sample size).

To examine geographical and population focus, we also extracted information on the country and population studied by each paper. Finally, health themes captured by the paper along with the main findings were added for each paper.

To synthesize the results from the selected and charted studies, we summarized each included source in terms of its overall health theme, country/region of focus, study design, sample size, population, and main findings. Both the authors worked collaboratively on data charting, coding, and synthesis of results.

RESULTS

As shown in [Figure 2](#), the database search yielded 260 non-duplicate sources. Of these, 175 were excluded after screening the title and abstract for lack of relevance. Full text of 85 sources were assessed further for eligibility.

Finally, a subset of 44 sources were included in the scoping review ([Table 1](#)). In the following section, we discuss the characteristics of recent research in terms of regional, population, study design, and health theme focus. We then discuss conceptual findings based on the review of the selected studies.

Characteristics of recent research

This review finds that most of the recent research on this topic has come from the field of public environmental occupational health, followed by economics. While social sciences disciplines such as sociology and women's studies are represented, their share is smaller compared to public health fields [Figure 3](#).

Many countries represented in the review were high-income. The highest representation is of the United States alone (n=10), followed by studies that focus on combinations of US and other European countries (n=8). Six studies are from Asia (India=3, China=2, and Thailand=1), three from South America (Peru=1; Brazil=2), and only two studies from Africa (Tanzania and Algeria).

In terms of population focus, diversity seems to be increasing in recent research. While most studies focused on adult populations of 18 to 60 years (n=7),



studies on school students, adolescents, parents, and older adults such as parents and elders have also been conducted (n=4 each). Additionally, studies on caregivers (n=3), workers (n=2), and children (n=2) also feature in the literature. Compared to older scholarship, studies on couples seem to have decreased in this period (n=3), as researchers turned their attention to other population subgroups.

Quantitative study designs continue to dominate the research on gender, time-use, and health. Out of 44 selected studies, only 2 are qualitative and 2 are mixed methods studies. Six studies were longitudinal, and the remaining were cross-sectional. A large majority of studies were quantitative analysis of secondary data and time-use data.

Among the included studies, the health theme that received the most focus is mental health (n=11). The second most featured theme is nutrition, with 9 studies focusing on nutrition outcomes along and another 3 focusing on nutrition and physical activity. A new health theme that is emerging in the literature is related to rest, sleep, and leisure (n=7). Similarly, self-reported well-being and health have also received research attention, as 7 out of 44 studies focused on this theme.

Conceptual findings on interrelationships among gender, time-use, and health

Multi-directional relationships

The overall findings from the selected studies emphasize the several ways in which these social categories are linked. First, many studies document gender inequality and time-use. Indeed, this is the standard in the literature. Relationships between time use and health, mediated through gender inequality, however, are more multi-dimensional. In addition to studies showing time use effects on health, health and well-being may also affect time-use. As it is with gender inequality in time use which may shape health, gender differences in health and well-being may also influence time-use patterns. Although studies could do a better job of disentangling these interrelations [Figure 4](#) suggest potential effects.

Time-use and the nutrition transition

Many studies in this review are concerned with the effect of time use on nutritional outcomes, such as diet, body-mass-index, and calorie consumption. Interestingly, the context of the study often determines the health outcomes they consider. Studies in developing countries often consider under-nutrition among women as the outcome, with agricultural or household work as the exposure variables (Komatsu, Malapit, Balagamwala, 2019). On the other hand, studies from more developed contexts are concerned about outcomes such as obesity and behaviors such as exercise and cooking at home (Gough, Lippert, and Martin 2019). Moreover, while developed country contexts have a variety of health themes that they focus on, nutrition seems to be the focus for almost all the studies from developing country contexts.

Time use, gender inequality, and health across the life-course

Although we did not find any study that tracks gender inequality and time-use across the life-course, taken together, the literature emphasizes the role of gendered life course transitions in shaping health and time-use. Many studies consider life course transitions independently. Several existing studies consider childhood, adolescence, young adults, marriage into childhood, working-age adults, as well as differences in and due to retirement.

For instance, Schott et al. (2019) in Peru find that women's adolescence transitions were associated with increases in adiposity while for boys they were not. During the transition more sleep was associated with less adiposity among boys, but not among girls, suggesting that usual patterns are disrupted at this time. Many studies of adolescents consider time in television or video game activities, particularly in developed country contexts (Domoff et al. 2020; Twenge & Martin 2020). In a developing country study from India, Roy (2020) found that girls were twice as likely to spend time doing household chores, and had less rest, sleep, or leisure.

Passias, Sayer, and Pepin (2017) consider marriage as an exposure and find that black single mothers have the highest extent of socially isolated leisure among women who are married or not. They find that although non-married women, in general, have more total leisure, their leisure activities are less fulfilling



and more socially isolating. (Lindo, Schaller, and Hansen 2018) find gendered effects of time use on children's health - when men get unemployed, children were more likely to experience maltreatment in California than when women got unemployed. Instead, female employment was correlated with child maltreatment, suggesting that women have social responsibilities for childcare which, if they escape, may have negative consequences for children.

Focusing on the elderly, (Gutierrez, Milani, Wong 2020) report that time-use in community and volunteering activities was associated with lower odds of having depressive symptoms among the Mexican older population. In a multi-country comparative analysis (Germany, Spain, the UK, and the US), (Adjei, Brand, Zeeb, 2017) find that time devoted to passive leisure (as opposed to active leisure) and personal activities were negatively associated with self-reported health among women.

Gendered caregiving and health

It is well-established in the health literature that caregiving, particularly informal caregiving, takes a toll on the health of the caregivers (Pinquart & Sörensen 2007). However, it is surprising to find that the recent scholarship on gendered time-use and health has focused marginally on this important aspect of people's activity. Out of all the included studies, only three focused on informal caregiving, and one focused on caregiving done by nurses. Furthermore, most of the studies were in high-income regions around the world (with exception of the study on formal caregiving by nurses from Brazil), which reinforces the need for further research in this area in developing countries.

In one of the studies that focus on informal caregiving, Stanfors, Jacobs, & Neilson (2019) find that across Sweden, the UK, and Canada, women provided more unpaid caregiving and thus made trade-offs in terms of paid work and leisure time. In another study, Tabler & Geist (2019) examine the effect of time-use on housework and adult caregiving on depressive symptoms for male and female caregivers. They found that while caregiving was associated with increased depressive symptoms, time spent in housework was associated with a decrease in depression for both men and women and particularly

for women caregivers. Despite gender differences in housework, authors note that housework's positive impact on depression among female caregivers could be related to the benefits of staying physically active as well as to the continuity in performance of gender normative behaviors.

DISCUSSION

In this scoping review, we identified 44 studies on the interrelationships among gender, time-use, and health. Although some studies from developing countries are present, the findings of this review indicate that much of the global research continues to be overrepresented by developed country contexts. The review also finds that mental health and nutrition are the health themes receiving the most attention, while outcomes related to chronic illnesses are missing. Finally, the studies hint at the multi-directionality and life-course approach of the relationship between gender, time-use, and health, though better efforts need to be made in explicating these conceptual findings.

In terms of limitations, this review captured limited academic literature in the form of published research papers and excludes book chapters, working papers, and dissertations. Moreover, we did not cross-reference the selected studies or looked at gray literature because of time and resource constraints. Relatedly, the review process, particularly screening and assessing the sources should be done by a larger team of reviewers. Finally, it is important to note that time-use studies, while extremely useful, have some conceptual limitations as well. They do not always capture the intensity or overlapping nature of work, both of which have a direct bearing on health. Future efforts should address these methodological and conceptual limitations.

Despite the limitations, this scoping review has several implications for future research. A clear agenda is to conduct more qualitative studies that can bring out the important processes and lived experiences related to the health impacts of gendered time-use. There is also a need to give attention to health outcomes beyond mental health and nutrition such as chronic illnesses, occupational health issues, and physical discomfort and pain which are linked to gendered daily activities. Finally, there is an urgent need to increase research focus on



developing country contexts where there is evidence of more severe gender inequality in time-use and health.

CONCLUSIONS

This review highlights that despite the increasing diversity in kinds of populations being studied, with a multidimensional and life course focus, there is a need to conduct qualitative studies; study the health and well-being impacts of gendered caregiving; give attention to health outcomes such as chronic illnesses, occupational health issues, and physical pain; and increase research focus on developing country contexts where gender inequality in time-use and health is severe.

REFERENCES

- Adjei, N. K., Brand, T. (2018a). "Investigating the Associations between Productive Housework Activities, Sleep Hours and Self-Reported Health among Elderly Men and Women in Western Industrialised Countries." *BMC Public Health* 18(1):1–10.
- Adjei, N. K., Brand, T. (2018b). "Investigating the Associations between Productive Housework Activities, Sleep Hours and Self-Reported Health among Elderly Men and Women in Western Industrialised Countries." *BMC Public Health* 18(1):1–10.
- Adjei, N. K., Brand, T., Zeeb, H. (2017). "Gender Inequality in Self-Reported Health among the Elderly in Contemporary Welfare Countries: A Cross-Country Analysis of Time Use Activities, Socioeconomic Positions and Family Characteristics." *PloS One* 12(9): e0184676.
- Adjei, N. K., Jonsson, K. R., Brand, T. (2018). "Time Spent on Work-Related Activities, Social Activities and Time Pressure as Intermediary Determinants of Health Disparities among Elderly Women and Men in 5 European Countries: A Structural Equation Model." *International Journal for Equity in Health* 17(1):1–12.
- Brooks, F.M., Chester, K. L., Smeeton, N. C., Spencer, N. H. (2016). "Video Gaming in Adolescence: Factors Associated with Leisure Time Use." *Journal of Youth Studies* 19(1):36–54.
- Cusatis, R., Fergestrom, N., Cooper, A., Schoyer, K. D., Kruper, A., Sandlow, J., Strawn, E., Flynn, K. E. (2019). "Too Much Time? Time Use and Fertility-Specific Quality of Life among Men and Women Seeking Specialty Care for Infertility." *BMC Psychology* 7(1):1–9.
- Domoff, S. E., Sutherland, E., Yokum, S., Gearhardt, A. N. (2021). "The Association of Adolescents' Television Viewing with Body Mass Index Percentile, Food Addiction, and Addictive Phone Use." *Appetite* 157:104990. doi: 10.1016/j.appet.2020.104990.
- Ferrar, K, Golley, R. (2015). "Adolescent Diet and Time Use Clusters and Associations with Overweight and Obesity and Socioeconomic Position." *Health Education & Behavior* 42(3):361–69.
- Flood, S. M., Moen, P. (2015). "Healthy Time Use in the Encore Years: Do Work, Resources, Relations, and Gender Matter?" *Journal of Health and Social Behavior* 56(1):74–97.
- Flores, G., Kieny, C., Maurer, J. (2020). "Deconstructing Gender Differences in Experienced Well-Being among Older Adults in the Developing World: The Roles of Time Use and Activity-Specific Affective Experiences." *Social Indicators Research* 1–34.
- Gough, M., Lippert, A. M., Martin, M. A. (2019). "The Role of Time Use Behaviors in the Risk of Obesity among Low-Income Mothers." *Women's Health Issues* 29(1):23–30.
- Gutierrez, S., Milani, S. A., Wong, R. (2020). "Is 'Busy' Always Better? Time-Use Activities and Depressive Symptoms among Older Mexican Adults." *Innovation in Aging* 4(5): igaa030.
- Hunt, E., McKay, E. A., Dahly, D. L., Fitzgerald, A. P., Perry, I. J. (2015). "A Person-Centred Analysis of the Time-Use, Daily Activities and Health-Related Quality of Life of Irish School-Going Late Adolescents." *Quality of Life Research* 24(6):1303–15.
- Jarosz, E. (2018). "Lifestyle Behaviours or Socioeconomic Characteristics? Gender Differences in Covariates of BMI in Hungary." *Obesity Science & Practice* 4(6):591–99.
- Jiang, X., Hardy, L. L., Baur, L. A., Ding, D., Wang, L., Shi, H. (2015). "Sleep Duration, Schedule and Quality among Urban Chinese Children and Adolescents: Associations with Routine



- after-School Activities." *PloS One* 10(1):e0115326.
- Jonsson, K. R., Oberg, G., Samkange-Zeeb, F., Adjei, N. K. (2020). "Determinants and Impact of Role-Related Time Use Allocation on Self-Reported Health among Married Men and Women: A Cross-National Comparative Study." *BMC Public Health* 20(1):1–15.
- Kerr, A. (2019). "Household Investment in Durable Appliances and Outcomes for Children: Evidence from China." *Labour Economics* 58:110–27.
- King, T. L., Taouk, Y., LaMontagne, A. D., Maheen, H., Kavanagh, A. M. (2021). "Gendered Associations between Household Labour Force Participation and Mental Health Using 17 Waves of Australian Cohort Data." *Social Psychiatry and Psychiatric Epidemiology* 56(6):1035–47. doi: 10.1007/s00127-020-01970-1.
- Komatsu, H., Malapit, H., Balagamwala, M. (2019). "Gender Effects of Agricultural Cropping Work and Nutrition Status in Tanzania." *PloS One* 14(9):e0222090.
- Leineweber, C., Falkenberg, H., Albrecht, S. C. (2018). "Parent's Relative Perceived Work Flexibility Compared to Their Partner Is Associated with Emotional Exhaustion." *Frontiers in Psychology* 9:640.
- Lindo, J. M., Schaller, J., Hansen, B. (2018). "Caution! Men Not at Work: Gender-Specific Labor Market Conditions and Child Maltreatment." *Journal of Public Economics* 163:77–98.
- Martins, P. C., Oliveira, V. H., Mendes, S. M., Fernández-Pacheco, G. (2021). "After-School Time Use of Urban Adolescents: Effects on Achievement, Problem Behaviors, and Happiness." *Journal of Leisure Research* 52(3):286–306.
- Martin-Storey, A., Prickett, K. C., Crosnoe, R. (2018). "Disparities in Sleep Duration and Restedness among Same-and Different-Sex Couples: Findings from the American Time Use Survey." *Sleep* 41(8):zsy090.
- Matthews, C. E., Berrigan, D., Fischer, B., Gomersall, S. R., Hillreiner, A., Kim, Y., Leitzmann, M. F., Saint-Maurice, P., Olds, T. S., Welk, G. J. (2019). "Use of Previous-Day Recalls of Physical Activity and Sedentary Behavior in Epidemiologic Studies: Results from Four Instruments." *BMC Public Health* 19(2):1–13.
- Matud, M., Bethencourt, J. M., Ibáñez, I. (2015). "Gender Differences in Psychological Distress in Spain." *International Journal of Social Psychiatry* 61(6):560–68.
- Negraia, D. V., Yavorsky, J. E., Dukhovnov, D. (2019). Mothers' and Fathers' Well-Being While Parenting: Does the Gender Composition of Children Matter? WP-2019-013. *Max Planck Institute for Demographic Research*, Rostock, Germany.
- Padmaja, R., Pramanik, S., Pingali, P., Bantilan, C., Kavitha, K. (2019). "Understanding Nutritional Outcomes through Gendered Analysis of Time-Use Patterns in Semi-Arid India." *Global Food Security* 23:49–63.
- Passias, E. J., Sayer, L., Pepin, J. R. (2017). "Who Experiences Leisure Deficits? Mothers' Marital Status and Leisure Time." *Journal of Marriage and Family* 79(4):1001–22.
- Pereira, A. V., Santos Oliveira, S., Rotenberg, L. (2018). "The Self-Confrontation with Own Time as an Analytical Perspective in the Study of Relations between Time and Health." *Ciência & Saúde Coletiva* 23:2393–2402.
- Pinto, K. A., Harter Griep, R., Rotenberg, L., da Conceição Chagas Almeida, M., Sousa Barreto, R., Aquino, E. M. L. (2018). "Gender, Time Use and Overweight and Obesity in Adults: Results of the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)." *PLoS One* 13(3):e0194190.
- Rao, N., Raju, S. (2020). "Gendered Time, Seasonality, and Nutrition: Insights from Two Indian Districts." *Feminist Economics* 26(2):95–125.
- Raskind, I. G., Patil, S. S., Tandon, N., Thummalapally, S., Kramer, M. R., Cunningham, S. A. (2020). "Household Chores or Play Outdoors? The Intersecting Influence of Gender and School Type on Physical Activity among Indian Adolescents." *Health Education & Behavior* 47(5):682–91.
- Rasmussen, C. L., Palarea-Albaladejo, J., Bauman, A., Gupta, N., Nabe-Nielsen, K., Birk Jørgensen, M., Holtermann, A. (2018). "Does Physically Demanding Work Hinder a Physically Active Lifestyle in Low Socioeconomic Workers? A Compositional Data Analysis Based on Accelerometer Data." *International Journal of Environmental Research and Public Health* 15(7):1306.



- Roeters, A., van Houdt, K. (2019). "Parent–Child Activities, Paid Work Interference, and Child Mental Health." *Family Relations* 68(2):232–45.
- Rokicka, M., Zajkowska, O. (2020). "Informal Elderly Caregiving and Time Spent on Leisure: Evidence from Time Use Survey." *Ageing International* 45(4):393–410.
- Roy, P. (2020). "Gender, Time Use, and Food Consumption in India." *Gender, Technology and Development* 24(3):378–96.
- Saksiruthai, S. (2017). "Housework Efficiency and Economical Systems Development: A Case Study of Thailand." *International Journal of Ecological Economics & Statistics* 38(4):115–22.
- Schott, W., Aurino, E., Penny, M. E., Behrman, J. R. (2019). "Time Use and Sexual Maturity-Related Indicators Differentially Predict Youth Body Mass Indices, Peruvian Girls versus Boys." *Annals of the New York Academy of Sciences*.
- Shakir, R. N., Coates, A. N., Olds, T., Rowlands, A., Tsiros, M. D. (2018). "Not All Sedentary Behaviour Is Equal: Children's Adiposity and Sedentary Behaviour Volumes, Patterns and Types." *Obesity Research & Clinical Practice* 12(6):506–12.
- Sprod, J. A., Olds, T. S., Burton, N. W., Brown, W. J., van Uffelen, J. G., Ferrar, K. E., Maher, C. A. (2016). "Patterns and Correlates of Time Use and Energy Expenditure in Older Australian Workers: A Descriptive Study." *Maturitas* 90:64–71.
- Stanfors, M., Jacobs, J. C., Neilson, J. (2019). "Caregiving Time Costs and Trade-Offs: Gender Differences in Sweden, the UK, and Canada." *SSM-Population Health* 9:100501.
- Tabler, J., Geist, C. (2019). "Do Gender Differences in Housework Performance and Informal Adult Caregiving Explain the Gender Gap in Depressive Symptoms of Older Adults?" *Journal of Women & Aging* 33(1):41–56.
- Tiliouine, H., Rees, G., Mokaddem, S. (2019). "Changes in Self-Reported Well-Being: A Follow-up Study of Children Aged 12–14 in Algeria." *Child Development* 90(2):359–74.
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L. (2018). "PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation." *Annals of Internal Medicine* 169(7):467–73.
- Twenge, J. M., Martin, G. N. (2020). "Gender Differences in Associations between Digital Media Use and Psychological Well-Being: Evidence from Three Large Datasets." *Journal of Adolescence* 79:91–102.



Figure 1. Search Strategy for Web of Science and PubMed

Web of Science	PubMed
Keywords entered: gender time-use health	Keywords entered: gender time-use health
Limits included*: Time: last five years Document type: Journal article Language: English	Limits included*: Time: 1 Jan 2015 to 31st Dec 2020 Species: Human Article type: Journal article Language: English

NOTE: Limits included were slightly different in the two databases because of the available options

Figure 2. Flow diagram of the review process

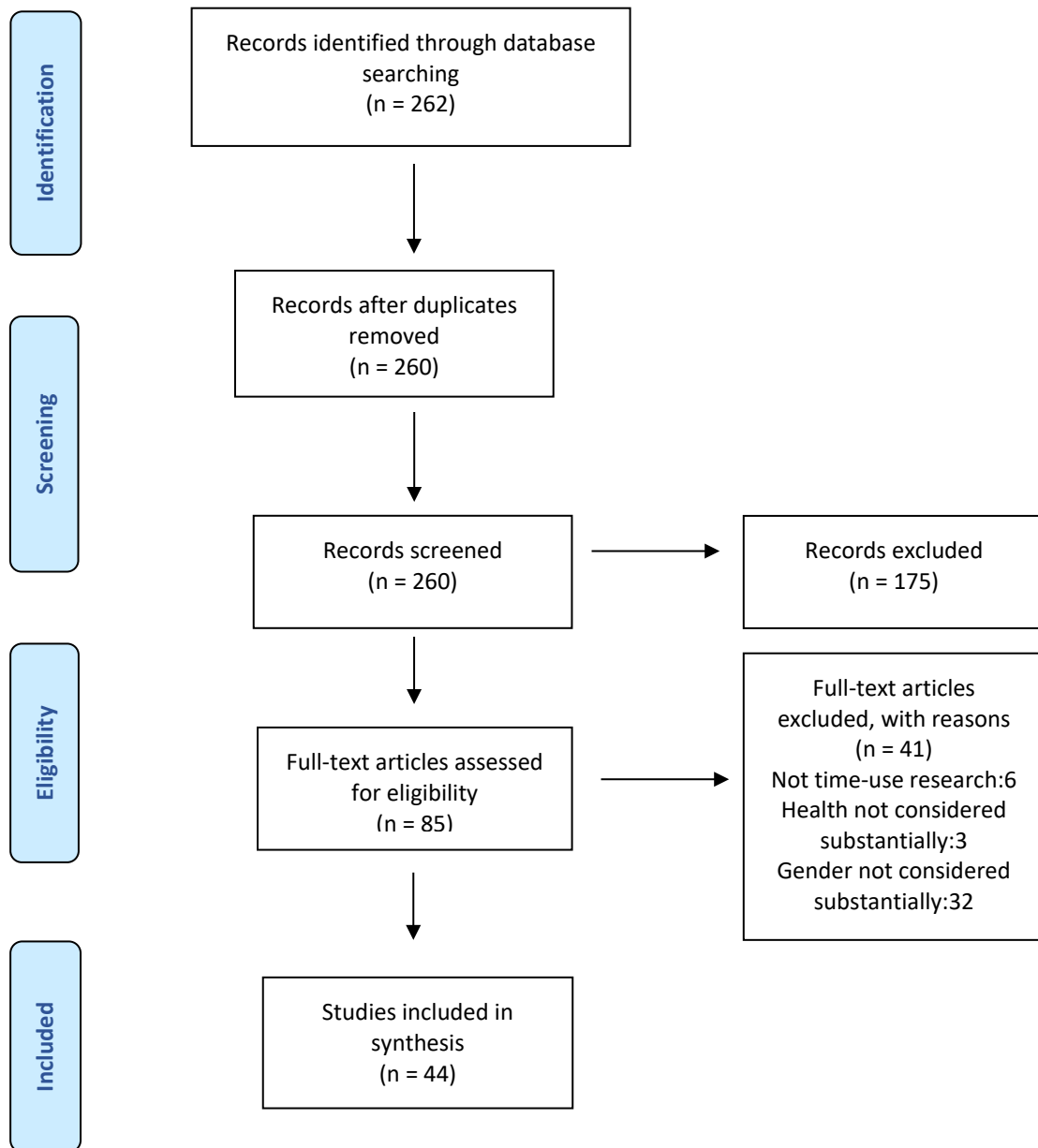




Table 1: Studies included in the scoping review

Article Title	Year of Publication	Author(s)	Country / Region	Study-Design	Sample Size	Population	Health Theme	Main Findings
Time use and sexual maturity-related indicators differentially predict youth body mass indices, Peruvian girls versus boys	2019	Schott et al	Peru	longitudinal	2,766	children, youth	nutrition	a) Gender differences in obesity exposures observed. b) For boys, paid and domestic work increased adiposity, while sleep reduced it. c) For girls, maturity related indicators predicted increases, regardless of time use.
Is "Busy" Always Better? Time-Use Activities and Depressive Symptoms Among Older Mexican Adults	2020	Gutierrez et al	Mexico	quantitative	4,309	elderly	mental health	a) more activities indoor were associated with higher odds of depression among both men and women. b) volunteer and community activity were associated with lower odds of depression among women, but not men.
The association of adolescents' television viewing with Body Mass Index percentile, food addiction, and addictive phone use	2020	Domoff et al	US	quantitative	190	adolescents	nutrition	a) girls had more tv time than boys; b) however, for boys, more tv viewing was positively associated with more addictive phone use and addictive eating.
Too much time? Time use and fertility-specific quality of life among men and	2019	Cusatis et al	US	quantitative	156	couples	mental health, fertility	a) women seeking infertility care spent a higher time in research, discussion, reflection compared to their male partners. b) more time spent reflecting was more anxiety in



women seeking specialty care for infertility								some domains for women, but all domains for men.
Understanding nutritional outcomes through gendered analysis of time-use patterns in semi-arid India	2019	Padmaja et al	India	cross-sectional	1,284	adults	nutrition	a) agricultural interventions can increase women's work, which was observed to increase under-nourishment in the sample b) qualitative findings supported that this was because of increased burden of work
Caregiving time costs and trade-offs: Gender differences in Sweden, the UK, and Canada	2019	Stanfors et al	Sweden, UK, Canada	quantitative analysis	173,224	caregivers	caregiving; rest, sleep, leisure	a) women are more likely to be caregivers within the family in the UK and Canada, but not in Sweden b) Intensive caregiving was negatively associated with everyday leisure time in Sweden, the UK and Canada.
Use of previous-day recalls of physical activity and sedentary behavior in epidemiologic studies: results from four instruments	2019	Mattews et al	Australia, New Zealand, Germany, US	mixed methods	8,286	adults	physical activity; rest, sleep, leisure	a) Women spent more time on chores, in light physical activity, and less time in moderate-vigorous physical activity than men. b) Men reported more leisure time than women. c) Household activities and caring are substantial contributors to overall physical activity energy expenditure women reported doing more of this type of activity
Changes in Self-Reported Well-Being: A Follow-Up Study of Children Aged 12-14 in Algeria	2019	Tiliouine et al	Algeria	longitudinal	443	children	self-reported health	a) girls were significantly more likely than boys to help with housework and do homework. b) boys were significantly more likely than girls to play sports or exercise. c) Boys were also more likely to take classes



								outside school, to take part in organized leisure activities, to spend time using a computer, and to spend time alone. d) With age, satisfaction with school decreased more for boys than for girls, but satisfaction with family, time use, and material possessions decreased for girls
Gender, time use and overweight	2018	Pinto et al	Brazil	quantitative analysis	15,105	adults; civil servants	nutrition	a) A greater proportion of women compared to men reported insufficient time for personal care and leisure. b) Insufficient time for personal care and leisure was associated with overweight and obesity only in women working over 40 hours/week.
The self-confrontation with own time as an analytical perspective in the study of relations between time and health [corrected]	2018	Pereira et al	Brazil	mixed methods	42	adults; nurses	caregiving; rest, sleep, leisure	a) nurses thought that they had too little time for themselves. b) work overload was particularly severe among women nurses, who had a difficult time juggling work and household responsibilities
Time spent on work-related activities, social activities and time pressure as intermediary determinants of health disparities among elderly	2018	Adjei et al	Italy, Spain, UK, France, Netherlands.	quantitative analysis	25,463	elderly	self-reported health	a) socioeconomic status (SES), demographic factors, stress, and work-related time use after retirement had significant influence on self-reported health among the elderly b) the magnitude of the effects varied by gender - social activities had a positive impact on self-reported health but had no significant impact on stress among



women and men in 5 European countries: a structural equation model								older men and women. c) paid work was negatively associated with stress among men, but household work had stress effects for both
Parent's Relative Perceived Work Flexibility Compared to Their Partner Is Associated With Emotional Exhaustion	2018	Leinewber et al	Sweden	cross-sectional	2,911	parents	mental health	a) Being a mother was associated with higher levels of emotional exhaustion, independent of possible confounders. b) Mothers spent more time on household chores as compared to fathers, while fathers reported longer working hours. c) Fathers spent more time on relaxation compared with mothers.
Not all sedentary behaviour is equal: Children's adiposity and sedentary behaviour volumes, patterns and types	2018	Shakir et al	Australia	quantitative	234	children	nutrition; physical activity	a) Daily energy expenditure and income negatively associated with adiposity for both sexes, and television time positively associated b) In boys, sedentary behaviour and playing video games/computer linked with adiposity. c) In girls, non-screen sedentary behaviour negatively associated with adiposity
Gender inequality in self-reported health among the elderly in contemporary welfare countries	2017	Adjei et al	Germany, Spain, UK, US	longitudinal	31,415	elderly	self-reported health	a) time in paid work, housework and active leisure were positively associated with health, b) passive leisure and personal activities were negatively associated with health among both men and women c) the magnitude of the association varied by gender and country



Patterns and correlates of time use and energy expenditure in older Australian workers: A descriptive study	2016	Sprod et al	Australia	qualitative	120	elderly; workers	nutrition; physical activity	a) Women spent more time doing chores while men spent more time on vigorous activities. b) Participants with worse health spent less time on chores and grooming than healthier participants.
A person-centred analysis of the time-use, daily activities and health-related quality of life of Irish school-going late adolescents	2015	Hunt et al	Ireland	cross-sectional	731	adolescents	self-reported health	a) Article identified male profiles: productive, high leisure, and all-rounder. Two female profiles, higher study/lower leisure and moderate study/higher leisure were identified. b) Females in the moderate study/higher leisure group were twice as likely to have above-average global health-related quality of life than females in higher study/lower leisure profile
Healthy time use in the encore years: do work, resources, relations, and gender matter?	2015	Flood & Moen	US	quantitative analysis	11,952	elderly	physical activity; rest, sleep, leisure	a) Work limits sufficient sleep and television watching and time spent in physical activity. b) College-educated and healthy encore adults-across age and gender more likely to exercise and watch less television. c) Marriage and caregiving encourage socializing and limit television watching, despite differential effects on physical activity and sleep.
Adolescent diet and time use clusters and associations with overweight and obesity and	2015	Ferrar & Golly	Australia	quantitative	1,853	children and adolescents	nutrition; physical activity	a) study identified four sex-specific time use and diet clusters. For both boys and girls, three clusters were identified by co-occurring time use and dietary intake behaviors and the remaining cluster was identified solely by time use behaviors. b) Two



socioeconomic position								clusters were associated with a reduced frequency of overweight and obesity (the boys' Active Sitter and girls' Healthy Academic clusters) and one with an increased frequency of overweight and obesity (the boys' Unhealthy cluster)
Gender differences in psychological distress in Spain	2015	Matud et al	Spain	quantitative	2,588	adults	mental health	a) women had more distress than men b) women's distress associated with more childcare time and less to activities they enjoy
Breakfast Skipping, Extreme Commutes, and the Sex Composition at Birth	2015	Mazumder & Seeskin	US	quantitative	8,233	adolescents and adults	nutrition	a) women with longer commutes more likely to skip breakfast
Sleep duration, schedule and quality among urban Chinese children and adolescents: associations with routine after-school activities	2015	Jiang et al	China	cross-sectional	6,247	school children	rest, sleep, leisure	a) On school nights, girls slept less and went to bed later b) This sex difference that was more pronounced in older students. c) Sex Differences were also observed in sleep duration, schedule, and quality
Mothers' and Fathers' Well-Being: Does the Gender Composition of Children Matter?	2019	Negraia et al	US	quantitative analysis	8,621	parents	mental health	a) Fathers reported greater stress parenting all girls and mixed gender children. b) Mothers reported greater fatigue and stress parenting all girls compared to parenting all boys. c) Fathers spend more time in parenting when boys are present.



Gendered associations between household labour force participation and mental health using 17 waves of Australian cohort data	2020	King et al	Australia	longitudinal	14,644	couples	mental health	a) Both men and women have better mental health when in paid employment than when not in the labour force
Informal Elderly Caregiving and Time Spent on Leisure: Evidence from Time Use Survey	2020	Rokicka, M; Zajkowska, O	Poland	quantitative analysis	38,967	caregivers	caregiving; rest, sleep, leisure	a) Caregivers are at risk oftimes poverty, and the effect differs by gender and day type (working days v weekends). b) No clear female disadvantage was observed c) I general, caregivers for adults more likely to allocate less time to physical activity, hobbies, and social lives
Determinants and impact of role-related time use allocation on self-reported health among married men and women: a cross-national comparative study	2020	Jonsson et al	Germany, Italy, Spain, the UK and the US	quantitative analysis	59,796	adults	self-reported health; rest, sleep, leisure	a) Significant gender differences in time allocation: women do less paid working time or reduce housework for childcare. b) Men less likely to reduce paid hours to increase time spent on childcare, reduced housework instead. c) More time to paid work and childcare associated with good health. d)Time spent on housework was associated with poor health, especially among women.
Deconstructing Gender Differences in Experienced Well-Being Among Older Adults in the	2020	Flores et al	China, Ghana, India, Russia, South Africa	quantitative analysis	21,488	elderly	mental health	a) Study documents gender gap in experienced well-being in favor of men. b) Women's lower affect in most activities linked to the conditions under which activities are performed, particularly to higher



Developing World: The Roles of Time Use and Activity-Specific Affective Experiences								level of disability of older women compared to men
After-school time use of urban adolescents: Effects on achievement, problem behaviors, and happiness	2020	Martins et al	Portugal	quantitative analysis	3,808	adolescents	mental health	a) Girls more frequently involved with studying, creative and social activities than boys; less involved with sports and evenings out.
Household Chores or Play Outdoors? The Intersecting Influence of Gender and School Type on Physical Activity Among Indian Adolescents	2020	Raskind et al	India	cross-sectional	395	school students	rest, sleep, leisure	a) Girls spent twice as much active time completing chores, errands, and work; b) boys spent twice as much active time playing; c) Gender differences were greater among public school students than among private school students
Gender, time use, and food consumption in India	2020	Roy, P	India	quantitative mixed method	450	adults	nutrition; rest, sleep, leisure	a) Women work by more than 2 hours compared to husbands; b) Chronic energy input deficiency is higher among wives than their husbands.



Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets	2020	Twenge & Martin	US, UK	quantitative analysis	221,096	adolescents	mental health	a) girls spent more time on smartphones, social media, texting, general computer use, and online; b) boys spent more time gaming and on electronic devices. c) moderate or heavy digital media use and low psychological well-being/mental health were more strongly associated among girls than boys
Do gender differences in housework performance and informal adult caregiving explain the gender gap in depressive symptoms of older adults?	2019	Tabler & Geist	US	quantitative analysis	1,321	adults	mental health; caregiving	a) caregiving associated with increased depressive symptoms, b) time spent in housework associated with decrease in depression for both men and women and particularly for women caregivers, c) despite gender differences in housework, housework's positive impact on depression among female caregivers could be related to benefits of staying physically active as well as to the continuity in performance of gender normative behaviors.
Gender effects of agricultural cropping work and nutrition status in Tanzania	2019	Komatsu et al	Tanzania	quantitative analysis	5,513	adults; households	nutrition	a) BMI of women in households with a hand powered sprayer is positively related to time spent in weeding, fertilizing, and non-harvest activities, while it is negatively correlated for men
Gendered Time, Seasonality, and Nutrition: Insights from Two Indian Districts	2020	Rao & Raju	India	longitudinal	60	adults; households	nutrition	a) women's work in agriculture may have a negative effect on household nutrition through two pathways: lack of adequate time for care work in peak agricultural seasons, and seasonal energy deficits that adversely affect their own health



Household investment in durable appliances and outcomes for children: Evidence from China	2019	Kerr, A	China	Longitudinal	6,680	adults	rest, sleep, leisure	a) Time-saving household appliances decrease children’s time allocated to household work; b) Effects of appliance ownership on child outcomes are more pronounced among females.
Parent-Child Activities, Paid Work Interference, and Child Mental Health	2019	Roeters &van Houdt	Netherlands	quantitative analysis	1,488	parents	mental health	a) Children demonstrated better mental health when the frequency of father–child activities was higher and the amount of interference due to work was lower
The Role of Time Use Behaviors in the Risk of Obesity among Low-Income Mothers	2019	Gough et al	US	quantitative analysis	17,914	adult women	nutrition	a) Greater risk of overweight and obesity for mothers with low incomes compared to mothers with moderate/upper incomes and all childfree women b) Mothers experiencing economic hardship at greater risk of overweight and obesity relative to other women.
Lifestyle behaviours or socioeconomic characteristics? Gender differences in covariates of BMI in Hungary	2018	Jaros, E	Hungary	quantitative analysis	7,765	adults	nutrition	a) Daily behaviours were associated with BMI for women, but not for men, except for smoking. b) Meal’s frequency and duration of sleep had negative effects on female BMI, duration of TV viewing had a positive effect.



Disparities in sleep duration and restedness among same- and different-sex couples: findings from the American Time Use Survey	2018	Martin-Storey et al	US	quantitative analysis	17,378	couples	rest, sleep, leisure	a) No links between partner sex and sleep among men. b) Women with same-sex partners reported lower restedness than women with different-sex partners. c) women with the same-sex partners living in states more supportive of sexual minorities reported better restedness than those in less supportive states.
Does Physically Demanding Work Hinder a Physically Active Lifestyle in Low Socioeconomic Workers? A Compositional Data Analysis Based on Accelerometer Data	2018	Rasmussen et al	Denmark	quantitative	895	workers	rest, sleep, leisure	a) Men spending more waking leisure time than women, driven by women performing more household tasks
Caution! Men not at work: Gender-specific labor market conditions and child maltreatment	2018	Lindo et al	US	quantitative analysis	832 counties	adults	mental health	a) Male employment is associated with reductions in child maltreatment and female employment is associated with increases in child maltreatment
Investigating the associations between productive housework activities, sleep hours and self-	2018	Adjei & Brand	Germany, Italy, Spain, UK, France, the Netherlands and the US	quantitative analysis	36,240	elderly	self-reported health	a) Elderly women have higher odds of reporting poor health when more time is devoted total housework combined with either short or long sleep duration



reported health among elderly men and women in western industrialised countries								
Who Experiences Leisure Deficits? Mothers' Marital Status and Leisure Time	2017	Passias et al	US	quantitative analysis	24,616	parents	rest, sleep, leisure	a) black single mothers have the highest extent of socially isolated leisure. b) never-married mothers have more total leisure but less high-quality leisure
Housework Efficiency and Economical Systems' Development: A Case Study of Thailand	2017	Saksiriruthai, S	Thailand	quantitative analysis	3,672	households	rest, sleep, leisure	a) Women are slightly less likely to spend time in work, much more likely to spend time in housework, and slightly less likely to spend time in leisure activities than men. b) With aging, involvement in household activities also rises, suggesting that older or less healthier individuals withdraw from paid work to do household work
Video gaming in adolescence: factors associated with leisure time use	2016	Brooks et al	UK	cross-sectional	4,404	adolescents	self-reported health	a) girls with less life satisfaction were more likely to play video games than girls with more life satisfaction, this was not the case for boys; b) for boys, bullying or going to bed hungry was associated with video game use, this was not the case for girls



Figure 3. Visualization of top 25 disciplines represented in Web of Science search



Source: Web of Science



Figure 4. Conceptual presentation of interrelationships among gender, health, and time-use

