24-Hour Movement Behaviors Among US Adults With Functional Disabilities

Samantha M. Ross, Justin A. Haegele, Bridgette M. Schram, and Sean Healy

This study aimed to quantify and compare physical activity, sitting time, and sleep behaviors among US adults with and without disabilities using the 2020 Canadian 24-hour movement framework. The weighted prevalence of 24-hour movement guideline adherence was estimated among a nationally representative sample from the 2017 to 2018 National Health and Nutrition Examination Survey of US adults (18–65 years old) with (n = 1070) and without (n = 33,370) functional disabilities in vision, hearing, mobility, cognitive, and self-care domains. The adjusted odds of single and combination guideline compliance were estimated by disability type, in reference to adults without disabilities, using separate multivariable logistic regressions. After adjusting for age, sex, and income, adults with disabilities in mobility, cognitive, or self-care domains had approximately half the odds of meeting all 3 guidelines, compared with adults without disabilities (adjusted odds range: 0.49–0.77). Significantly lower adherence was observed among adults with functional disabilities, compared with no disabilities, for sleep, and moderate to vigorous physical activity, but not sedentary guidelines. This report establishes baseline prevalence estimates for guidelines compliance among US adults with functional disabilities ages 18–65 years old. Low guideline adherence, and evidence for significant differences in physical activity and sleep, signals a need to further explore combination health behaviors among adults with disabilities.

Keywords: disability, sedentary behavior, sleep

Adults with disabilities, which represents one in 4 US adults, are a priority population for health promotion. Adults with disabilities represent a diverse group, experiencing a range of impairments, and activity limitations, that may interact with environmental barriers to result in participation restrictions, such as low engagement in physical activity. In alignment with the World Health Organization (WHO) and US Centers for Disease Control and Prevention, this paper identifies adults with functional disabilities, broadly, characterized by difficulty in seeing, hearing, walking, communicating, remembering or concentrating, or with self-care, even with the use of assistive devices. Adults with functional disabilities tend to experience poorer health than those without disabilities and can be at greater risk for developing chronic conditions, such as cardiovascular disease, diabetes, obesity, and hypertension, at earlier ages. Despite this, the study of health behaviors among adults with disabilities has been historically marginalized. Identifying health behavior patterns among adults with disabilities that may offset risk for secondary conditions is a necessary first step to inform targeted health promotion efforts. A recent shift is underway toward the adoption of 24-hour movement guidelines that recognize the integrative benefits of physical activity, sedentary behavior, and sleep behaviors. In 2020, Canada released the first 24-hour movement guidelines for adults, suggesting that a healthful 24-hour includes engaging in moderate to vigorous physical activity (MVPA) to accumulate at least 150 minutes per week, limiting sedentary behavior to ≤8 hours per day, and sleeping for 7 to 8 hours per night. Increasing the proportion of adults engaging in sufficient MVPA, and reducing sedentary behavior, is aligned with Healthy People 2030 “move more, sit less” campaign. Benefits of meeting each of these guidelines observed for adults include enhanced fitness, adiposity, and cardiometabolic, and mental health among adults without disabilities. However, despite known benefits of meeting physical activity, sedentary behavior, and sleep guidelines, individual benefits associated with meeting each guideline collectively for adults with disabilities are currently unknown.

Examining health profiles relative to the newly created 24-hour movement guidelines among adults with functional disabilities can inform future public health initiatives, and support development of appropriate interventions supporting positive health behaviors. As such, the purpose of this study was to quantify and compare 24-hour movement guideline adherence among US adults with disabilities experiencing functional limitations in sensory, mobility, cognitive, and self-care domains.

Methods

Study Population and Data Collection

This study used a 2017–2018 National Health and Nutrition Examination Survey (NHANES) cross-sectional, nationally representative sample of noninstitutionalized US adults. NHANES methodology documentation and data sets are freely available online. NHANES data collection follows a complex survey design to be representative of US civilian, noninstitutionalized residents. Primary sample units (PSU) are identified at the county level and then segmented by city block. Households within city blocks are randomly selected to complete a screener survey, with geographic areas with greater populations of target age, ethnic, or income demographics...
oversampled. Individuals within households are randomly selected to complete a telephone survey. Oversampling strategies are used to increase data representation of race/ethnic population subgroups. PSU, stratum, and individual sample weights are provided within NHANES public data sets to adjust analytic models for participants’ nonequal probability of being sampled.15 NHANES protocols were approved by the National Center for Health Statistics Ethics Review Board, and informed consent was obtained from all participants prior to data collection.

Study Measures

Functional Disability. The 6-item standardized Disability Question Set16 was used to classify participants’ functional disability status. NHANES participants were asked to report if they are currently experiencing “serious difficulty” in 5 domains of functional limitation: (1) hearing; (2) seeing, even when wearing glasses; (3) concentrating, remembering, or making decisions; (4) walking or climbing stairs; and/or, (5) dressing or bathing.14 Participants who responded “yes” to any of the above questions were classified as having a functional disability related to hearing, vision, cognitive, mobility, and/or self-care, respectively. Functional limitation types are not mutually exclusive, and participants may be counted in 2 or more groups if they experience multiple functional limitation types. Participants who answered “no” to all questions were classified as “not having a functional disability.” Participants identified as having one or more functional disabilities represent individuals currently experiencing functional limitations, which may include individuals with congenital disabilities (onset in early childhood) or acquired disabilities. The subset sample for the present paper was delimited to adults 18–65 years old in an effort to differentiate adults aging with a disability from adults aging into disability17; however, this distinction cannot be made within NHANES data set.

Movement Behaviors. The 2020 Canadian 24-hour movement guidelines10 were used to explore physical activity, sitting time, and sleep behaviors in combination. Within NHANES, physical activity was measured using the Global Physical Activity Questionnaire.18 Participants reported how many days per week, and minutes per day, on average they engaged in MVPA across 3 activity domains: work-related activity, leisure-time activity, and transportation. MVPA time from the 3 domains were combined to create an “average total minutes per week of MVPA” variable. A dichotomous met/unmet variable was created where MVPA ≥150 minutes per week was coded as “meeting physical activity guidelines.”7,10

Sedentary behavior was measured using the survey item: “How much time do you usually spend sitting on a typical day?” This item included a prompt asking participants to count any time spent at work, home, in travel, and participating in leisure activities that involved sitting, but to exclude time spent sleeping. A dichotomous met/unmet variable was created where responses ≤8 hour were coded as “meeting sedentary behavior guidelines.”7,10

Sleep was operationalized as the number of hours the participant usually spent asleep per night. “Average number of hours of sleep per night” was calculated from 2 survey items asking participants what time they “tend to fall asleep,” and what time they “tend to wake up” on weekdays or weekdays. A dichotomous met/unmet variable was created where responses of 7 to 9 hours were coded as “meeting sleep guidelines.”7,10

Statistical Analysis

Weighted prevalence estimates for age/sex distributions and meeting the 2020 24-hour guidelines were calculated for subgroups defined by functional disability status (adults with and without a disability) and disability type (mobility, vision, hearing, cognition, and self-care). Participant interview weights were used, allowing for estimates to be interpreted as representative of US civilian, nonnationalized population. Following recommendations,14,15 PSU and stratum weights were used for variance estimations to account for complex sampling design. All analyses were conducted using SAS statistical software for complex sampling design (eg, SURVEYFREQ and SURVEYLOGISTIC; 2013, SAS® version 9.4, SAS institute Inc).

Distribution differences between each functional disability type and adults without disabilities, separately, were evaluated using Roa–Scott chi-square statistical comparisons. The relative contribution of disability type in accounting for variance in 24-hour guideline adherence was evaluated using separate multivariable logistic regressions. All models were adjusted for age, sex, and income. Age in years was collapsed into 2 age categories: younger adults, 18 to <36 years old and older adults, 36–65 years old. Income was represented as a ratio of family monthly income to 2017–2018 Department of Health and Human Services’ poverty guidelines, accounting for family size, year, and state.14 The “family monthly poverty level index” variable is available in NHANES public data set, and ranges from 0 to 5.0. The index value can be interpreted as percentage of poverty guidelines, for example, an index value of 1.3 represents 130% of the poverty guidelines. The index is collapsed into 3 categories: ≤1.30, 1.30 to <1.85, and ≥1.85 for reporting.10 To account for multiple comparisons, and reduce risk of type I error, predictor variables were evaluated against a more conservative alpha value of <0.1. Crude and adjusted odds ratios and corresponding 99% confidence intervals (CIs) were reported.

Results

Analytic Sample

The NHANES 2017–2018 publicly available data set includes 9252 unique participant observations. A subset of 4449 observations met our age inclusion criteria (18–65 y). Nine observations included a “don’t know” response on one or more questions regarding functional limitations in the Disability Question Set and were therefore excluded. The final analytic subset sample included 4440 unique observations with complete data on functional disability type, representing an estimated 201,150,055 US civil, noninstitutionalized adults (SE of weighted frequency = 7,537,985).

Participant Characteristics

Approximately 20.7% (99% CI, 16.8–24.4) of adults in the subset sample reported at least one functional limitation (n=1070), representing an estimated 41.5 million US civil, noninstitutionalized adults living with at least one functional disability type (see Table 1 for weighted prevalence by functional disability type). In general, a greater proportion of adults with disabilities were female (53.7%; 99% CI, 48.3–59.2), and older, 36–65 years (66.7%; 99% CI, 57.9–75.5), compared with younger, 16–35 years. Sixty percentage of adults without disabilities were older (99% CI, 55.6–64.3), compared with younger. In comparison, a significantly
Table 1  Prevalence Estimates for Meeting 24-Hour Movement Guidelines Among US Adults 18–65 Years Old, Stratified by Functional Disability Type

<table>
<thead>
<tr>
<th>Functional disability type&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Vision</th>
<th>Hearing</th>
<th>Mobility</th>
<th>Cognitive</th>
<th>Self-care</th>
<th>1+ Functional disability type</th>
<th>No disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unweighted sample size</td>
<td>263</td>
<td>224</td>
<td>496</td>
<td>508</td>
<td>408</td>
<td>1070</td>
<td>3370</td>
</tr>
<tr>
<td>Weighted population estimate</td>
<td>9278,956</td>
<td>9613,873</td>
<td>16,703,500</td>
<td>21,088,249</td>
<td>15,924,052</td>
<td>41,507,875</td>
<td>159,642,181</td>
</tr>
</tbody>
</table>

Sleep recommendations (7–9 h per night)

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>140 (55.3)</th>
<th>115 (57.8)</th>
<th>258 (56.9)</th>
<th>262 (50.7)</th>
<th>195 (48.2)</th>
<th>575 (55.9)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>2179 (67.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>42.7–67.9</td>
<td>47.0–64.4</td>
<td>49.4–64.4</td>
<td>41.0–60.4</td>
<td>37.9–58.7</td>
<td>48.7–63.2</td>
<td>63.4–70.7</td>
</tr>
<tr>
<td>aOR</td>
<td>0.64</td>
<td>0.84</td>
<td>0.66</td>
<td>0.58</td>
<td>0.56</td>
<td>0.73</td>
<td>Referent</td>
</tr>
<tr>
<td>99% CI</td>
<td>0.4–1.1</td>
<td>0.5–1.5</td>
<td>0.5–0.9**</td>
<td>0.4–0.8**</td>
<td>0.38–0.81**</td>
<td>0.5–0.9*</td>
<td></td>
</tr>
</tbody>
</table>

Sedentary recommendations (8 h or less per day)

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>210 (80.5)</th>
<th>181 (78.5)</th>
<th>387 (76.8)</th>
<th>407 (78.0)</th>
<th>317 (76.8)</th>
<th>866 (79.4)</th>
<th>2800 (79.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>69.7–91.3</td>
<td>67.0–89.9</td>
<td>68.4–85.1</td>
<td>70.8–85.1</td>
<td>67.6–85.2</td>
<td>75.2–83.5</td>
<td>76.1–83.7</td>
</tr>
<tr>
<td>aOR</td>
<td>0.83</td>
<td>0.82</td>
<td>0.63</td>
<td>0.69</td>
<td>0.62</td>
<td>0.80</td>
<td>Referent</td>
</tr>
<tr>
<td>99% CI</td>
<td>0.4–2.0</td>
<td>0.3–2.1</td>
<td>0.6–1.1</td>
<td>0.4–1.2</td>
<td>0.4–1.1</td>
<td>0.5–1.2</td>
<td></td>
</tr>
</tbody>
</table>

Physical activity (<150 min of MVPA—in at least 10 min bouts—per week)

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>47 (21.8)</th>
<th>33 (21.1)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>62 (11.3)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>112 (23.7)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>63 (19.5)</th>
<th>219 (24.7)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>1276 (40.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>6.9–36.7</td>
<td>9.9–32.3</td>
<td>5.5–17.1</td>
<td>14.8–32.6</td>
<td>10.2–28.8</td>
<td>17.6–31.8</td>
<td>35.8–44.9</td>
</tr>
<tr>
<td>aOR</td>
<td>0.63</td>
<td>0.50</td>
<td>0.29</td>
<td>0.52</td>
<td>0.47</td>
<td>0.59</td>
<td>Referent</td>
</tr>
<tr>
<td>99% CI</td>
<td>0.2–1.8</td>
<td>0.2–1.0**</td>
<td>0.1–0.6**</td>
<td>0.3–1.0</td>
<td>0.2–0.9*</td>
<td>0.4–0.9*</td>
<td></td>
</tr>
</tbody>
</table>

Sleep and sedentary

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>112 (44.0)</th>
<th>96 (45.2)</th>
<th>208 (44.2)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>215 (37.7)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>149 (36.2)</th>
<th>472 (44.2)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>1795 (52.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>29.2–58.8</td>
<td>32.8–58.7</td>
<td>37.7–50.8</td>
<td>29.9–45.5</td>
<td>27.9–44.5</td>
<td>38.0–50.3</td>
<td>48.4–57.1</td>
</tr>
</tbody>
</table>

Sleep and MVPA

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>32 (14.8)</th>
<th>17 (15.1)&lt;sup&gt;***&lt;/sup&gt;</th>
<th>33 (5.6)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>63 (12.7)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>30 (9.6)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>128 (14.7)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>848 (27.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>22.2–27.4</td>
<td>3.8–26.4</td>
<td>1.1–10.0</td>
<td>4.6–20.7</td>
<td>4.6–14.6</td>
<td>9.4–20.1</td>
<td>23.1–31.6</td>
</tr>
</tbody>
</table>

Sedentary and MVPA

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>44 (19.3)</th>
<th>26 (18.8)&lt;sup&gt;***&lt;/sup&gt;</th>
<th>50 (8.1)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>89 (18.1)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>49 (13.3)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>182 (19.6)</th>
<th>1043 (31.8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>6.0–32.6</td>
<td>6.0–31.5</td>
<td>3.1–13.1</td>
<td>9.0–27.1</td>
<td>6.7–20.9</td>
<td>12.7–26.5</td>
<td>28.4–35.2</td>
</tr>
</tbody>
</table>

All 3 guidelines

<table>
<thead>
<tr>
<th>Met, n (%)</th>
<th>31 (14.6)</th>
<th>14 (13.8)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>28 (3.9)&lt;sup&gt;***&lt;/sup&gt;</th>
<th>53 (9.5)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>23 (6.3)&lt;sup&gt;***&lt;/sup&gt;</th>
<th>110 (12.3)&lt;sup&gt;**&lt;/sup&gt;</th>
<th>686 (21.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% CI</td>
<td>2.1–27.2</td>
<td>2.4–25.2</td>
<td>1.1–6.8</td>
<td>3.7–15.3</td>
<td>2.4–10.2</td>
<td>7.5–17.1</td>
<td>18.5–24.6</td>
</tr>
<tr>
<td>aOR</td>
<td>0.84</td>
<td>0.77&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.21&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.41</td>
<td>0.30</td>
<td>0.60</td>
<td>Referent</td>
</tr>
<tr>
<td>99% CI</td>
<td>0.2–2.9</td>
<td>0.3–2.0</td>
<td>0.1–0.5</td>
<td>0.2–0.9&lt;sup&gt;**&lt;/sup&gt;</td>
<td>0.2–0.6&lt;sup&gt;**&lt;/sup&gt;</td>
<td>0.4–1.0</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: aOR, adjusted odds ratios; CI, confidence interval; MVPA, moderate to vigorous physical activity. Note: Unweighted sample size (n), weighted (column) percentages, aOR estimates odds of meeting guideline(s) among adults with functional disability type, compared with odds observed among adults without disabilities (referent group), after controlling for age, sex, and month income poverty index. aOR and 95% CI estimates for the likelihood among adults with functional disability type of meeting each guideline compared with likelihood among adults with no disability, after adjustment for age and sex.

*Categories not mutually exclusive, participants may report 2 or more functional disability types. **Small sample size (n < 30), odds ratio estimates, and prevalence estimates should be interpreted with caution.

***Statistical significance for Roa–Scott chi-square comparison of group difference tests, weighted for complex survey design and with adults with no disability set as the referent group for all comparisons: *P < .01, **P < .001.
greater proportion of adults with vision (71.9%; 99% CI, 57.1–86.6; \( P < .001 \)), hearing (84.3%; 99% CI, 72.7–95.9; \( P < .001 \)), and mobility (86.8%; 99% CI, 78.7–94.9; \( P < .001 \)) functional disability types were older, compared with younger. The sex distribution significantly differed among adults with vision disabilities (35.9% male; 99% CI, 23.9–47.8; \( P = .004 \)) and hearing disabilities (62.9% male; 99% CI, 52.3–73.3; \( P = .001 \)), compared to adults with no functional disabilities (49.6% male; 99% CI, 45.4–53.8).

A greater proportion of adults with functional impairments reported family monthly income below 130% of the poverty guideline (42.2%; 99% CI, 34.6–49.7) compared to adults without disabilities (21.4%; 99% CI, 15.7–26.7). Similarly, a lower proportion of adults reported monthly income greater than 185% of poverty guidelines among those with functional disabilities (41.9%; 99% CI, 34.0–49.9) compared with no disabilities (66.4%; 99% CI, 60.1–72.7).

### Meeting 24-Hour Movement Guidelines

Table 1 shows the proportion of adults that met each 24-hour movement guideline (physical activity, sedentary behavior, and sleep), individually and in combination, by functional disability types. Crude and adjusted odds ratios from the multivariable logistic regression estimates are also included in Table 1, reporting the likelihood of meeting a guideline among adults with a given functional disability type, compared with no disabilities, after adjustment for age, sex, and monthly income poverty index.

**Physical Activity Guidelines.** Overall, statistically fewer adults with at least one functional disability type met the 24-hour movement physical activity guideline (63.3%; 99% CI, 56.3–70.2) compared to adults without disabilities, 70.4%; 99% CI, 67.6–72.8; \( \chi^2(1, 4440) = 43.13; P < .001 \)). Adults with mobility disabilities had the lowest prevalence (48.5%; 99% CI, 37.2–59.8) and adjusted odds (aOR; aOR = 0.50; 99% CI, 0.31–0.81) of MVPA guideline adherence. Similarly, adults with hearing (aOR = 0.62; 99% CI, 0.49–0.97) or self-care (aOR = 0.47; 99% CI, 0.24–0.89) disabilities had significantly lower adjusted odds for MVPA guideline adherence than adults without disabilities.

**Sedentary Behavior Guidelines.** Overall, significant differences were not observed for the prevalence of meeting the 24-hour movement sedentary behavior guideline between adults with (79.4%; 99% CI, 75.2–83.5) and without disabilities, 79.9%; 99% CI, 76.1–83.7; \( \chi^2(1, 4440) = 0.06; P = .80 \), or across functional disability types (Table 1).

**Sleep Guidelines.** Overall, a significantly lower proportion of adults with at least one functional disability (55.9%; 99% CI, 48.7–63.2) met the 24-hour movement sleep guideline than was observed among adults without disabilities (67.0%; 99% CI, 63.4–70.7; \( \chi^2[1, 4440] = 20.2; P < .0001 \)). The adjusted odds of meeting the sleep guideline were significantly lower among adults with functional disabilities in mobility, cognitive, or self-care domains, compared to adults without disabilities (aOR range 0.56–0.66).

Adults with functional disabilities related to self-care had the lowest prevalence and odds of meeting the sleep guideline (48.2%; 99% CI, 37.9–58.7 and aOR = 0.56; 99% CI, 0.38–0.81).

**Combined Guidelines.** Overall, significantly fewer adults with at least one functional disability (29.4%; 99% CI, 24.8–33.9) self-reported meeting all three 24-hour guidelines compared with adults without disabilities, 37.4%; 99% CI, 33.9–40.9; \( \chi^2(1, 4440) = 12.9; P < .0003 \). A significantly lower proportion of adults with functional disabilities in mobility, cognition, and self-care domains met all 3 guidelines \( (P > .001) \) compared with the proportion of adults without disabilities meeting all guidelines. The lowest prevalence and adjusted odds of meeting all 3 guidelines was observed among adults with functional disabilities in self-care (20.6%; 99% CI, 14.3–28.9) or mobility (21.9%; 99% CI, 15.0–28.7) domains. The adjusted odds of meeting all 3 guidelines were significantly lower among adults with functional disabilities in mobility (aOR = 0.54; 99% CI, 0.35–0.84), cognitive (aOR = 0.54; 99% CI, 0.36–0.81), or self-care (aOR = 0.49; 95% CI, 0.34–0.69) domains compared with the odds observed among adults without disabilities.

### Discussion

Fewer US adults with disabilities met the 2020 Canadian 24-hour movement guidelines,\(^2\) as compared to adults without disabilities. Of concern, after adjusting for age, sex, and income, adults with functional disabilities related to mobility, cognitive, or self-care had approximately half the odds of meeting all three 24-hour movement guidelines (physical activity, sedentary behavior, and sleep) compared to adults without disabilities (aORs ranging from 0.49 to 0.77). This reflects the increased risk of inactivity,\(^3\) and poor sleep health\(^4\) previously reported for adults with disabilities. Documenting this risk using the new 24-hour movement guidelines, and a large nationally representative data set, enables us to observe patterns in health behavior combinations (eg, sufficient sleep and MVPA, but too much sedentary time). For example, there is consistent evidence that the composition of adults’ 24-hour movement behaviors, as opposed to time in singular behaviors, are related to cardiometabolic health indicators, such as triglycerides, plasma glucose, plasma insulin,\(^21\) and systolic,\(^22\) and diastolic blood pressure.\(^23\) The 24-hour movement framework may be a valuable lens through which to examine time-related behavioral determinants of disparities in health, such as cardiometabolic disease.

The decreased odds of meeting physical activity and sleep guidelines were particularly evident among adults with functional disabilities in this analysis. Highlighting this, only 26.7% of adults with mobility disabilities met the physical activity and sleep guidelines, as compared with 46.0% of adults without disabilities. This finding is highly significant as compositional analysis studies, albeit sparse, tend to show time in physical activity and sleep, relative to other behaviors, to be significantly associated with a host of important health outcomes.\(^2\) Data show that time in physical activity, relative to other behaviors, is beneficially associated with cardiometabolic markers and aerobic fitness, mental health,\(^2\) and reallocating more time to higher intensity physical activity or sleep was associated with favorable perceived health.\(^3\) These data suggest that behavioral interventions that prioritize the reallocation of time from sedentary behavior to physical activity and sleep may be the most critical for adults with functional disabilities within the mobility domain.

Stamatakis and Bauman\(^2\) noted the potential value of public guidelines, such as the 24-hour movement guidelines, to raise community and professional awareness, set behavioral targets for interventions, and serve as a yardstick for health surveillance. This study prompts consideration of the appropriateness of these guidelines for individuals with functional disabilities. It is necessary to diligently study how these guidelines can be achieved for adults with disabilities; from inclusivity of language within and in the dissemination of the guidelines, to increased representation of adults with disabilities in defining guideline parameters.
The extension for the Canadian 24-hour framework to US adults with functional disabilities is a promising research avenue to comprehensively examine the time-related behaviors that may contribute to the health disparities experienced by this segment of the population. To guide this work, researchers may consider the Framework for Viable Integrative Research in Time-Use Epidemiology framework outlined by Pedišić et al. The current study sought to begin this endeavor, by examining the prevalence of time-use composition among adults with functional disabilities. In addition to the continued study of prevalence and trends of time-use, important work remains, including the study of 24-hour time-use measurement, determinants, outcomes, and ultimately interventions. The findings from studies in these areas with adults without disabilities cannot be presumed generalizable to adults with specific functional disabilities. For example, relating to outcomes, the benefits associated with 24-hour movement profiles among adults without disabilities are increasingly quantified using compositional analysis methods. Studies of the benefits of 24-hour movement behaviors, utilizing compositional analysis, require replication among adults with specific functional disability types, including extending to potential outcomes that may be particularly relevant to adults with disabilities such as level of independence. Finally, researchers have begun to seek the perspective of adults with specific functional limitations to inform the study of 24-hour movement-related areas (eg, perceived determinants, outcomes). This work is essential to ensure that the health-related framework is applied to adults with functional disabilities in a way that is meaningful, efficient, and impactful.

Limitations

Two important limitations should be considered. First, this study utilized NHANES data collected via self- and proxy-report methods, and thus the data are impacted by response bias, such as social desirability bias. Future research should seek to examine the 24-hour movement profiles of adults with functional disabilities utilizing more objective estimates of time spent in physical activity, sedentary behavior, and sleep. Second, this study utilized broad descriptors of disabilities; the aim was to survey movement behaviors profiles of disability groups characterized by functional limitations in hearing, vision, mobility, cognition, and self-care domains. Functional disability types were chosen to align with Centers for Disease Control and Prevention and to support consistent national surveillance and reporting on health behaviors for this priority population. The Disability Standard Question Set was employed as advised by the US Department of Health and Human Services as a standardized question set for disability across national surveillance systems. The survey set is self-report and dichotomizes disability status as yes/no the individual experiences serious difficulty in one or more functional domains. This approach supports large, national data collection, yet has acknowledged limitations in refining disability subgroup classifications by type or severity. A warranted extension of this health surveillance study is consideration for how experiences across multiple functional domains or severity levels impact health behaviors. Future research should seek to involve more homogenous groups for increased generalizability.

Conclusion

This report establishes baseline prevalence estimates for compliance with the newly released 2020 Canadian 24-hour movement guidelines for US adults ages 18–65 years, among a specific priority body of recent literature is establishing behavior profiles for 24-hour movement among children and youth in North America. This report contributes to this effort by identifying patterns of compliance, and target areas for improvement, among US adults with disabilities. This study extends prior research to examine compliance with guidelines individually (eg, sleep guideline met, only), and in combination (eg, sleep and physical activity guideline met) by functional disability type. Prevalence estimates across disability types offers more refined profiling of groups with the lowest and highest risk for noncompliance with health guidelines. This effort may lead to future research, targeted promotional interventions among US adults with disabilities, and realization of the Healthy People 2030 “move more, sit less” initiative.

References


